Ventura County Waterworks
District No. 8

WATER DESIGN AND CONSTRUCTION STANDARDS

ADOPTED JULY 26, 2021

UPDATED JUL 2022

CITY OF SIMI VALLEY
2929 TAPO CANYON ROAD • SIMI VALLEY CA • 93063

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ABBREVIATIONS

AASHTO - American Association of State Highway and Transportation Officials.

ACI - American Concrete Institute.

ANSI - American National Standards Institute

API - American Petroleum Institute

ASCE - American Society of Civil Engineers.

ASTM - American Society for Testing and Materials.

AWWA - American Water Works Association.

DOHS - State of California Department of Health Services

UBC - Uniform Building Code.

UPC - Uniform Plumbing Code.

VCFPD - Ventura County Fire Protection District

Pipe Types:

AC - Asbestos Cement.

CI - Cast Iron.

CMP - Corrugated Metal Pipe.

DIP - Ductile Iron Pipe.

CMC - Cement Mortar Coated Steel Pipe.

CMCL - Cement Mortar Coated and Lined Steel Pipe.

PB - Polybutylene.

PE - Polyethylene.

PVC - Poly-Vinyl Chloride.

RC - Reinforced Concrete.

SECTION 1
GENRAL POLICIES

1.1 PURPOSE AND SCOPE

The design and construction of water mains and other appurtenances in the Ventura County Waterworks District No. 8 (District) shall comply with these standards herein called Water Design and Construction Standards (WDCS), or the permit requirements of various governing bodies, except where specific modifications have been approved, in writing, by the Director of Public Works. All submitted plans shall be signed by a registered civil engineer and all work shall be in accordance with good engineering practice. This document sets forth the procedure for designing and preparing plans and specifications for water systems built for the District. Wherever there are differences between these standards and other county, state or federal regulations, the most stringent or highest requirement shall govern. Specifications and plates relating to pipelines are intended for pipes up to and including 18 inches (450 mm) in diameter.

It is the District's intent to provide uniformity of design and construction; the methods and procedures contained herein shall be reviewed by the engineer using them to assure they apply to the project under design or construction.

The District will revise the WDCS as needed to keep it current to include new or changed policy, data, and methods. The District Engineer shall have the primary responsibility for the coordination and preparation of new material or revisions to the standard.

1.2 DISTRICT SERVICE AREA

The District provides water service within the City of Simi Valley and some unincorporated areas of Ventura County as shown in Figure 1-1; the WDCS is applicable for District service area only.

1.3 DISTRICT JURISDICTION

District facilities are public water infrastructure located within public streets, District properties, easements, or other rights-of-way. The District shall operate, maintain, and repair its facilities.

For all projects subject to District approval, the engineer shall submit all water improvement plans to the District for review. All plans, specifications, reports, and/or

documents shall be prepared, signed, and stamped by a registered civil engineer licensed to practice in California and shall be in conformance with the WDCS.

1.4 OTHER APPLICABLE CODES, REGULATIONS, AND STANDARDS

Ordinances, requirements, and applicable standards of governmental agencies having jurisdiction within the District's service area shall be observed in the design and construction of water systems. Such requirements include but are not limited to current revisions of the following:

1. The American Water Works Association Standards (AWWA)
2. The California Plumbing Code (CPC)
3. Ventura County Fire Protection District Standards

1.5 EXCEPTIONS AND INTERPRETATIONS

Requests to modify or deviate from any standard within the WDCS must be submitted in writing to the District Engineer for approval. The District Engineer shall have sole authority to determine the interpretation of all WDCS provisions requiring clarification.

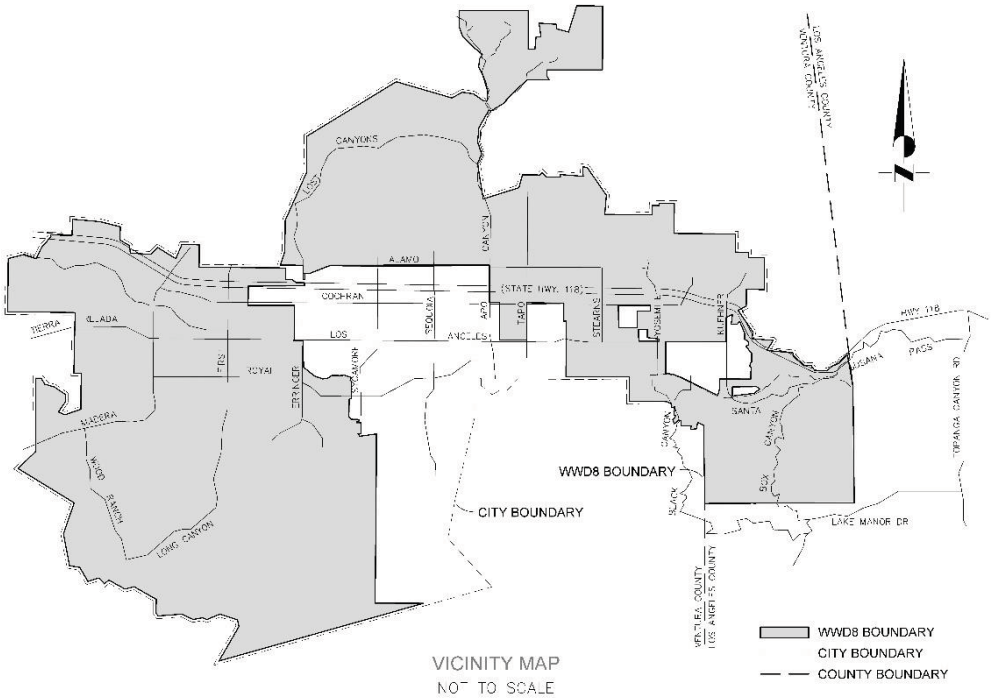

Figure 1-1 District Service Area

SECTION 2
REQUEST FOR WATER SERVICE

2.1 GENERAL

Section 2.0 of the WDCS outlines the process and requirements for securing water service from the District.

It is advisable to speak with District staff to confirm that a property is within the District Service Area and to determine water availability and service requirements for a property prior to its purchase. The District shall not be held liable for any decision made to purchase a property based upon the information provided. It is the responsibility of the interested party to practice due diligence and perform an independent verification from a licensed engineer as to the feasibility and constructability of water improvements to the property.

2.2 WATER SERVICE APPLICATION

Persons requesting water service from the District for a property located within the District's service area must apply for water service and complete the Water Service Application in Figure 2.1.

Water service applications are available at the Public Works counter or may be downloaded from the City of Simi Valley Waterworks website. The applicant may use the Customer Self Service Portal to apply for water service by registering for an account at:

http://selfservice.simivalley.org

or by mailing the application to the following address:

Ventura County Waterworks District No. 8
Simi Valley City Hall
2929 Tapo Canyon Road
Simi Valley, California 93063

District staff will respond within (7) seven working days after receipt of the Application for Water Service.

Simi Valley Waterworks District No. 8

2929 Tapo Canyon Road, Simi Valley, California 93063 (805) 583-6700

APPLICATION FOR WATER SERVICE

APPLICANT INFORMATION:

Name: _____

Company: _____

Mailing Address: _____

_____

Phone: _____

Email: _____

PROJECT INFORMATION:

Assessor's Parcel Number(s) (APNs): _____

Service Address: _____

City, State and Zip Code: _____

Planning Division or Building Permit No. (if applicable): _____

Type of Use:

☐ Residential, number of dwelling units: _____

☐ Commercial, Industrial, Institutional (see Attachment #2, below)

Description of the proposed project: _____

_____

Applicant Signature: _____ Date: _____

Please allow a minimum of seven (7) working days for processing application

Required Attachments: *1 & 2 Required for a Water Availability Letter* *1 – 7 Required for a Water Will-Serve Letter*			
1. Site map identifying project location and elevation. 2. Water Supply Fixture Unit (WSFU) count per 2013 CPC and supporting calculations (for commercial and industrial, only). 3. VCFD Form 126, signed by VCFD and WWD. 4. Fire hydrant plan, approved by VCFD.		5. Construction drawings for public/ offsite improvements, signed by VCFD and WWD. 6. Recorded Low Pressure Agreement, when applicable (30 psi >Ps< 40 psi). 7. Receipt for payment of plan check fees. 8. Receipt for payment of connection and meter fees.	
Required Fees: (Effective: 02/01/2020)		***ID Number:***	
Minor Plan Check $275 ***Date Paid:***	***Major Plan Check $4,740*** ***Date Paid:***	***TI Plan Check $275*** ***Date Paid:***	***Connection Fee:*** ***Date Paid:***

A "Water Availability Letter" is an informational document which addresses: (1) whether or not a project site is located within the (WWD8) service boundaries, (2) whether or not adequate water supply is available, and (3) whether or not minimum static pressure requirements can be met based on site elevation.

A "Water Will-Serve Letter" is an agreement/assurance that WWD8 will provide water service for the proposed project.

Figure 2-1 Water Service Application

2.3 WATER AVAILABILITY LETTER

The Water Availability Letter is issued by the District to an applicant requesting water service to determine the following:

- The property is located within the District Service Area.
- Water supply from the District is available to serve the property.
- Improvements that may be required of the applicant to comply with District water service requirements as specified in the WDCS.
- Other provisions that may be required to secure water service.

Options to comply with certain water service requirements may be available. District staff is available to discuss such options.

2.4 WATER WILL-SERVE LETTER

The Water Will-Serve Letter serves as a notice that the District will provide water service to the customer, subsequent to compliance with conditions and payment of fees.

The City of Simi Valley Building and Safety Division requires a Water Will-Serve Letter from the applicant prior to issuance of a building permit.

Ventura County Building and Safety requires a Water Will-Serve Letter prior to submitting building plans for review.

2.5 WATER SERVICE PRESSURE

Water service pressure is defined as the water pressure at the building pad (finished floor elevation) of the property.

Water service pressure requirements are outlined in Section 3.3.

2.6 GENERAL WATER METER POLICY

Meters shall be located within the street frontage of the property being served. All meters must be installed and located per Standard Plates: *Location of Water Meters, 1/2" and 2" Water Meter Service Installation,* and *3" and Larger Water Meter Service Installation*.

2.6.1 Residential Properties

For single-owner detached, single-family residential dwellings, the District requires individual water meters to serve each property.

For single-owner attached, multi-family dwellings such as townhomes and condominiums, and single-ownership, multiple-tenant, multi-family dwellings such as apartment buildings or apartment complexes, the District requires a master-meter with one point of connection to the District's water distribution system to serve the property. A District approved backflow prevention assembly must be installed and located on private property as close as practical to the master meter, but no further than ten (10) feet from the public-right-of way or District's easement. A separate sub-meter may be installed to each unit, at the developer's discretion, and shall be maintained by the property owner. Separate connections to the District's water main for landscape and fire services shall be installed with backflow prevention assemblies.

2.6.2 Non-Residential Properties

For single-owner, single-tenant, commercial property, the District requires separate water meters. A District approved backflow prevention assembly must be installed for each meter, and located on private property as close as practical to the meter, but no further than ten (10) feet from the public-right-of way or District's easement. If the meter size is sufficient to supply both domestic and fire sprinkler demand, and if approved by the Ventura County Fire Protection District (VCFPD), then there is no need to install a separate connection to the District's water main for fire service. Otherwise, separate connections to the District's water main for landscape and fire services shall be installed with backflow prevention assemblies.

For single-ownership, multiple-tenant commercial developments, the District requires a master-meter with one point of connection to the District's water distribution system. If requested by the owner, the District may allow additional connections to the public main with a separate meter. A District approved backflow prevention assembly must be installed and located on private property as close as practical to the master meter, but no further than ten (10) feet from the public-right-of way or District's easement. Separate connections to the District's water main for landscape and fire services shall be installed, with backflow prevention assemblies.

2.6.3 Accessory Dwelling Units

When an accessory dwelling unit (ADU) is permitted on a residential property, the property owner may be required to increase the existing meter size to provide sufficient water supply to both dwellings, based on the demand.

The District shall determine the appropriate meter size for the property based on the water demand estimate in accordance with subsequent sections herein.

2.7 WATER DEMAND FOR THE PROPERTY

Water demand estimates and peaking factors for properties are based on the District's Water Master Plan as specified in Section 3.2 – Water Demand Estimates.

If the District's current water distribution system serving the property is unable to provide for the water demand, as required under Section 3.3 – Water Service Pressure Requirements, the applicant shall provide the necessary system improvements to satisfy those requirements as outlined in Section 3.0 – Design Criteria.

2.8 FIRE PROTECTION FOR THE PROPERTY

Fire-flow requirements are determined by the Ventura County Fire Protection District (VCFPD) and are outlined in Section 3.4 – Fire Protection Requirements.

If the District's current water distribution system serving the property is unable to provide for the required fire-flow, the applicant shall provide the necessary system improvements to satisfy those requirements as outlined in Section 3.0 – Design Criteria.

VCFPD requires the applicant to submit Fire Prevention Form 625 Fire-Flow Verification to the District for fire-flow test certification. The District must verify fire-flow prior to issuance of the Water Will-Serve Letter.

2.9 DEVELOPER'S REQUIREMENTS

The WDCS is a guideline for the design and construction of all public water facilities within the District. The developer's engineer shall review the methods and procedures contained herein to assure they are applicable to the project under design or construction.

The contents of this manual do not preclude the use of different methods when special or emergency conditions warrant. Requests to modify or deviate from any standard within the WDCS must be submitted in writing to the District Engineer for approval, prior to tentative map recordation and/or development project approval. The engineer-of-record, who signs and seals the drawings, shall be responsible for all facilities constructed per said drawings, including the incorporation of requirements of all agencies having jurisdiction, including all applicable local, State, and Federal requirements.

It is the developer's engineer's responsibility to be familiar with the District's Water Master Plan and/or any applicable specific plan for water system improvements and to indicate any main line relocations, extensions, or oversizing on the tentative tract map. This responsibility shall include investigating any changes from the Master Plan necessitated by development subsequent to the Master Plan, although the above shall not relieve the developer from the responsibility to provide an approved system consistent with District requirements. Verification of the adequacy of the surrounding water system rests jointly with the District Engineer and the developer.

All drawings, specifications, reports, or documents shall be prepared by a registered civil engineer licensed by the State of California Department of Consumer Affairs, or by a subordinate employee under the civil engineer's direct supervision. The civil engineer shall sign and stamp all plans, specifications, and reports to indicate responsibility for each document.

Acceptance of plans by the District does not in any way relieve the developer's engineer of the responsibility to meet all of the District's requirements, as well as all requirements of other agencies having jurisdiction. If the District Engineer determines that the requirements have not been satisfied, the drawings may be revised or supplemented. In most cases, District signed drawings approved for construction should not require revisions based upon subsequent revisions to these standards. The District Engineer may determine a change is necessary based upon a significant change in the standards or if the developer does not proceed to construction within the time allowed in the development agreement.

2.10 OCCUPANCY

The District must sign the supplemental zoning clearance for each residential unit or building prior to occupancy. Occupancy will not be granted until the public water system

is field-accepted by the Waterworks Inspector. For tract developments, clearances will be granted on a street-by-street or lot-by-lot basis, at the discretion of the District Engineer.

2.11 DISTRICT ACCEPTANCE

The District will not accept the public water system until all applicable requirements of these standards and related Public Works Department standards have been satisfied, including the requirement that 100 percent of all homes or buildings be constructed and occupied.

2.12 RECYCLED WATER

If recycled water is available, the District may require the property to use recycled water for non-potable use in accordance with the District's "Recycled Water Design and Construction Standards."

2.13 PRIVATE WELLS

District policy requires properties within the District Service Area needing water service to connect to the District's public water system. However, in special cases, the District may approve the use of private wells to provide water supply for the property.

Requirements for approval by the District for use of private wells to provide water supply for the property include the following:

- Well Permit approved by the Ventura County Public Works Agency
- Written approval by the Ventura County Fire Department assuring compliance with fire protection requirements
- Compliance with applicable health and safety regulations governing private well water quality
- A District approved backflow prevention assembly must be installed and located on private property as close as practical to the master-meter but no further than ten (10) feet from the public-right-of way or District's easement, in accordance with Section 3.7 – Backflow Prevention Assemblies.

Private wells shall be constructed in accordance with the City of Simi Valley Well Ordinance.

The District's approval of a private well does not assure the quality or quantity of the well water supply.

SECTION 3
DESIGN CRITERIA

3.1 GENERAL

Section 3.0 of the WDCS outlines design criteria that apply to the design and construction of all waterworks facilities owned and/or operated by the District.

The applicant may request a variance from the criteria and requirements outlined in Section 3.0; all variances are subject to the written approval by the District Engineer.

3.2 WATER DEMAND ESTIMATES

Water demand estimates or flow rates shall be used to design waterworks facilities. Flow rates shall be determined from the maximum potential population of land use of the area served. Flow rates are based upon the District's Water Master Plan.

Average daily demand (ADD) estimates for water use shall be determined by following Section 3.2.1 for residential properties and Section 3.2.2 for commercial and industrial properties.

Maximum-daily demand (MDD) and peak-hour demand (PHD) for the proposed waterworks facility design shall be determined using the peaking factors in Section 3.2.3.

3.2.1 Residential Water Demand

For undeveloped residential property, the estimated ADD shall be based on the maximum potential residential units and types of units that may be allowed under the applicable zoning for the undeveloped property and its size. Table 3-1 shall be used to estimate the ADD for undeveloped residential properties where the number and types of residential units are not known.

TABLE 3-1 Residential Water Demand – Duties for Undeveloped Property		
Density	Average Daily Demand	
	gpm/acre*	gpd/acre*
Low Density (0 - 3 dwelling units [DU] per acre)	1.10	1,584
Medium Density (3.1 - 10 DU per acre)	1.40	2,016
High Density (10.1 - 18+ DU per acre	5.70	8,208

* Factor shall be applied to raw acreage with no deduction for opens space, roads, easements, etc.

For a residential property where the number and type of dwelling units to be constructed are known, the ADD shall be estimated by using the criteria shown in Table 3-1A.

TABLE 3-1A Residential Water Demand – Duties for Dwelling Unit Types	
Housing Type	Average Daily Demand (gpd/unit, lot, or room as noted)
Detached Residential (per Lot)	
Small Lot, up to 9,999 SF	420
Medium Lot, 10,000 - 22,000 SF	840
Large Lot, 22,001 SF - 1 acre	1,680
Condominium (per unit)	259
Multi-Family Apartment (per unit)	222
Retirement Facility (per room)	92
Senior Apartment (per room)	111

3.2.2 Commercial and Industrial Water Demand

For properties zoned for commercial and industrial use, including greenbelt areas, the estimated ADD shall be determined through fixture counts for each existing/proposed building where the demand for each fixture is based on the California Plumbing Code. For such properties where the land use is not defined,

the estimated ADD shall be determined by using the criteria shown in Table 3-2 with prior approval from the District Engineer.

TABLE 3-2
Commercial and Industrial Water Demand Based on Land Use

Land Use	Average Daily Demand (ADD)	
	gpm/acre	gpd/acre
COMMERCIAL:		
Light	1.75	2,520
Heavy	2.35	3,384
Office	2.00	2,880
INDUSTRIAL:		
Light	1.95	2,808
Heavy	9.20	13,248
Business Park	2.00	2,880
PUBLIC / SEMI-PUBLIC:		
Parks	1.10	1,584
Hospitals	1.85	2,664
Schools	1.20	1,728
Community Services	1.35	1,944

3.2.3 Peaking Factors

The peaking factors in Table 3-3 shall be multiplied by the ADD to determine MDD and PHD flows.

TABLE 3-3 - Peaking Factors

Demand	Peaking Factor [1]
Maximum Day Demand (MDD) [2]	2.15
Peak Hour Demand (PHD) [3]	4.50

[1] Multiply ADD by the applicable peaking factor to determine MDD or PHD.
[2] MDD occurs over 24-hours.
[3] PHD occurs over 1-hour.

If and when special studies of a particular area are conducted that demonstrate that different water demand estimates or peaking factors are appropriate, then those values may be used if approved by the District Engineer.

3.3 WATER SERVICE PRESSURE REQUIREMENTS

Water service pressure for a property is defined as the water pressure at the building pad elevation under PHD conditions within the pressure zone serving the property with the water level of the tank equivalent to an occurrence of one MDD.

The applicant shall be responsible for the construction of any improvements to the District's water distribution system that may be required to satisfy the requirements outlined in Section 3.3.

3.3.1 Minimum Required Water Service Pressure

The minimum water service pressure under non-fire-flow conditions is 40 pounds-per-square-inch (psi) under PHD conditions within the pressure zone serving the property with the water level of the tank(s) in the pressure zone at half full. The minimum water service pressure is 20 psi under an MDD event and the maximum required fire-flow in the pressure zone.

3.3.2 Low-Pressure Agreement

For properties that have available water service pressures less than 40 psi, the minimum required service pressure, the property owner must enter into a Low-Pressure Agreement with the District. Prior to receiving a Water Will-Serve Letter and Zoning Clearance, a calculated minimum pressure of 20 psi must be confirmed at the meter during MDD conditions, including the required fire-flow. To confirm that the minimum condition can be met, the property owner may need to submit a hydraulic study for review and approval.

Building and Safety may require the property owner to comply with on-site minimum water pressure requirements per the latest version of the Building and Plumbing Codes.

Before a Water Will Serve Letter for the property is issued, the property owner shall record the low-pressure agreement with the County Clerk at the Ventura County Recorder.

3.3.3 Maximum Water Service Pressure

The maximum allowable water pressure for service shall be 80 psi. This maximum pressure shall be based on the Static Head (in feet), which is calculated as the difference between the high-water elevation of the highest reservoir within the pressure zone serving the property and the pad elevation of the property. The elevation difference is multiplied by a factor of 0.433 feet per pound per square inch (ft/psi) to determine the maximum water pressure.

For properties having a static pressure greater than 80 psi, the property owner shall be required to install and maintain a pressure regulator on the customer side of the water meter to secure water service.

The applicant shall be responsible for demonstrating that the aforementioned requirements in Section 3.3 can be met through hydraulic calculations per Section 3.6.

3.4 FIRE PROTECTION REQUIREMENTS

Fire-flow requirements for the property shall be determined by the Ventura County Fire Protection District (VCFPD).

The fire-flow required by the VCFPD shall be provided from the District's water distribution system as follows:

1. Required fire-flow shall be provided at a fire hydrant, as specified by the VCFPD, with a minimum pressure of 20 psi during MDD conditions.

2. The duration of the fire-flow to the fire hydrant shall be specified by the VCFPD.

3. Required fire-flow plus MDD shall be supplied solely from the District storage tank(s) of the pressure service zone serving the property. The water level at the storage tank(s) shall be assumed to be half full, and the stored water shall be sufficient to satisfy the fire-flow duration requirement.

The applicant shall be responsible for demonstrating that the aforementioned requirements in Section 3.4 – Fire Protection Requirements can be met through hydraulic calculations per Section 3.6 – Hydraulic Calculations.

The applicant shall be responsible for the construction of any improvements to the District's water distribution system that may be required to satisfy the requirements specified in Section 3.4– Fire Protection Requirements.

3.5 DISTRICT WATER DISTRIBUTION SYSTEM REQUIREMENTS

The applicant shall be responsible for the construction of any improvements to the District's water distribution system that may be required to satisfy the requirements specified in Section 3.0 – Design Criteria

The applicant shall be responsible for demonstrating that the aforementioned requirements can be met through hydraulic calculations per Section 3.6 – Hydraulic Calculations.

Variance from the requirements specified in this section may be requested by the applicant and may be permitted subject to the written approval by the District Engineer.

3.5.1 WATER MAIN REQUIREMENTS AND DESIGN

3.5.1.1 Water Main Pressure

The acceptable pressure range for District water mains shall be a minimum of 40 psi to a maximum of 150 psi for all flow ranges.

Where system pressures exceed 150 psi for a water main, the applicant shall be required to install a pressure regulating station on the District water

main, as directed by the District Engineer, to ensure that the acceptable system pressure range is maintained.

3.5.1.2 Water Main Flow Velocity

District water mains shall be sized to limit the flow velocity not to exceed five (5) feet per second under MDD conditions.

3.5.1.3 Water Main Sizing

Water mains shall be a minimum of eight (8) inches in diameter unless otherwise approved by the District Engineer. Exceptions are as follows:

1. Dead-end water mains may be six (6) inches in diameter. A dead-end main cannot and will not be extended in the future (such as a water main in a cul-de-sac). Dead-end water mains shall be avoided to the extent practicable. All dead-end mains shall be provided with a means of flushing (fire hydrant, blow-off, etc.) approved by the District. The last water meter being served by a dead-end water main shall be located as close as practical to the end of the main.

2. When the development of unimproved properties beyond the applicant's property can be anticipated, the applicant may be required to upsize certain water mains needed to serve the applicant's property.

3.5.1.4 Pipe Networks

The engineer shall strive to provide multiple sources of water for any subdivision or commercial/industrial project. Wherever practical, the use of "looped" pipe network systems shall be required.

3.5.1.5 Water Main Design

A. General: These Standards cover main lines from 6-inches (152.4 mm) to 18-inches (450 mm) in diameter.

B. Main Pipelines: In general, main lines shall be either polyvinyl chloride (PVC, AWWA C900/C909), steel or ductile iron pipe in accordance with Section 4.0 – Materials and Section 6.0 – Construction. The water main centerline, wherever possible, shall be located in public streets or public rights-of-way parallel to and five (5) feet (1.5m) north or west of the street centerline. For separation requirements refer to the District Standard Plates: *Separation Requirements for Water and Wastewater Lines*.

Where storm drains or other facilities are in the center of the street, the water lines shall be located to provide a minimum of four (4) feet (1.2m) clearance between the outsides of the pipe (measured on a horizontal plane). This also pertains to any case of paralleling lines.

The engineer shall take special care in designing where storm drains or other pipes cross above flexible pipes to avoid deflection problems during construction.

The pipeline shall extend to the tract/project boundary when an area outside the tract or development project may potentially be served through a future extension of the water main.

Where PVC (AWWA C900/C909) pipe is selected, the head classes contained in Table 3-4 shall be used.

TABLE 3-4 – PVC Pipe Class

Static Pressure (psi)	Class of PVC*	Dimension Ratio (DR)
<125	235	18
126-175	305	14

*Where pipes are laid in deep trenches, the class size shall be determined using the criteria established in AWWA C900/C909.

A valve, rated at the highest pressure class, shall separate all transitions between different pipe pressure classes or pipe materials. The service lateral pipe from the public water main to the fire hydrant must be a minimum Class 235.

Steel pipe thickness shall be sufficient for the static pressure per Section 4.3 – Main Line Pipe Materials

Ductile iron pipe shall be selected with a thickness that will be suitable for the pressure and laying condition in accordance with AWWA C150 or as otherwise approved by the District Engineer.

C. Criteria for the Separation of Water Main and Wastewater Main Lines:

1. General: The separation of water mains with adjacent sewers and drains, shall be in accordance with Section 64572, Title 22, California Code of Regulations, entitled "California Waterworks Standards," as set forth by the California State Water Resource Control Board, Division of Drinking Water (DDW).

2. Basic Separation Standards:

   a. Parallel Construction: The horizontal distance between pressure water mains and sewer lines shall be a minimum of 10 feet.

   b. Perpendicular Construction (Crossing): Pressure water mains shall be at least one foot above sanitary sewer lines.

   c. Common Trench Prohibition: Construction of water and wastewater main lines in the same (common) trench is prohibited.

3. Exceptions to Basic Separation Standards: All efforts shall be taken to comply with the above-described separation requirements. Alternative construction criteria as specified in the District's Standard Plate: *Separation Requirements for Water and Wastewater Lines*, and subject to the special provisions outlined below, may be considered in exceptional cases. All exceptions to the basic separation requirement shall be approved in writing by the District Engineer. In extenuating circumstances, the District Engineer may require the engineer to submit the request to the DDW for review and approval before the District grants an exception.

4. Special Provisions:

   a. The Separation Requirements for Water and Wastewater Lines District standard plates are applicable under normal conditions for wastewater (sewage) collection lines and water distribution mains. More stringent requirements may be necessary if conditions such as high groundwater exist as determined by the engineer and/or District.

   b. Wastewater lines shall not be installed within 25 feet horizontally of a low head (5 psi or less pressure) water main.

   c. During the construction of water pipelines, measures shall be taken to prevent damage to existing pipeline(s) and other underground utilities.

   d. Wastewater Force Mains:

      1) Wastewater force mains shall not be installed within ten feet (horizontally) of a water main.

      2) When a wastewater force main crosses a water line, the crossing shall be perpendicular. The wastewater force main shall be at least one foot below the water line.

      3) When a new wastewater force main crosses under an existing water main, all portions of the wastewater force main within ten (10) feet (horizontally) of the water main shall be enclosed in a continuous sleeve.

      4) When a new water main crosses over an existing wastewater force main, the water main shall be constructed of pipe materials with a minimum rated working pressure of 200 psi or equivalent pressure rating.

D. Location of Lines (Easements)

Easements for water line installations shall be avoided whenever an alternate pipeline alignment exists. Unless there are extreme physical

limitations, water lines shall be installed within the street or the public right-of-way. Where easements are necessary and where the side slope (perpendicular to the pipe) exceeds 25 percent (1 vertical to 4 horizontal) the plans shall clearly indicate appropriate contours within the easement.

Pipelines located within an easement shall be accessible at all times by maintenance vehicles traveling over paved roads or driveways unless otherwise approved by the District Engineer.

1. Width: Water easements for 6-inch (152.4 mm) to 18-inch (450 mm) diameter pipe shall be a minimum of 20 feet wide (6.1 m). When two pipelines are located within a single easement, the easement width shall be a minimum of 30 feet (9.2 m). The District Engineer may require additional easement width where the depths of pipe are deemed excessive (deeper than eight feet) or where deemed necessary to assure adequate space to maintain and/or operate the water system.

2. Pipeline Location: Pipelines shall be located in the center of the easement unless authorized by the District Engineer. Unless specifically otherwise approved by the District Engineer, pipelines located within an easement shall be straight without horizontal bends or deflections. Under no circumstances shall a pipeline be located within 5 feet (1.5 m) from the edge of the easement. Water pipelines located within an easement shall not be located on a property lot line.

3. Easement Location: The full easement width shall be on one lot or parcel in such a manner that access to the entire pipeline alignment will be unobstructed by walls, trees, or permanent improvements. Where this requirement cannot be met without interfering with existing structures, and subject to the approval of the District Engineer, easements may straddle lot lines. The water pipeline may not be located directly on the lot lines.

4. Deeds: Deeds for easements shall prohibit permanent construction within the easement to provide ingress and egress for maintenance and/or system operation of the pipeline or other District facility.

5. Easement Provisions: Easements shall be provided as follows:

   a. Subdivision Tracts: Landowners included within the subdivision shall offer to dedicate, for utility access and maintenance of public water main, the water easements so designated on the final map. The standard language is included in Section 5.10 – Standard Language for Dedication of Facilities to the District.

   b. Other than Subdivision Tracts: Except for dedications created by a subdivision tract map, all water rights-of-way shall be dedicated through deeds of conveyance to the District in a form acceptable to the District Engineer.

E. Depth of Water Mains

The standard uniform minimum depth of cover to the top of the pipe shall be 42-inches (1.1 m). Increases in depth may be required where future grading for road improvements removes the existing cover or where there are other conflicting utilities.

F. Design for Proper Flushing

Proper flushing of water mains to prevent sediment buildup and the maintaining of disinfectant residuals are important aspects of the District's maintenance program. The following criteria apply:

1. Unnecessary intermediate low points in the lines shall be eliminated wherever possible to prevent sediment accumulation.

2. The flushing techniques as described in Sections 7.3 – Role of Flushing and 7.5 – Disinfecting Water Mains shall be followed.

3. Water pipeline systems shall be looped. Dead-end pipelines may be permitted only with the written approval of the District Engineer.

G. Horizontal and Vertical Curves

1. General: The horizontal alignment of water pipelines in curved streets shall follow the street curvature or radius. Pipeline alignments shall not

cross, nor meander about the street centerline. Allowable joint deflections shall be as outlined in Table 3-5 or the manufacturer's recommendations, whichever is more stringent. Vertical grade breaks in excess of the allowable joint deflections shall not be permitted. Fittings shall be required or a vertical curve shall be constructed instead of a grade break exceeding the allowable joint deflections.

TABLE 3-5 – Allowable Joint Deflections

Nominal Pipe Size (inches)	Minimum Radius of Curvature (feet/m)
6	175' (53m)
8	225' (69m)
10	275' (84m)
12	325' (99m)

2. PVC (AWWA C900/C909) Pipe: The standard laying length for PVC pipe is 20 feet. The pipe must not be bent to a lesser (tighter) radius than the minimum shown in Table 3-5.

3. Steel Pipe: The maximum allowable deflection per joint for bell and spigot steel pipe shall be limited to 2-1/2degrees[ME1]. The minimum radius of curvature for bell and spigot steel pipe up to 18-inch in diameter shall be 920 feet of 40-foot pipe lengths and 460 feet for 20-foot pipe lengths. Shorter pipe lengths and/or fittings are required for radii less than 460-feet.

4. Ductile Iron Pipe: The maximum allowable deflection for pipe sizes 6-inches through 12-inches is 4 degrees and for pipe sizes, 14–inches through 18-inches is 3 degrees. When using standard 18-foot laying lengths, the minimum radius of curvature should be 260 feet (79 m) and 345 feet (105 m) for 6-inch to 12-inch pipe and 14-inch to 18-inch pipe, respectively. If changes in grade or alignment cannot be accomplished with the use of couplings, then standard fittings are available with bends of 90, 45, 22-1/2, or 11-1/4 degrees.

H. Structural Requirements:

1. Under Roads: All structures and pipes placed under public roads shall be of sufficient strength to support, with an adequate factor of safety the backfill, road surfacing, and H-20 loading per AASHTO Standard Specifications (truck loading with impact). Higher loading may be as specified by the Public Works Department or as required by the District Engineer.

2. Other Pipes and Structures: Water lines designed to cross under or over other pipes or structures shall be protected from damage and shall be constructed to prevent endangering the other pipe or structure. Particular attention shall be given to the possibility and prevention of damage caused by settlement. If there is a potential that future replacement of any pipeline may be difficult due to the pipe or structure, special design consideration may be required and shall be submitted to the District Engineer for review and approval prior to construction. The use of any encasement or other protection requires approval of the District Engineer before finalizing the design.

3. Flexible Joints: Flexible joints that allow for differential settlements or other movements of water pipelines or structures, adjacent pipes, and adjacent structures shall be provided where water lines enter encasements or structures. Flexible joints shall be within a minimum of 24 inches (600 mm) of such structure unless otherwise approved by the District Engineer.

   a. Expansion Joints: Expansion joints shall be installed at locations where protection against damage from linear expansion is required. Adjacent piping shall be strong enough to transfer loads. The engineer shall indicate the location of expansion joints on the project drawings.

   b. Flexible Ball Joints: Flexible ball joints shall be installed at locations where protection against bending is required but where protection against linear expansion is not required. The engineer shall indicate the location of flexible ball joints on the project drawings.

c. Flexible Expansion Joints: Flexible expansion joints are available in either single ball or double ball models. Double ball models are acceptable at all locations where protection from bending moments, axial stresses, and shear stresses are required and are the preferred type of joint. Double ball models shall be used at all locations where differential shear protection is required such as water storage tanks, bridge abutments to bridge decks, the crossing of known faults, and in some cases the transitions between disturbed and undisturbed soils. Single ball models may be used in installations such as pump stations, valve installations inside buildings, or "inline" pipeline protection. Single ball flexible expansion joints may only be used with the written permission of the District Engineer. The engineer shall indicate the location of flexible expansion joints on the project drawings.

4. Thrust Blocks: Thrust blocks are required in the following locations:

   a. Abrupt changes in grade or alignment requiring tees or elbows;
   b. Changes in pipe size;
   c. Pipeline dead ends;
   d. Locations subject to sudden thrust, such as valves, hydrants, etc.;

   Refer to District Standard Plates: *Thrust Block for Mechanical Joint Connections* and *Thrust and Anchor Blocks* for thrust blocks dimensions and details.

5. Steep Grades: Water lines laid on grades steeper than 10 percent, which are not under, nor intended to be under pavement shall be evaluated for possible erosion protection. Where the slope exceeds 33 percent pipe anchors and backfill stabilizers shall be installed following the American Public Works Association Standard Plan 221-0.

   Where steep grades are present, a restrained joint pipe may be used. Thrust force shall be checked using AWWA M11. Pipe without welded joints may require substantial anchorage to prevent separation.

6. Design for Earth Loads: Generally, because of the pipe materials specified and the relatively shallow depths of cover, specific design for earth loads is not necessary. Therefore, the subject will not be covered in any detail in these standards. However, the engineer shall be responsible for the earth load design. The following sources of information for earth load design are available:

   a. AWWA Manual No. M-11 covering steel pipe in all size ranges.

   b. AWWA standard C900 covering PVC pipe in sizes 4-inch to 12-inch.

l. Special Consideration for Welded Steel Pipe:
   Where joints are welded, it is possible to eliminate or reduce thrust blocks providing that the steel is not over-stressed or the shear resistance by the soil to pipe movement is less than the thrust it is trying to resist. The subject matter is outside of the scope of these standards and requires engineering analysis by the designer for submission, review, and approval by the District Engineer.

   To prevent the mortar lining and coating from cracking, the deflection of the steel pipe must not exceed 2 percent of the diameter as a result of both live and dead loads.

3.5.2 Water Main Appurtenance Requirements and Design

3.5.2.1 Valves

All pipeline branches at intersections shall be installed with valves unless otherwise approved by the District Engineer. All pipeline valves shall be the same nominal size as the pipeline.

In-line valves shall be required at 1,000-foot (300 m) intervals for pipelines 8-inches and smaller and at 750-foot (225 m) intervals for pipelines 10-inches and larger.

Any valve deeper than five (5) feet to the top of nut shall have extensions attached to the operation nuts.

3.5.2.2 Service Lines

Service lines shall be a minimum diameter and pipe material as described in Table 3-6. Service lines shall have a minimum pressure rating equal to or greater than the pressure rating of the associated water main. Service line material shall be a minimum Type K Copper and cross-linked polyethylene (PEXa) as described below, and in Section 6.11 – Service Connections and Service Lines. PEXa pipe shall only be used when the geotechnical reports warrant the use of the material in place of copper, as approved by the District. Polybutylene pipe shall not be allowed for service lines.

In areas where soil conditions are determined to be corrosive, special consideration for the protection of the service line shall be implemented by the engineer and constructed by the contractor.

TABLE 3-6 – Service Line Size and Pipe Material

Service Line Size	Meter Size	Material
1-inch	1-inch	Type K Copper -(PEXa)
2-inch	2-inch	Type K Copper -(PEXa)
4-inch	3-inch to 4-inch	Type K Copper C900/C909 PVC C151 Ductile Iron (DI)
6-inch and larger	6-inch and larger	C900/C909 PVC C151 Ductile Iron (DI)

3.5.2.3 Fire Hydrant Assemblies

The spacing and location of fire hydrants shall be determined by the Ventura County Fire Protection District (VCFPD). Fire Hydrant Assemblies shall be in accordance with the latest version of the Ventura County Fire Protection Fire Prevention Bureau Standard 14.5.3 – Fire Hydrants and District Standard Plate: *Fire Hydrant Assembly*.

A. Public Hydrant: Public hydrants shall be installed in the public right-of-way or within the easement dedicated to the District for maintenance purposes. Public hydrants shall be installed in accordance with District Standard Plates: *Location of Above Ground Facilities* and *Fire Hydrant Assembly*.

B. Private Hydrant: Private hydrants shall be installed on private property and shall be maintained by the property owner. An approved double detector assembly or reduced pressure assembly for backflow prevention shall be installed, maintained, and tested by the property owner and must comply with District Standard Plate: *Fire Service Backflow Preventer*. The assembly shall be installed on private property, not more than ten (10) feet from the public right-of-way or easement, and screening of the assembly must comply with the Planning Division's requirements.

3.5.2.4 Blow-off Assemblies

A. General: Blow-off assemblies shall be located at every low spot in the line to facilitate line draining and flushing, see District Standard Plates: *Blow-Off Installation*. Fire hydrant assemblies can be substituted for blow-off assemblies (see Section 3.5.2.3, Fire Hydrant Assemblies). Engineers are encouraged to install fire hydrant assemblies instead of blow-off assemblies whenever possible.

Blow-off valves shall be constructed on all dead-end lines (i.e., cul-de-sacs) where a fire hydrant is not required.

B. Sizing: Blow-offs should be sized according to the following criteria:

1. In general, a particular section of the pipeline should be capable of being drained within 2-4 hours.

2. The blow-off should be capable of creating a minimum velocity of 2.5 fps (0.75 mps) in the pipeline for the removal of sediments. Table 3.7 lists recommended blow-off sizes for average pressures ranging between 45 and 100 psi, which will achieve this velocity.

TABLE 3-7 – Blow-Off Diameter	
Pipe Size	**Blow-Off S**
6” to 8" (150 mm)	2" (50 mm)
10” to 12" (250 mm)	4" (100 mm)
Above 12" (305 mm)	By special design

3.5.2.5 Air Release and Vacuum Valves

A. Types of Valves:

1. Air release valves allow the discharge of air that accumulates at high points along the pipeline. The air is entrained in the water and when it accumulates at the high points, it creates a throttling effect, as would a partially closed valve.

2. Air and vacuum valves allow large quantities of air to be expelled during line filling and allow air to re-enter the pipeline during draining of the pipeline whether planned or due to a rupture. These valves are located at high points along the line.

3. Combination air and vacuum release valves combine both the air release and air and vacuum valves as described above. It is this type of valve that is generally specified in the District system. Variance from the use of combination air and vacuum release valves requires approval by the District Engineer.

B. Location: Combination air and vacuum release valves shall be located at all high points along the pipeline or as otherwise required by the District Engineer. Combination air release valves shall be installed per District Standard Plate: *Location of Above Ground Facilities*.

C. Sizing: The following is provided as guidelines for determining the size of combination air and vacuum release valves:

1. Determine the maximum rate of flow that can occur in the line -

   The rate in CFS under filling conditions:

   $$Q = \frac{GPM}{7.48\ x\ 60}$$

   The rate in CFS under draining conditions:

   $$Q = 0.087\sqrt{S\ D^5}$$

   S = Slope or gradient (ft. per foot)
   D = Diameter of pipe in inches

2. Using the largest value in "1" above, the size should be a minimum of:

RATE (CFS)	VALVE SIZE[1] (inches)
0 - 5	1
5 - 15	2

   [1] The air valve at the end of the main requires a 2-inch line for 1-inch and 2-inch air valves to help with filling and draining the line.

3. For most installations involving 8-inch (200 mm) pipelines, the valve shall be 2-inch size (25 mm). District Standard Plate: *Valve Box Assembly* illustrates typical installations.

4. In addition to the above requirements, steel pipelines shall be evaluated for collapsing pressure. The engineer shall investigate collapsing pressure per the pipeline manufacturer's instructions and certify that such an investigation has been performed and that the design is following the manufacturer's requirements.

3.5.2.6 Meters

A. Individual Domestic Meters: All single-family detached residential dwellings shall have individual domestic meters installed per District Standard Plate: *Water Meter Service Installation* and within the public right-of-way or easement dedicated to the District.

B. Irrigation Meters: When the parkways adjacent to the street are to be irrigated, a separate meter shall be installed on each side of the street. Running an irrigation line from the meter to the opposite side of the street is prohibited.

   When a median is irrigated, the meter shall be in the side parkway. Meters are not allowed in the center median. The meter location shall be easily accessible and protected from being covered by landscape materials or other obstructions. The District Engineer reserves the right to determine and/or select all meter locations.

C. Master Meters: All single owner, multi-tenant commercial/industrial complexes and multi-family residential developments shall be provided water service through a master meter. Master meters shall be installed in place of individual tenant meters and shall be provided at all points of connection from the on-site piping to the District's system. Variations from this policy shall require written permission from the District Engineer.

3.5.2.7 Backflow Prevention Assemblies

Backflow prevention assemblies shall be designed following Section 3.7 – Cross Connections and Backflow Prevention Assemblies.

3.5.3 Tank Requirements and Design

Water storage tanks operate in conjunction with pump stations and provide pressure regulation, storage for normal operations to serve domestic water demand needs, and storage for fire protection and emergencies. Tanks shall also control the operation of the pump station serving the pressure zone with telemetry to start and stop the pump operation based on water levels in the tank.

Applicants requesting water service for larger developments may be required to design and construct a water tank for the pressure zone serving their property.

3.5.3.1 Tank Storage Capacity

Tank storage is comprised of the following components:

A. Regulatory Storage: Regulatory storage, in conjunction with pump station operation, provides the water demand for the pressure zone being served. The total MDD for the pressure zone shall be provided by the pump-tank system with the pump station(s) supplying the MDD for the pressure zone and the tank supplying -all peak flows above MDD. All tank regulatory storage -must recover over a 12-hour period. The lowest water level in the tank during the 24-hour MDD period shall be sufficient to ensure that all properties in the pressure zone have a minimum water service pressure of 40 psi.

B. Reserve Storage: Reserve storage provides for the MDD for the pressure zone over the 24-hour period to cover a possible pump station service outage.

C. Fire Storage: Fire storage provides for the maximum required fire-flow and duration, as required by the VCFPD, in each pressure zone, but shall be a minimum of 360,000 gallons (1,500 GPM for a four-hour duration).

Tank storage volume calculations shall exclude “dead storage” that can not be accessed because it is below the outlet pipeline crown elevation at the tank penetration. The amount of storage required can vary with the unique characteristics of the pressure zone or system of pressure zones and shall be determined by hydraulic calculations following Section 3.6 - Hydraulic Calculations.

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3.5.3.2 General Tank Design Parameters

Before initiating tank design, the engineer shall consult with the District to secure the most up-to-date tank design details to assist in preparing plans

and specifications for the tank. The engineer shall evaluate the following general parameters when situating the storage facility on the site:

A. Access and Parking: Adequate right-of-way shall be provided for vehicular access and turnaround, and the supply pipeline and drain. A 10-foot minimum width strip area shall be provided around the standpipe, on the turnaround area, and the driveway to the street or the access area. Pavement design is based on a 4-inch plant-mix pavement as approved by the City of Simi Valley Public Works Department. Curbs, gutters, and other concrete improvements shall be designed in accordance with the latest edition of the Standard Plans for Public Works Construction.

   Access roads at storage facilities shall be wide enough to allow positioning to accommodate the size of a truck-mounted crane needed to remove the largest piece of equipment on the site. Sufficient space shall also be provided to park two 3-ton maintenance trucks. The engineer shall avoid placing the access road and parking over pipe penetrations through storage facility walls to avoid shear loadings.

B. Flood Protection: The floor elevation of buildings at the storage facility shall at least be two (2) feet above the 100-year flood elevation determined by the Federal Emergency Management Agency (FEMA).

C. Grading and Drainage: The grading plan shall be developed in conformance with Chapter 7 of the Ventura County Land Development Manual adopted by City Council Resolution No. 69-8. The site paving, drainage, and grading plan shall be accompanied by a geotechnical report, prepared to comply with the City of Simi Valley Guidelines for Geotechnical Reports. Where conflicts exist between the code and ordinance and the geotechnical report, the more stringent requirements shall be adopted.

   The Drainage design/study shall be prepared by a California State Registered Civil Engineer. This study shall include hydrologic and hydraulic calculations and comply with the City of Simi Valley Drainage Study Guidelines, Goal VIII-3 of the General Plan, the Ventura County

Hydrology Manual, and the Hydraulic Design Manual of the Los Angeles County and Ventura County Watershed Protection Districts. Detention design shall conform to the City of Simi Valley Drainage Study Guidelines. Site runoff shall not exceed the 10-year undeveloped storm runoff from the site area.

D. Yard Piping: Yard piping and exposed piping at storage facilities shall be either steel or ductile iron pipe and linings and coatings shall conform to the requirements in Section 4.3 – Water Main Pipe Materials.

   Unless otherwise approved by the District Engineer, mainline valves shall be the same diameter as the pipeline.

E. Land ownership and zoning: Storage facility sites may be located on easements but should be entirely located on District property if possible. A zoning variance is typically required for storage facility sites.

F. Setbacks: Adequate setbacks from property lines shall be provided to conform to local ordinances and codes. The distance between structures shall be determined by access requirements, piping requirements, and future expansion plans. Sufficient setbacks shall also be provided to allow for fill, cut, or fill transition to existing contour elevations at property lines.

G. Landscaping and irrigation: Storage facility sites shall be landscaped in a manner to meet community standards and conform to the City's Planning Division. Landscape designs shall be developed by a licensed Landscape Architect.

   The landscape development of storage facility sites shall be kept to a minimum and should be low maintenance. Irrigation systems and plant material shall be installed outside the District's security fence or wall. Landscaped areas shall be the responsibility of the HOA or other private management companies.

H. Security Fencing: Storage facility sites shall be completely enclosed by an 8-foot high perimeter security fence with a barbed wire top. The

fence shall be chain-link or architectural wrought iron, meeting the City's Planning Division requirements. A 6-foot high masonry brick wall around the storage facility may also be approved, as appropriate. All accessible valves, vaults, and water fixtures shall be located inside the security fence. Specific fencing height and materials shall be determined on a case-by-case basis. An intrusion alarm and video surveillance system shall be installed at the front gate. Additional video cameras and alarm systems may be required as directed by the District.

I. Site lighting: Storage facility site lighting shall be controlled by photocell equipment with a manual on/off controller. Outdoor lighting shall be selected to reduce glare over the surrounding area and to prevent vandalism.

J. Site utilities: During the design process, the developer's engineer shall coordinate with representatives of local utility agencies.

K. Geotechnical conditions: The geotechnical consultant shall develop and implement a program of geotechnical testing to provide relevant design parameters for the storage facility.

L. Aesthetics: Views of the facility from areas surrounding the storage facility site shall be analyzed and alternatives evaluated to harmonize the aesthetics of the storage facility with its surroundings.

3.5.3.3 Tank Structural Design

A. Loads and Forces: Tanks shall be designed to withstand all expected forces including forces from the dead load of the structure, internal pressure, seismic load, wind load, and other various live loads including that from the water when the tank is full.

1. Dead Loads: Dead Loads, which are defined as the weight of all permanent construction, including equipment and piping, permanently connected to the tank, is determined by using the following unit weights:

- Steel 490 pounds per cubic foot (pcf)
- Concrete 150 pcf
- Aluminum 169 pcf

Dead Loads shall include allowances for the following items:

- All equipment and piping that is permanently attached to and considered part of the structure, including future equipment and piping.
- Structural steel platform framing and floor plates (based on 20 psf)
- Heavy beams or girders, such as those required to carry loads other than platform live loads.
- Piping 12-inches in diameter and smaller shall be treated as a uniformly distributed load. A typical minimum value of 20 psf is used.
- Piping larger than 12-inches in diameter shall be treated as a concentrated load.

2. Live Loads: Live loads in addition to concentrated loads shall be determined as follows:

   - Roof Loads: per ASCE 7/ANSI A58.1 UBC, ANSI/AWWA D100, or local code, whichever is more stringent
   - Stairs, Platforms, and Walkways: per AWWA D100 Section 3.1.6 and AWWA D103 Section 5.2.6.
   - Minimum concentrated load on ladders and stairs: per the requirements of ANSI-A58.1, OSHA, Cal-OSHA, or local codes, whichever is greatest

3. Wind Loads: Wind loads shall be in accordance with ASCE 7/ANSI A58.1, -CBC, ANSI/AWWA D100, and ANSI/AWWA D103, based on a minimum basic wind speed of 100mph and applicable exposure, or on the requirements of local code, whichever is more stringent. The design shall be governed by maximum wind or maximum seismic load, whichever is greater.

4. Hydrostatic and Hydrodynamic Loads: Hydrostatic loads shall be based on the water when the tank is filled to overflowing. The unit weight of water is 62.4 pcf. Hydrodynamic loads shall be determined in conjunction with the Seismic Loads described in this section.

5. Lateral Soil Loads: For all yielding structural components, lateral soil loads shall be determined by using active soil pressure conditions as recommended in the geotechnical report.

   For non-yielding structural components, lateral soil loads shall be determined by using passive soil pressure conditions as recommended in the geotechnical report.

   A minimum surcharge pressure equal to an additional two (2) feet of soil shall be used for all structures adjacent to traffic loading conditions.

   Seismic soil loads shall be determined per the Seismic Loads described below.

6. Seismic Loads: The following criteria provide the basic guidelines for determining design ground accelerations and seismic forces:

   - Seismic soil loads shall be determined following the recommendation given in the geotechnical report.
   - Response spectra with damping factors of 0.5%, 2.0%, and 5.0% shall be used for the seismic design for the applicable level of shaking and type of structure.
   - Site-specific ground acceleration, response spectra, and design recommendations presented in the geotechnical report shall be used to determine seismic loads.

7. Miscellaneous Loads: The following shall be considered in the design:

   - Miscellaneous loads of special nature, such as thrust from expansion joints, and special appurtenances.

- Surcharge loads, such as those due to adjacent structures and vehicular loads.
- Thermal loads, where applicable.
- Operating pressure forces, test forces, and loads.
- Construction loads and conditions.

B. Loading Combinations: Loading shall be calculated for different conditions. As a minimum, the following loading combinations shall be determined:

- Full tank or standpipe: hydrostatic loading, plus hydrodynamic loading, plus seismic forces due to dead loads.
- Empty tank or standpipe: static soil pressure (active or passive), plus seismic soil pressure, plus seismic forces due to dead load, plus permanent surcharge.

C. Allowable Stress: Allowable stress shall conform to the following:

- For steel plate and structural steel, allowable stresses shall meet the requirements of ANSI/AWWA D100.
- For tank concrete footings, allowable stresses shall be per the requirements of ACI 318.
- For wind and seismic loading conditions, allowable stresses shall be increased by 33%
- For wind and seismic design, allowable stresses shall have a factor of safety of 1.5 against overturning and sliding.

D. Roof Design: The roof shall be a structural-steel-supported, steel-cone roof with a slope of 3/4-inch in 12-inch per Section 3.6.1.2 of the AWWA

The roof shall be designed for the loading and allowances in accordance with the requirements of AWWA D100 Section 3.1.3.2 and AWWA D103 Section 5.2.3.2. The minimum roof live load shall be15 psf.

The roof plate that is not in contact with water shall be at least 3/16-inch thick; the roof plate submerged in water during normal operations shall be ¼-inch minimum (knuckle or cone type). A corrosion allowance is

not required for the roof plate. The roof plate construction shall be per the standard practice of ANSI/AWWA D100, by seal welding between the support members and the underside of the roof plate. Full penetration welds shall be used to join the roof knuckle together.

Roof supports shall be hot-rolled structural shapes with a minimum thickness of 3/16 inches. Shapes, bars, and roof plates submerged in water shall be at least ¼-inch thick. Lateral bracing of the roof rafter compression flanges is assumed to be provided by the roof plate.

Bolts, washers, and nuts installed inside the storage facility shall be Type 316 stainless steel.

Columns shall be fabricated from a sealed steel pipe welded at both ends. The column base shall be fabricated from a steel plate and designed for a maximum allowable soil bearing in the geotechnical report. The column base shall not be welded to the bottom plate, but must be restrained from any lateral movement.

E. Wall Design: The wall design shall be per ANSI/AWWA D100 and ANSI/AWWA D103 standards. Applicable loadings and allowable stress shall be as described in sections 3.5.3.3 A, B, and C.

All wall plates shall be rolled, regardless of material thickness.

The design fabrication and inspection requirements specified in ANSI/AWWA D100 and ANSI/AWWA D103 are required, except that only steel that complies with AAWWA Section 2.2.3 and Section 14 Table 34 and AWWA D103 Section 4.4 material requirements shall be used. The lowest 1-day mean ambient temperature at the tank site is typically 45°F.

A corrosion allowance shall be specified for the tank if required. Minimum wall thickness shall be per the requirements of ANSI/AWWA D100 and ANSI/AWWA D103.

The tank wall shall be designed for stability without the requirement for intermediate girders on the inside or outside surface of the wall.

Freeboard as defined by AWWA D100 Section 13.5.4.4 is the distance from the maximum operating level (MOL) to the lowest level of the roof framing.

F. Floor Design: Floor plates shall be lap welded continuously from the top of the plate with a minimum thickness of 5/16 inches. Sketch plates shall be 1/16-inch thicker than the rest of the floor plates. The floor plate shall be extended a minimum of one (1) inch beyond the exterior of the wall. The joint between the wall and the bottom plates shall be continuously welded from the inside and outside of the tank wall.

A corrosion allowance, if required, shall be added to the minimum requirements of the standards.

G. Anchor Bolts: Anchor bolts shall be designed to safely resist the uplift resulting from the overturning moment about the axis of the base of the tank or standpipe. Anchor bolt nuts shall be tightened with a torque wrench after filling the storage facility and again before acceptance by the District.

H. Footings and Foundations: A ring wall footing shall be used. The top of the ring wall footing shall be six (6) inches above the finished grade. The minimum depth of the ring wall footing below the bottom of the tank shall be two (2) feet or greater.

The ring wall footing shall be reinforced to resist the lateral soil pressure of the confined earth. The width and height of the ring footing shall be sized for the loadings in sections 3.5.3.3. A and B, and the allowable soil bearing pressure recommended in the geotechnical report. The minimum width shall not be less than 2.5 feet.

Concrete shall have a compressive strength of 4,000 psi, and reinforcing steel shall have yield strength of 60,000 psi. Concrete cover for

reinforcing bars shall be per the requirements of ACI 318. The alternative design method is recommended for design reinforcement.

3.5.3.4 Instrumentation and Control Guideline

Instrumentation and control systems at storage facilities shall consist of water level monitoring, storage facility inlet/outlet valve position monitoring, a seismic isolation valve system, chlorine disinfection and injection control system, recirculation systems, and intrusion alarm systems. These systems must be compatible and connected to the District's SCADA system.

A. Telemetry/Control and Communications: A programmable logic controller (PLC) interfaces between the site instruments and the radio transceiver and/or leased-line modem. The storage facility RTU is polled by a programable Central Control System.

B. Water Level Monitoring: The below-grade storage facilities level sensor shall be an ultrasonic level transmitter that produces a 4-20 mA signal proportional to the measured height of the water in the storage facility. The transducer shall be mounted on a 3-inch ANSI flange at the top of the storage facility, and the transmitter control box shall be mounted 4.5 feet above the finished ground. The control box integral digital lever readout shall indicate the tank water level in feet and inches.

   High and low-level switches shall be provided as a backup to the level transmitter. The level switch shall be the inductive type with cable-suspended electrodes held by an electrode holder mounted on a 3-inch ANSI flange at the top of the storage facility. The switches and the level transmitter shall be connected to the PLC. Dual cell storage facilities shall be provided with level instrumentation in each cell.

   Above-grade storage tanks and standpipes level transmitters shall be the pressure sensing type, connected to a vessel bottom flange by 1/2-inch diameter Type 316 stainless steel tubing. The transmitter shall be equipped with an integral digital display calibrated to feet of water level.

Above-grade tanks and standpipes requiring local level indication shall be equipped with a target and gauge board assembly. The vertical moving pointer shall be actuated by an internal float riding on two bottom-anchored guide cables. All components in contact with water shall be Type 316 stainless steel.

C. Inlet/Outlet Valves: Storage facility isolation butterfly valves shall be provided with valve position limit switches to report valve status to the SCADA system.

D. Seismic Isolation Valve System: There are three primary functions of a seismic isolation valve:

1. Provide remote operator control to open/isolate a tank under normal or seismic conditions;

2. Isolate a tank from the pressure zone, should the operator deem it suitable to withhold the water inventory in the tank from leaking out of broken distribution system pipes. The water in the tank can then be made available for fire prevention at some time after the earthquake has occurred, but before the pressure zone can be re-supplied with additional water; i.e. water treatment plants; and

3. Isolate the tank from the distribution system to prevent rapid loss of water through broken pipes that could result in a high safety risk to nearby people.

E. Site Intrusion Alarm: The storage facility site shall be provided with intrusion switches in hatches, maintenance access openings, entrance gates, and electrical panels. Intrusion switches shall be connected to the PLC, which shall be programmed with an adjustable time delay upon entrance to allow the operator time to disable the alarm before it is broadcast by the telemetry system. The disarm/reset controls shall be located in a convenient location for operation by authorized personnel.

F. Chlorine Injection Instrumentation: Residual chlorine is monitored in a continuous sample stream by a Hach® Model CL17 colorimetric type chlorine analyzer, and its output signal shall be used to pace the chlorine

injection pumps. The transmitter produces an isolated 4-20 mA output to the PLC proportional to chlorine residual. Field selectable ranges shall be between 0 and 5 mg/L. The PLC shall be programmed with a 3-mode proportional integral derivative controller to pace the chlorine injection pumps.

The liquid level in the sodium hypochlorite storage tanks shall be monitored by an ultrasonic level transmitter with a local indication at the truck loading fill port and a 4-20 mA level signal to the PLC. Telemetry signals and alarms transmitted to the SCADA system include residual chlorine concentration, sodium hypochlorite tank level, pump, failure, sample flow low, and analyzer common alarm.

A liquid level indication shall be provided by a direct reading gauge with a Type 316 stainless steel float inside the tank and an indicator board mounted on the outside of the tank.

3.5.3.5 Cathodic Protection

Water facilities contain metallic components which, when placed in contact with soil and/or water without protection from its surrounding environment tend to corrode, deteriorate and fail prematurely. The principle of cathodic protection is to make the entire surface of the structure cathodic, thus directing corrosion elsewhere (to anodes). Cathodic protection is accomplished by superimposing an electrical current from an expendable material (anode) through an electrolyte (soil, water, wastewater) in a manner that ensures that the current enters all parts of the metallic surface (e.g., pipe, tank, etc.) and the entire surface becomes a cathode.

A. Coordination with Structure Design: The developer's engineer and the District shall coordinate to ensure that the cathodic protection system is fully compatible with the design of the structure to be protected. The selection of construction materials and protective coatings for a structure shall be coordinated between the developer's engineer and the District Engineer. Locations and configurations of appurtenant facilities such as valve vaults, service connections, instrumentation, and connections to other structures shall also be coordinated with the District.

The locations of cathodic protection equipment, devices, outlets, and appurtenances shall be shown at approximate locations on the drawings. Exact locations shall be determined by the contractor subject to approval by the District Engineer. The District Engineer shall verify all data and final locations of all work done under the specifications of the project.

B. Cathodic Protection System Type: The type of cathodic protection system selected by the District Engineer shall provide an acceptable service life of a minimum of 20 years. Factors to be considered during selection are as follows:

1. Galvanic or Sacrificial Anodes – Galvanic anodes use the natural potential difference (voltage) between two different metal alloys to generate direct electrical current (dc). These anodes consist of magnesium or zinc castings or ribbons directly connected to the pipe. Because magnesium and zinc are anodic to steel, ductile and cast iron, stainless steel, lead, and copper, the resulting galvanic cell consists of the galvanic anodes and the structure being protected.

2. Zinc anodes shall be used in low resistivity environments (less than approximately 500 ohm-cm) or brackish or saline water and soil conditions. In low resistivity conditions, zinc anodes have a longer operating life than magnesium anodes because of lower current output. In soil conditions where galvanic anodes shall be required, a magnesium anode should be used.

   The number of anodes depends on the electrolyte conditions and the current requirement. Anodes shall be sized to provide a minimum service life of 20 years. Galvanic anode systems shall be used where electrical current requirements are low (less than 2 amps), where structures are well-coated, and in areas of low electrolyte resistivity. Galvanic anode systems shall be used where the following items are important:

- No external power supply is available or allowed (classified/protected areas)
- Low maintenance is necessary
- Minimal interference with other structures is mandatory
- Low installation cost is mandatory with an economical comparison requirement
- Minimal easement or right-of-way needed

Considerations that discourage the use of galvanic anode systems are:

- Limited driving potential and current
- High resistivity of the electrolyte
- High cost of retrofit or upgrade
- Adjustment of output is required

Where conditions are not favorable for galvanic anode or sacrificial anode protection, impressed current systems should be considered.

3. Impressed Current – Impressed current cathodic protection systems use an external source of direct current (DC) power. The power is used to make the structure cathodic relative to some other metal in the ground or water.

   Rectifiers should be used to convert alternating current (AC) to direct current (DC). The DC goes from the positive terminal of the rectifier to the groundbed (anodes) where it is discharged into the electrolyte. This current is collected on the structure to be protected. The electrical circuit is completed as the DC returns via the protected structure to the negative terminal of the rectifier. Typical impressed current anodes are made of graphite, high-silicon cast iron, mixed-metal oxide coated titanium, and platinized titanium or niobium.

   Impressed current systems are best suited to applications where current requirements are high and in areas of high electrolyte resistivity.

Impressed current systems are frequently used where:

- A large current is required
- High-resistivity soil or water conditions exist
- Current must be adjustable
- Contamination of the product is prohibited

The following considerations may discourage the use of impressed current systems:

- Slightly higher initial installation cost
- Skilled maintenance effort
- Interference with other structures
- Congested areas

Where conditions are unfavorable for impressed current protection systems, galvanic or sacrificial anode protection, or a combination of the two methods shall be used.

4. Selection of Protection System – The type of cathodic protection systems, design configuration, and component specifications shall be selected to deliver the required current with due consideration of the control of stray currents.

   The replaceable parts of cathodic protection systems are designed to provide a minimum service life of 20 years. This includes items such as rectifiers, anodes, and wiring. Longer design life is not recommended and is not economical because the durability of construction materials for continuous use becomes marginal and the risk of equipment failure increases substantially.

   The actual service life of a cathodic protection system may be greater or less than the design life, depending on the following:

   - The average current output
   - Soil or water conditions
   - Actual anode consumption efficiency

- The rate of material deterioration
- The addition of facilities

The design shall incorporate sufficient safety and redundancy factors to achieve the design life under a reasonable range of conditions.

Features necessary for the operation of the cathodic protection system shall be designed to last for the life of the structure or facility.

C. Consistency Among Contracts – Cathodic protection systems shall be designed for consistency with adjacent projects. All system components and configurations shall be as required by these standards and guidelines. In the absence of pertinent standards, the specifications and details of a recently designed facility for previous projects shall be used as a reference for consistency.

3.5.4 Pump Stations Requirements and Design

The Pump station capacity shall be capable to deliver supply to meet MDD for the pressure zone. The pump station shall consist of a minimum of two pumps with one to serve as a standby to ensure that continued supply is delivered if the operating unit is out of service for repair or maintenance. The standby pump shall have the capacity of the largest pump to deliver MDD. Pump motors and other mechanical and electrical components shall be subject to approval by the District Engineer.

The pump station shall be capable of supplying MDD plus the flow necessary to replace the fire storage in the tank serving the pressure zone within 72 hours.

The pump station operation shall be controlled, via telemetry controls, by water levels of the tank serving the pressure zone.

Before initiating pump station design, the developer's engineer shall consult with the District to secure the most up-to-date pump station design details to assist in preparing plans and specifications for the pump station.

3.5.5 Regulator Station Requirements and Design

3.5.5.1 Definition

Pressure control stations serve the following functions:

- Regulating/reducing stations maintain constant water pressure on the downstream side of the station regardless of changing flow rates and/or varying inlet pressure. These stations are typically used to supply an area of lower pressure from an area of higher pressure while ensuring that the area being served is not over-pressurized.

- Sustaining stations throttle the flow rate when the upstream pressure approaches the set pressure on the upstream side of the station and closes completely if the set pressure cannot be maintained. They are typically used to prevent demands in an area of lower pressure from depleting the pressure in the area supplying it.

- Relief stations maintain constant upstream pressure by relieving flow (and excess pressure) to the downstream system. They are typically used to prevent pressure surges in pumped, closed, or failed systems.

3.5.5.2 Locations of Pressure Control Stations

Pressure control stations are located within the public right-of-way and easements granted in perpetuity to the District, but not in vehicular corridors or curbside parking areas. Any location other than those described above must be approved by the District.

In evaluating the need or site for a pressure control station, extreme care must be taken to ensure that all hydraulic standards within each of the connected pressure zones are maintained at all times. This is especially important in the case of pressure regulating/reducing stations where the potential to deplete the hydraulic energy of the upstream area is particularly acute.

3.5.5.3 Configuration and Sizing Criteria

Pressure control stations shall be designed to handle maximum, minimum, and emergency (including fire) demands. The highest static pressure to be provided at any customer service within the system is 80 psi. Pressure relief valves to protect the water system shall be set 15 psi above the normal maximum pressure at each mechanically operated source such as a pump station or pressure control station. The pressure class of the water main pipe at any elevation shall be dictated by the relief valve setting.

In pressure zones supplied by more than one pressure control station (without available storage), each station shall be sized so that any one of the pressure control stations can be removed from service without reducing the overall maximum supply capacity to meet PHD for the entire pressure zone.

In general, large pressure control valves (greater than ten (10) inches in nominal size) may not be used to handle both maximum and minimum flows. Small pressure control valves, not less than four (4) inches in nominal size, are used to handle minimum flows. The control station may require multiple parallel legs with various valve sizes to cover the desired flow range.

All pressure regulating/reducing valves must be equipped with a check valve feature to protect against undesired backflow due to a failed pressure regulating/reducing valve in another part of the same pressure zone. Each pressure regulating station shall include a bypass line of an equal size, but not more than 2-sizes smaller in diameter than the supply line to the station, and an adequate high-pressure relief valve to protect the regulated water system.

Pressure control stations shall be equipped with one more than the number of pressure control valves required for the maximum design pressure. In general, this means that:

1. Larger capacity pressure control stations containing pressure control valves, 10-inches and larger, shall be designed for not less than three parallel legs with pressure control valves as follows: one or more duty valves for the anticipated maximum flows, one backup valve equal in size

to one of the duty valves, and one low-flow valve for the anticipated minimum flows.

2. Smaller capacity stations containing pressure control valves, 8-inches and smaller, shall be designed for not less than two parallel legs with pressure control valves as follows; one duty valve for the anticipated maximum and minimum flows, and one backup valve equal in size to one of the duty valves.

Pressure control valves shall be enclosed in a concrete masonry unit (CMU) vault with a chain-link swing gate for accessibility. The valves shall be elevated and supported by steel pipe supports with the center of the pipe a minimum of 30-inches above the finished floor elevation. All pressure control valves inside the vault shall have a minimum 2-foot clearance around the CMU wall.

In general, pressure control valves shall be aligned so that all associated piping passes perpendicularly through the walls of the vault. For large-pressure control stations, where thrust conditions from pressure and/or flow may dictate special design, the alignment of pressure control valves may be skewed (e.g., 45 degrees) to the walls of the vault. However, these special designs shall be approved by the District Engineer.

All connected water-conveying equipment and appurtenances within the walls of the vault shall be flanged. Each pressure regulating valve shall be isolated by gate or butterfly valves on both sides.

Pressure control stations shall have a by-pass line of equal size, but not less than 2-sizes smaller than the supply line to the station.

Pressure control valves, piping, gate valves, and all other appurtenances associated with pressure control stations shall conform to the District **Approved Materials List.**

3.5.6 System Control and Data Acquisition (SCADA) System

All tank and reservoir water levels, pump station parameters (pump run, pump call, pump off, flow rate, pressures, pump hours, valve malfunctions, etc.), and regulator

station parameters shall be designed to be telemetered to Waterworks which houses the District's SCADA system computer and central control.

Variance from the requirements under Section 3.5 may be requested by the applicant and may be permitted subject to the written approval by the District.

3.6 HYDRAULIC CALCULATIONS

All hydraulic calculations shall be prepared, signed, and sealed by a Professional Civil Engineer, licensed in the State of California. The calculations shall be submitted to the District Engineer for review and approval.

For pipeline analysis, the maximum Hazen-Williams coefficient (C) shall be assumed to be 120 for cement mortar-lined pipes and 130 for polyvinyl chloride pipes.

The applicant shall be responsible for improvements to the District's water distribution system to satisfy the requirements outlined in Sections 3.3, 3.4, and 3.5.

3.7 CROSS CONNECTIONS AND BACKFLOW PREVENTION ASSEMBLIES

Backflow prevention assemblies (BFPA), including but not necessarily limited to double check detector assemblies (DCDA) and reduced pressure principle (RPP) assemblies shall be installed within ten (10) feet from the public-right-of way or District's easement

All BFPA's shall be screened from view to the maximum practical extent possible as directed by the Environmental Services Department, Planning Division

According to the AWWA definition, "cross-connection is an actual or potential connection between any part of a potable water system and an environment that would allow substances to enter the potable water system. Those substances could include gases, liquids, or solids, such as chemicals, water products, steam, water from other sources (potable or non-potable), and any matter that may change color or taste of water or add odor to water."

Cross connections may be regarded as direct or indirect. A direct connection is an arrangement whereby a safe water system is physically joined to a system containing unsafe water, wastewater, or other waste. An indirect connection is an arrangement

whereby unsafe water in a system may be blown, pulled by vacuum, or otherwise diverted into a safe water system.

To understand cross-connection and backflow prevention, several other terms need definition. Backflow is generally defined as the flow of any foreign liquids, gasses, or other substances into the distribution pipelines of a potable water supply from any other source than the intended one. For backflow to occur, two conditions must be present: (1) a link must exist between the potable and the non-potable system; (2) the resultant flow produced by the differential pressure must be toward the potable system. If the pressure in the non-potable system is greater than the pressure in the potable system, then backflow due to “back-pressure” occurs. A pump, elevated tank, or boiler can create back-pressure that is greater than the pressure in the potable system.

If the potable water system is at a pressure less than atmospheric (negative pressure), the atmospheric pressure on the foreign liquid will force it toward the partial vacuum, and back-siphonage occurs. This condition can occur when there is a water system outage or water main break. A more explicit term for backflow when sub-atmospheric pressure exists is back-siphonage. Back-siphonage is the backing up or siphoning, of a foreign liquid into a potable water system.

3.7.1 Authority and References

The Cross-Connection Control Officer for the District is an individual within (or on contract with) Waterworks District No. 8, who is responsible for ensuring that the devices are properly installed, maintained, and tested. The various protective devices are to be installed, maintained, and tested by and at the expense of the property owner.

All backflow prevention assemblies shall comply with the list of approved backflow prevention assemblies from the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research, and these Standards.

3.7.2 Types of Backflow Prevention

As described below, there are several different types of BFPA. The reduced pressure backflow principle assembly and double check detector assembly are used to prevent backflow and the DCDA also prevents back-siphonage. The air gap and pressure or atmospheric vacuum breakers" are used for the prevention of back-siphonage. Descriptions of each device are as follows:

A. Reduced Pressure Principle Assembly: Referred to as an RP or RPP, consists of two independently acting check valves, together with an automatically operating pressure differential relief valve located between the two check valves. The first check valve reduces the supply pressure at a predetermined amount so that during normal flow, and at the cessation of normal flow, the pressure between the two check valves shall be lower than the supply pressure. If either check valve leaks, the relief valve will discharge to the atmosphere. This will maintain the pressure in the zone between the two check valves lower than the supply pressure. The unit also has two shutoff valves (one upstream and one downstream of the checks) and test cocks for field testing.

B. Double Detector Check Valve Assembly: The double detector check valve assembly is consists of two single, independently acting check valves. The unit also has two tightly closing shutoff valves located at each end of the device and four test cocks for the testing of the check valves.

   The Double Check Detector Valve Assembly is specifically designed for use on fire protection system pipeline installations. The device protects potable water supplies from possible contamination through cross-connection to fire service pipelines by preventing the return of degraded fire system water into potable water supply mains which could happen when a VCFPD pumper connects to the system. This unit also contains an additional meter used to detect leakage or unauthorized use of water from fire system lines.

C. Air Gap: An air gap is a physical separation between the free-flowing discharge end of a potable pipeline and an open or non-pressure receiving vessel. To have an acceptable air gap, the end of the discharge pipe has to be at least

twice the diameter of the pipe above the topmost rim of the receiving vessel, but in no case can this distance be less than one inch.

This may seem to be the simplest, most effective, and least expensive type of protection. However, the chance for future cross-connections and the cost of additional pumps to pressurize the system often makes this an expensive protection system.

D. Pressure Vacuum Breaker: The pressure vacuum breaker is a device that contains within a single body, a single loaded check valve, and a loaded air opening valve which opens to admit air whenever the pressure within the body of the device approaches atmospheric. The body of the device has two shutoff valves and it is fitted with test cocks, for testing the device.

E. Atmospheric Vacuum Breaker: An atmospheric vacuum breaker, which has a moving element inside, prevents water from spilling from the device during flow and cessation of flow. The element drops down to provide a vent opening to prevent a vacuum condition. This device should not remain under pressure for long durations and it cannot have any shutoff valve downstream from it.

3.7.3 Requirements

Refer to the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research website for acceptable devices to be installed. Also, the following is provided:

A. Reduced Pressure Principle Assemblies: RPPs shall be used where cross-connections are known or probably will exist which cannot be eliminated and where the degree of severity is judged by the Cross-Connection Control Officer to warrant more than a DDC assembly.

Specific cases where an RPP assembly shall be required include, but are not limited to, the following:

1. Water service to industrial or commercial facilities where chemicals are used within the premises that could potentially be harmful to the District's water supply and distribution system.

2. Water service to hospitals and medical offices for humans and animals.

3. Irrigation systems such as median or parkways along streets or landscape areas within projects that are subject to backpressure.

4. Fire sprinkler systems using chemical additives.

5. Water service to mortuaries.

B. Double Detector Check Valve Assemblies: Use where there is an auxiliary water source to the premises handled in separate piping systems. Also, use where a cross-connection possibly exists where the substance would be objectionable, but not necessarily hazardous to health.

Specific Examples:

1. Service connections to multi-family residential homes or commercial buildings.

2. Service connection to homes or buildings supplied by well water.

3. Water service to buildings that use products that might impart an objectionable taste, odor, or color but would not be hazardous.

4. Food processing plants.

5. Community or project swimming pools.

C. Double Check Detector Valve: Use where there is no other meter between the water source and the building such as a fire service line for a building with fire sprinklers.

Specific Example:

1. Fire service line for building with fire sprinklers and/or private hydrants

D. Air Gap: Use where there is a connection to any premise using a dangerous or toxic substance in toxic concentrations. The air gap shall be located as close as practicable to the service cock and all piping between the service cock and receiving tank shall be entirely visible. If these conditions can't be met, then use an RP device as directed by the Cross-Connection Control Officer.

Specific Example:

1. A commercial installation where an air gap is required.

E. Pressure Vacuum Breaker (PVB): This unit can only be used where there can be no backpressure - only where there can be back-siphonage. The unit can have shutoff valves downstream of the device. The PVB must be installed at least 12 inches (0.3 mm) above the highest outlet or tank.

Specific Example:

1. Lawn irrigation system where outlets are situated below the device and where there may be a shutoff valve downstream (or past) the device such as a hose bib.

F. Atmospheric Vacuum Breaker: As with the pressure type, there should be no possibility of backpressure. This device cannot have any shutoff valves downstream of the device. It must be installed at least 6 inches (150 mm) above the highest outlet or tank.

1. Typical residential sprinkler system.

3.7.4 Installation

A. General: In terms of installation, there is an essential difference between service and internal protection. Service protection is a backflow prevention assemblies installed outside of the building, but on the customer side of the meter (except for the double detector check valve which doesn't have a meter). These devices are specifically intended to protect the District water system regardless of other protective devices inside the building.

Internal protection devices are installed within the building or facility.

B. Service Protection Devices: The owner/developer submits drawings of the building to the Building & Safety Department that may require an outside or service protection device. Also, the Cross-Connection Control Officer may require service protection after a survey of the facility once under construction or occupied unless internal cross-connections are abated to the satisfaction of the Cross-Connection Control Officer. In either case, the property owner should make arrangements with the Cross-Connection Control Officer for inspection.

   Once installed, the device will be recorded by the District and be tested by the owner per Section 3.7.6 – Testing and Maintenance.

C. Internal Protection: The installation of these devices falls under the jurisdiction of the Building & Safety Division as approved to the satisfaction of Waterworks District No. 8.

3.7.5 Approved Devices

Refer to the latest List of Approved Backflow Prevention Assemblies, as issued by University of Southern California Foundation for Cross-Connection Control and Hydraulic Research. It is intended for information and the Cross-Connection Control Officer should be consulted for the current approved list.

3.7.6 Testing and Maintenance

All backflow prevention assemblies shall be tested annually by a certified tester registered with VCRMA, with repairs or maintenance to be performed as recommended at the expense of the property owner. All District recorded owners of backflow prevention devices will be notified annually of their responsibility for inspection and repair. A Backflow Assembly Test Report form SHA-256 must be completed by the certified tester and returned to the VCRMA. Registration may be submitted online through the Ventura County Citizen Access Portal at https://vcca.ventura.org/EHD/.

SECTION 4
MATERIALS

4.1 GENERAL

Section 4.0 specifies the approved products and types of materials used in the construction of District-owned water facilities. The materials outlined herein have been selected for their strength, durability, and ease of maintenance. All materials, unless specifically approved otherwise by the District Engineer, shall be new and unused.

American Water Works Association (AWWA) or other standards are referenced where applicable; it shall be the responsibility of the engineer and contractor to become familiar with those standards to ensure compliance.

The District established parts standardization by including manufacturer and product names in an **Approved Materials List** and is available upon request. Other products may also meet District requirements; the contractor must indicate that the product/material is equal to the one specified in the construction documents and submit any requested change of materials in writing for District approval prior to placement.

The District reserves the right to discontinue or prohibit the use of any specific product or material. The District Engineer has the sole authority to make such changes based upon engineering judgment, product performance, or maintenance criteria.

4.2 DISTRICT ACCEPTABILITY OF MATERIAL

The contractor must bring the approved construction materials to the job site for inspection, prior to installation. The Waterworks Inspector shall have the right to reject any damaged or defective materials found on the job.

4.3 WATER MAIN PIPE MATERIALS

Water main pipe materials for nominal pipe size diameters 6-inch through 18-inch shall be either polyvinyl chloride (PVC) or ductile iron pipe (DIP) as described in this section or as otherwise directed by the District. Water main pipe materials for nominal pipe size diameters greater than 18-inches shall be either steel or DIP as described in this section or as otherwise directed by the District.

4.3.1 Polyvinyl Chloride (PVC) Pipe

A. Pipe: PVC pipe diameters 4-inch through 18-inch shall conform to the requirements of AWWA C900/C909. Each length of pipe shall be clearly marked with the following:

1. Nominal size and O.D. base;
2. Material code (i.e., PVC 1120);
3. Dimensional ratio (i.e., DR 25, where DR is equal to outside diameter divided by thickness);
4. AWWA pressure class (i.e., PC 150);
5. AWWA designation "AWWA C900"
6. Manufacturer's trade name and production record code;
7. Seal (mark) of testing agency.

The standard laying length shall be 20 feet ± 1 inch in all classes and sizes; no more than 15 percent may be of random lengths of not less than 10 feet each.

Each length of ethylene-propylene-diene monomer (EPDM) elastomeric-gasket bell-end pipe shall include one EPDM gasket. Where couplings are used, two EPDM gaskets shall be included with each end of the coupling.

Pipe surfaces shall be free from nicks, scratches, and other blemishes. The joining surfaces of pipe spigots and integral bell and sleeve reinforced bell sockets, shall be free from gouges or other imperfections that might cause leakage.

B. Joint Mechanism: The joints shall be either for the following:

1. Integral wall – Thickened bell end (bell and spigot with rubber gasket)
2. Integral sleeve reinforced bell end.
3. Ethylene-propylene-diene monomer (EPDM) elastomeric gasket couplings.

The use of PVC solvent cement joints on distribution pipelines or fittings is strictly prohibited.

C. Couplings and Fittings: Where couplings are used, they shall meet the requirements of AWWA C900 for PVC pipe diameters 4-inch through 12-inch. Couplings shall be as furnished by the manufacturer. Couplings shall be marked with the same information as the pipe.

Ductile iron fittings shall be used with PVC pipe as outlined in Section 4.4 – Main Line Fittings. The use of PVC solvent cement joints on distribution pipelines or fittings is strictly prohibited.

D. Physical Test Requirements: Inspection and testing by the manufacturer shall be in accordance with AWWA C900 for PVC pipe diameters 4-inch through 12-inch. A certified testing laboratory shall perform all testing and be available for inspection by the District Engineer. If requested by the District Engineer, the manufacturer shall supply a letter of certification attesting to the pipe specifications.

4.3.2 Steel Pipe

A. Pipe: Steel pipe shall conform to the requirements of AWWA C200 and as specified below, that pertain to electrically butt-welded, straight-seam or spiral-seam pipe and to seamless pipe 6-inch (150 mm) in diameter or larger. Steel pipe material shall conform to one of the criteria listed in Table 4-1 below.

TABLE 4-1 – Steel Pipe Criteria

Specifications	Grade	Minimum Yield Strength
ASTM A283	C	30,000 psi
ASTM A283	D	33,000 psi
ASTM A570	30	30,000 psi
ASTM A570	36	36,000 psi
ASTM A570	40	40,000 psi
ASTM A570	45	45,000 psi

The stress in the steel pipe shall not exceed the higher of 15,000 psi or one-half the designated working pressure and the minimum thickness as listed in Table 4-2.

TABLE 4-2 – Steel Pipe Pressure and Thickness

Diameter inches / (mm)	Minimum Thickness (inches)	Maximum Pressure* (psi)
8 (200)*	0.105 (12 gauge)	394
10 (250) *	0.135 (10 gauge)	405
12 (300) *	0.135 (10 gauge)	338
14 (350) *	0.150 (9 gauge)	321
16 (400) *	0.165(8 gauge)	309
18 (450)	0.179 (8 gauge)	298
20 (500)	0.209 (5 gauge)	313
22 (550)	0.224 (4 gauge)	305
24 (600)	0.250 (¼ inch)	313

* Assuming 15,000 psi stress and the formula below:

$$P = \frac{2ST}{D}$$ where

P = Pressure (psi [KPa])
S = Allowable stress 0.50 times the minimum yield strength of the steel.
T = Pipe wall thickness (inches)
D =Diameter of pipe (inches)

The gauges specified above consider the thickness required for welding as well as that required for external loads with a corrosion allowance.

Another factor for consideration in some steel lines is earth loads. For additional information on earth-loads refer to AWWA Manual M-11 and

Section 3.5.15 Water Main Design, Subsection H. Structural Requirements, of these standards.

The pipe shall be essentially round. The outside circumference shall not vary more than ± 1.0 percent from the nominal outside circumference based upon the diameter specified (except for the ends as specified below).

The pipe shall not deviate by more than 1/8 inch from a 10-foot long straight edge held against the pipe.

The standard pipe length shall be 40 feet long with a tolerance of ± 2 inches. Random lengths may average 29 feet or more, with minimum lengths not less than 20 feet each.

B. Cement Mortar Lining and Cement Mortar Coating (CML & CMC): Unless otherwise approved or as revised below, all steel pipe shall be mortar lined and coated in accordance with AWWA C205 that covers shop applied lining and coating. Cement shall be Type II, ASTM C150.

1. CML shall be uniform in thickness except at joints or other discontinuities. Lining ends shall be left square and uniform and the lining holdback shall be as specified for the particular type of joint.

TABLE 4-3 Cement Mortar Lining Thickness

Nominal Pipe Size (inches)	Lining Thickness (inches)	Tolerance (inches)
6 - 10	5/16	-1/16 + 1/8
12 - 16	3/8	-1/16 + 1/8
18 – 24	1/2	-1/16 + 1/8

The District requirements for thickness exceed those of AWWA, also, no wire fabric reinforcement is required for any lining of specials 24-inches in diameter or less.

2. CMC shall be a reinforced coating over all outside surfaces of the pipe and specials. The coating shall be of a uniform thickness except at joints or other discontinuities in the pipe. Ends of coatings shall be left square and uniform and the coating holdback shall be as specified for the particular type of joint.

C. Ductile Iron Pipe (DIP)

1. Pipe: The pipe shall conform to AWWA C151 for both quality and strength. Each pipe shall include the letters "DI" or the word "DUCTILE" to indicate the pipe material.

2. Joints: These shall be of the rubber gasket push-on joint type conforming to the requirements of AWWA C111 and being of the “Tyton®” type.

3. Fittings: All fittings shall conform to AWWA C110.

4. Lining and Coating: The internal surfaces shall be lined with a uniform thickness of cement mortar and then sealed with a bituminous coating in accordance with AWWA C104 unless otherwise approved. With the approval of the District Engineer, ductile iron fittings can be coated with fusion-bonded epoxy in accordance with AWWA C116.
A polyethylene encasement furnished and installed in accordance with AWWA C105 shall protect the outside surface.

4.4 MAIN LINE FITTINGS

Typical materials for main line fittings are included below. Contact the District Engineer for current materials standards.

A. Gray-Iron and Ductile Iron Fittings: These fittings shall meet the requirements of AWWA C110. All fittings shall be rated for 250 psi. This standard covers, but is not limited to, fittings with combinations of ends including mechanical joints, plain end, and flange. The fitting types are as follows:

90° bend, 45° bend, 22-1/2° bend, 11-1/4° bend.

Tees, reducers, caps & plugs, connecting pieces, flanged bends, flanged tees, flanged reducers.

Care must be exercised to not mix mechanical and flange joint ends since they will not mate. Section B outlines flange requirements.

B. Flanges, Bolts & Gaskets: They shall be flat-faced and meet the requirements of AWWA C207 and should be AWWA standard steel hub flanges, Class E (275 psi) (these flanges meet ANSI B-16.5). The flanges shall be marked with the size, name, or trademark of the manufacturer and with the AWWA class, i.e., "E". Bolts and nuts shall be stainless steel Type 316. Gaskets shall be of the drop-in gasket type, 1/8" thick EDPM, NSF 61-certified O-Ring. All bolts shall be coated with a nickel base anti-seize designed for use with stainless steel bolts, prior to installation.

TABLE 4-4 – Bolt Dimensions for Flanges

Pipe Size (inches)	Bolt Hole Diameter (inches)	Bolt - Diameter x Length (inches)	No. of Bolts (each)
6	7/8	¾ x 3½	8
8	7/8	¾ x 3½	8
10	1	7/8 x 4	12
12	1	7/8 x 4	12
14	1-1/8	1 x 4½	12
16	1-1/8	1 x 4 1/2	16
18	1-1/4	1 1/8 x 5	16

The inherent problem with flanges is that they are rigid and do not provide flexibility. Two keys to their installation are (1) uniform tightening of the bolts, and (2) prevention of bending or torsional strains. Proper anchorage is important to meet the latter objective. **The materials list includes all parts and manufacturers approved by the District.**

C. Mechanical Joint Fittings: This is a bolted joint of the stuffing box type. Each joint has a bell provided with an exterior flange having bolt holes or slots, and a socket with gaskets to receive the plain end of the pipe or fitting. The joint also has a sealing gasket, follower gland with bolt holes, and tee-head bolts with hexagonal nuts. Nuts and bolts shall be Type 316 stainless steel.

The mechanical joints shall meet AWWA C111. That standard covers the joint as well as gaskets and bolts. **The materials list includes all parts and manufacturers approved by the District.**

TABLE 4-5 – Bolt Dimensions for Mechanical Joint Fittings

Pipe Size (inches)	No. of Bolts (each)	Bolt Diameter x Length (inches)
6	6	¾ x 3½
8	6	¾ x 4
10	8	¾ x 4
12	8	¾ x 4
14	10	¾ x 4½
16	12	¾ x 4½
18	12	¾ x 4½

D. Flexible Couplings: Flexible couplings are designed to connect plain end pipes with a mechanical compression joint to provide a stress-relieving, flexible, leak-proof joint. Couplings can be ordered in steel or cast iron pipe sizes (note: C900 PVC pipe has the same O.D. as cast iron). The center barrel length for pipe diameters greater than 8-inches shall be a minimum of 12-inches. All flexible couplings shall be fusion-bonded epoxy lined and coated in accordance with AWWA C213. Fasteners, nuts, and bolts shall be Type 316 stainless steel. **The materials list includes all parts and manufacturers approved by the District.**

E. Transition Couplings: Transition Couplings are used to connect pipes of the same nominal size but different materials; AC, steel, and PVC pipes can be connected. The center barrel length for pipe diameters eight (8) inches or less shall be a minimum of twelve (12) inches. The center barrel length for pipe diameters greater than eight (8)

inches shall be a minimum of twelve (12) inches. All transition couplings shall be fusion-bonded epoxy lined and coated in accordance with AWWA C213. Fasteners, nuts, and bolts shall be Type 316 stainless steel. **The materials list includes all parts and manufacturers approved by the District.**

F. Flanged Coupling Adapters: Flanged coupling adapters are used to connect plain end pipe to flanged valves, pumps, meters, etc. They eliminate the need for both a flanged spool and coupling. Generally, they are available in sizes through 12 inches. All flanged coupling adapters shall be fusion-bonded epoxy lined and coated in accordance with AWWA C213. Fasteners, nuts, and bolts shall be Type 316 stainless steel. **The materials list includes all parts and manufacturers approved by the District.**

G. Expansion Joints: Expansion joints shall be manufactured of ductile iron conforming to AWWA C153. All expansion joints shall have the capability to expand and contract a minimum of 4 inches or as otherwise indicated on the approved plans. All expansion joints shall have restrained joints at each point of connection to the distribution piping, and be self-restrained at full expansion. All expansion joints shall be lined with 15-mil fusion bonded epoxy in accordance with AWWA C213. **The materials list includes all parts and manufacturers approved by the District.**

H. Flexible Ball Joints: Flexible ball joints shall be manufactured of ductile iron conforming to AWWA C153. All flexible ball joints shall consist of a ball and socket type of joint capable of at least 15 degrees minimum deflection. All flexible ball joints shall have restrained joints at each point of connection to the distribution piping. All flexible ball joints shall be lined with a minimum of 15 mils of fusion-bonded epoxy in accordance with AWWA C213. **The materials list includes all parts and manufacturers approved by the District.**

I. Flexible Expansion Joints: Flexible expansion joints shall be manufactured of ductile iron in accordance with AWWA C153. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint. Each integrated ball shall have a minimum of 15 degrees of deflection per ball and each integral expansion joint shall have a minimum of 4 inches of expansion (or as otherwise indicated on the approved plans). Flexible expansion joints shall be the double ball configuration. Single ball models may only be used with the prior written permission of the District Engineer. All flexible expansion joints shall have restrained joints at each point of connection to the distribution piping, and be self-restrained at full expansion. All flexible expansion joints shall be lined with 15 mil

fusion-bonded epoxy in accordance with AWWA C213. **The materials list includes all parts and manufacturers approved by the District.**

J. Special Steel Pipe Fittings: AWWA C208 covers special fittings such as elbows, tees, crosses, reducers, etc., and should be referred to for a specific application.

4.5 SERVICE LINE MATERIALS AND FITTINGS

The materials covered in this section include service line pipes, corporation stops, and saddles, as well as the valves inside the meter box. Unless stated otherwise in this section, service line materials and fittings shall comply with the provisions of AWWA Standard C800. Where specific manufacturers' products are listed, other equivalent products may be used only if approved in writing by the District. Refer to District Standard Plate: *Water Meter Service Installations* and Sections 3.5.2.2 – Meters and Service Lines and 6.11 – Service Connections and Service Lines, of these standards for design and construction considerations. Section 4.5 is for a minimum 1-inch size service line.

A. Copper Pipe: Copper pipe material is approved for all 1-inch through 2-inch service lines. The pipe shall be Type K soft copper tubing with solder fittings. Solder fittings shall be lead-free. Solder shall be of the type certified for use in potable water applications as specified in AWWA Standard C800.

B. Cross-linked Polyethylene (PEX) Pipe: Polyethylene Pipe is commonly known as Municipex® pipe material and is used only in corrosive soils as recommended in a Geotechnical report, and as approved by the District Engineer. Pipe diameters range from 1-inch through 2-inch services lines. The pipe shall be modified polyethylene material, typically high-density polyethylene (HDPE), with compression fittings. Compression joint fittings shall be manufactured in accordance with AWWA C800.

C. Service Saddles: Service saddles shall be either the doublewide strap type made of bronze with bronze nuts, or the stainless double steel strap type. The thread shall be a female iron pipe. **The materials list includes all parts and manufacturers approved by the District.**

D. Corporation (Corp) Stops: Corp stops shall be bronze with a male iron pipe thread on the inlet side. 1-inch and 2-inch Corp stops shall be of the ball valve type. **The materials list includes all parts and manufacturers approved by the District.**

E. Angle Meter Ball Valve Stop: Standard angle meter ball valve stops shall be bronze and 1-inch in size; in the 2-inch size, they shall be a flanged angle meter ball valve. **The materials list includes all parts and manufacturers approved by the District.**

F. Customer Hand Valve: Customer hand valves shall be full-flow bronze ball valves with a customer handle. The outlets shall be female iron pipe threads. **The materials list includes all parts and manufacturers approved by the District.**

4.6 METER BOXES AND VALVES

All meter boxes shall have provisions for a touch/radio read receptacle. The meter boxes for 1-inch and 2-inch meters shall be concrete with a concrete cover and rectangular concrete reading lid according to the District-approved materials list.

Traffic lids are typically not approved since the meter boxes should be placed outside the traveled right-of-way, including driveways. Where no other alternative is available and the meter box will be in the traveled right-of-way, then a steel traffic-rated lid or composite lid shall be used. The materials list includes all parts and manufacturers approved by the District. The engineer is expected to design the location of the meter boxes outside of driveways, with the minimum clearances, and comply with District Standard Plates: *Location of Hydrants and Meters*.

The angle meter stops and customer hand valves placed inside the valve box are outlined in Section 4.5 above.

A temporary jumper supplied by the District shall be installed inside the meter box to provide water during vertical construction of a building. The installation of the meter shall occur once all District fees have been paid, and prior to issuance of a Certificate of Occupancy by the Building and Safety Division.

4.7 WATER METERS

The District shall select the manufacturer and install the approved water meter type.

4.8 MAIN LINE VALVES

All main line valves shall include a valve extension if the top of the operating nut is five (5) feet deep or greater. All valve extensions shall be pinned to the operating nut.

A. Butterfly Valves:

1. General: All butterfly valves shall be of the tight-closing, rubber-seat type conforming to AWWA C504, latest revision, except as noted herein. Valves shall be bubble-tight at the rated pressure in either direction and shall be suitable for throttling service and/or operation after long periods of inactivity. The manufacturer shall be ISO 9001 certified or have similar certification up and above AWWA standards. Valve discs shall rotate 90 degrees from a fully open to a tightly closed position.

2. Valve body: Valve bodies shall be cast iron ASTM A536, Class B with integrally cast mechanical joints, ends for the pipe, or flanged ends. All flanged ends shall be ANSI B16.1 flange drilling.

3. Disc: Discs for butterfly valves size 10-inch to 24-inch shall be of the concentric design. Valve discs shall be ductile iron ASTM A536, Grade 65-45-12 with a Type 316 stainless steel edge.

4. Shaft: Valves 10-inch to 24-inch shall have a one-piece-through shaft of 18-8 stainless steel, corresponding to the requirements of AWWA C504, latest revision. The shafts shall fasten to the disc utilizing a threaded disc pin or through pin providing a positive leak-proof connection of the shaft to the disc.

5. Valve Seats: Seats for valves 10-inch to 24-inch shall be simultaneously bonded and vulcanized to the body of the valve. All interior surfaces in contact with water, excluding stainless steel and disc, shall be rubber-lined or epoxy-coated. Valves with the rubber seat located on the valve disc are not permitted. Seats shall be designed so that no adjustments or maintenance is required.

6. Bearings: All shaft bearings shall be of the self-lubricating, corrosion-resistant, sleeve type. Bearings shall be designed for horizontal and/or vertical shaft loading.

7. Packing: Shaft packing shall be self-adjusting and suitable for pressure or vacuum service. Packing for valves 30-inch or greater shall incorporate an adjustable packing gland and the packing shall be adjustable and/or replaceable without removing the valve actuator.

8. Valve Operators: Valve operators shall be of the manual traveling nut type and conform to AWWA C504. Operators shall be equipped with a 2-inch AWWA square-operating nut. They shall be sealed-and-gasketed and lubricated for underground service. The operator shall be capable of withstanding an input torque of 450 lb-ft at an extreme operator position without damage. The valve manufacturer shall install and test all valve operators at the factory. Bonnet and packing bolts shall be Type 316 stainless steel.

9. Painting and Coating: All valves shall be epoxy coated overall in accordance with Section 4.16 – Painting. The valve disc shall be Fusion Bonded Epoxy Coated with an AWWA NSF-61 coating system or liquid epoxy on wetted interior surfaces 16 mils, holiday free. Exterior coating shall have 16 mils of liquid epoxy.

10. Testing: All valves shall be hydrostatic and leak tested in accordance with ANSI/AWWA C504, latest revision with the following modification:
Buried service valves shall be tested and rated to 200 psi to facilitate field system hydro-test.

11. Proof of Design: The contractor shall provide an Affidavit of Compliance certifying all valves from the manufacturer to the District. This Affidavit of Compliance shall serve as proof of compliance with ANSI/AWWA C504, latest revision.

12. Marking: The manufacturer shall show the valve size, manufacturer, class, and year of manufacture on each valve.

13. Approved Valves: The materials list includes all valves and manufacturers approved by the District.

14. Number of Turns: The product manufacturer determines the number of turns to open or close a valve. The District approves the product manufacturer.

15. End Types: Available end types are Flange x Flange (F x F), Flange x Mechanical Joint (F x M.J.), Mechanical Joint x Mechanical Joint (M.J. x M.J.).

The materials list includes all parts and manufacturers approved by the District.

B. Resilient-Seated Gate Valves:

1. General: This specification pertains to resilient-seated gate valves for underground service lines from 3-inches to 10-inches where design gage-pressures are less than 200 psig. Resilient-seated gate valves shall meet the requirements of AWWA standard specification C509 or the latest revision. Resilient-seated gate valves shall be the same size as the main. All such valves shall be of the non-rising stem type, with an O-ring seal, equipped with a 2-inch square operating nut that shall turn to the left in a counter-clockwise direction to open the valve. All bonnet, seal plate, packing plate nuts and bolts, shall be high strength Type 316 stainless steel. Valve bodies and gates shall be manufactured of ductile iron with internal working parts machined from the grades of bronze as specified in Table 4-6.

TABLE 4-6 – Gate Valve Stem Material

Part	Grade of Bronze*
Stem	E
Stem Nut	A

*Based on Table 5, AWWA C509
Grade refers to alloy yield strength and corrosion resistance.

The materials list includes all valves and manufacturers approved by the District.

C. Tapping Sleeves and Valves:

1. Tapping Sleeves: Tapping sleeves shall be of high tensile ductile iron or stainless steel construction specifically designed to withstand the strains and vibrations of the tapping machine and shall include a stainless steel tapping saddle.

   The tapping sleeve shall have gaskets at each end of the sleeve. Sleeves with only an O-ring around the tapped hole are not permitted.
   Manufacturers and models are included in the District approved materials list.

   In selecting the class of the tapping sleeve, Class 200 shall be used wherever the main line is Class 200 or if the operating pressure exceeds 125 psi.

2. Tapping Valve: Tapping valves shall meet all of the requirements for resilient-seated gate valves as described in Section 4.8 – Main Line Valves. The tapping valve shall have a clear unobstructed waterway. The seat rings shall be of a large diameter to allow entry of the full diameter tapping machine cutter.

3. Coating: See Section 4.16 – Painting for painting and coating requirements.

D. Valve Stacks and Covers: The valve stack shall be SDR 35 PVC pipe 8-inches in diameter. Refer to District Standard Plate: *Valve Assembly Details*.

   The valve box cap shall be of the heavy-duty, long body type. The valve cover must have the acronym WWD8 inscribed on top.

The materials list includes all parts and manufacturers approved by the District.

4.9 COMBINATION AIR RELEASE AND VACUUM ASSEMBLIES

A. Mechanical Assembly: The mechanical assembly has both the features of an air release valve and an air vacuum valve as outlined in Section 3.5.2.5 - Air Release and Vacuum Valves. The assembly shall be housed in a cast iron body and all internal parts such as the float, bushing, level pins, seat, and baffle shall be either stainless steel or brass as furnished by the manufacturer. All assemblies shall be rated at a maximum operating pressure of 300 psi.

The inlet threads shall be iron pipe threads of the same size as the valve.

The materials list includes all parts and manufacturers approved by the District

B. Metal Housing (CAN): Refer to District Standard Plate: *Combination Air Release and Vacuum Valve Installation*.

C. Service Lines: Type K soft copper per Section 4.5 – Service Line Materials and Fittings. There shall be a corporation stop at the main per Section 4.5.

D. Ball Valves: Refer to District approved materials list, with a female iron pipe thread on each end and tee head.

E. Guard Posts: See Section 4.17 – Marker Posts.

4.10 BLOW-OFF ASSEMBLIES

A. 2-inch Blow-Off: Refer to District Standard Plate: *2-inch Blow-Off Installation*. Materials shall be as follows:

1. Service Line: Service lines shall be Type K copper per Section 4.5 – Service Line Laterals and Fittings with a corporation stop and saddle at the water main line per Section 4.5.

2. 2-inch Ball Valves: Ball valves shall have a female iron pipe thread on each end and tee head. Refer to District approved materials list.

3. Vault: The vault shall be the same as for a 1-inch meter installation. See Section 4.5 - Service Line Materials and Fittings.

4. Plastic Plug: The plug shall protect the top of the ball valve.

5. Corporation Stop: Refer to the District approved materials list

B. 4-inch Blow-Off: Refer to District Standard Plate: *4-inch Blow-Off Installation*. Materials shall be as follows:

1. Service Line. Service lines shall be 4-inch PVC per Section 4.8 – Main Line Valves. There shall be a bottom outlet tee on the main per Section 4.4 as well as other miscellaneous fittings.

2. 4-inch Valve: Valve shall be resilient-seated gate valve per Section 4.8 – Main Line Valves.

3. Flanged Spool: Flanged spool shall be made of ductile iron per Section 4.4 – Main Line Fittings.

4. 4-inch Brass Nipple.

5. 2-inch Ball Valve: Ball valves shall be with a female iron pipe thread on each end and tee head. Refer to District approved materials list,

6. Vault: Vault shall be a concrete box with a one-piece concrete cover with a reading lid. Refer to District approved materials list for parts and manufacturers.

7. Guard Posts: Guard posts shall be required where an above-ground blow-off is located in undeveloped areas. See Section 4.17 – Marker Posts.

4.11 FIRE HYDRANT ASSEMBLIES

A. Fire Hydrant Body: Public fire hydrants maintained by the District shall comply with the latest version of the Ventura County Fire Protection District Fire Prevention Bureau Standard 14.5.3.

Fire hydrant outlets shall be protected with caps chained to the hydrant head. Additional specifications required by the District are as follows:

1. The hydrant upper portion (above ground) may consist of either one or two sections.

2. Hydrant materials shall be in accordance with AWWA C503.

3. Hydrants shall be designed per AWWA C503 with a minimum working pressure of 150 psi.

4. Hydrant flanges shall contain six (6) equally spaced bolt holes of 7/8 inch diameter on a 9 3/8 inch diameter flange.

5. All hydrants shall be permanently marked with the manufacturer's name and manufacture date.

6. Caps shall be plastic.

All District approved fire hydrant parts and manufacturers are included in the materials list.

B. Hydrant Lateral: Hydrant laterals shall be 6-inch PVC pipe and C900 DR 18 pressure class 235 or greater. See Section 4.3 – Main Line Pipe Materials for material specifications. For fittings description see Section 4.4 – Main Line Fittings. For thrust block sizes refer to District Standard Plate: *Thrust and Anchor Block Sizes*. Where the fire hydrant also serves as a blow-off, the tee in the line shall be a "bottom outlet tee" specially made so that the flow will scour the bottom of the main line.

C. Hydrant Valve: Hydrant valves shall be 6-inch valves with flange X-ring-tite ends for PVC pipe discussed in Section 4.8 – Main Line Valves.

D. Painting: See Section 4.16 - Painting

E. Spools and Bury: As shown on Standard Plate: *Fire Hydrant Installation*, a 6” x 6” flanged breakaway extension spool shall be used between the bury and fire hydrant. The spool shall be made of ductile iron. The spool and bury shall be painted in accordance with the standard plate referenced above.

Hydrant buries shall be a 6-inch inside diameter and made of cast iron conforming to ASTM A-126 and AWWA C153. The bury shall be one piece with the top having a flange drilled with six (6) holes to receive the extension spool or hydrant. The bottom shall have a 90º bend. The bury end shall be a mechanical joint fitting. Buries are typically available in 30", 36", 42", and

48" lengths. The District-approved fire hydrant buries are included in the materials list.

F. Bolts: Alloy steel break-off bolts shall be used to attach the fire hydrant to the extension spool. All Bolts shall conform to ASTM A307 Grade A, ANSI B1.1, B18.2.1, ASTM C920, 100% silicone-filled, and Zinc Plated.

G. Main Line to Fire Hydrants: Separate lines used only for fire hydrants shall be a minimum of 8-inch in diameter. Actual size to be determined by District Engineer.

H. Private Fire Hydrants: Private fire hydrants shall be maintained by the property owner and shall comply with Chapter 4 of the latest version of the Ventura County Fire Protection District Fire Prevention Bureau Standard. The District does not review or approve the fire hydrant assembly.

The property owner shall install a Double Check Detector Backflow Assembly (DCDA) between the fire hydrant and point of connection to the public water main in accordance with Section 3.5 District Water Distribution System Requirements.

4.12 PIPE TRENCH MATERIALS

Refer to District Standard Plate: *Trench Terminology and Standard Dimensions* for trench cross-section terminology.

A. Within Pipe Zone: The pipe zone extends from the bottom of the trench to twelve (12) inches above the top of the pipe. The material within the pipe zone shall be clean, well-graded, imported sand. Sizes are shown in Table 4-7 below:

TABLE 4-7 – Sand Size

Sieve Size	Percent Passing (%)
No. 4	90-100
No. 8	80-95
No. 200	0-10

B. Above Pipe Zone: The material in the above pipe zone shall conform to the requirements of the City of Simi Valley Public Works Department, Ventura County Public Works Department, or the State of California, Division of Highways (Caltrans). In the absence of stricter requirements, the material above the pipe zone shall be native material compacted to 90% relative density that does not contain rocks larger than ¾-inches, and shall be made so graded that at least 40 percent of the material passes the No. 4 sieve.

C. Special Slurry Backfill: The City of Simi Valley Public Works Department may require the backfill above the pipe zone to be a one-sack slurry mix in place of soil backfill compacted at 90% relative density for pipelines laid in heavy traffic arterial streets. The slurry mix shall have no less than one sack of cement per cubic yard.

4.13 ROADWAY MATERIALS

Pavement materials (asphalt, aggregate base, and aggregate sub-base) for resurfacing of trenches cut into existing pavement shall comply with the latest requirements of the City of Simi Valley Public Works Department, Ventura County Public Works Department, or the State of California, Division of Highways.

4.14 CONCRETE MATERIAL

Approved concrete material shall be based on the 28-day compressive design strength and shall be chosen according to Table 4-8, showing its intended use:

TABLE 4-8 – Concrete Mix Design

Class	Application	28-Day Strength (Min.)	Max. Aggregate Size	Slump Min.	Slump Max.
A	Walls, structures and reinforced structural encasement	3,500 psi	1 1/2"	3"	6"
B	Trust blocks, non-reinforced pipe encasement, non-structural use	2,000 psi	1 1/2"	2"	"
C	Pump mix for abandoning lines	2,000 psi	3/8"	*	*

* Adequate for pumping

4.15 REINFORCING STEEL

A. Bar Reinforcement: Bar reinforcement shall be Grade 40 minimum deformed bars conforming to ASTM A615, accurately placed securely in position. Where bars are spliced, the length of the lap shall be at least thirty (30) times the bar diameter, or butt-welded, except where otherwise shown on the plans.

B. Mesh Reinforcement: Mesh reinforcement shall conform to the requirements of ASTM A185; wire gauge and mesh dimensions will be as shown on the plans.

4.16 PAINT

A. General: This section will only cover the paint materials. Painting as it relates to construction is outlined in Section 6.21 - Painting.

All paint colors shall be as specified or as selected by the District. Paints shall be delivered to the job site in original, unopened cans or packages bearing the brand name and manufacturer name and date.

Paints specified shall be used unless written approval by the District is obtained in advance to use other products.

B. Specific Material Requirements:

1. Fire Hydrants: If hydrants are bronze, the etching material shall be Krud Ketter® Metal Clean & Etch. The procedure shall be to first degrease metal surfaces with Carboline® Thinner #10. Carboline® Multi-Bond 150 Alkyd or Carboline® Shop Primer #1 shall be used before the finish coats. Two (2) finish coats of yellow paint as specified in the approved materials list (gloss finish) shall be required.

2. Combination Air Release Cans: District-approved, standard manufactured cans shall be finished in stone-type material.

3. Cast Iron Valves, Fittings, and Miscellaneous Metal (except bronze): Exterior surface shall receive two (2) coats of Carboline® Bitumastic No. 50 (15 mils each).

4. PR, DC, and DCDA: Prior to coating, the contractor shall submit color samples as specified on the approved materials list, to the District for approval. The following colors are designated to correspond with the type of backflow prevention assembly:

    - Domestic: Blue (gloss finish)
    - Fire: Red (gloss finish)
    - Irrigation: Green (gloss finish)
    - Non-potable: Purple (gloss finish)

    Designated colors shall be painted on the backflow prevention or reduced pressure assembly.

    In addition to the bitumastic coating, all exterior surfaces including nuts and bolts shall be encapsulated with a Polyethylene wrap, 8-mil tube.

    The interior of valves with the exception of bronze and working parts (see exceptions below) shall be coated with 100 percent solids, catalytically setting epoxy that is manufactured for use in the interior of potable water systems. The fusion method of coating 100 percent solid epoxy is acceptable. The two components shall be of different colors to aid in complete mixing. The epoxy lining shall be factory applied; field applications are not permitted.

    Exceptions to the above policy for interior coating require written approval by the District before delivery to the job site.

    Fittings shall all be cement mortar lined or epoxy lined.

5. Steel Surfaces: One (1) shop coat of rust penetrating Carboline® Multi-Bond 150 and one (1) field coat of Carboline® Shop Primer #1 shall be used. Finish coats for inside locations shall be two (2) coats of Carboline® 890 (epoxy mastic). Finish coats for outside locations shall be two (2) coats of Carboline® 139 Alkyd Polyurethane (Alkyd).

Cast iron and other bitumen-coated metals located above ground and/or in vaults shall receive two coats of Carboline® Multi-Bond 120 (synthetic resin) with 48 hours drying time between coats. Finish coats in the pressure regulating station vaults and other inside locations except meter vaults shall be two (2) coats of Carboline® 890 (epoxy mastic). Finish coats for outside locations shall be two (2)coats of Carboline® 139 Alkyd Polyurethane (Alkyd).

6. Concrete and Masonry: Exterior surfaces shall receive one (1) coat of Carboline® Flexxide Masonry Block Sealer, or Dutch Boy® Block Coat No. 30W01; one (1) coat of Dutch Boy® Nalprep No. 019; and one coat of Dutch Boy® Nalcrete, or two coats Carboline® Flexxide HB Elastamameric or 3359.

   Exterior surfaces below ground shall receive two (2) coats of Carboline® Bitumastic Super Service Black, 12 mils/coat, or approved equivalent.

   Interior, above-ground surfaces, shall receive one (1) coat of Dutch Boy® Masonry Vinyl Speed Primer No. 30W10 or Sentry® 500 Resurfacer, and one (1) coat of Dutch Boy® Masonry Vinyl No. 32W11, or Koppers® 601 Interior.

   Interior, below ground surfaces, such as in pressure reducing stations and lift stations, shall receive a cementitious seal coat of Sentry® Semcrete 610. After at least three (3) days, two (2) coats of Carboline® Flexxide HB Elastomeric or 3359 shall be applied.

7. Wood: Exterior locations shall receive one (1) primer coat and two (2) finish coats. Primer shall be one (1) coat Carboline® 139 Alkyd Polyurethane (alkyd) thinned 20%. Finish shall be two coats of Carboline® 139 Alkyd Polyurethane (Alkyd).

   Interior wood surfaces shall receive one (1) primer coat and two (2) finish coats. Primer shall be one (1) coat of Carboline® Multi-Bond 120. The finish coat shall be two (2) coats of Carboline® 139 Alkyd Polyurethane (Alkyd).

C. Plastic Film Wrap: Plastic film wrap shall be used around all buried valves, bolted flanges, and other fittings. Polyethylene film shall be of virgin polyethylene as produced by DuPont® as Alathon® resin and shall meet the requirements of ASTM

Designation D 1248 for Type 1, Class A, Grade E-1, and shall have a maximum flow rate or nominal melt index of 0.4 g/min.

The polyethylene film shall be 10 mils in thickness, and of sufficient length to firmly attach the film to the pipe on either side of the valve, flange, or fitting. The following minimum flat sheet widths used for the specified valve sizes are shown in Table 4.9:

TABLE 4-9 – Polyethylene Flat Sheet Dimensions

Nominal Valve Size (inches)	Minimum Flat Sheet Width (inches)
4	24
6	24
8	24
10	30
12	36
16	48
18	48

Tubular material may be purchased and cut with one side to fold out to the required width.

Tape for securing the polyethylene wrap shall be two (2) inch wide adhesive tape such as Polyken® No. 900 (Polyethylene), Scotchrap® No. 5 (Polyvinyl), or approved equal. The tape shall be such that the adhesive will bond securely to both metal surfaces and polyethylene film.

4.17 MARKER POSTS

When shown on the construction plans, marker or guard posts shall be installed per the requirements of the District. Marker posts shall be 4-inch diameter, schedule 40 galvanized steel pipe, and 5-foot 6-inches in length. Marker posts shall be set 2-feet 6-inches below the ground surface and centered in a concrete base of not less than 18-

inches in diameter with a minimum of 3-inch of end cover. Marker posts shall be filled with concrete.

Unless otherwise approved, marker posts shall be painted yellow (gloss finish) as specified in the approved materials list and Section 4.16 – Painting.

SECTION 5
PLAN PREPARATION

5.1 GENERAL

The District has established procedures for the preparation of Water Improvement Plans (Plans). Deviations from these requirements, unless specifically authorized by the District, shall be cause for rejection by the District. It is the responsibility of the engineer to become familiar with District Standards. For all projects subject to City approval, the engineer shall submit all water improvement plans to the District for review. Plans shall be submitted on plain bond paper, or electronically during the review process. Final construction plans shall be submitted in ink on 4.0 mil. double-mat Mylar sheets.

The design of and plan preparation for all water system improvements and extensions or modifications shall be performed by or under the direct supervision of a professional engineer (engineer) with current registration in the State of California under the California Business and Professions Code; Sections 6700 – 6706.3.

All Plans and Specifications shall conform to the requirements of the District. Where Federal, State, or District requirements conflict, the more restrictive requirements shall govern. The engineer shall sign and stamp all plans, specifications, and reports to indicate responsibility for each document.

The engineer shall have the distinct responsibility to follow the progress of the work and to submit change orders or to incorporate "As-Built" information on the drawings.

The responsibility for the accuracy and completeness of the drawings rests with the engineer. By signing the drawings, the District Engineer attests to the fact that they have been reviewed and that the District has authorized construction. Acceptance of plans by the District does not in any way relieve the engineer of the responsibility to meet all of the District's requirements, as well as all requirements of other agencies having jurisdiction. If the District Engineer determines that the requirements have not been satisfied, the drawings may be revised or supplemented. In most cases, District signed drawings approved for construction should not require revisions based upon subsequent revisions to these standards. The District Engineer may determine a change is necessary based upon a significant change in the standards or if the developer does not proceed to construction within the time allowed in the development agreement.

5.2 SHEET SIZE AND MARGINS

Overall dimensions 24" x 36" (600mm x 900mm). Margins shall be two inches (50mm) on left, all other 1/2 inch (13mm).

5.3 SIGNATURE BLOCK

All sheets of the plans shall have an approved signature block as shown on the District Standard Plates: *Standard Title Sheet* and *Standard Plan and Profile*. The approval blocks shall be signed before any construction occurs. Any changes to the plans after initial approval shall be shown as revisions and shall be approved by the District.

5.3.1 Ventura County Fire Protection District (VCFPD)

A signature block for VCFPD approving the fire hydrant location only, as illustrated below, shall be included on the cover sheet. The VCFPD representative shall sign the cover prior to acquiring signatures from the District.

VENTURA COUNTY FIRE PROTECTION DISTRICT

REQUIRED FIRE FLOW _____ @ 20 PSI.

HYDRANTS SHALL BE INSTALLED PER VCFD AND WWD8 STANDARDS.

= DENOTES 6" WET BARREL HYDRANT WITH _____ 4" & _____ 2 1/2" OUTLETS.

_____ _____

REVIEWED DATE

5.4 COVER SHEET

Cover sheets are available from the District in the preferred format in hard copy format for a small charge. The District also provides the preferred format cover sheet as an Auto Cad file on either a computer disk for a small fee or via e-mail at no charge. This shall be the first sheet in the set and shall contain:

A. Location Map: A location map with an overall plan at a scale of 1" = 250 ft. (25mm = 76m) showing, named streets, lot lines, and public right-of-way/easement lines. The cover sheet shall include a note as to the pressure zone in which the proposed project is located.

B. Vicinity Map: A vicinity map with a scale of 1" = 1,000 ft. (25mm = 305m) showing tract boundary, streets, adjacent tracts, and arterial streets outside of tract boundaries.

C. Benchmarks: All benchmarks used in the project shall be graphically shown on this sheet and the elevations, descriptions, location, etc., spelled out as illustrated below:

BM No. _____ Elev. _____ F.B. _____ Page _____

Type of Marker _____

Location _____

All elevations used in the preparation of standard plans shall be based on (NAD-1983, State Plane California V, US feet).

D. General Notes: The general notes shall be shown on the cover sheet and need not be shown on the other sheets. The general notes are as follows:

1. FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE WATERWORKS DISTRICT NO. 8 (WWD8) DESIGN AND CONSTRUCTION STANDARDS, AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS, AND THE STANDARD PLANS AND SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK). CONTRACTOR SHALL BE FAMILIAR AND WITH ALL APPLICABLE STANDARDS, AND UPON DISCOVERY OF A DISCREPANCY BETWEEN STANDARDS, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE DISTRICT ENGINEER AND REQUEST CLARIFICATION.

2. AN ENCROACHMENT PERMIT SHALL BE REQUIRED FOR ALL DISTRICT PROJECTS WHETHER OR NOT THE PROJECT IS LOCATED WITHIN THE CITY LIMITS, DISTRICT EASEMENTS, AND DISTRICT SERVICE AREAS.

3. CONTRACTOR SHALL POSSESS A VALID CLASS A GENERAL ENGINEERING LICENSE FOR ALL WORK RELATED TO THE DISTRICT'S WATER SYSTEM.

4. CONTRACTOR IS PERMITTED TO CONSTRUCT IMPROVEMENTS SHOWN ON THE APPROVED CONSTRUCTION PLANS, ONLY. CHANGES IN THE WORK REQUIRE FORMAL PLAN REVISIONS AND MUST BE APPROVED BY THE DISTRICT PRIOR TO THE START OF CHANGED WORK.

5. CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THESE REQUIREMENTS SHALL BE IN EFFECT CONTINUOUSLY FROM CONTRACTOR'S INITIAL MOBILIZATION THROUGH PROJECT ACCEPTANCE.

6. CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD HARMLESS DISTRICT, ITS AGENTS, OFFICIALS, OFFICERS, REPRESENTATIVES, AND EMPLOYEES FROM AND AGAINST ALL CLAIMS, LAWSUITS, AND LIABILITY, REAL OR ALLEGED, RELATED TO PERFORMANCE WITH THE PROJECT.

7. ALL WORK SHALL BE COMPLETED DURING THE HOURS INDICATED ON THE ENCROACHMENT PERMIT. OVERTIME INSPECTION, WHETHER OR NOT SCHEDULED IN ADVANCE, WILL BE BILLED TO THE CONTRACTOR. CONTRACTOR'S PAYMENT OF ALL FEES IS A CONDITION OF PROJECT ACCEPTANCE.

8. CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION STAKING.

9. AS A FIRST ORDER OF WORK, CONTRACTOR SHALL POTHOLE ALL UTILITY CROSSINGS AND POINTS OF CONNECTION TO EXISTING WATER FACILITIES. POTHOLE DATA SHALL INCLUDE UTILITY DESCRIPTION, LOCATION (PIPELINE STATION AND OFFSET), DEPTH, AND OBSERVED CONDITION. A POTHOLE REPORT SHALL BE

SUBMITTED AND APPROVED BY THE DISTRICT PRIOR TO THE DISTRICT REVIEWING SUBMITTALS AS REQUIRED IN GENERAL NOTE NO. 10.

10. CONTRACTOR SHALL PROVIDE SHOP DRAWING SUBMITTALS FOR ALL PROPOSED MATERIALS, INCLUDING CATALOG DATA SHEETS IDENTIFYING MANUFACTURER, MODEL NUMBER, SIZE, AND QUANTITY OF EACH ITEM. CONTRACTOR'S FAILURE TO SUBMIT SHOP DRAWINGS OR INSTALLATION OF UNAPPROVED MATERIALS SHALL REQUIRE REMOVAL AND REPLACEMENT OF NON-APPROVED MATERIALS AT NO COST TO THE DISTRICT.

11. CONTRACTOR SHALL PROVIDE A SUBMITTAL WITH A SKETCH DESCRIBING THE SHUTDOWN AND TIE-IN SEQUENCE OF ACTIVITIES. INDICATE WHICH VALVES WILL BE CLOSED AND WHICH CUSTOMERS WILL BE TEMPORARILY OUT OF SERVICE. WATERLINES SHALL NOT BE OUT OF SERVICE FOR LONGER THAN FOUR (4) HOURS. TEMPORARY KICKERS (STEEL JACKS OR STRUTS, ETC.) MAY BE REQUIRED TO SUPPORT THRUST UNTIL CONCRETE HARDENS.

12. WATER MAIN CONNECTIONS SHALL BE AT LEAST THREE DIAMETERS FROM THE NEAREST JOINT AND NOT LESS THAN 24 INCHES.

13. TRENCHING SHALL BE LIMITED TO THE LENGTH OF PIPE THAT CAN BE INSTALLED IN A SINGLE DAY. TRENCH PLATES, WHEN USED, SHALL BE THE ANTI-SKID TYPE, RECESSED TO BE FLUSH WITH THE ADJACENT PAVEMENT, SECURELY PINNED INTO PAVEMENT AND ADJACENT PLATES SHALL BE TACK-WELDED TOGETHER.

14. TRENCHES AND OTHER EXCAVATIONS IN PAVED AREAS SHALL BE SAW-CUT IN STRAIGHT, NEAT, AND UNIFORM LINES.

15. WHERE EXCAVATIONS ARE ADJACENT TO EXISTING POWER POLES, CONTRACTOR SHALL SUPPORT AND PROTECT POLES IN-PLACE.

16. WHERE EXCAVATIONS INTERFERE WITH ABOVE-GROUND FACILITIES, SUCH AS SIGNS, FENCES, GATES OR BOLLARDS, CONTRACTOR SHALL REMOVE AND REPLACE SAID FACILITIES IN-KIND.

17. EXCAVATIONS SHALL BE BRACED IN ACCORDANCE WITH SSPWC SECTION 306-3. CONTRACTOR SHALL PROVIDE ADEQUATE SHEETING, SHORING, AND BRACING FOR WORKER PROTECTION FROM THE HAZARD OF CAVING GROUND. CONTRACTOR SHALL MAINTAIN COPIES OF ALL APPLICABLE SAFETY ORDERS AT THE JOBSITE.

18. CONTRACTOR IS NOT AUTHORIZED TO TURN VALVES ON THE EXISTING SYSTEM. FORTY-EIGHT HOURS PRIOR TO MAKING TIE-IN TO THE EXISTING WATER SYSTEM, CONTRACTOR SHALL NOTIFY THE DEPUTY DIRECTOR OF WATERWORKS SERVICES.

19. ALL WORK SHALL BE COORDINATED WITH THE APPROPRIATE INSPECTOR. THE WATERWORKS INSPECTOR MUST OBSERVE AND APPROVE ALL PUBLIC WATER FACILITIES UP TO AND INCLUDING THE WATER METER. THE BUILDING AND SAFETY DIVISION INSPECTOR WILL OBSERVE AND APPROVE ALL ON-SITE/PRIVATE FACILITIES, PRIVATE FIRE HYDRANTS, AND FIRE RISERS. THE PUBLIC WORKS INSPECTOR WILL OBSERVE AND APPROVE SURFACE IMPROVEMENTS SUCH AS THE ROADWAY, SIDEWALK, CURB AND GUTTER, AND TRENCH BACKFILL ABOVE THE PIPE ZONE

20. BACKFLOW PREVENTION ASSEMBLIES SHALL BE LOCATED ON PRIVATE PROPERTY, WITHIN 10 FEET OF THE PUBLIC RIGHT-OF-WAY.

21. WATERLINE STATIONING SHALL BE BASED ON THE HORIZONTAL PIPELINE CENTERLINE. PIPELINE ELEVATIONS SHALL BE TOP OF PIPE (TOP) UNLESS NOTED OTHERWISE.

22. ALL PIPELINE JOINTS SHALL BE FULLY-RESTRAINED, WHETHER OR NOT CALLED OUT ON THE PLANS.

23. ALL BURIED NUTS, BOLTS, AND WASHERS SHALL BE TYPE 316 STAINLESS STEEL AND COATED WITH ANTI-SEIZE LUBRICANT PRIOR TO INSTALLATION. ALL BURIED NUTS, BOLTS, AND WASHERS SHALL BE COATED WITH NO-OX-ID. THE LENGTH OF EACH BOLT OR STUD SHALL BE SUCH THAT BETWEEN ¼" AND ½" PROJECTS THROUGH THE NUT WHEN DRAWN TIGHT.

24. DUCTILE IRON AND STEEL FLANGES SHALL BE CLASS E PER AWWA C115 AND C207, RESPECTIVELY (AWWA WORKING PRESSURE RATING = 250 PSI). FLANGE BOLT PATTERN SHALL BE PER ANSI B16.1 FOR DUCTILE IRON AND ANSI B16.5 FOR STEEL (ANSI PRESSURE RATING = 175 PSI).

25. NOT ALL REQUIRED PIPE FITTINGS AND APPURTENANCES ARE SPECIFICALLY CALLED OUT ON THE PLANS BUT SHALL BE REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL PIPING SYSTEM.

26. DIELECTRIC COUPLINGS OR EQUIVALENT INSULATION BETWEEN DISSIMILAR METALS, INCLUDING MILD STEEL, STAINLESS STEEL, COPPER, AND BRASS SHALL BE UTILIZED.

27. CONTRACTOR SHALL PROVIDE A CLEAN AND ORGANIZED SET OF RECORD DRAWINGS, WHICH CLEARLY ILLUSTRATES THE "AS-BUILT" CONDITIONS. DISTRICT ACCEPTANCE OF RECORD DRAWINGS SHALL BE A CONDITION OF PROJECT ACCEPTANCE AND ENCROACHMENT PERMIT CLOSEOUT.

28. CONTRACTOR SHALL SALVAGE FITTINGS, VALVES, AND EQUIPMENT AS DIRECTED BY THE WATERWORKS INSPECTOR AND DELIVER TO THE WATERWORKS DISTRICT YARD, LOCATED AT 600 W. LOS ANGELES AVENUE, SIMI VALLEY, CA 93065.

29. CONTRACTOR SHALL APPLY FOR AND OBTAIN A TEMPORARY HYDRANT METER FOR CONSTRUCTION WATER, TESTING, AND DISINFECTION.

30. PRIOR TO CONNECTING NEW WORK TO THE DISTRICT'S WATER SYSTEM, CONTRACTOR SHALL HYDROSTATICALLY PRESSURE TEST PIPELINES PER AWWA C600. THE DISTRICT WATERWORKS INSPECTOR MUST BE PRESENT DURING ALL PRESSURE TESTING.

31. PRIOR TO CONNECTING NEW WORK TO THE DISTRICT'S WATER SYSTEM, CONTRACTOR SHALL DISINFECT AND TEST FACILITIES IN ACCORDANCE WITH AWWA C651 (WATER MAINS), C652 (STORAGE TANKS), AND C655 (FIELD DECHLORINATION). ALL DISINFECTION WORK SHALL BE PERFORMED BY PERSONNEL CERTIFIED BY THE CALIFORNIA STATE WATER BOARD. CONTRACTOR SHALL SUBMIT A DISINFECTION PLAN TO THE DISTRICT FOR REVIEW AND APPROVAL.

32. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING DAMAGED BENCHMARKS AND/OR OTHER SURVEY MONUMENTS.

33. SEQUENCE OF CONSTRUCTION ACTIVITIES:
    A. MATERIAL SUBMITTALS FOR APPROVAL BY THE DISTRICT
    B. PRECONSTRUCTION MEETING WITH WATERWORKS INSPECTOR
    C. POTHOLE ALL POINTS OF CONNECTION AND UTILITY CROSSINGS
    D. SUBMITTALS FOR APPROVAL BY DISTRICT ENGINEER
    E. ON-SITE MATERIALS INSPECTION
    F. CONSTRUCTION

General Notes are subject to change to suit the needs of the District.

E. The engineer’s California registration stamp including license shall be placed on the cover sheet, and a wet-signature must be included on the title sheet and each subsequent plan sheet.

F. Prior to the submittal of as-built/record drawings, the pertinent information shall be completed by the engineer on record.

Record Drawing certification by the engineer shall also be required and be worded as follows:

RECORD DRAWING CERTIFICATE

I HEREBY CERTIFY THAT THE WATER SYSTEME SHOWN ON THE CONSTRUCTION PLANS _____THROUGH _____HAVE BEEN CONSTRUCTED IN CONFORMANCE WITH THE LNES AND GRADES AS SHOWN ON SAID PLANS AND REFERENCED SPECIFICATIONS.

REGISTERED CIVIL ENGINEER

R.C.E NO. DATE

5.5 PLAN OF WATER SYSTEM

Plans shall show information including, but not be limited to, the following:

- Location of water lines, service lines, and other structures in relation to survey lines and stations. Structures shall include blow-offs, combination air release and vacuum valves, main line valves, fire hydrants, thrust blocks, and other water appurtenances.
- All data for horizontal deflections or curves.
- Limits of any easements.
- Pad locations, trees, walls, fences, etc. within a minimum of 25 feet of an easement.
- The footprint of proposed structures and all driveway aprons within 50 feet of proposed pipeline improvements.
- Lot numbers, Assessor Parcel Numbers, and pad elevations.
- All existing and/or proposed underground utilities and substructures that cross or parallel the water line. The identity of the owner and the size of each underground facility shall be included.
- Existing facilities of other water purveyor mains.

5.6 PROFILE OF WATER SYSTEM

Profile plan shall show information including, but not be limited to, the following:

- Water line with the size, length, type, class, and grade for each segment.

- Elevations at the top of pipe to ± 0.01 foot.
- Items such as valves and other structures or appurtenances that are included in the plan.
- Any special encasement required to carry loads on the pipe.
- Any existing substructure that crosses the water line including, but not limited to sewer lines, gas lines, telephone line conduit systems, power line conduit systems, storm drain facilities, telecommunications lines, and oil lines. The identity of the owner and the size of each underground facility shall be included.
- The grade of major parallel lines within 5 feet (1.5 m) of the water line shall be shown as dashed.

For Section 5.6 and 5.7, the City/District shall not be responsible for the accuracy of the location of these underground lines. Approval of the water plans by the City/District does not constitute a representation as to the accuracy of the location of, or the existence or non-existence of any underground utility, pipe, or structure within the limits of the project.

5.7 GRAPHIC SCALES AND NORTH ARROW

All plan and profile sheets shall contain:

A. A graphic scale, horizontal as well as vertical, illustrated such that a true representation is produced when the plans are reduced in size, and they shall be as follows:

Horizontal 1" = 40 feet (25mm = 7.6m)

Vertical 1" = 4 feet (25mm = 1.2m)

Double scale plans (i.e., 1" = 8 feet) may only be submitted where the predominant slope of the existing ground surface or any sheet exceeds 15 percent. In such cases, the words "Double Scale" shall be shown in bold font.

B. The North Arrow shall be oriented towards the top or to the right of the plan. Any deviation must be approved by the District Engineer.

5.8 PROCEDURE FOR APPROVAL

Plan Approval by the District shall be subject to satisfying the following requirements:

A. Requirements for authorization of construction are specified in Section 6.0 - Construction.

B. Requirements for final acceptance are specified in Section 9.0 – Requirements for Final Acceptance.

5.9 PLAN CHECK AND PROJECT REQUIREMENTS

The following is intended as a guideline to assist the preparer; it is not represented to be a complete list of requirements:

5.9.1 CHECK LIST FOR PLAN CHECKING

A. COVER SHEET
- ❑ Standard size 36” x 24”
- ❑ General notes
- ❑ Sheet index
- ❑ Public Utilities/Service contact information
- ❑ Underground service alert note
- ❑ Standard line types and symbol legends
- ❑ Abbreviations
- ❑ Revision and engineer's block
- ❑ VCFPD signature block for Hydrant location(s) approval
- ❑ Key/vicinity and location maps, including lot numbers and lot lines
- ❑ Adjacent tracts and street layout
- ❑ Pressure zone and elevation
- ❑ Benchmark and basis of bearings
- ❑ Design and record drawing certificates
- ❑ Pressure in the project and fire-flow requirement
- ❑ Engineer's stamp and a wet-signature

B. GENERAL DESIGN
- ❑ Conform to master plans and Section 3.0 – Design Criteria
- ❑ Check for oversizing requirements

- Check for pressure and fire-flow
- Selection of pipe type(s)
- For any tie-ins to the District's existing system, provide instructions relative to sequencing, timing, and phasing

C. PLAN AND PROFILE SHEETS

- Title block and signature block
- Construction notes
- Graphic scales
- North arrows
- Curve and line data, if applicable
- Assessor parcel number
- Lot numbers and pad elevations
- Right-of-way, property, easement lines, and lot boundaries
- Easements including line bearings, width, and reference to any applicable record easement document
- Street, curb dimensions, street names
- Existing underground and overhead utilities
- Existing water facilities such as meters, valves, fire hydrants, backflow prevention assemblies, blow-offs, air vacs, etc.
- Proposed water line with stationing from left to right
- Angle points - show deflection angle right or left moving up station
- Proposed water facilities such as meters, valves, fire hydrants, backflow prevention assemblies, blow-offs, air vacs, etc.
- Thrust blocks
- Pipe Separation shall be in accordance with District Standard Plate
- Tee Connection detail
- Min cover of 42-inches from the top of pipe to final grade/finished surface
- Pipe size(s) and type(s) and length
- Slope and radius of the pipe
- Inverts at connection points and utility crossings

5.9.2 PROJECT REQUIREMENTS

A. ADMINISTRATIVE BEFORE CONSTRUCTION OF MAIN(S)

- Agreement for construction

- Cost estimate
- Inspection and plan check fee
- Bonds and insurance
- Approval of materials
- Encroachment permits
- Pre-construction meeting with Waterworks Inspector

B. ADMINISTRATIVE DURING OR AFTER CONSTRUCTION OF MAIN(S)

- Change Order Fee
- Temporary hydrant meter permit
- Testing and Disinfection of water mains per Section 7.0 – Testing and Disinfection for Water Mains
- Acceptance of water main
- Payment of Capital Improvement Charges
- Water Will-Serve Letter
- Payment for the meter(s)
- Meter installation requests

5.10 STANDARD LANGUAGE FOR DEDICATION OF FACILITIES TO THE DISTRICT

The following language is an example of standard language for the dedication of facilities to the District. The language may be modified as necessary to be applicable to the project.

A. Grant Deed, Quitclaim Deed, Bill of Sale or Other. All of its rights, title, and interests in and to the water system, pipe lines, manholes, and appurtenances thereto as located in, on, over, under, and across streets, easements, and rights-of-way shown on Tract as per map thereof recorded in Book ___, Page ____, and shown on the easement(s) as per Document No. ____, recorded on , of the Official Records, in the Office of the County Recorder, County of Ventura, State of California.

B. Easement Deed. An easement and right-of-way to lay, construct, repair, maintain, operate, renew and replace pipe line and appurtenances incidental thereto for the transportation of water with the rights to ingress and egress to and from same, in, over, under, and across the following described real property in the County of Ventura, State of California, and rights to disturb the surface of the easement area or surface improvements constructed by the servient tenement wherein the responsibility for replacement or restoration shall belong to the servient tenement unless otherwise specified herein. Easements shall prohibit permanent construction within the easement to provide ingress and egress for maintenance and/or system operation of the pipeline or other District facility.

Additional language may be added by the District as required.

SECTION 6
CONSTRUCTION

6.1 GENERAL REQUIREMENTS

Section 6 describes the use of materials and labor for the construction of the public water system. The engineer shall prepare standard specifications and special provisions as are necessary to define the nature and location of the work, contract agreements, payment, and any other matters outlined in the standards.

A. Reference Standards: Specific standards incorporated into this section by reference include:
   - AWWA C206 "Field Welding of Steel Pipes".
   - AWWA C900 "Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches".
   - AWWA Manual M11 "Steel Pipe - Design and Installation".
   - AWWA Manual M16 "Work Practices for Asbestos-Cement Pipe".
   - AWWA Manual M17 "Installation, Operation and Maintenance of Fire Hydrants".
   - AWWA Manual M23 "PVC Pipe - Design and Installation".
   - Standard Specifications for Public Works Construction.

   The contractor shall refer to Section 4.0 - Materials along with this section and the respective plates to comply with approved materials used and method during construction. . The contractor must comply with the testing and disinfection procedures and requirements as per section 7.0 – Testing and Disinfection for Water Mains of these Standards.

B. Protection/Operation of Existing Water System: The protection and operation of the existing water system is a primary concern of the District. **No contractor shall be allowed to operate any existing water valves or to cause a shutdown of any portion of the District's water system without prior approval from the District.** The contractor shall notify the District at least 3 working days prior to a shutdown; a planned shutdown should be discussed at the pre-construction meeting and. District personnel performs all operation of valves in a planned shutdown. Shutdowns are allowed only if no other reasonable alternative exists; such as the use of a hot-tap connection in lieu of a cut-in tee. When shutdowns are required, the District shall evaluate whether the shutdown should occur during

the day or at night. Avoiding interruption and inconvenience to existing customers shall have a higher priority over contractor economics. The contractor shall provide notification to all affected customers as well as provide bottled water, water tanks, etc., where appropriate during a shutdown.

C. Quality of Materials: All materials, unless specifically approved otherwise by the District Engineer, shall be new and unused. In case a reference is not clear as to which of several available grades is required; the highest quality material shall be selected. The District Engineer shall have sole authority to determine the interpretation of all provisions requiring clarification. All construction bids submitted to the District shall indicate the proposed pipe material and the manufacturer name and date.

   The contractor shall have at the job site or be able to supply upon request, certified copies of factory or laboratory test reports showing the strength characteristics of any materials used in the work. For all reinforced concrete work, the contractor shall furnish in advance of pouring concrete and, if requested, the mix design and calculated concrete strength as prepared by the concrete supplier.

D. Substitutions: Where articles or materials are specified by brand or trade name, alternate materials or articles equal to those specified may be approved provided the request for approval is submitted for review and approval to the District Engineer, in writing, accompanied by supporting data, in ample time to permit investigations without delaying the work. Unless substitutions have received prior District approval, no deviation from the Standards will be allowed.

E. Quality of Workmanship: All work shall be performed by persons experienced in the specific work, under competent supervision, and in a first-class manner to the District's complete satisfaction. When work is being performed directly for the District; the contractor in the proposal shall provide a list of each subcontractor, and no substitutions shall be permitted without prior District approval.

F. Defective Work: Defective materials or workmanship that become evident within one year after field acceptance of completed work shall be replaced or repaired without cost to the District. Refusal of the contractor to correct defective work that is clearly his/her responsibility shall be considered just cause for exclusion from performing future work connected with the District's system. Such exclusion shall

not impair the District's right to bring legal action to correct the deficiencies as well as to withhold exoneration of performance and payment bonds.

G. City Inspection, Field Acceptance, and Guarantee Period: The District shall inspect all excavation, materials, pipe laying including appurtenant structures, trench backfill within the pipe zone, and testing. All such work shall be available for inspection at all times. The contractor shall be responsible to provide a five (5) working day notice to the District prior to the start of any work. Such notification will allow for scheduling a pre-construction meeting between interested parties. Failure to provide proper notification may delay the start date since the District may not be able to inspect the work and shall not accept any work for which inspection has not been arranged. The contractor shall be responsible for compliance with all District requirements and standards. Any acceptance of a portion of the work by a construction inspector shall not relieve the contractor of this basic responsibility.

Field acceptance is made by the Waterworks Inspector and shall not coincide with the date of District acceptance of the work. The one-year warranty period for all work shall begin upon District acceptance. Any defective work discovered during the warranty period shall be repaired or replaced and a new one-year warranty period will begin for that corrected work.

Inspection hours are from 7:30 am through 4:00 pm, Monday through Friday, unless otherwise approved in writing by the District Engineer. Requests for inspection after hours, on holidays, or weekends shall be submitted in advance by the Contractor such that the District Engineer can approve and issue written authorization at least 48 hours in advance. All after-hour, holiday, or weekend inspections shall be subject to additional charges.

H. Public Relations: The contractor shall conduct its affairs in a manner that will lessen the disturbance to residents adjacent to the work. In this regard, standard working hours are 7:00 a.m. to 5:00 p.m., Monday through Friday unless prior approval is received from the District. The job site shall be maintained in a condition that shall bring no discredit to the District or its personnel, and all affected private improvements shall be restored to their original condition or better.

6.2 PERMITS

The contractor shall obtain the following required permits as applicable:

A. Encroachment: Where construction will encroach into the public right-of-way or within District's easements, the contractor shall obtain all necessary encroachment permits. The City of Simi Valley Public Works Department issues the permit within the City of Simi Valley right-of-way and District easements. Within the County areas, a similar permit is required from the Ventura County Public Works Department.

B. Temporary Hydrant Meter: The contractor shall be required to obtain a temporary hydrant permit from the District if water is necessary for construction purposes. A portable hydrant meter shall be issued to the contractor to measure the quantity of water used during construction.

6.3 SHIPMENT AND DELIVERY

All pipes shall be braced and stacked to prevent damage during shipment. Any damaged pipe or fittings delivered and unloaded at the trench side shall be removed by the contractor from the worksite.

Handling of CMLC steel pipe, including off-loading and placement in the trench, shall be performed using nylon (or other approved type of) rigging straps so as not to damage the pipe coatings. Rigging straps shall be properly rated for the weight category of the lift. Chains shall not be allowed to come into contact with the pipe.

6.4 CLEARING AND GRUBBING

A. General: Clearing and grubbing of objectionable material from the right-of-way shall be performed with caution; existing underground improvements, trees, and shrubbery not to be removed from adjacent property, shall be protected from injury or damage.

   Trees, shrubs, fences, and all other improvements removed within District easements or public rights-of-way to permit construction and intended for replacement, shall be replaced in kind or size or with approved substitutes unless

permission to exclude such replacement is obtained from the owner/agency or granted by the District. Replacement requirements exclude native trees under 2-inch diameter or native brush. The contractor must contact the City's Landscape Inspector to conduct field inspections and provide the final approval of the area.

B. Removal and Disposal of Material: The contractor shall be responsible for leaving the site in a neat and finished appearance, free from debris or inflammable material. Disposal of removed material shall be in legally approved location(s).

C. Protected Trees: The developer and contractor must contact the City of Simi Valley Environmental Services Department, Planning Division should trimming, removing, or construction around protected trees be required. In general, any work under or within the drip line of a protected tree may be subject to special requirements.

6.5 UTILITIES AND EXISTING FACILITIES

A. Abandonment: Refer to Section 8.0 – Abandonment regarding abandonment of existing water lines and/or structures.

B. Utilities and Existing Facilities: The existing utilities and/or facilities shown on the construction plans shall be protected from damage during the excavation and backfilling of trenches and, if damaged, shall be repaired by and at the contractor's expense. Any existing utility and/or facility not shown on the plans, if inadvertently damaged during construction, shall be repaired by the contractor; and payment adjustment, if any, is subject to negotiation between the contractor and the developer without any District liability unless it is a District-sponsored project. The contractor shall contact the proper utility company if its facilities become damaged during construction.

Whether expressly indicated on the plans or not, all contractors shall call the Underground Service Alert (811) prior to any construction. Failure to do so shall not relieve the contractor of any liability associated with disturbance or damage to existing utilities.

In case it shall be necessary to remove any such utilities, facilities, or any portions thereof, the contractor shall notify the District and the owner of the structure. The

contractor shall not interfere with said utility and/or facility structures until disposition of the obstruction to the work has been determined and/or notice to relocate or remove has been granted by the District or the owner of the utility and/or facility so effected.

The fact that any underground utility and/or facility is not shown on plans shall not relieve the contractor's responsibility to comply with these standards. The contractor is responsible to ascertain the existence of underground utilities or facilities that may be subject to damage during construction.

The District will provide the location of existing service lines prior to construction when requested by the contractor with sufficient notification.

6.6 CONCRETE REMOVAL

Portions of existing concrete pavement, curbs, gutters, sidewalks, foundations, and other concrete or mortared structures shall be removed to the lines and elevations specified as shown on plans. Concrete structures or objects not shown or noted on the plans, shall be removed, where necessary, and disposed of by the contractor.

The contractor shall not cause damage to any portion of an existing concrete structure that is to remain in place during concrete removal operations. If damage does occur, the contractor, at its own expense, shall repair any such damage, to the satisfaction of the District. Repair/replacement of any sidewalks, curbs, and/or gutters shall be to the satisfaction of the City of Simi Valley or Ventura County Public Works Department, as appropriate. Where existing reinforcement is incorporated into new work, such reinforcement, shall be protected from damage and thoroughly cleaned of all adhering material before being embedded in new concrete

6.7 EXCAVATION AND TRENCHING

A. General: Trench excavation shall consist of all excavations involved in the grading and construction of the water line as shown on the plans. The contractor shall perform all excavation to depths indicated on the plans or otherwise specified or required. During excavation, material suitable for backfill shall be stock-piled in an orderly manner of sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. Stock-piled material shall not

obstruct existing sidewalks or driveways. All excavated materials not required, or unsuitable for backfill, shall be removed per Section 6.4 B - Removal and Disposal of Materials. Grading may be necessary to prevent surface water from flowing into trenches or other excavations; water from any source, shall not be allowed to accumulate and shall be removed by pumping or other approved methods. The contractor shall install sheeting and shoring as necessary for the protection of the work and the safety of personnel.

Unless otherwise indicated, the excavation shall be by open cut. When approved by the District, short sections of a trench may be tunneled if the pipe or duct can be safely, and properly installed, and backfill can be properly tamped in such tunnel sections.

B. Excavation: Excavation for water lines shall begin only after the delivery of pipe and other necessary materials to the worksite. After such delivery, trench excavation shall proceed as rapidly as possible, and the pipe installed and the trench backfilled without undue delay.

Where rock excavation is required, the rock shall be excavated to a minimum overdepth of 6 inches (150 mm) below the trench depths indicated on the drawings or specified. Overdepth in the rock excavation and unauthorized overdepth shall be backfilled with the same material as the bedding zone. Wet or otherwise unstable soil in the bottom of the trench, incapable of properly supporting and restraining the pipe, shall be removed to the depth required. The trench shall be backfilled to the proper grade with an appropriate material between coarse sand and crushed rock to provide a stable foundation.

C. Shoring: All shoring for open excavations shall conform to the State of California, Department of Industrial Relations Industrial Safety Division "Construction Safety Orders."

The contractor shall be responsible for adequately shored and braced excavations so that the earth will not slide, move, or settle, and so that all existing improvements will be fully protected from damage.

Once installed, shoring shall not be removed until the trench has been approved for backfill operations. Shoring shall only be removed during backfill operations in such a manner as to prevent any movement of the ground or damage to the pipe or other structures.

The contractor shall obtain and pay for all permits for any excavations over five (5) feet (1.52m) in depth into which a person is required to descend or any excavation less than five (5) feet (1.52m) in depth in soils where hazardous ground movement may be expected and into which a person is required to descend.

D. Trench Width and Grade: The width of the trench within the pipe zone shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed the amount detailed in the standard plates. In general, the following shall be adhered to as outlined in Table 6-1:

TABLE 6-1 - Open Trench Dimension

Nominal Pipe Diameter	Trench Width	
	Minimum	Maximum
6"-12" (150mm-300mm)	O.D.+ 12" (300mm)	O.D.+ 18" (450mm)
14"-18"(350mm-450mm)	O.D.+ 18" (450mm)	O.D.+ 24" (600mm)

Trench widths in excess of those shown may be as wide as necessary if for the explicit purpose of installing sheeting and bracing the performance of the work.

E. Pipe Subgrade: The trench bottom shall have a flat or semi-circular cross-section. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of each joint except for required "bell holes" at joints. A coupling hole shall be excavated as necessary with sufficient length, width, and depth to permit assembly and provide a minimum clearance of 3 inches (75mm) below the coupling for a length of 6 inches (150mm) beyond the coupling.

See Section 6-8 Pipe Bedding and Laying for specific requirements concerning pipe bedding.

6.8 PIPE BEDDING AND LAYING

A. General: This portion of the work includes the furnishing of all materials and their proper assembly to result in a water line installation that is true to line and grade and free from leaks, cracks, and obstructions and that is acceptable to the District.

The contractor shall select such materials and construction methods as will result in a completed project in full accordance with these Standards. Refer to Section 4.0 – Materials, and District Standard Plates for additional details.

Approved water pipeline design is based upon a proper combination of pipe strength and pipe support; the District shall not accept the work unless the contractor's trenching, bedding, laying, backfilling, and compaction is in accordance with the procedures outlined in these Standards.

Except as otherwise approved or included in permits, the maximum length of an open trench at any one time shall be 600 feet, or the distance necessary to accommodate the amount of pipe installed in a single day.

Grades shall be measured and transferred from the ground surface to the bottom of the trench, using not less than three consecutive grade points in common, so that variations from a straight grade may be readily detected. Each length of pipe shall be laid on a firm, approved bedding material in accordance with these standards and shall have full bearing for its entire length between bell holes excavated in said bedding material to allow for unobstructed assembly of all joints. Adjustments of pipe to line and grade shall be made by scraping away or filling in and tamping approved material under the body of the pipe. Wedging or blocking with wood or soil to support the pipe shall not be permitted. The contractor shall not be allowed to dump backfill materials on top of a pipe that is not continuously supported in its final grade position.

Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe, following manufacturer's instructions for the specific jointing method being used. Pipe shall not be laid when the engineer or inspector determines that the condition of the trench or weather is unstable. As the work progresses, the interior of the water line shall be cleared of all dirt and superfluous materials. If the maximum width of the trench at the top of

the pipe is exceeded, the contractor shall install such concrete cradling, pipe encasement, or other bedding as may be required to support the added load of the backfill. Trenches shall be kept free from water until sufficient backfill has been applied to keep the pipe in place. Open ends of pipe and fittings shall be securely closed to the satisfaction of the inspector so that no trench water, earth, or other substance will enter the pipe or fittings when work is not in progress. Pipe or fittings damaged during assembly shall be removed and replaced.

B. Pipe Laid on Bedding vs. Earth Mounds: The key elements to the pipe bedding shall be that the pipe ultimately is continuously supported and that the full six (6) inches of bedding material (imported sand or better) be placed under the pipe. Where pipe is to be laid where considerable amounts of rock, cobblestone, or groundwater are present, then the continuous bedding method shall be used. Earth mounds may be used, if specifically approved by the inspector, in areas exhibiting ideal pipe laying conditions where there is a clear demonstration that the 6-inch bedding material will be placed after the pipe is laid in the trench.

For the continuous bedding method, the trench bottom shall be over excavated a minimum of four (4) inches and brought back to grade with imported bedding material, see Section 6.7 – Excavation and Trenching for excavation in rock. Before lowering the pipe into the trench, coupling holes shall be excavated in the bedding with sufficient length, width, and depth to permit assembly and provide a minimum of three (3) inches below the coupling.

For the earth mound method, the mounds shall be compacted firmly and of a size adequate to suspend the pipe six (6) inches above the trench bottom while maintaining the pipe true to grade. Each length of pipe shall be laid on two mounds with the center of each placed at approximately one-fifth the distance from each end. Coupling holes shall provide a minimum clearance of three (3) inches. After assembly, the trench zone shall be properly backfilled with imported bedding material. The bedding material shall then be compacted utilizing methods, acceptable to the District, to provide a firm and uniform bedding throughout the entire length of pipe.

C. Pipe Laying For Steel Pipe:

1. CML and CMC steel pipe shall be handled with straps per Section 6.3 – Shipment and Delivery; chains, bare cinch, or choker type cables shall not be used. The slings shall be of sufficient width to prevent damage to the lining or coating.

   The pipe shall not be lowered into the trench until the pipe bed has been brought to grade. Dirt and other foreign matter shall be removed from the pipe interior and the machined ends before the pipe is lowered into the trench. The sealing surfaces of all materials shall be kept clean during installation.

2. No welded joint shall be backfilled until it has been inspected by the District. Sufficient trench space shall be left open in the vicinity of each joint to permit visual inspection around the entire periphery of the joint.

3. Rubber Ring Joints. Except as noted under field joints and electrically bonded connections, joining pipes shall be in accordance with the following:

   a. The ends of pipe and appurtenances shall be cleaned immediately before assembly, and assembly shall be made as recommended by the manufacturer. Each pipe joint shall not be deflected either vertically or horizontally beyond the limits recommended by the manufacturer.

      Unless otherwise approved in writing based upon manufacturer instruction, stabbing or swinging the pipe into position shall not acceptable for pipes above ten (10) inches in diameter. Stabbing or swinging may be used for smaller pipes providing the following is done:

      - The minimum length of swing necessary is used to join the pipe.
      - The pipe end shall be in perfect alignment with the receiving coupling.
      - The pipe end shall be thoroughly lubricated.
      - The joints shall be "gauged" after installation.
      - Methods shall meet the approval of the inspector. The contractor shall be aware that this procedure, if not properly executed, can result in impact damage in either the pipe coupling or the pipe spigot.

Gasket lubricants shall be non-toxic and water-soluble specially prepared for use in potable water systems. After assembly, the proper location of the gaskets shall be gauged with a manufacturer-supplied feeler gauge.

When pipe laying is not in progress, the open ends of the installed pipe shall be closed to prevent the entrance of trench water into the line.

Whenever water is excluded from the interior of the pipe, enough backfill shall be placed on the pipe to prevent floatation. Any pipe that has floated shall be removed from the trench and the bedding corrected.

4. Inside Joints: Mortar lining of the interior joints shall be performed with a mortar composed of one (1) part cement to not more than two (2) parts sand, dry mixed, and moistened with sufficient water to permit caulking and troweling without crumbling. Sand shall be graded within the limits for plaster sand. Water shall be potable. Mortar workability may be improved by replacing not more than 7 percent by weight, of the cement with hydrated lime, or by replacing not more than 30 percent by weight of the cement with an approved pozzolan.

   When the pipe diameter is smaller than 22 inches, the joint shall be finished by placing a sufficient amount of the joint mortar in the bell end of the section against the shoulder of the lining, just prior to installing it in the line. When the section has been laid in place, the joint shall be finished by pulling a rubber ball or the equivalent through the joint to finish it off smooth with the inside surface of the lining (swabbing).

   The metal jumper rods shall then be welded in place to form an electrical bond.

   No pipe shall be placed into service or filled with water until at least 24 hours after the joints have been mortared.

5. Outside Joint: Mortar coating of the holdback section shall be as described. Grout shall be composed of one (1) part cement to not more than two (2) parts sand, thoroughly mixed with water to the consistency of thick cream. Sand gradation shall conform to the requirements of ASTM C33 except that 100 percent shall pass the No. 16 Sieve. The joints shall be coated with cement-

mortar, retained by suitable bands to bridge the joint and retain the grout without leakage. The grout space, prior to filling, shall be flushed with water so that the surface of the joint to be in contact with the grout will be thoroughly moistened when the grout is poured. The joint shall be filled with grout by pouring from one side only. The grout shall be rodded with a wire or other flexible rod or vibrated so that the grout fills the joint recess by moving down one side of the pipe, around the bottom of the pipe, and up the opposite side. Pouring and rodding the grout shall be continued to allow completion of the filling of the entire joint recess in one operation. Care shall be taken to leave no unfilled space. The exposed portion of the grout at the top of the pipe shall be coated with a sealing compound, or covered with burlap, or moist earth.

6. Welded Joints: Field welding of joints shall be in accordance with AWWA C206-17. This specification shall pertain to automatic field welding by the metal arc-welding process and covers lap joints, butt joints, and butt strap joints.

   Only certified welders qualified in accordance with the standards of the American Welding Society shall weld. Welding electrodes shall comply with the requirements of ASTM A233. Welding procedures shall meet the qualifications of AWS D10.9 - Qualification of Welding Procedures and Welders for Piping and Tubing.

   Welds shall be applied utilizing continuous stringer beads; each bead shall be thoroughly cleaned and descaled before the succeeding bead is applied. The metal shall be applied in successive layers and the minimum number of passes or beads in the completed weld shall be as follows:

TABLE 6-2 - Minimum Number of Beads for Field Welded Joints

Steel Cylinder Thickness (inches)	Fillet Weld Passes or Beads (Minimum Number)
Smaller than 3/16	1
3/16 and 1/4	2
5/16	3
3/8	3

When the plans designate welded joints, the pipe may be joined with rubber gaskets as specified in the above provision for rubber ring joints in place of slip (lap) joints. The outside recess between the bell and spigot shall be caulked with a rod to facilitate the welding. The weld shall be continuous for the full circumference of the pipe.

Undercutting of the base metal in the pipe adjoining the weld is a defect and shall be repaired; it is not permitted to overlap or burn back the inside or outside corner during the application of a fillet weld. The finished fillet weld shall be free of grooves, deep valleys, or ridges and contain no abrupt changes in the section at the toe.

Lap or fillet welds shall have legs of equal size except when specified on the plans, and they shall have a throat profile that is straight to slightly convex. In no case shall a throat with a concave surface be acceptable.

Small erection tack welds used in the assembly of joints need not be removed provided they are sound and do not exceed in size the subsequently applied root pass.

After the joints have been welded, each joint shall be grouted with cement mortar in the same manner as specified for rubber ring joints.

Butt Strap closure joints shall be completed in the trench after the pipe has been laid to the alignment and grade shown on the plans. They shall be field welded to the outside of the pipe along both edges by full circumferential fillet welds or one of the edges may be shop welded and the other field welded. A half of a standard 5-inch pipe coupling shall be shop welded to the top section of the butt strap to permit access for mortaring the inside of the joint. Butt joints shall be accurately aligned and retained in position during the welding operation so that in the finished joint the abutting pipe sections shall not be misaligned by more than 20 percent of the pipe's thickness, or a maximum of 1/8 inch.

After welding and mortaring, this coupling shall be closed with a standard threaded pipe plug welded in place for sealing.

The interior of butt strap joints shall be finished in the same manner as bell and spigot joints.

The exterior of butt strap joints shall be finished as described below:

- Wire mesh, 2"x4"x No. 13 gauge, shall be clean and free from rust.
- The wire mesh shall be applied to the exterior of the butt strap joints so that the wires on the 2-inch spacing run circumferentially around the pipe.
- The wires on the 4-inch spacing shall be crimped in such a manner that the mesh will be held 3/8 inch from the metal joint surface.
- The mesh shall be lapped in a minimum of 8 inches and shall be securely wired in position.
- The joint exterior shall be coated with cement mortar to a minimum thickness of 1½".
- Immediately prior to applying mortar to the interior or exterior of the joints, a cement wash shall be applied to the metal surfaces to be coated.

7. Flanged Joints: Flange faces shall be wire brushed and gaskets shall be thoroughly cleaned just prior to joining. Ethylene Propylene Diene Monomer (EPDM) gaskets shall be used on each side of the valves. Once the bolts are tightened, all exposed metal surfaces, including bolts and nuts, shall be cleaned with a wire brush, and then primed.

8. Flexible Coupling Joints: Flexible coupling joints shall be completed in the trench after the pipe has been laid to the alignment and grade shown on the plans. Each pipe end for a distance of 6 to 8 inches back from the end shall be thoroughly cleaned to remove oil, dirt, loose scale, rust, and other foreign matter. Flanges, gaskets, and sleeves shall then be assembled on the pipe end following the manufacturer's recommendations. Gaskets, pipe ends, and coupling sleeve flares shall be lubricated with a non-toxic vegetable soap compound to facilitate the joining. Coupling sleeves shall be accurately centered over the pipe ends and one pipe end shall touch the coupling sleeve centering stop if the coupling sleeve is so equipped.

   The contractor shall tighten the bolts in the presence of the Waterworks Inspector; bolts shall be tightened to the torque recommended by the

manufacturer with a torque wrench. All bolts shall be coated with an anti-seize compound suitable for the type of bolts specified and installed.

D. Pipe Laying for PVC Pipe: Pipe laying of PVC C900/C909 pipe is very similar to that for steel pipe with the following exceptions:

1. Because it is a plastic product, the pipe should be covered with an opaque material if it is to be stored outdoors or exposed to sunlight for a prolonged period (45 days).

2. In obtaining a square end cut, a PVC pipe cutter is recommended, but a conventional fine-tooth hand or power saw may be used.

3. Field beveling of pipe ends after cutting shall be performed with special beveling tools or with such items as rasps.

4. In making the pipe conform to a curve, the pipe lengths shall first be assembled in a straight line and then bent as they are lowered into the trench.

5. All PVC pipe shall be installed with a 12 gauge insulated copper locator wire suitably fastened to the pipe and connected to all fittings to provide a signal for location purposes. Splice kits must be used for installing locator wire.

E. Pipe Laying for Ductile Iron Pipe: Where approved for use, ductile iron pipe shall be laid following manufacturer instructions and in general compliance with the applicable procedures as listed for steel pipe. Where specified, the District may request a specification for such installation practices. Specific attention shall be given to the placement of the 8-mil thick polyethylene encasement wrap and any tapping of the pipeline for services and/or other main connections.

6.9 THRUST RESTRAINT

A. General: Thrust forces occur at any point in the distribution system where the pipe alignment changes or there is a change in the pipe cross-sectional area. Thrust forces are balanced using bearing or gravity thrust blocks or the use of restrained joints. The District Engineer may allow a combination of the two methods in special cases.

B. Supporting of Valves: Valves and fittings shall be supported by the trench bottom and shall be independent of the pipe. When pouring thrust blocks around a fitting, the concrete shall be placed under and around the fitting and not the joint.

C. Thrust Blocks: Thrust blocks shall be placed as shown on the plans or as required by District Standard Plates: *Thrust Joints for Push Joint/Mechanical Joint Connections* and *Thrust and Anchor Blocks*. The concrete shall meet the requirements of Section 4.14 – Concrete Material. Concrete shall be poured against undisturbed ground and the fitting to be anchored.

D. Joint Restraint: Various mechanical locking-type joint systems are available to provide longitudinal restraint (including flanged and welded joints). Restrained joint systems resist the thrust forces by distributing the resistance over the restrained pipe length. The engineer determines the necessary length of the restrained pipe and submits it to the District Engineer for review and approval.

1. Pipe Joint Restraint Systems: Pipe joint restraint systems shall be used on domestic water mains for PVC C-900 pipe sizes 4-inch through 12-inch diameter and PVC C909 pipe sizes 14-inch through 24-inch diameter, and for ductile iron pipe sizes from 4-inch through 24-inch diameter. Joint restraint systems shall be classified as a compression joint or a mechanical joint for the specific type of pipe joint to be restrained.

    a. Underwriter Laboratories (U.L.) and Factory Mutual (FM) certifications shall be required on all restraint systems.

    b. Unless otherwise noted, restraint systems used on PVC C900 and C909 pipes shall meet or exceed ASTM Standard F1674-96, “Standard Test Methods for Joint Restraint Products for Use with PVC Pipe,” or the latest revision thereof. Restraint systems used on ductile pipe shall meet or exceed U.L. Standard 194.

    c. Each restraint system shall be packaged individually and include installation instructions.

d. Restrainer for PVC C900/C909 and Ductile Iron Push-on Type Connections:

1) Pipe restraints shall be utilized to prevent movement for push-on D.I. or PVC (C900 & C909) (compression type) bell and spigot pipe connections or where a Dresser style (flexible) coupling has been used to join two sections of plain-end pipe D.I. or PVC. (C900 & C909). The restrainer may be adapted to connect a plain end D.I. or PVC pipe to a ductile iron mechanical joint (MJ) bell fitting. The restrainer shall not be directionally sensitive.

2) The pipe shall be restrained by a split retainer band. The band shall be cast ductile iron, meeting or exceeding ASTM A536-80, Grade 65-45-12. The inside face or contact surface of the band shall be sufficient width to incorporate cast or machined non-directionally sensitive serrations to grip the outside circumference of the pipe. The serrations shall provide full (360 degrees) contact, maintain pipe roundness, and avoid any localized points of stress. The split band casting shall be designed to “bottom-out” before clamping bolt forces (110 lb-ft minimum torque) can over-stress the pipe but shall provide full non-directionally sensitive restraint at the rated pressures.

3) Type 316 stainless steel bolts and nuts used to attach the split retainer ring shall comply with ANSI B 18.2.1/18.2.2, SAE Grade 5. Type 316 stainless steel tee-bolts, nuts, and restraining rods shall be fabricated from high-strength, low-alloy steel per AWWA C111-90.

4) The split ring type non-directionally sensitive restrainer system shall be capable of a test pressure twice the maximum sustained working pressure listed in Table 6-3 and be for both D.I. and/or PVC (C900) sizes 6-inch thru 12-inch.

5) Restraint systems size six (6) thru twelve (12) shall be capable of use for both ductile iron and/or PVC C900.

6) The restraint system may consist of two types: the two split retainer rings and, for new construction use only, the one split and one solid cast backup ring.

e. Compression Ring Fitting Restrainer for Ductile Iron Pipe & PVC C900:

1) Compression ring with follower gland type of restrainer may be utilized in conjunction with Mechanical Joint (MJ) bell end ductile iron pipe fittings for restraining PVC C900 and ductile iron pipe.

2) The system shall utilize a standard MJ gasket with a color-coded compression ring and replacement gland conforming to ASTM A 536-80, Grade 65-45-12.

3) Standard MJ fitting Tee-bolts and nuts shall be fabricated from high strength steel conforming to AWWA C-111/A21.11-90 and AWWA C-153/A21.53-88.

4) Standard MJ gasket shall be virgin SBR meeting ASTM D-2000 3 BA 715 or 3 BA 515.

5) The restraint system shall be capable of a test pressure twice the maximum sustained working pressure listed in Table 6-3.

f. Retainer Gland for Ductile Iron Pipe (Only):

1) Radial bolt type restrainer systems shall be limited to ductile iron pipe in conjunction with Mechanical Joint (MJ) bell end pipe or fittings. The system shall utilize a standard MJ gasket with a ductile iron replacement gland conforming to ASTM A 536-80. The gland dimensions shall conform with standard MJ bolt circle criteria.

2) Individual wedge restrainers shall be ductile iron heat treated to a minimum hardness of 370 BHN. The wedges screws shall be compressed to the outside wall of the pipe using a shoulder bolt and twist-off nuts to insure proper actuating of the restraining system.

3) Standard MJ fitting Type 316 stainless steel tee-bolts and nuts shall be high strength steel conforming to AWWA C-111/A21.11.90 and C-153/A21.53-88.

4) Standard MJ gasket shall be virgin SBR meeting ASTM D-2000 3 BA 715 or 3 BA 515.

5) The retainer gland system shall be capable of a test pressure of twice the maximum sustained working pressure listed in Table 6-3.

TABLE 6-3 - PIPE WORKING PRESSURE

Diameter (inches)	PVC C-900 (psi)	Ductile Iron (psi)	PVC C-909 (psi)
6	200	350.	NA
8	200	250	NA
10 & 12	200	200	NA
14 & 16	200	200	235
20 & 24	200	200	235

6.10 HOT TAPPING

Hot tapping shall only be done in the presence of the Waterworks Inspector. Section 4.8 – Main Line Valves discusses the tapping sleeve and valve requirements. Hot Taps shall only be allowed if the tap is two pipe sizes smaller in diameter than the existing main line. The maximum pipe size for hot tapping shall be 6 inches in diameter. The tapping mechanism shall be of the self-purging type so that cutting chips are removed from the tapping machine and do not enter the pipeline.

6.11 SERVICE CONNECTIONS AND SERVICE LINES

Generally, service saddles and dry tapping are approved; the District may require the contractor to install heavy wall tap couplings with AC pipe as per Section 4.3 – Main Line Pipe Materials. The specified method shall be listed on the cover sheet of the plans.

Service connections on the opposite sides of the pipe are not allowed and there shall be a minimum of 1 foot (0.30m) between service connections. For PVC, the taps shall be staggered vertically to prevent a split in the pipe.

With service saddles, the surface of the AC pipe shall be filed (or clean other pipes as necessary) to remove all loose material before placing the saddle on the pipe.

Either Teflon tape or sealing compound approved for use in potable water shall be used in all metal-to-metal threaded connections.

Service lines shall be one continuous length of copper within the trench to allow for expansion or contraction. For 2-inch services, approved copper fittings can be used where one continuous length of copper cannot be used. Services shall comply with the requirements in accordance with District Standard Plates: *1-inch and 2-inch Water Meter Service Installation*. Services for meters 3-inch or larger shall comply with the requirements in accordance with District Standard Plate: *3-inch Water Meter and Larger Service Installation*.

6.12 INSTALLATION OF VALVES AND FITTINGS

Valves and fittings shall be installed at the locations and grades shown on the plans. The following items comprise a checklist:

- The weight of the valve or fittings shall be taken by firm ground or blocking, and not by the pipe.

- All materials shall comply with Sections 4.3 – Water Main Pipe Materials, 4.8 – Main Line Valves, and 4.16 – Paint.

- Valves and all bolted connections shall be coated and receive a plastic film wrap in accordance with Section 4.16 – Paint. The valves shall be wrapped by passing the flat sheet of film under the valve bottom and bringing the ends up around the body to the stem and securing it in place with 2-inch strips of polyethylene tape. The polyethylene wrap shall be secured around the valve stem in such a manner as to leave the stem free to operate. The film shall be brought completely around the flanges and secured to the pipe with polyethylene tape on either side of the valve, flange, or fitting.

- All bolted connections shall be tightened in an even manner by a series of steps so that no portion of the bolted connection is over-stressed.

- All bolts shall be coated with an anti-seize compound suitable for the type of bolts specified and installed.

6.13 INSTALLATION OF AIR RELEASE AND BLOW-OFF ASSEMBLIES

Combination air release and blow-off assemblies shall be installed as shown on District Standard Plates: *1" and 2" Combination Air Release and Vacuum Valve Installation, 2" Blow-Off Installation,* and *4" Blow-Off Installation*. The contractor shall locate the combination air release cans and blow-off vaults in a suitable location with respect to the adjacent properties. This shall include locating them closer to property lines rather than in the middle of a property where there could be future objections from the property owner. The service line to the assembly shall have a positive grade to prevent accumulations of air.

Refer to Section 4.5 – Service Line Materials and Fittings for copper tubing connections. The service line shall be one continuous length without fittings between the corporation stop to the air release valve riser. The corporation stop shall be stacked at the main with 8-inch PVC and valve box if two (2) inches or larger.

Dielectric connections with PVC tape wrap shall be provided at all connections between steel, brass, or bronze.

6.14 INSTALLATION OF FIRE HYDRANT ASSEMBLIES

Fire hydrant assemblies are to be installed following the general instructions contained in AWWA C600 and AWWA Manual No. M17. Materials shall comply with Section 4.11 – Fire Hydrant Assemblies and the installation as shown on District Standard Plate: *Fire Hydrant Installation*. Please note the following:

- The 2-foot (0.60m) setback from the curb face shall be adhered to regardless of whether the curb is next to a private street or within a private street parking lot. The 2-foot dimension shall be from the curb face to the centerline of the fire hydrant.

- The elbow in the fire hydrant bury shall be anchored on a concrete thrust block.

- The fire hydrant shall be positioned so that the Type 316 stainless steel bolts between the extension piece and the hydrant are accessible, both top and bottom within the limits shown on District Standard Plate: *Fire Hydrant Installation*. If the hydrant is either too low or too high, it shall be corrected.

- Painting shall be per Section 4.16 – Paint. All metal surfaces above ground shall be painted including any extension; it is suggested that the extension piece be painted before pouring the sidewalk.

- All underground flanges shall be wrapped with a plastic film per Sections 4.16 - Paint and 6.12 – Installation of Valves and Fittings.

6.15 INSTALLATION OF METER BOXES, PRESSURE REGULATORS

A. General: Specific installation details are shown on the District standard plates. Meter size will be determined on the proposed project's domestic and fire sprinkler demand. In all cases, the District will select the meter type and install the meter after the contractor completes construction of the service line and meter box per the Standard, and after fees have been paid to the District.

B. Meter Boxes: District-approved meter boxes shall be set with the longitudinal axis perpendicular to the street and located as shown in District Standard Plates: *Location of Meters and Hydrants*. All lids shall have provisions for touch-and-read meters.

With the exception of irrigation meters, spacers (or jumpers) shall be placed within the meter box until the District installs the meter. The contractor may utilize spacers provided by the District on an "as available" basis. Care shall be taken to avoid placing a strain on the spacer through misalignment of the house line or service line.

C. Jurisdiction: All pipes on the customer side of the meter box are under the jurisdiction of the City of Simi Valley, Environmental Service Department Building

and Safety Division if the property is within the City. If the property is within the County, the Ventura County Building and Safety has jurisdiction.

D. Pressure Regulators: The maximum allowable water service pressure under Section 3.3 – Water Service Pressure Requirements shall be 80 psi. Water service pressures exceeding 80 psi shall require a pressure regulator to be installed in accordance with Section 3.3.3 – Maximum Water Service Pressure. For convenience, the house or buildings requiring regulators shall be shown on the plans, but this does not relieve the contractor's responsibility to verify the maximum water service pressure of each house or building with the District. The types of regulators and their installation are required by the respective Building and Safety Division/Department.

6.16 BACKFILL AND COMPACTION

A. General: Several distinct zones shall be addressed in the backfill procedure as follows (refer to District Standard Plate: *Pipeline Trench and Street Repair*):

- Pipe Zone - This area is from the trench bottom to 12 inches (300mm) above the pipe. This zone shall be backfilled under the strict supervision of the District and the Public Works Department.

- Above Pipe Zone – This area is above the pipe zone but below pavement subgrade plus the zone including the subgrade and pavement. Backfill and compaction in existing streets and the Above Pipe Zone shall comply with the City or County encroachment permit issued for the specific work and with the City or County land development specifications. In both cases, the filling of trenches shall be subject to approval by the City or County Public Works Inspector who shall have full authority to order compaction tests to demonstrate the actual backfill relative density.

  Section 4.12 – Pipe Trench Materials contain the material designations for both the Pipe Zone and Above Pipe Zone areas.

B. Backfilling Pipe Zone: Sand, as specified in Section 4.12 - Pipe Trench Materials, shall be used and be placed in the Pipe Zone with particular attention to getting material to the underside of the pipe and fittings to provide firm support along the

full length of the pipe. Care shall be exercised in backfilling to prevent damage to the pipe or coating, as applicable. Backfill in the Pipe Zone may be either compacted by hand tamping methods or flooded into place in a single lift without hand working. In no case shall sufficient water be applied to float the pipe. Requirements for flooding or jetting backfilling methods are specified in Section 6.16 E. Acceptability of compaction in the Pipe Zone will be determined primarily by visual inspection and probing by the Waterworks inspector to determine that no voids exist in the backfill. The backfill within the Pipe Zone shall meet the requirements of 90 percent relative compaction.

C. Backfilling Above Pipe Zone: The sequence of backfilling and compaction in the Above Pipe Zone (in the public right-of-way, i.e., streets) shall be as directed by the District or County Public Works Inspector. In the absence of such directions, the following procedure shall govern: Testing for pipe and joint leakage shall be performed after the consolidation of the backfill to the top of the pavement subgrade zone and after service lines have been installed to the property lines.

Backfill, compaction, and resurfacing shall be scheduled so that existing public streets may be opened to normal traffic per the City or County encroachment permit, and so that the backfill operations closely follow the pipe laying avoiding open trenches overnight.

The trenches or excavations shall not be backfilled without prior inspection by the Waterworks Inspector. Such inspection shall not relieve the contractor from compliance with the testing of the water line that shall be conducted after the final assembly of main and service lines in the consolidation of backfill as described above. The contractor shall assume the cost of removal and replacement of backfill necessary for correction of defective conditions revealed by testing.

If no pavement is to be placed, the backfill zone between the top of the Pipe Zone and the bottom of the subgrade zone or ground surface may be filled with native material, as approved by the City of Simi Valley Public Works Department, or Ventura County Public Works Department. Material shall be placed in lifts not exceeding 3 feet (0.91 m) in un-compacted thickness and compacted by water, or mechanical means to obtain 90 percent relative density. The subgrade zone, consisting of the space under pavement and/or shoulder to at least 2.5 feet (0.76

m) below finished road grade which shall be filled and compacted to the prevailing City or County requirements, without flooding or jetting.

If the work is in private property and not subject to public agency requirements, excavations shall be backfilled, compacted, and finished to match original conditions as interpreted by the District Engineer.

In traffic areas within public right-of-way where pavement is to be replaced, the City of Simi Valley or Ventura County requirements may call for a cement sand slurry mixture to be used for trench backfill. This requirement will generally apply to repair trenches that are 2 feet or less in width. For trenches wider than 2 feet, the aforementioned procedures must be approved by the City of Simi Valley Public Works Department. The specific requirements for the Above Pipe Zone are within the jurisdiction of the Public Works Department and the contractor shall have a responsibility to investigate and comply with all applicable requirements.

District Standard Plate: *Trench Repair Within Paved Right-of-Way* specifies the City of Simi Valley Public Works Department trench repair requirements within the paved right-of-way.

D. Backfill by Tamping Method: Backfill material shall be placed in uniform layers of the thickness specified above. The moisture content of the backfill material shall be near or at the optimum required for compaction and each layer shall be tamped until compacted to the required minimum relative compaction. Heavy-duty compacting equipment having an overall weight above 125 pounds shall not be used until the backfill has been completed to a depth of 2 feet over the top of the pipe.

If a hydro-hammer is used for compaction of overlying materials, at least 4 feet (1.22 m) of backfill must be placed over top of the pipe prior to its use. This is required to ensure that the pipe is not damaged.

E. Backfilling by Flooding or Water Settling Method or Jetting: This method shall only be attempted where the trench drains naturally and in a fairly rapid manner. Also, the backfill material shall be sufficiently granular to consolidate properly by this method and shall not cause damage to surrounding structures or soils.

If flooding is used, sufficient time shall be allowed for the puddled or flooded mass in each layer to solidify until it will support the weight of a man before any overburden is placed on the pipe. Only enough water shall be applied to give complete saturation of the backfill material. Excess water shall be drained to retard the drying and consolidation of the materials. Flooding, if used, shall be applied after Pipe Zone material is placed. However, to prevent floating of the pipe at a minimum, some material shall be placed adjacent to and over the pipe to add weight.

In the Pipe Zone, the backfill material shall be placed in uniform layers of the thickness specified above. At the top of each layer, the trench shall be diked at suitable intervals depending on the slope, and the trench between dikes shall be filled with sufficient water to inundate the backfill materials. Visual inspection of the backfill shall indicate settlement before placing the next layer of fill. Care shall be exercised to prevent floating the pipe.

Following the backfilling of the Pipe Zone, the trench shall be filled in uniform layers not to exceed 18 inches (450 mm) in thickness. Each layer of fill shall be diked at suitable intervals depending upon the slope, and the area between the dikes flooded with water at repeated time intervals until the backfill is completely saturated. Visual inspection of the backfill shall indicate settlement before placing the next layer of fill. The final layer shall also be saturated, and after settlement occurs, the surface shall be prepared for final dressing or paving.

Jetting with water to saturate the trench backfill layers is an acceptable alternative to flooding. Jet holes shall be a maximum of 10 feet (3 m) apart and sufficient water shall be applied to consolidate the backfill materials. The jetting pipe shall not be pushed down below the spring line of the pipe to avoid causing a disturbance to the pipe grade. Also, the materials shall be jetted from the bottom upwards.

F. Compaction Tests: These tests shall be taken as determined by the Public Works Inspector. The contractor shall make all necessary excavation for the tests at locations selected by the Waterworks Inspector and shall refill and re-compact these excavations to the specified densities.

6.17 RESURFACING AND RESTORATION

If the water facility construction occurs in streets where no paving exists, the contractor shall leave the completed trenches in a suitably compacted condition for finish grading, placement of base material, and paving by others following City and County requirements.

If the work is within existing City or County streets, any required surfacing shall be per the City or County encroachment permit.

If the work has disturbed or damaged existing private streets, alleys, driveways, or other improved surfaces, the damaged portions shall be removed and restored, including the provision of adequate subgrade where contractor construction has disturbed the original material.

Structures and substructures removed or damaged on public or private property shall be restored or replaced unless such structures are designated on plans "to be abandoned". Such structures include, but are not limited to, trees, bushes, plantings, groundcover, mailboxes, fences, and sprinkler systems.

Any temporary paving, barricades, or special provisions required by public agencies shall be furnished by the contractor as required.

6.18 BORING AND JACKING OPERATIONS

A. General: Placement of pipe by boring or jacking methods shall require special District approval for each instance. However, as a general guideline, the following shall pertain:

1. Except for the use of air or water, the methods and equipment used in boring and jacking operations shall be the contractor’s option, provided that the District reviews them prior to any work.

2. The placement of pipe shall be to the lines and grades shown on the plans.

3. Voids remaining outside the pipe (or carrier pipe if applicable) shall be backfilled with concrete.

4. Where a casing pipe is used, it shall be no less than 8 inches (200 mm) greater in diameter than the pipe to be installed.

5. The placement of pipe in casings shall be supported with redwood skids, shims, or wedges to the lines and grades shown on the plans.

B. Bores: The boring machine shall cut a true circular bore to the required line and grade. The bored tunnel shall be no more than 2 inches (50 mm) larger in diameter than the maximum outside diameter of the casing or water pipe to be installed.

C. Jacked Steel Casings: In addition to the applicable portions above, the following shall pertain:

1. Where casings are used, the size and wall thickness of the casing shall be at the contractor's option except that the minimum casing thickness shall be not less than 3/8 inch.

2. Field joints of steel casings shall be welded with a continuous circumferential weld.

3. The placement of pipe in casings shall be supported with redwood skids, shims, or wedges to the lines and grades shown on the plans.

4. Prior to backfilling the annular space between the pipe and casing, the pipeline shall be tested following Section 7 – Testing and Disinfection for Water Mains.

5. The annular space shall be backfilled with washed concrete sand blown or rammed into place until the entire cavity is filled. Concrete bulkheads shall be placed at each end of the cased section to retain the backfill material.

6.19 CONCRETE AND MORTAR WORK

A. Concrete:

1. Material: Concrete used for encasements, filling, blocking, piers and other typical water construction applications shall be transit-mixed concrete from a supervised batch plant which issues certified delivery tickets with each load,

showing the mix proportions, mixing time, truck departure time and water added. Such certified tickets shall be handed to the inspector at the time of delivery. Ready-mixed concrete shall be batched and handled in accordance with ASTM C94. Job-mixed concrete shall be limited to that needed for patching and minor non-structural uses requiring one sack of cement or less. In these cases, the materials and workmanship shall be the same as if transit-mixed concrete had been used. The 28-day compressive design strength of concrete shall be chosen according to its intended use as outlined in Section 4.14 – Concrete Material of these standards.

2. Placement: Concrete shall be placed in clean forms before its initial set begins, using the minimum amount of mixing water required for good workability. Concrete shall be worked into forms by rodding or vibrating to secure a dense homogeneous mass free from voids and rock pockets. All concrete shall be vibrated unless the inspector approves solely rodding to avoid having the concrete run out of the forms or trench.

3. Finish: Concrete surfaces, where required, shall be steel troweled to a smooth hard surface free from ridges, holes, and surface roughness. Exposed walls shall be left with a surface finish comparable to that obtained with new plywood forms. Slabs and walkways shall be finished with a wood float unless otherwise specified. Corners and edges shall be neatly beveled. Surface defects shall be repaired to match the surrounding concrete.

B. Mortar: Mortar for general work (exclusive of CML & CMC steel pipe) shall consist of one part Type II Portland cement and two parts of sand, by volume, thoroughly mixed in a dry state before adding sufficient water to give the mortar a proper troweling consistency.

6.20 CONSTRUCTION WATER / TEMPORARY HYDRANT METER

The developer/contractor shall not take unmetered water from the District water system; the contractor shall apply for a temporary hydrant meter permit with the District for water usage. After receipt of a deposit, District staff will install the meter at the fire hydrant selected by the contractor. The contractor shall not move the construction meters; District staff will move the meter to another hydrant location upon request. Unpaid invoices for water usage shall result in the removal of the construction meter.

6.21 PAINTING

Paint materials shall comply with Section 4.16 – Paint. Paint shall be opened and mixed at the job site. Quality workmanship shall be meet the requirements of the best standards of the painting industry and all work shall be done by skilled and experienced painters. Surfaces to be painted shall first be thoroughly cleaned to remove dirt, loose scale, rust, oil, grease, and/or other foreign matter immediately before painting. Cleaning shall be done with abrasives, scrapers, wire brushes, and/or other means approved by the District. Each coat of paint shall be applied in such a manner as to assure an even, smooth, uniform adhering coat free from dirt, runs, brush marks and laps, and shall be applied as recommended by the manufacturer. Painting shall not be permitted when freshly painted surfaces may become damaged by rain, fog, or condensation or when inclement weather can be anticipated. The contractor shall replace fresh paint damaged by the elements at his expense. Drop cloths shall be used to protect floors, equipment, piping, and other exposed surfaces from spatter and spillage. Paint shall be allowed to dry thoroughly between applications of successive coats. The contractor shall use the manufacturer's recommended time between coats as a guide to when the next coat of paint may be applied. District approval shall be required before successive coats are applied.

The contractor shall notify the District after surface preparation and after the application of each successive coat of paint. Spray painting shall not be permitted unless specifically authorized by the District.

6.22 SAFETY

Wherever the contractor observes or otherwise becomes aware of any unsafe activity, condition, practice, or operation, the contractor shall immediately discontinue such unsafe activity, condition, practice, or operation, including any unsafe acts of subcontractors. If the Waterworks Inspector notifies the contractor of the same, it shall be the contractor's responsibility to comply; in such instances, the notice shall not be construed as implying any District liability. Adherence to proper safety is essential to all Public Works Department traffic control requirements.

The contractor shall submit a copy of their annual CAL OSHA permit and the letter notifying CAL OSHA of their work on the District's project to the District.

SECTION 7
TESTING AND DISINFECTION

7.1 GENERAL

The Contractor shall test all newly constructed water lines, service lines, and appurtenant structures maintained by the District, for pressure and leakage; all lines and structures shall be cleaned and disinfected at the contractor's expense prior to acceptance by the District.

Testing and disinfection of water mains and appurtenances shall be per the applicable AWWA Standards except as modified herein.

The Waterworks Inspector shall be present for all testing and disinfection. The contractor shall notify the Waterworks Inspector not less than forty-eight (48) hours in advance of the actual time of testing and disinfection so that the Waterworks Inspector may observe the procedure.

When the pressure test, leakage test, chlorination, or bacteriological and plate count tests fail to meet the requirement of the specifications, the contractor shall at his own expense make the necessary repairs, replacements, or repetition of procedures to conform to the specified requirements. The contractor shall correct all defects in workmanship or materials that become evident by inspection or testing at any time during the work. The contractor shall perform all testing and disinfection after the complete installation and compaction of all underground utilities.

The contractor shall provide District-approved backflow prevention assemblies and a temporary hydrant meter or construction meter installed to account for water usage, prior to commencement of any procedure(s) hereinafter.

7.2 HYDROSTATIC TESTING

The purpose of hydrostatic testing is to test for the ability of the pipeline to withstand required pressure and to ensure the pipeline does not leak. Hydrostatic tests shall be conducted in accordance with the following:

TABLE 7-1 – Hydrostatic Testing Criteria	
Pipe Material	**Criteria**
Steel	AWWA Manual of Water Supply Practices M11, Steel Pipe- A Guide for Design and Installation.
Polyvinyl Chloride (PVC)	AWWA Manual of Water Supply Practices M23, PVC Pipe- Design, and Installation, and ANSI/AWWA Standard C605; Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
Ductile Iron (DI)	AWWA Manual of Water Supply Practices M41, Ductile-Iron Pipe, and Fittings. ANSI/AWWA Standard C600; Installation of Ductile-Iron Water Mains and Their Appurtenances.

7.2.1 Pressure Test

All water mains and appurtenances shall be tested as described herein; the pressure test shall not be performed until the following conditions have been met:

A. In areas where a pavement surfacing is to be constructed, the pressure test shall be performed only after other utilities such as storm drains, and sanitary sewers have been installed;

B. Subgrade materials of the portion of the pavement area have been constructed to proper grade, and all compaction tests, including tests for water trenches, have been approved by the City of Simi Valley Public Works Department and the District;

C. All services, fire hydrants, meter boxes, and other appurtenances have been installed and adjusted to final grade and location;

D. All concrete anchor and thrust blocks shall have cured at least three (3) days;

E. A blind flange provides mechanical separation between the backflow prevention assemblies and pipe sections undergoing pressure to prevent pressure from being exerted against the backflow prevention assembly check valves.

The contractor shall conduct a preliminary pressure test once items A through E are completed and before the hydrostatic pressure test. The District shall not accept preliminary test results. All pipes and appurtenances shall be subjected to a 4-hour hydrostatic pressure test.

The Waterworks Inspector may require a secondary test if service lines are brought down to a finish grade, or any other connections are added that were not previously tested.

The minimum test pressure shall not less than 150 psi at the highest point unless otherwise noted.

The maximum length of pipe to be included in any one test shall be not more than 2,500 feet (760 m) or the distance between valves, whichever is less. The contractor shall provide suitable test bulkheads, blocking, and fittings to permit such sectionalizing.

At least twenty-four (24) hours prior to testing, the pipe shall be filled with water and placed under slight pressure. Prior to testing, all air shall be expelled from the pipeline and whenever practical, water should be introduced from the low end of the new system to facilitate the elimination of air in the pipeline. District-approved taps and fittings shall be installed where air valves or other suitable outlets are not available for releasing air before applying the test; after testing taps and fitting installed for testing shall be securely plugged.

The pipeline pressure shall be increased to the required test pressure by pumping; the pumping shall be discontinued until the pressure in the line has dropped 10-15 psi, at which time the pressure shall again be pumped up to the required test pressure. The test procedure shall be repeated for an elapsed time of four (4) hours from the time the required test pressure was first applied; the pressure shall

be pumped up to the required test pressure for the last time at the end of the four (4) hour test period.

The Waterworks Inspector shall approve the pump connection for the pressure test. The contractor shall furnish the pump, pipe connections, bulkheads, pressure gauges, and other equipment, labor, and materials required to perform the test.

The Waterworks Inspector may check the test pressure by installing District pressure gages in place of the contractor's gage. In case of a difference in pressure readings between gages, the District's gage reading shall govern.

All appurtenant facilities shall be tested at the same pressure and for the same duration as the mainline pipe.

All valves shall be tested for leak-proof tightness after the mainline pressure test with the test pressure on one side of the valve and atmospheric pressure on the other side.

Wet tap valve sleeves shall be hydrostatically pressure tested for a period of one (1) hour at a test pressure of pipe class plus 50 psi. During and at the end of the test, a solution of soapy water shall be applied at all joints to test for leakage. Pressure loss or leakage will not be permitted.

7.2.2 Leakage

All water mains and appurtenances shall be tested as described herein.

The test pressure applied to the water main for the leakage test shall be maintained as constant as possible for not less than four (4) hours. The leakage test shall be held concurrently with the pressure test. For C-900 PVC pipe (Class 150), the test pressure shall be 225 psi and the test duration shall be four (4) hours.

The length of fire hydrant laterals and service lines are not included in the overall length of pipe in determining leakage.

All noticeable leaks shall be repaired regardless of the results of the test. Defective pipe, fittings, valves, and other appurtenances discovered during the leakage test

shall be removed and replaced; repair clamps of any kind or type are not permitted and all gaskets shall only be used once. The contractor shall notify the Waterworks Inspector of any repair work performed. The leakage test shall be repeated until satisfactory results are obtained.

It is the contractor's responsibility for locating leaks and restoring the bedding and pipe zone material in accordance with the *Pipeline Trench and Street Repair* Standard Plate. Damage to pipe bedding and backfill resulting from leaks discovered during the pressure leakage test shall be restored in compliance with these standards.

The contractor shall furnish the pump, pipe connection, measuring devices, gages, and all other equipment, labor, and materials necessary for performing the leakage test.

7.2.3 Possible Causes for Test Failure

The following are possible causes for test failure and provided for informational purposes only:

A. Dirt or foreign material under the coupling gasket.

B. The pipe is not sufficiently covered in the trench.

C. Fittings and valves in the test section are not sufficiently blocked.

D. Corporation stop valve cocks not tightly closed.

E. Air in line (no relief valve).

F. Leakage through a valve at end of the test section.

G. Valve bonnet plug leaking.

H. Packing on valves and wet-barrel hydrants leaking.

I. Test pump leaking. Check valve as well as gate valve.

J. Curves not sufficiently thrust blocked.

K. Testing too long a section of pipeline.

L. Insufficient saturation time (24 hours).

M. Ruptured pipe - cracked, blown out.

N. Broken couplings.

O. Faulty accessory equipment - valves, fittings, hydrants, saddles, corps, relief valves.

P. Faulty test gauge.

Q. Test pump suction line drawing air.

R. Fish-mouthed gasket.

7.3 ROLE OF FLUSHING

Newly constructed water mains shall be flushed with potable water before disinfection. The primary purpose of flushing is to remove the sediments and miscellaneous products of construction. Included shall be service lines, fire hydrants, valves, and all other accessories.

The contractor shall provide a sufficient number of suitable outlets at the end(s) of the line(s) being sterilized, in addition to those required by the plans, to permit the main to be flushed with water at a velocity of at least 2.5 feet per second (0.75 mps) over its entire length. The outlets provided shall meet the requirements for fittings as specified under Section 4 – Materials, for the type of main constructed. Drainage facilities shall be constructed such that the water lines cannot be contaminated through the flushing outlet. Certain contaminants, such as caked deposits, resist flushing at any velocity, therefore, 2.5 feet per second (0.75 mps) should be considered a minimum velocity.

TABLE 7-2 – Minimum Flushing Flow Rate for Velocity of 2.5 (fps)	
Pipe Size (inches)	**Flow Rate (gpm)**
6	220
8	390
10	610
12	880
14	1,200
16	1,565
18	1,980

Flushing shall not be a substitute for preventive measures. If the Waterworks Inspector observes dirt in the pipe, the interior of the pipe shall be cleaned and swabbed as necessary with a five (5) percent hypochlorite disinfecting solution and may require additional bacteria samples.

The contractor shall remove the flushing water or the chlorinated water from the project area. The Contractor shall be responsible for any damage resulting from flushing operations.

The contractor shall obtain a wastewater discharge permit from the Environmental Compliance Division before discharging to the public sewer system. The contractor shall ensure that the flushed water shall have a residual chlorine content not to exceed 0.10 mg/L

7.4 TESTING FOR FIRE-FLOW OR PRESSURE

The developer or engineer may request for the fire-flow certification or water system pressure test to determine the service pressure of a proposed development. District staff shall perform a fire-flow inspection test from a nearby hydrant located closest to the proposed development.

7.5 DISINFECTING WATER MAINS

All newly constructed water mains and appurtenances shall be disinfected following AWWA C-651, Disinfecting Water Mains, except as modified herein. Disinfection shall be performed after the pressure and leakage tests have been performed by the contractor and accepted by the District. The contractor must use a company approved by the District, to chlorinate the water main.

Chlorine used for disinfection must be a liquid chlorine solution. The liquid chlorine and sodium salts, making up the sodium hypochlorite solution (sodium hypochlorite less than or equal to 15%; typically 12.5%), shall be fed directly into the water main pipe. NSF/ANSI 61 sodium hypochlorite shall be approved for potable water use. The contractor shall follow the safe handling practices outlined in AWWA M20 - Water Chlorination/ Chlorination Practices.

The chlorine solution shall be by the continuous feed method as outlined in sub-section 5.2 of AWWA C-651-05 except when modified by the District Engineer. Water dosed with chlorine is fed into the line at a constant rate such that the chlorine concentration of the water in the pipe is maintained at a minimum of 50 mg/L and a maximum of 150 mg/L available chlorine. The chlorine application shall not cease until the entire main is filled with the chlorine solution, and all valves and hydrants shall be operated to disinfect the appurtenances. The chlorinated water shall then be retained in the main for a minimum 24-hour period. At the end of the 24 hours, the chlorine residual shall be no less than 25 mg/L throughout the main. Table 7-3 outlines the amount of chlorine required to produce 50 mg/L concentration in 100 feet of pipe.

TABLE 7-3 – Chlorine Disinfection of Water Mains

Pipe Size	100% Chlorine	1% Chlorine Solution
6"	0.061 lb (28 g*)	0.73 gal (2.8 L*)
8"	0.108 lb (49 g)	1.30 gal (4.9 L)
10"	0.170 lb (77 g)	2.04 gal (7.7 L)
12"	0.240 lb (109 g)	2.88 gal (10.9 L)

*g = grams; L = Liters Source: AWWA C651

The chlorine solution shall be applied at the beginning of the water main to be disinfected through a corporation stop installed for this purpose, through curb stop, or through any other opening as may be allowed or required by the Waterworks Inspector. Fire hydrants and air valves shall not be used for this purpose. However, an air valve riser pipe with the air valve removed may be an appropriate chlorine solution feed point.

Water from the existing distribution system shall be used to convey the chlorine solution throughout the water main. The rate of flow shall be so controlled that water will flow slowly into the un-disinfected main during the application of chlorine. The end of the main being chlorinated shall be kept open and running during the application of chlorine and until the desired chlorine concentration is reached, after which each curb stop, fire hydrant, air valve line, or any other connection to the water main shall be individually opened and flushed with the chlorine solution. After the water main and all appurtenances thereto have been loaded with chlorine at the proper concentration, the water source, chlorine feeder, and all other openings to the water main shall be closed.

The chlorine solution shall remain in the water main for not less than twenty-four (24) hours after which the treated water through the length of the main shall contain not less than twenty-five (25) Mg/L of chlorine. The chlorine content of the water shall be tested by the Waterworks Inspector and if found to be less than twenty-five (25) Mg/L after twenty-four (24) hours contact, the water main and appurtenances shall be re-chlorinated and held for another minimum 24-hour period.

During the period of chlorination, all main line valves and blow-off valves shall be operated to ensure that the discs and seats are fully open to chlorinated water. Air valves shall be chlorinated separately under the direction of the Waterworks Inspector. After twenty-four (24) hours of disinfection and approval by the Wastewater Inspector, the chlorine solution shall be flushed from the water main through each service, fire hydrant, and blow-off. Flushing shall continue until the chlorine residual is not more than five-tenths (0.5) mg/L. In no case shall a chlorine solution of over five-tenths (0.5) mg/L be held in the main or appurtenances for more than five (5) days from the initial injection to the final flushing. The contractor shall dispose of the chlorinated water from the project area in compliance with applicable regulations.

The chlorinated water shall have a residual chlorine content not to exceed 0.10 Mg/L before discharging into the public sewer system. The contractor must obtain a discharge

permit from Environmental Compliance before discharge. The flushing operation shall be in accordance with the California Regional Water Quality Control Board requirements.

The contractor has two options for disposing of the chlorinated water from the project site:

Option 1: The contractor may treat the chlorinated water with chemicals. This treatment shall neutralize any chlorine residual from the water. After treatment, the de-chlorinated water can be discharged into the public sewer system. The contractor must obtain a wastewater discharge permit from Environmental Compliance prior to discharge.

Option 2: The contractor shall dispose of the chlorinated water at a State of California-approved treatment disposal plant.

The Contractor shall be responsible for any damage resulting from the disinfection operation and shall provide adequate drainage from the project site.

7.6 BACTERIOLOGICAL TESTS

A twenty-four (24) hour period between the final flushing and the taking of bacteriological samples is required. During the sampling phase, flushing or movement of water in the pipe is not allowed. Following the 24-hour period, the contractor shall have a California Department of Public Health (CDPH) certified laboratory technician present at the site to take water samples for bacteriological tests. All sampling shall be in the presence of the Waterworks Inspector. The contractor shall notify the Waterworks Inspector 48 hours in advance of sampling procedures.

A Waterworks Inspector shall take samples in the field to transport to the laboratory for testing. Such tests shall meet California Department of Health (CDPH) requirements for drinking water standards. The Waterworks Inspector shall determine the number and location of samples; a minimum of one bacteriological test sample per 500 feet of main and a minimum of two (2) samples per day, per test section, shall be required. One set of samples shall be required for two consecutive days, 24 hours apart. All samples, each day, shall indicate an absence of coliform bacteria and have a heterotrophic plate count (HPC) of less than 200 CFU/mL. Failure of any sample shall require complete retesting, under these procedures, for two (2) consecutive days. All test results shall be submitted, in writing, to the Waterworks Inspector as soon as available.

The Waterworks Inspector shall inform the contractor of the test results within three (3) calendar days of the sample date, to avoid the risk of resampling. System connections shall not be scheduled until the test results are accepted by the Waterworks Inspector.

Upon successful completion of bacteriological testing, the pipeline shall be accepted for use in the District's potable water system; however, the standard policy is to accept the water mains for use upon the District giving written Notice of Final Acceptance.

7.7 CONTRACTOR'S RESPONSIBILITY FOR TESTING AND DISINFECTING

The contractor shall be solely responsible to construct a water main that passes the pressure and leakage test and complies with disinfection requirements specified herein. The fact that the District provides inspection during the construction and testing of the water facilities and receives laboratory test results, shall not relieve the contractor's responsibility in this regard.

It is the contractor's responsibility to prevent the consumption or use of water from un-disinfected mains, whether it be by the workers, subcontractors, or any other person to come into contact with the un-disinfected water. The contractor shall indemnify and hold harmless the District, its officers, agents, and employees from any and all claims, suits, or actions of every name, kind, or description, brought by any person or persons for, or on account of any injury, sickness or death of any person, including the contractor, sustained or arising out of the consumption of water from the main until final acceptance by the District.

7.8 CONNECTIONS TO EXISTING DISTRICT WATER MAIN LINES

Under no circumstances shall a connection be made, permanent or otherwise, between any existing water main, hydrant, or other source to any unapproved contractor-installed water main regardless of size.

No permanent connection between any contractor-installed water main and existing water mains shall be made by the contractor, except for wet tapped water services larger than 2-inches and fire services. All wet taps require full-time District inspection. Wet tapped connections with mechanical joint tapping sleeves shall be cleaned and disinfected following AWWA C-651, Sections 9 and 10. The work shall include treating the trench

with a hypochlorite solution, as deemed necessary by the Waterworks Inspector, thoroughly cleaning the main to be tapped, and the interiors of the sleeve and tapping gate; and swabbing the tapping sleeve interior with a 1 percent (1%) hypochlorite solution.

Water required for the initial filling, pressure testing, leakage testing, flushing, and chlorination may be obtained from an existing District main through the public fire hydrant by use of a District temporary hydrant meter. The temporary hydrant meter shall measure all water usage. The Contractor shall supply a District approved backflow prevention assembly prior to water usage.

The contractor shall pay a deposit, fees, and water usage charges for the temporary hydrant meter to the District.

SECTION 8
ABANDONMENT

8.1. GENERAL

The engineer shall show all existing water lines, facilities, and structures that are to be abandoned on the plans. Existing water lines that are proposed to be abandoned shall be replaced with a parallel line of equal or larger size. The engineer shall demonstrate that the abandonment does not adversely affect the water system. All requests for abandonment shall be submitted in writing to the District Engineer for approval.

All abandonment and construction techniques shall be discussed with the District and shall be approved in writing by the District Engineer prior to commencement of any line abandonment work.

8.2. WATER MAIN LINES

8.2.1 WITHIN THE CITY OF SIMI VALLEY BOUNDARY

Water lines to be abandoned within the City of Simi Valley limits shall be filled by pumping one-sack cement slurry into the line. The engineer shall show the approximate number of cubic yards of concrete that will be required for any particular reach on the plans.

8.2.2 OUTSIDE THE CITY OF SIMI VALLEY BOUNDARY

Water lines to be abandoned outside of the City limits/boundary shall conform to the standards and specifications set forth by the corresponding agency, Ventura County, LA County, or the City of Los Angeles[RM2][ME3]. The engineer shall be responsible to determine the latest procedures for abandoning water main lines within the jurisdiction.

8.3. SERVICE LINES

Service lines shall be abandoned and plugged at the main under the direction of the Waterworks Inspector. This abandonment shall include the removal of all existing corporation stops or other valves at the main and insertion of a properly sized solid brass or stainless steel plug depending on the material of the main or saddle. No dissimilar metal plugs are allowed.

8.4. STRUCTURES

Structures associated with lines to be abandoned shall be removed by the contractor and given to the District if salvageable. All structures to be removed shall be so identified on the construction plans and approved for disposal by the District before disposal. The contractor shall make all arrangements for the proper disposal of all discarded materials and/or equipment, including any materials identified as hazardous waste. All costs associated with the disposal of discarded materials and/or equipment, including any materials identified as hazardous waste, shall be solely at the contractor's expense.

SECTION 9
REQUIREMENTS FOR FINAL ACCEPTANCE

9.1 GENERAL

Acceptance of a project by the District can occur at different stages of the work. The following terms apply:

Partial Acceptance:

Partial Acceptance may be conditionally granted when occupancy is requested for units within a development and when the entire water system is not to a state of completion where it could be termed field accepted. Partial Acceptance shall not be given unless District standards for water service per Section 3.0 – Design Criteria can be reliably met as determined by the District. Partial acceptance shall not imply that the District has waived any right to insist on repairs or corrections of punch list items subsequently identified in a final inspection of the development's entire water system improvements.

Field Acceptance:

Field Acceptance is limited acceptance granted when the Waterworks Inspector inspects the water system improvements and determines that conditions have been fulfilled as shown on the approved improvement plans and specifications and as required by these Standards.

The Waterworks Inspector shall provide a field acceptance letter to the Development Services Division for use to proceed with the Final Acceptance. The developer is responsible to initiate action and provide the required administrative items and fees prior to consideration of Final Acceptance by the District.

Final Acceptance:

Final acceptance is when the District formally accepts the development's water system improvements in its entirety by resolution.

9.2 AS-BUILT RECORDS

Original as-built drawings and two sets of prints shall be submitted to the District Engineer. The as-built shall reflect the actual improvements made and give the accurate location of all new/or relocated facilities. The as-built certificate, as defined in Section 5.4, Subsection F[e4][ME5][ME6], shall be signed and shall appear on the cover sheet of the water plans.

The engineer is responsible for accurate as-built drawings. All changes, whether completed through a formal change order or revision process or completed as a field adjustment, shall be reflected on the as-built drawings.

9.3 NOTICE OF COMPLETION

The developer shall submit a copy of the recorded Notice of Completion of the water system improvements to the District Engineer.

9.4 GRANT DEED

The developer shall submit the original unrecorded grant deed executed by the developer conveying the water system improvements to the District; this includes notarization of all signatures. Language to be used on grant deeds is as follows:

"An easement and right-of-way to lay, construct, repair, maintain, operate, renew, replace pipeline and appurtenances incidental thereto for the transportation of water with the right of ingress and egress to and from same in, over, under and across the easement and with the right to disturb the surface of the easement area. Replacement or repair of improvements, including landscaping, which are disturbed, damaged, or destroyed by the District in exercising the above-described rights, will be the responsibility of the servient tenement, who shall bear the full cost unless otherwise stated herein."

9.5 ITEMIZED COST/ADDITIONAL FEES

The developer shall submit to the District a certified and itemized copy of the cost of the facilities offered for dedication. Such certification shall consist of copies of the signed contractual agreement with any change orders. If the final cost is found to be more than

the originally approved engineer's cost estimate, the developer shall pay the District an additional amount of plan check and inspection fees, based on the difference between the estimate and the final cost, and based on the current rates of such fees.

9.6 OTHER ADMINISTRATIVE ITEMS

Depending upon the project, there may be other administrative items required before Final Acceptance. Examples are unpaid invoices, contractual requirements involving easements, etc.

9.7 FIFTY PERCENT OCCUPANCY

Under certain conditions, District approval may be processed after fifty percent (50%) of the development has been completed.

9.8 BOND REDUCTION

Performance bonds may be reduced to a maximum of fifty percent (50%) for infrastructure improvements that are at least eighty percent (80%) complete.

9.9 APPROVAL FOR ACCEPTANCE

When all requirements (field and administrative) have been met, staff will prepare a resolution recommending District acceptance of the improvements and exoneration of the performance and labor and material bonds. Ten percent (10%) retention of the bond remains in force until it is fully exonerated; typically, this is for the one-year maintenance and guarantee period. The City of Simi Valley or County of Ventura Public Works Department may have additional requirements for final acceptance.

Whereas the normal maintenance and guarantee period is one year and the bond retention is ten percent (10%) of the final cost of construction; both of these may be increased if the District determines the normal period and amount are not sufficient.

9.10 STATUS DURING MAINTENANCE AND GUARANTEE PERIOD

The developer is responsible during the guarantee period for the proper performance and maintenance of the water system improvements. Should the District be required to perform any of this work, the costs for such work shall be invoiced to the developer.

9.11 EXONERATION OF SURETY

Ninety percent (90%) of the final cost of the development will be exonerated upon acceptance by the District unless determined otherwise. Ten percent (10%) shall be retained for the one-year guarantee period and then released upon written request by the developer.

SECTION 10
STANDARD PLATES

STANDARD PLATE NO.	TITLE OF STANDARD PLAN
GENERAL:	
101	STANDARD TITLE SHEET
102	STANDARD PLAN AND PROFILE SHEET
103	STANDARD SYMBOLS
104	PIPELINE TRENCH AND STREET REPAIR
LOCATIONS:	
201	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
202	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
203	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
204	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
205	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
206	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
207	WATERMAIN CONNECTIONS AT INTERSECTIONS
208	LOCATIONS OF ABOVE GROUND FACILITIES (HYDRANTS, AIR/VACS, BLOW-OFFS, ETC.)
209	LOCATION OF WATER METERS
210	MISCELLANEOUS DETAILS FIRE HYDRANTS AND AIR/VAC VALVES

STANDARD PLATE NO.	TITLE OF STANDARD PLAN
CONNECTIONS:	
301	VALVE ASSEMBLY DETAILS
302	WATER PIPELINE ENCASEMENT
303	CUT-IN TEE
304	DISSIMILAR PIPE CONNECTIONS
305	WATER SAMPLE STATION
METERS:	
401	1" WATER METER SERVICE INSTALLATION
402	1 1/2" AND 2" WATER METER SERVICE INSTALLATION
403	3" WATER METER AND LARGER SERVICE INSTALLATION
HYDRANTS, BLOW-OFFS, AIR/VACS:	
501	FIRE HYDRANT INSTALLATION
502	2" BLOW-OFF INSTALLATION
503	4" BLOW-OFF INSTALLATION
504	1" AND 2" COMBINATION AIR RELEASE & VACUUM VALVE (AIR/VAC)
BACKFLOWS AND RP DEVICES:	
601	REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY, 2" & SMALLER
602	REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY, 3" & LARGER

STANDARD PLATE NO.	TITLE OF STANDARD PLAN
603	DOUBLE CHECK BACKFLOW ASSEMBLY, 3" AND LARGER (FIRE)
THRUST BLOCKS AND ANCHORS:	
701	THRUST AND ANCHOR BLOCK SIZES
702	THRUST BLOCK FOR PUSH JOINT / MECHANICAL JOINT CONNECTIONS
703	ANCHOR BLOCKS
704	PIPE ANCHORS AND BACKFILL STABILIZERS
705	PIPE ANCHORS AND BACKFILL STABILIZERS

Ventura County Waterworks District No. 8

STANDARD PLATES

CITY OF SIMI VALLEY

ADOPTED JULY 26, 2021

Ventura County Waterworks
District No. 8

GENERAL
- PLATE 101 STANDARD TITLE SHEET
- PLATE 102 STANDARD PLAN AND PROFILE SHEET
- PLATE 103 STANDARD SYMBOLS
- PLATE 104 PIPELINE TRENCH & STREET REPAIR

LOCATIONS
- PLATE 201 SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
- PLATE 202 SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
- PLATE 203 SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
- PLATE 204 SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
- PLATE 205 SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
- PLATE 206 SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES
- PLATE 207 WATERMAIN CONNECTIONS AT INTERSECTIONS
- PLATE 208 LOCATIONS OF ABOVE GROUND FACILITIES (HYDRANTS, AIR-VACS, BLOW-OFFS, ETC)
- PLATE 209 LOCATION OF WATER METERS
- PLATE 210 MISCELLANEOUS DETAILS FIRE HYDRANTS AND AIR/VAC VALVES

CONNECTIONS
- PLATE 301 VALVE ASSEMBLY DETAILS
- PLATE 302 WATER PIPELINE ENCASEMENT
- PLATE 303 CUT-IN TEE
- PLATE 304 DISSIMILAR PIPE CONNECTIONS
- PLATE 305 WATER SAMPLE STATION

METERS
- PLATE 401 1" WATER METER SERVICE INSTALLATION
- PLATE 402 1½" & 2" WATER METER SERVICE INSTALLATION
- PLATE 403 3" WATER METER AND LARGER SERVICE INSTALLATION

HYDRANTS, BLOW-OFFS, AIR/VACS
- PLATE 501 FIRE HYDRANT INSTALLATION
- PLATE 502 2" BLOW OFF INSTALLATION
- PLATE 503 4" BLOW OFF INSTALLATION
- PLATE 504 1" & 2" COMBINATION AIR RELEASE AND VACUUM VALVE (AIR/VAC)

BACKFLOWS AND RP DEVICES
- PLATE 601 REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY, 2" AND SMALLER
- PLATE 602 REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY, 3" AND LARGER
- PLATE 603 DOUBLE CHECK BACKFLOW ASSEMBLY, 3" AND LARGER (FIRE)

THRUST BLOCKS AND ANCHORS
- PLATE 701 THRUST AND ANCHOR BLOCK SIZES
- PLATE 702 THRUST BLOCK FOR PUSH JOINT / MECHANICAL JOINT CONNECTIONS
- PLATE 703 ANCHOR BLOCKS
- PLATE 704 PIPE ANCHORS AND BACKFILL STABILIZERS
- PLATE 705 PIPE ANCHORS AND BACKFILL STABILIZERS

WATER GENERAL NOTES

1. FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE WATERWORKS DISTRICT NO. 8 (WWD8) DESIGN AND CONSTRUCTION STANDARDS, AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS, AND THE STANDARD PLANS AND SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK). CONTRACTOR SHALL BE FAMILIAR AND WITH ALL APPLICABLE STANDARDS, AND UPON DISCOVERY OF A DISCREPANCY BETWEEN STANDARDS, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE DISTRICT ENGINEER AND REQUEST CLARIFICATION.
2. AN ENCROACHMENT PERMIT IS REQUIRED FOR ALL DISTRICT PROJECTS WHETHER OR NOT THE PROJECT IS LOCATED WITHIN THE CITY LIMITS.
3. CONTRACTOR SHALL POSSESS A VALID CLASS A GENERAL ENGINEERING LICENSE FOR ALL WORK RELATED TO THE DISTRICT'S WATER SYSTEM.
4. CONTRACTOR IS PERMITTED TO CONSTRUCT IMPROVEMENTS SHOWN ON THE APPROVED DRAWINGS, ONLY. CHANGES IN THE WORK REQUIRE FORMAL DRAWING REVISIONS AND MUST BE APPROVED BY THE DISTRICT PRIOR TO THE START OF CHANGED WORK.
5. CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THESE REQUIREMENTS SHALL BE IN EFFECT CONTINUOUSLY FROM CONTRACTOR'S INITIAL MOBILIZATION THROUGH PROJECT ACCEPTANCE.
6. CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE DISTRICT HARMLESS FROM ALL LIABILITY, REAL OR ALLEGED, RELATED TO PERFORMANCE WITH THE PROJECT.
7. ALL WORK SHALL BE COMPLETED DURING THE HOURS INDICATED ON THE ENCROACHMENT PERMIT. OVERTIME INSPECTION, WHETHER OR NOT SCHEDULED IN ADVANCE, WILL BE BILLED TO THE CONTRACTOR. CONTRACTOR'S PAYMENT OF ALL FEES IS A CONDITION OF PROJECT ACCEPTANCE.
8. CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION STAKING.
9. AS A FIRST ORDER OF WORK, CONTRACTOR SHALL POTHOLE ALL UTILITY CROSSINGS AND POINTS OF CONNECTION TO EXISTING WATER FACILITIES. POTHOLE DATA SHALL INCLUDE UTILITY DESCRIPTION, LOCATION (PIPELINE STATION AND OFFSET), DEPTH AND OBSERVED CONDITION.
10. CONTRACTOR SHALL PROVIDE SHOP DRAWING SUBMITTALS FOR ALL PROPOSED MATERIALS, INCLUDING CATALOG DATA SHEETS IDENTIFYING MANUFACTURE, MODEL NUMBER, SIZE AND QUANTITY OF EACH ITEM. THE DISTRICT WILL NOT REVIEW AND APPROVE SUBMITTALS UNTIL AFTER AN ACCEPTABLE POTHOLE REPORT IS SUBMITTED. CONTRACTOR'S FAILURE TO SUBMIT SHOP DRAWINGS, OR INSTALLATION OF UNAPPROVED MATERIALS WILL REQUIRE REMOVAL AND REPLACEMENT OF NON-APPROVED MATERIALS AT NO COST TO THE DISTRICT.
11. CONTRACTOR SHALL PROVIDE A SUBMITTAL WITH A SKETCH DESCRIBING THE SHUTDOWN AND TIE-IN SEQUENCE OF ACTIVITIES. INDICATE WHICH VALVES WILL BE CLOSED AND WHICH CUSTOMERS WILL BE TEMPORARILY OUT OF SERVICE. WATERLINES SHALL NOT BE OUT OF SERVICE FOR LONGER THAN FOUR (4) HOURS. TEMPORARY KICKERS (STEEL JACKS OR STRUTS, ETC.) MAY BE REQUIRED TO SUPPORT THRUST UNTIL CONCRETE HARDENS.
12. WATER MAIN CONNECTIONS SHALL BE AT LEAST THREE DIAMETERS FROM THE NEAREST JOINT AND NOT LESS THAN 24 INCHES.
13. TRENCHING SHALL BE LIMITED TO THE LENGTH OF PIPE THAT CAN BE INSTALLED IN A SINGLE DAY. TRENCH PLATES, WHEN USED, SHALL BE THE ANTI-SKID TYPE, RECESSED TO BE FLUSH WITH THE ADJACENT PAVEMENT, SECURELY PINNED INTO PAVEMENT AND ADJACENT PLATES SHALL BE TACK-WELDED TOGETHER.
14. TRENCHES AND OTHER EXCAVATIONS IN PAVED AREAS SHALL BE SAW-CUT IN STRAIGHT, NEAT AND UNIFORM LINES.
15. WHERE EXCAVATIONS ARE ADJACENT TO EXISTING POWER POLES, CONTRACTOR SHALL SUPPORT AND PROTECT POLES IN-PLACE.
16. WHERE EXCAVATIONS INTERFERE WITH ABOVE-GROUND FACILITIES, SUCH AS SIGNS, FENCES, GATES OR BOLLARDS, CONTRACTOR SHALL REMOVE AND REPLACE SAID FACILITIES IN-KIND.
17. EXCAVATIONS SHALL BE BRACED IN ACCORDANCE WITH SECTION 306-3 OF SSPWC. CONTRACTOR SHALL PROVIDE ADEQUATE SHEETING, SHORING AND BRACING FOR FOR WORKER PROTECTION FROM THE HAZARD OF CAVING GROUND. CONTRACTOR SHALL MAINTAIN COPIES OF ALL APPLICABLE SAFETY ORDERS AT THE JOBSITE.
18. CONTRACTOR IS NOT AUTHORIZED TO TURN VALVES ON THE EXISTING SYSTEM. FORTY-EIGHT HOURS PRIOR TO MAKING TIE-IN TO THE EXISTING WATER SYSTEM, CONTRACTOR SHALL NOTIFY THE DEPUTY DIRECTOR OF THE WATERWORKS DISTRICT AT 805-583-6494.
19. ALL WORK SHALL BE COORDINATED WITH THE APPROPRIATE INSPECTOR. THE WATERWORKS DISTRICT INSPECTOR MUST OBSERVE AND APPROVE ALL PUBLIC WATER FACILITIES UP TO AND INCLUDING THE WATER METER. THE BUILDING AND SAFETY DIVISION INSPECTOR WILL OBSERVE AND APPROVE ALL ONSITE/PRIVATE FACILITIES, INCLUDING THE BACKFLOW PREVENTER. PRIVATE FIRE HYDRANTS AND FIRE RISERS. THE PUBLIC WORKS INSPECTOR WILL OBSERVE AND APPROVE SURFACE IMPROVEMENTS SUCH AS THE ROADWAY, CURB AND GUTTER.
20. BACKFLOW PREVENTERS SHALL BE LOCATED ON PRIVATE PROPERTY, WITHIN 10 FEET OF THE PUBLIC RIGHT-OF-WAY.
21. WATERLINE STATIONING IS BASED ON THE HORIZONTAL PIPELINE CENTERLINE. PIPELINE ELEVATIONS ARE TOP OF PIPE (TOP) UNLESS NOTED OTHERWISE.
22. ALL PIPELINE JOINTS SHALL BE FULLY-RESTRAINED, WHETHER OR NOT CALLED OUT ON THE DRAWINGS.
23. ALL BURIED NUTS, BOLTS AND WASHERS SHALL BE TYPE 316 STAINLESS STEEL, AND COATED WITH ANTI-SEIZE LUBRICANT PRIOR TO INSTALLATION. ALL BURIED NUTS, BOLTS AND WASHERS SHALL BE COATED WITH NO-OX-ID. THE LENGTH OF EACH BOLT OR STUD SHALL BE SUCH THAT BETWEEN ¼" AND ½" PROJECTS THROUGH THE NUT WHEN DRAWN TIGHT.
24. DUCTILE IRON AND STEEL FLANGES SHALL BE CLASS E PER AWWA C115 AND C207, RESPECTIVELY (AWWA WORKING PRESSURE RATING = 250 PSI). FLANGE BOLT PATTERN SHALL BE PER ANSI B16.1 FOR DUCTILE IRON AND ANSI B16.5 FOR STEEL (ANSI PRESSURE RATING = 175 PSI).
25. NOT ALL REQUIRED PIPE FITTINGS AND APPURTENANCES ARE SPECIFICALLY CALLED OUT ON THE DRAWINGS, BUT ARE REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL PIPING SYSTEM.
26. UTILIZE DIELECTRIC COUPLINGS OR EQUIVALENT INSULATION BETWEEN DISSIMILAR METALS, INCLUDING MILD STEEL, STAINLESS STEEL, COPPER AND BRASS.
27. CONTRACTOR SHALL PROVIDE A CLEAN AND ORGANIZED SET OF RECORD DRAWINGS, WHICH CLEARLY ILLUSTRATES THE "AS-BUILT" CONDITIONS. DISTRICT ACCEPTANCE OF RECORD DRAWINGS IS A CONDITION OF PROJECT ACCEPTANCE AND ENCROACHMENT PERMIT CLOSEOUT.
28. CONTRACTOR SHALL SALVAGE FITTINGS, VALVES AND EQUIPMENT AS DIRECTED BY THE INSPECTOR AND DELIVER TO THE WATERWORKS DISTRICT YARD, LOCATED AT 500 W. LOS ANGELES AVE, SIMI VALLEY, CA.
29. CONTRACTOR SHALL APPLY FOR AND OBTAIN A TEMPORARY HYDRANT METER FOR CONSTRUCTION WATER, TESTING AND DISINFECTION.
30. PRIOR TO CONNECTING NEW WORK TO THE DISTRICT'S WATER SYSTEM, CONTRACTOR SHALL HYDROSTATICALLY PRESSURE TEST PIPELINES PER AWWA C600. THE WATERWORKS INSPECTOR MUST BE PRESENT DURING ALL PRESSURE TESTING.
31. PRIOR TO CONNECTING NEW WORK TO THE DISTRICT'S WATER SYSTEM, CONTRACTOR SHALL DISINFECT AND TEST FACILITIES IN ACCORDANCE WITH AWWA C651 (WATER MAINS), C652 (STORAGE TANKS) AND C655 (FIELD DECHLORINATION). ALL DISINFECTION WORK SHALL BE PERFORMED BY PERSONNEL CERTIFIED BY THE CALIFORNIA STATE WATER BOARD. CONTRACTOR SHALL SUBMIT A DISINFECTION PLAN TO THE DISTRICT FOR REVIEW APPROVAL.
32. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING DAMAGED BENCHMARKS AND/OR OTHER SURVEY MONUMENTS.
33. SEQUENCE OF CONSTRUCTION ACTIVITIES:
    - A. PRECONSTRUCTION MEETING WITH DISTRICT INSPECTOR (805-501-2512)
    - B. POTHOLE ALL POINTS OF CONNECTION AND UTILITY CROSSINGS
    - C. SUBMITTALS FOR APPROVAL BY DISTRICT ENGINEER
    - D. ON-SITE MATERIALS INSPECTION
    - E. CONSTRUCTION

INDEX OF DRAWINGS		
SHEET NO.	DESCRIPTION	CITY DWG. NO.
1	WATER IMPROVEMENTS COVER SHEET	YEAR-XXXX

QUANTITY TABLE	
DESCRIPTION	

PUBLIC UTILITIES / SERVICES

CABLE TV:	SPECTRUM 2525 KNOLL ROAD VENTURA, CA 93003 (805) 732-8160
ELECTRIC:	EDISON INTERNATIONAL CO. 3589 FOOTHILL DR. THOUSAND OAKS, CA 91361 (805) 494-7030 (805) 433-5464
FIRE:	VENTURA CO. FIRE DEPARTMENT 165 DURLEY AVE. CAMARILLO, CA 93010 (805) 389-9738 x1
GAS:	SO. CALIFORNIA GAS CO. 977 CHAMBERS LANE SIMI VALLEY, CA 93065 (818) 701-3468 EMERGENCY:(800) 427-2200 ext.1
OIL:	CRIMSON PIPELINE ATT: CORDELIA CISNEROS 3780 KILROY AIRPORT WAY, STE. 400 LONG BEACH, CA 90806 (562) 285-4133 or 285-4100 EMERGENCY: (866) 351-7473
PARKS & RECREATION:	RANCHO SIMI RECREATION & PARK DISTRICT 1692 SYCAMORE DR. SIMI VALLEY, CA 93065 (805) 584-4400
POLICE:	SIMI VALLEY POLICE DEPARTMENT. 3901 ALAMO STREET SIMI VALLEY, CA 93063 (805) 583-6950
POSTAL SERVICE:	MAIN POST OFFICE 2551 GALENA AVE. SIMI VALLEY, CA 93063 (805) 526-9819 (800) 275-8777
RUBBISH:	AMERICAN RUBBISH CO. (G.I. RUBBISH) 195 W. LOS ANGELES AVE. SIMI VALLEY, CA 93065 (805) 522-9400 x4360 ANDERSON RUBBISH 4590 INDUSTRIAL ST. SIMI VALLEY, CA 93063 (805) 526-1919
SCHOOL DISTRICT:	SIMI VALLEY UNIFIED SCHOOL DIST. 875 E. COCHRAN ST. SIMI VALLEY, CA 93065 (805) 306-4500
SEWER:	CITY OF SIMI VALLEY, SANITATION DIVISION 500 W. LOS ANGELES AVE. SIMI VALLEY, CA 93065 (805) 583-6404
TELEPHONE AND FIBER OPTICS:	A.T.& T. CONSTRUCTION & ENGINEERING 600 E. GREEN ST., 3rd FLOOR PASADENA, CA 91101-2020 (626) 817-4263 A.T.& T. INQUIRIES (long distance fiber optic) 22311 BROOKHURST STREET, SUITE No. 203 HUNTINGTON BEACH, CA 92646 (714) 963-7964 VERIZON/MCI L.A. NORTH FIELD SERVICES 157 So. LILAC AVENUE RIALTO, CA. 92376-6322 (909) 421-3316 OR (941) 993-9018 SPRINT NEXTEL TRANSMISSION OPERATIONS ATTN: TIBOR LAKY 2592 DUPONT DRIVE IRVINE, CA 92612 (949) 842-9870 LEVEL 3 COMMUNICATIONS 100 S. CINCINNATI AVE. TULSA, OK 74103 (918) 547-0007
TRAFFIC:	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS TRAFFIC ENGINEERING 2929 TAPO CANYON RD. SIMI VALLEY, CA 93063 (805) 583-6786
TRANSIT:	CITY OF SIMI VALLEY TRANSIT DIVISION 2929 TAPO CANYON ROAD SIMI VALLEY, CA 93063 (805) 583-6456
WATER:	CALLEGUAS MUNICIPAL WATER DIST. 2100 OLSEN RD. THOUSAND OAKS, CA 91362 (805) 579-7156 (805) 807-9495 VENTURA CO. WATERWORKS DIST. NO. 8 500 W. LOS ANGELES AVE. SIMI VALLEY, CA 93065 (805) 583-6469 GOLDEN STATE WATER CO. 4680 LOS ANGELES AVE, UNIT H SIMI VALLEY, CA 93063 (805) 527-9393 (805) 990-9600

UNDERGROUND SERVICE ALERT

CALL TOLL FREE - 1 800 227 2600

OR 811

TWO WORKING DAYS BEFORE YOU DIG

LINETYPE LEGEND

(EXIST SHOWN IN GREY)

- CENTERLINE
- CURB & GUTTER LINE
- CURB OR AC. BERM
- EDGE OF PAVEMENT
- FENCE
- PROPERTY LINE
- RAILROAD
- RIGHT-OF-WAY
- SAW-CUT & JOIN LINE
- 8" W UTILITY LINE (LABELED)
- WALL

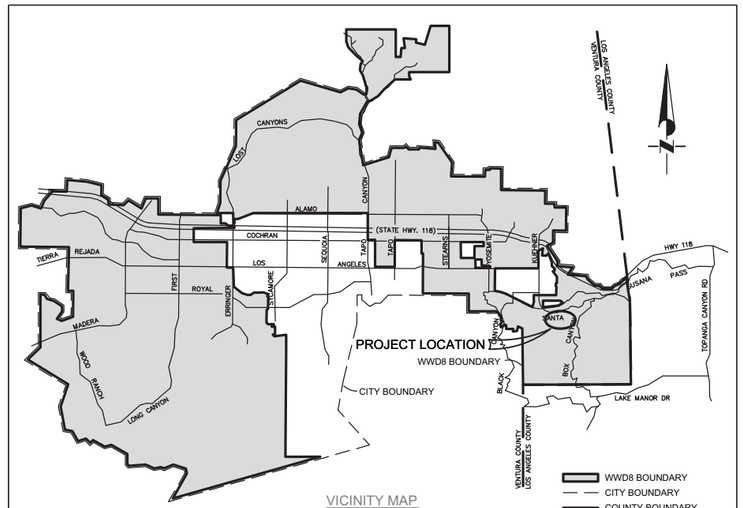
ABBREVIATIONS

ABAN	ABANDON
ABAND	ABANDONED
AC	ASPHALT CONCRETE
AIR-VAC	AIR VACUUM AND AIR RELEASE ASSEMBLY
ASSY	ASSEMBLY
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BEGIN CURVE
BFV	BUTTERFLY VALVE
BM	BENCHMARK
BO	BLOW OFF ASSEMBLY
CL	CENTERLINE OR CLASS
CLF	CHAIN LINK FENCE
CLR	CLEAR
CMB	CRUSHED MISCELLANEOUS BASE
CMC	CEMENT MORTAR COATED
CML	CEMENT MORTAR LINED
CML&C	CEMENT MORTAR LINED AND COATED
CO	CLEANOUT
CONC	CONCRETE
CY	CUBIC YARD
DET	DETAIL
DI	DUCTILE IRON
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DWG	DRAWINGS
EA	EACH
EC	END CURVE
EL	ELEVATION
EP	EDGE OF PAVEMENT
EX EX'G	EXISTING
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FLG	FLANGE
FS	FINISH SURFACE
GALV	GALVANIZED
GPM	GALLONS PER MINUTE
GV	GATE VALVE
HGL	HYDRAULIC GRADE LINE
HOR	HORIZONTAL
ID	INSIDE DIAMETER
IN	INCH
INV	INVERT ELEVATION
L	LENGTH
LF	LINEAR FOOT
MH	MANHOLE
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
NTS	NOT TO SCATE
OC	ON CENTER
OD	OUTSIDE DIAMETER
PE	PLAIN END
PL	PROPERTY LINE
PRC	POINT OF REVERSE CURVE
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
R/W	RIGHT OF WAY
RCP	REINFORCED CONCRETE PIPE
RR	RAILROAD
S	SLOPE
SCH	SCHEDULE
SD	STORM DRAIN
SDR	STANDARD DIMENSION RATIO
SE	SAND EQUIVELENT
SF	SQUARE FOOT
SHT	SHEET
SPPLC	STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
SSPWD	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
STA	STATION
STD	STANDARD
STL	STEEL
STN STL	STAINLESS STEEL
TOP	TOP OF PIPE
TYP	TYPICAL
VERT	VERTICAL
WATCH	WORK AREA TRAFFIC CONTROL HANDBOOK
WT	WEIGHT
WWD8	VENTURA COUNTY WATERWORKS DISTRICT NO 8

SYMBOL LEGEND

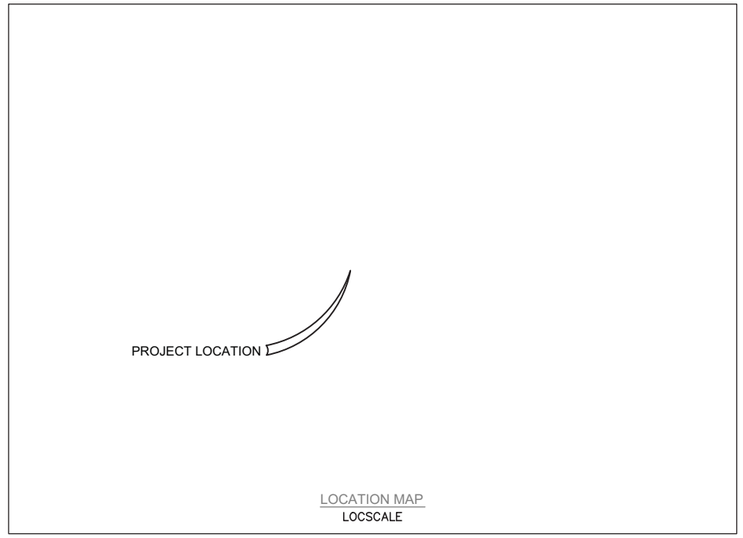
(EXIST SHOWN IN GREY)

- AIR VAC ASSEMBLY
- BLOW-OFF ASSEMBLY
- CLEAN-OUT
- CATCH BASIN
- CURB RAMP
- DRIVEWAY
- END CAP / PLUG
- EARTHWORK/GRADING
- FIRE HYDRANT (PROVIDE BLUE REFLECTIVE RAISED PAVEMENT MARKER)
- IRON PIPE / SURVEY MARKER
- MAILBOX
- MANHOLE (LABELED)
- POWER POLE
- PRESSURE REGULATION VALVE
- PULLBOX
- REDUCER / ENLARGER
- SIGN
- STREET LIGHT
- THRUST BLOCK
- TREE
- VENTURA COUNTY SURVEY MONUMENT
- VALVE (LABELED)
- VAULT (LABELED)
- WATER METER
- 1/9 DETAIL NUMBER / SHEET NUMBER



VICINITY MAP

NOT TO SCALE



LOCATION MAP

LOCSCALE

BENCHMARK

VENTURA COUNTY BM 72-5 ELEV. 1083.21 (NAVD 1988)

A 3.5" VENTURA COUNTY BRASS DISK LOCATED 3.25 MILES SOUTHEASTERLY ALONG THE SOUTHERN PACIFIC RAILROAD FROM THE POST OFFICE IN SANTA SUSANA PASS ROAD, THENCE 0.2 MILE WESTERLY ALONG KATHERINE ROAD TO A PAVED PARKING LOT OF THE SANTA SUSANA CITY PARK, SET IN THE EAST END AND IN THE TOP OF A CONCRETE CURB OF A TRIANGULAR CONCRETE SLAB AND A FLAGPOLE ABOUT IN THE CENTER OF THE SLAB, 105.6 FEET NORTHWEST OF THE CENTER OF THE ROAD, 0.7 FEET EAST OF A FLAG POLE, 0.78 FEET WEST OF THE EAST END OF THE CURB, 0.7 FEET ABOVE THE PARKING LOT SURFACE.

WATER PRESSURE ZONE

RECORD DRAWING CERTIFICATE

I HEREBY CERTIFY THAT THE WATER SYSTEM SHOWN ON DRAWINGS _____ THROUGH _____ HAVE BEEN CONSTRUCTED IN CONFORMANCE WITH LINES AND GRADES AS SHOWN ON SAID PLANS AND REFERENCED SPECIFICATIONS.

REGISTERED CIVIL ENGINEER

R.C.E. NO. DATE

VENTURA COUNTY FIRE PROTECTION DISTRICT

REVIEWED DATE

REQUIRED FIRE FLOW _____ @ 20 PSI. HYDRANTS SHALL BE INSTALLED PER VCFD AND WWD8 STANDARDS.
◇ = DENOTES 6" WET BARREL HYDRANT WITH ____ 4" & ____ 2 ½" OUTLETS.

JUL 2021

PLATE 101

STANDARD TITLE SHEET

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS

RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER

Ventura County Waterworks District No. 8

NO.	REVISION	PREP.	APPVD.	DATE

CITY OF SIMI VALLEY - VENTURA COUNTY WATERWORKS DISTRICT NO 8

ACCEPTED:

ASSIST. DIR./DIST. ENGINEER DATE

DEPUTY DIRECTOR/WATERWORKS SERVICES DATE

REVIEWED:

ENGINEER DATE

RECOMMENDED: PRINCIPAL ENGINEER DATE

CITY OF SIMI VALLEY
DEPARTMENT OF PUBLIC WORKS

DESIGNED BY: DESBY
DRAWN BY: DRNBY
DATE: DATE

VENTURA COUNTY WATERWORKS DISTRICT NO.8

SHEET

PROJECT1
PROJECT2
PROJECT3
SVNUM

WATER PLAN SET 1W OF TW

SHEET NUMBER 1 OF T

DRAWING NUMBER DWG

REV. 10/2020 RH

PLATE_101_TITLE_20210701.dwg Jul 19, 2021 - 7:38am

JUL 2021

PLATE
102

STANDARD PLAN AND PROFILE SHEET

RECOMMENDED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER

APPROVED: /S/
DIRECTOR OF PUBLIC WORKS

Ventura County Waterworks District No. 8

NO.	REVISION	PREP.	APPVD.	DATE

CITY OF SIMI VALLEY – VENTURA COUNTY WATERWORKS DISTRICT NO 8

REVIEWED: SENIOR ENGINEER DATE

CITY OF SIMI VALLEY
DEPARTMENT OF PUBLIC WORKS

DESIGNED BY: DESBY
DRAWN BY: DRNBY
DATE: DATE

VENTURA COUNTY WATERWORKS DISTRICT NO.8

SHEET
PROJECT1
PROJECT2
PROJECT3
SVNUM

WATER PLAN SET
2W OF TW

SHEET NUMBER
2 OF T

DRAWING NUMBER
DWG

REV. 10/2020 RAR

PLATE_102_PROFILE_20210701.dwg Jul 19, 2021 - 7:39am

EXISTING		PROPOSED
8"W	WATERLINE	8"W
W	WATER VALVE	W
	FIRE HYDRANT	
PRV	PRESSURE REGULATING STATION	PRV
	REDUCER	
WM	WATER METER	WM
E	ELECTRIC LINE	
A/V	AIR AND VACUUM VALVE	A/V
B.O.	BLOW-OFF	B.O.
	END CAP	
	PLUG	
	THRUST BLOCK	
G	GAS LINE	
T	TELEPHONE LINE	
S	SEWER	

Ventura County Waterworks District No. 8

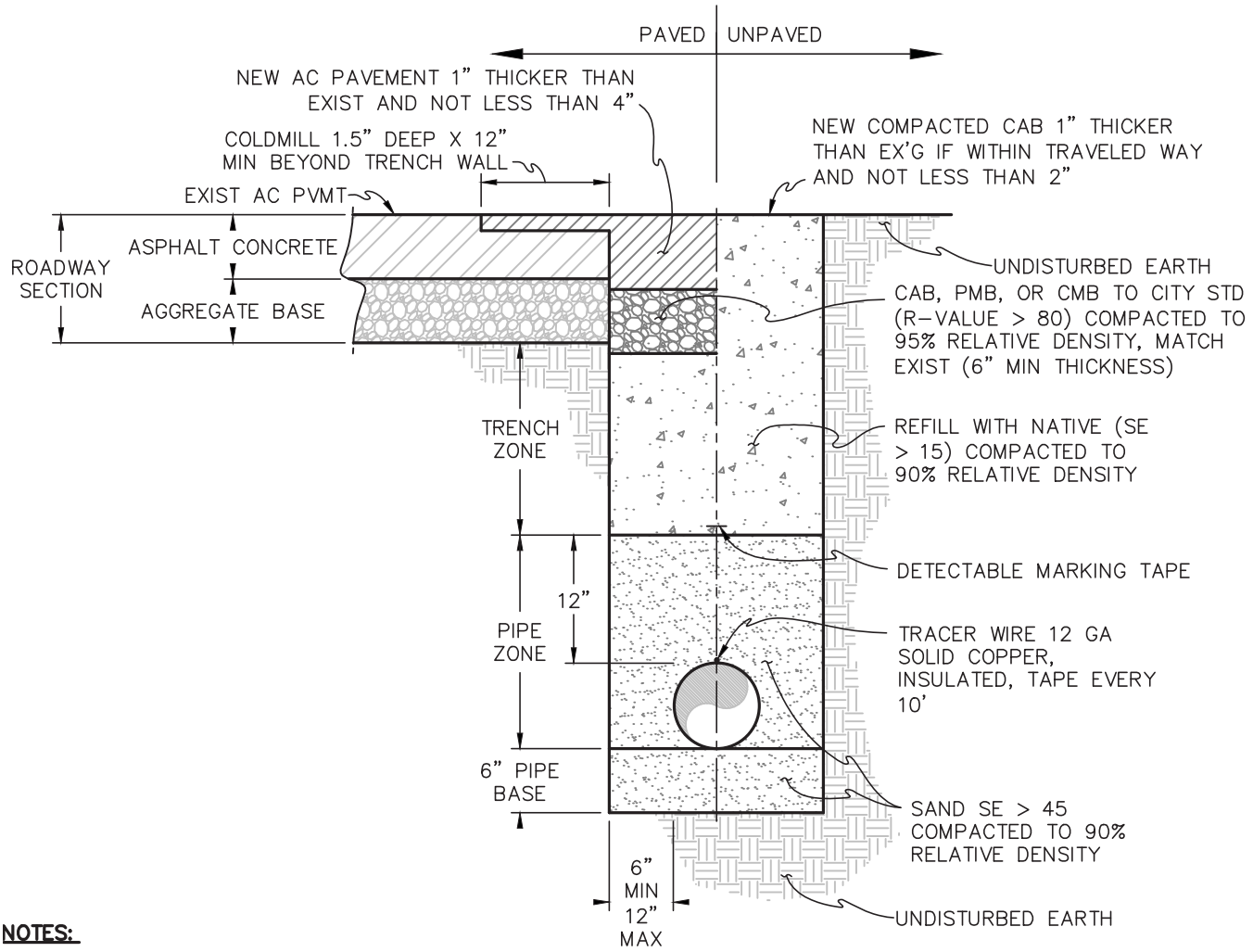
STANDARD SYMBOLS

JUL 2021

RECOMMENDED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER

APPROVED: /S/
DIRECTOR OF PUBLIC WORKS

PLATE 103



NOTES:

1. ALL COLD-MILLED EDGES AND SAW-CUT LINES SHALL BE PARALLEL OR PERPENDICULAR TO THE STREET CENTERLINE, UNLESS SPECIFICALLY DIRECTED TO DO OTHERWISE BY THE PUBLIC WORKS INSPECTOR.
2. EXISTING ASPHALT SHALL BE COLD-MILLED 1.5" DEEP AND 12" BEYOND THE TRENCH WALLS. WHEN THE EDGE OF THE ASPHALT REMOVAL IS WITHIN 3' OF AN EXISTING EDGE (GUTTER, MANHOLE, ETC.), EXTEND THE REPAIR LIMITS TO SAID EXISTING EDGE.
3. TEMPORARY TRENCH PLATES SHALL BE NON-SKID, RECESSED FLUSH WITH THE ADJACENT ROADWAY, AND PINNED INTO THE EXISTING ASPHALT. ON HIGH-TRAFFIC STREETS (AS DETERMINED BY THE PUBLIC WORKS INSPECTOR), ADJACENT PLATES SHALL BE TACK WELDED TOGETHER.
4. THE NEW ROADWAY SECTION, INCLUDING AC AND AGGREGATE BASE, SHALL BE PER THE CITY OR COUNTY (AS APPLICABLE) SPECIFIED THICKNESS AND MATERIALS.
5. THE ROADWAY BASE MATERIAL SHALL BE CRUSHED MISCELLANEOUS BASE (CMB) PER SECTION 200 OF THE SSPWC, MINIMUM R-VALUE = 80, MATCH EXISTING THICKNESS, NO LESS THAN 6 INCHES.
6. PRIOR TO INSTALLATION OF NEW PAVEMENT, TACK COAT ALL EXISTING EDGES WITH DILUTED SS-1H EMULSION PER SECTION 203-3 OF THE SSPWC.
7. ASPHALT SHALL BE PERFORMANCE GRADE PG 64-10. AC TOP COURSE SHALL BE 1.5-2" THICK, ½" AGGREGATE. AC BASE COURSE SHALL BE 3" THICK (MINIMUM), ¾" AGGREGATE, 4" (MAX) LIFTS.
8. ASPHALT PAVING SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 302-5 OF THE SSPWC.
9. REMOVE ALL DIG ALERT UTILITY MARKINGS (PRESSURE WASH, BLAST OR PAINT OVER WITH MATCHING COLOR).
10. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
11. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S "APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS."

Ventura County Waterworks District No. 8	PIPELINE TRENCH AND STREET REPAIR	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 104

CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES

THE CRITERIA PRESENTED HEREIN ARE BASED ON THE LATEST VERSION OF THE CALIFORNIA CODE OF REGULATIONS, AND GUIDANCE MEMORANDUM NO. 2003-02: GUIDANCE CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES, PREPARED BY THE STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES, DATED OCTOBER 16, 2003. FOR ADDITIONAL INFORMATION, PLEASE REFER TO THE CCR AND THE FULL GUIDANCE MEMORANDUM DOCUMENTS.

DEFINITIONS

- CALIFORNIA WATERWORKS STANDARDS CHAPTER 16 OF DIVISION 4, TITLE 22, CCR.
- COMPRESSION JOINT – A PUSH-ON JOINT THAT SEALS BY MEANS OF THE COMPRESSION OF A RUBBER RING OR GASKET BETWEEN THE PIPE AND A BELL OR COUPLING.
- CONTINUOUS SLEEVE – A PROTECTIVE TUBE OF HIGH-DENSITY-POLYETHYLENE (HDPE) PIPE WITH HEAT FUSION JOINTS OR OTHER NON-POTABLE METALLIC CASING WITHOUT JOINTS INTO WHICH A PIPE IS INSERTED.
- DIVISION OF DRINKING WATER (DDW) A DIVISION OF THE STATE WATER RESOURCES CONTROL BOARD (WATER BOARDS OR STATE BOARD) RESPONSIBLE FOR THE ADMINISTRATION OF THE DRINKING WATER PROGRAM (DWP) AND REGULATION OF PUBLIC DRINKING WATER SYSTEMS.
- DISINFECTED TERTIARY RECYCLED WATER – WASTEWATER THAT HAS BEEN FILTERED AND SUBSEQUENTLY DISINFECTED IN ACCORDANCE WITH SECTION 60301.230, CHAPTER 3 (WATER RECYCLING CRITERIA), TITLE 22, CCR.
- HOUSE LATERAL – A SEWER LINE CONNECTING THE BUILDING DRAIN AND THE SANITARY SEWER MAIN SERVING THE STREET.
- SUPPLY LINE – PIPELINES CONVEYING RAW WATER TO BE TREATED FOR DRINKING PURPOSES IN ACCORDANCE WITH SECTION 64572, CCR.
- WATER MAIN – MEANS ANY PIPELINE, EXCEPT FOR USER SERVICE LINES, WITHIN THE DISTRIBUTION SYSTEM IN ACCORDANCE WITH SECTION 64551.70 OF THE CCR.
- WATER WORKS STANDARDS THE CALIFORNIA CODE OF REGULATIONS (CCR), APPLICABLE PORTIONS OF TITLE 17 (GROUP 4. DRINKING WATER SUPPLIES) AND TITLE 22 (DIVISION 4. ENVIRONMENTAL HEALTH).
- RATED WORKING WATER PRESSURE – A PIPE CLASSIFICATION SYSTEM BASED ON INTERNAL WORKING PRESSURE OF THE FLUID IN THE PIPE, TYPE OF PIPE MATERIAL, AND THE THICKNESS OF THICKNESS OF THE PIPE WALL.
- SANITARY SEWER MAIN – A GRAVITY SEWER CONVEYING UNTREATED MUNICIPAL WASTEWATER.
- SEWAGE FORCE MAIN – A PRESSURIZED SEWER CONVEYING UNTREATED MUNICIPAL WASTEWATER.

GENERAL SEPARATION CRITERIA

SECTION 64572, TITLE 22, CCR – WATER MAIN SEPARATION

(a) NEW WATER MAINS AND NEW SUPPLY LINES SHALL NOT BE INSTALLED IN THE SAME TRENCH AS, AND SHALL BE AT LEAST 10 FEET HORIZONTALLY FROM, AND ONE FOOT VERTICALLY ABOVE, ANY PARALLEL PIPELINE CONVEYING:

(1) UNTREATED SEWAGE,

(2) PRIMARY OR SECONDARY TREATED SEWAGE,

(3) DISINFECTED SECONDARY-2.2 RECYCLED WATER (DEFINED IN SECTION 60301.220, CCR),

(4) DISINFECTED SECONDARY-23 RECYCLED WATER (DEFINED IN SECTION 60301.225, CCR), AND

(5) HAZARDOUS FLUIDS SUCH AS FUELS INDUSTRIAL WASTES, AND WASTEWATER SLUDGE.

(b) NEW WATER MAINS AND NEW SUPPLY LINES SHALL BE INSTALLED AT LEAST 4 FEET HORIZONTALLY FROM, AND ONE FOOT VERTICALLY ABOVE, ANY PARALLEL PIPELINE CONVEYING:

(1) DISINFECTED TERTIARY RECYCLED WATER (DEFINED IN SECTION 60301.230, CCR), AND

(2) STORM DRAINAGE.

Ventura County Waterworks District No. 8	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON-POTABLE PIPELINES	JUL 2021
	RECOMMENDED: /s/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /s/ DIRECTOR OF PUBLIC WORKS	PLATE 201
		SHEET 1 OF 6

(c) NEW SUPPLY LINES CONVEYING RAW WATER TO BE TREATED FOR DRINKING PURPOSES SHALL BE INSTALLED AT LEAST 4 FEET HORIZONTALLY FROM, AND ONE FOOT VERTICALLY BELOW, ANY WATER MAIN.

(d) IF CROSSING A PIPELINE CONVEYING A FLUID LISTED IN SUBSECTION (A) OR (B), ABOVE, A NEW WATER MAIN SHALL BE CONSTRUCTED CO LESS THAN 45–DEGREES TO (PERPENDICULAR PREFERRED), AND AT LEAST ONE FOOT ABOVE THAT PIPELINE. NO CONNECTION JOINTS SHALL BE MADE IN THE WATER MAIN WITHIN EIGHT HORIZONTAL FEET OF THE FLUID PIPELINE.

(e) THE VERTICAL SEPARATION SPECIFIED IN SUBSECTIONS (A), (B), AND (C), ABOVE, IS REQUIRED ONLY WHEN THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS TEN FEET OR LESS.

(f) NEW WATER MAINS SHALL NOT BE INSTALLED WITHIN 100 HORIZONTAL FEET OF THE NEAREST EDGE OF ANY SANITARY LANDFILL, WASTEWATER DISPOSAL POND, OR HAZARDOUS WASTE DISPOSAL SITE, OR WITHIN 25 HORIZONTAL FEET OF THE NEAREST EDGE OF ANY CESSPOOL, SEPTIC TANK, SEWAGE LEACH FIELD, SEEPAGE PIT, UNDERGROUND HAZARDOUS MATERIAL STORAGE TANK, OR GROUNDWATER RECHARGE PROJECT SITE.

(g) THE MINIMUM SEPARATION DISTANCES SET FORTH IN THIS SECTION SHALL BE MEASURED FROM THE NEAREST OUTSIDE EDGE OF EACH PIPE BARREL.

(h) WITH STATE BOARD APPROVAL, NEWLY INSTALLED WATER MAINS MAY BE EXEMPT FROM THE SEPARATION DISTANCES IN THIS SECTION, EXCEPT SUBSECTION (F), ABOVE, IF THE NEWLY INSTALLED MAIN IS:

(1) LESS THAN 1320 LINEAR FEET,

(2) REPLACING AN EXISTING MAIN, INSTALLED IN THE SAME LOCATION, AND HAS A DIAMETER NO GREATER THAN SIX INCHES MORE THAN THE DIAMETER OF THE MAIN IS IS REPLACING, AND

(3) INSTALLED IN A MANNER THAN MINIMIZES THE POTENTIAL FOR CONTAMINATION, INCLUDING, BUT NOT LIMITED TO:

(A) SLEEVING THE NEWLY INSTALLED MAIN, OR
(B) UTILIZING UPGRADED PIPING MATERIAL.

ALTERNATIVE CONSTRUCTION CRITERIA

WHEN NEW WATER MAINS, NEW SANITARY SEWER MAINS, OR OTHER NON–POTABLE FLUID–CARRYING PIPELINES ARE BEING INSTALLED IN EXISTING DEVELOPED AREAS, LOCAL CONDITIONS (E.G., AVAILABLE SPACE, LIMITED SLOPE, EXISTING STRUCTURES) MAY CREATE A SITUATION IN WHICH THERE IS NO ALTERNATIVE BUT TO INSTALL WATER MAINS, SANITARY SEWER MAINS, OR OTHER NON–POTABLE PIPELINES AT A DISTANCE LESS THAN THAT REQUIRED BY THE SECTIONS 64630 AND 64572 OF THE CCR. IN SUCH CASES, THROUGH PERMIT ACTION, THE DDW MAY APPROVE ALTERNATIVE CONSTRUCTION CRITERIA. THE ALTERNATIVE APPROACH IS ALLOWED UNDER: SECTION 64551.100 – WAIVERS AND ALTERNATIVES

(a) A WATER SYSTEM THAT PROPOSES TO USE AN ALTERNATIVE TO A REQUIREMENT IN THIS CHAPTER SHALL:

(1) DEMONSTRATE TO THE STATE BOARD THAT THE PROPOSED ALTERNATIVE WOULD PROVIDE AT LEAST THE SAME LEVEL OF PROTECTION TO PUBLIC HEALTH; AND

(2) OBTAIN WRITTEN APPROVAL FROM THE STATE BOARD PRIOR TO IMPLEMENTATION OF THE ALTERNATIVE. APPROPRIATE ALTERNATIVE CONSTRUCTION CRITERIA FOR TWO DIFFERENT CASES IN WHICH THE REGULATORY CRITERIA FOR SANITATY SEWER MAIN AND WATER MAIN SEPARATION CANNOT BE MET ARE SHOWN IN:

FIGURE 1 (PARALLEL CONSTRUCTION)

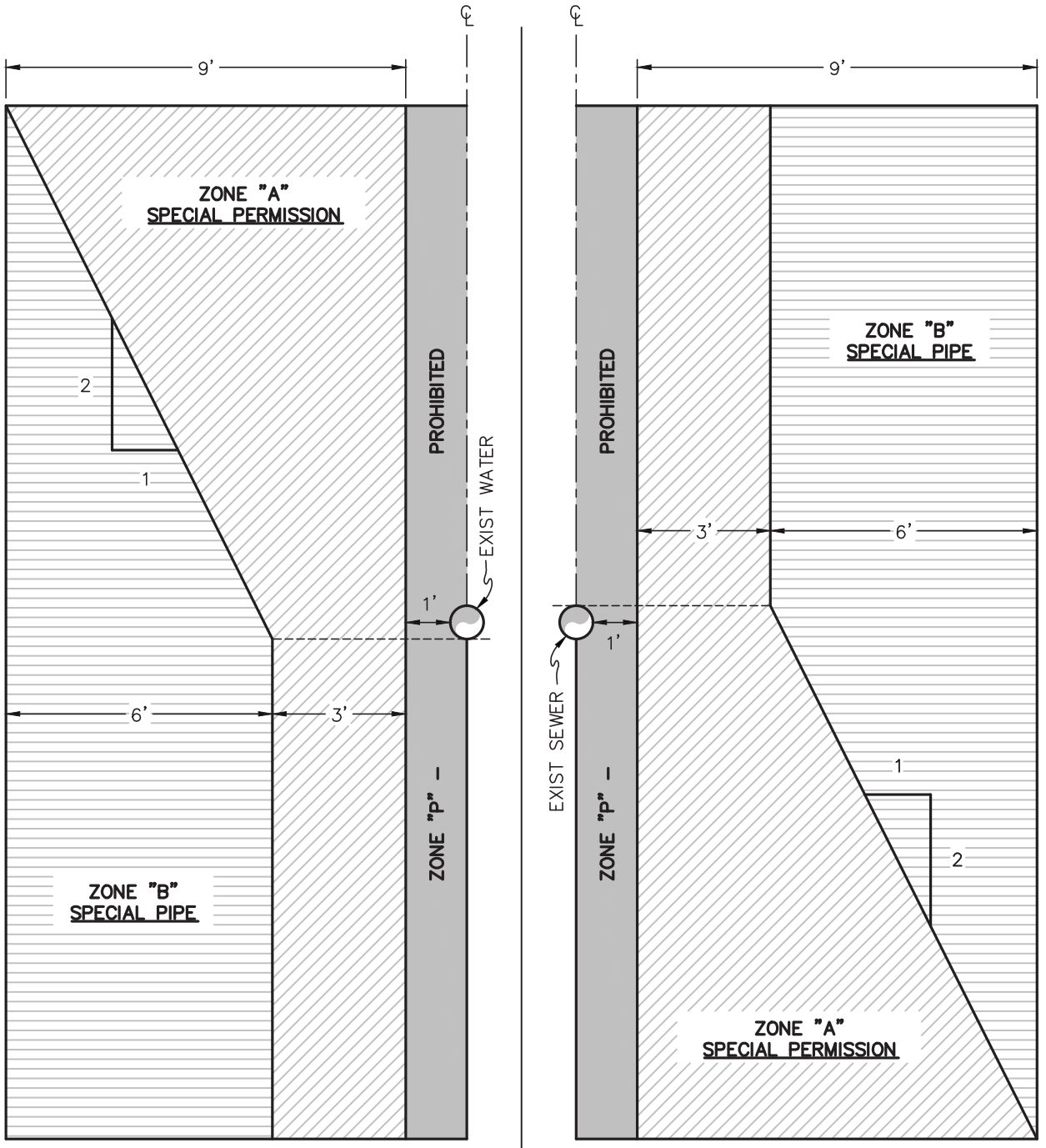
CASE 1: NEW SANITARY SEWER MAIN
CASE 2: NEW WATER MAIN

FIGURE 2 (CROSSINGS)

CASE 1: NEW SANITARY SEWER MAIN
CASE 2: NEW WATER MAIN

Ventura County Waterworks District No. 8	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON–POTABLE PIPELINES	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 202
		SHEET 2 OF 6

FIGURE 1 – PARALLEL CONSTRUCTION
SECTIONAL VIEW



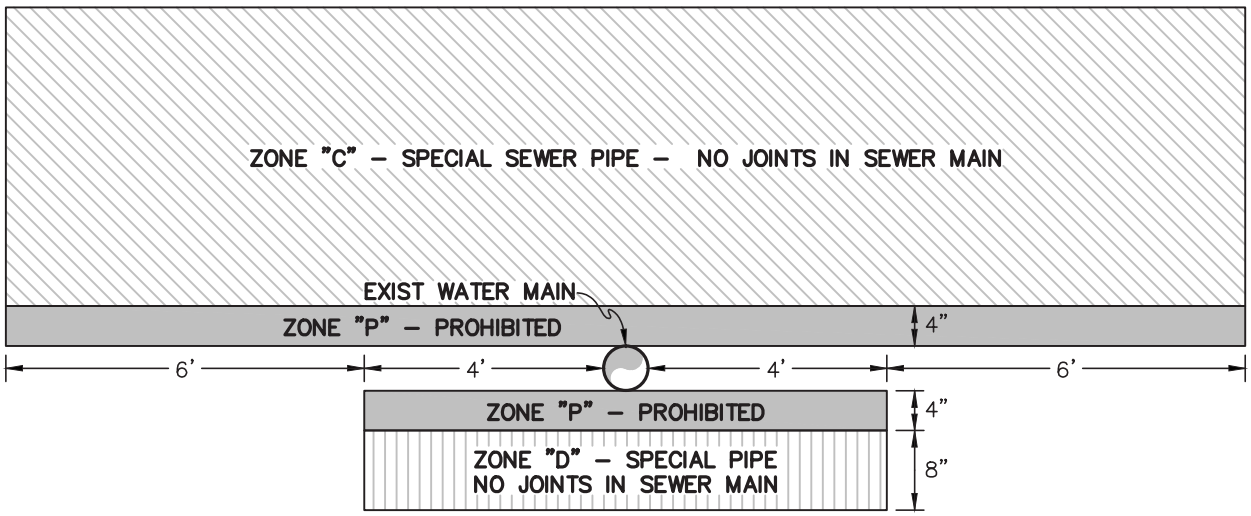
CASE 1 – NEW SEWER MAIN
PARALLEL TO EXIST WATER

CASE 2 – NEW WATER MAIN
PARALLEL TO EXIST SEWER

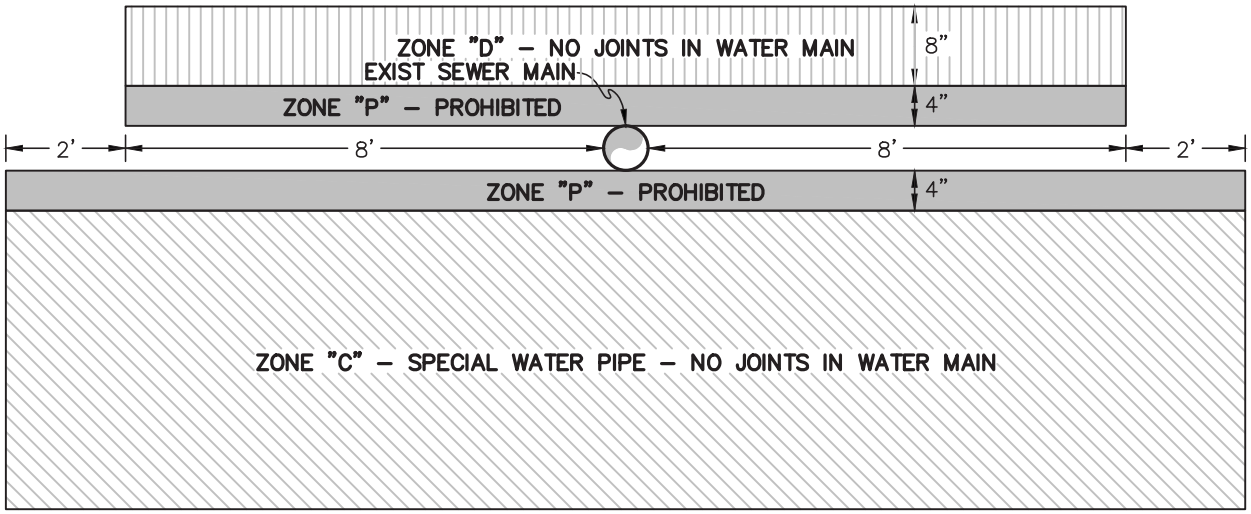
ZONES ARE IDENTICAL ON EITHER SIDE OF CENTERLINE

Ventura County Waterworks District No. 8	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON–POTABLE PIPELINES	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 203
		SHEET 3 OF 6

FIGURE 2 – CROSSINGS



CASE 1 – NEW SEWER MAIN – CROSSING EXIST WATER



CASE 2 – NEW WATER MAIN – CROSSING EXIST SEWER

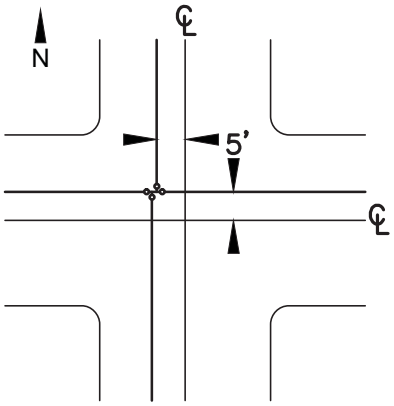
Ventura County Waterworks District No. 8	SEPARATION REQUIREMENTS FOR WATER MAINS AND NON–POTABLE PIPELINES	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 204
		SHEET 4 OF 6

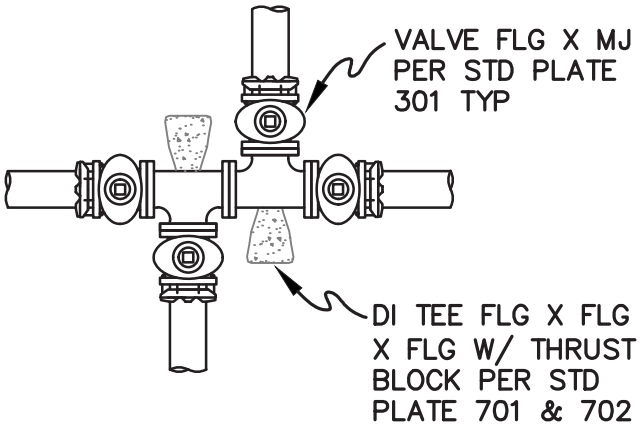
CASE 1 – NEW SEWER MAIN (FOR PARALLEL CONSTRUCTION AND CROSSINGS)

ZONE	SPECIAL CONSTRUCTION REQUIREMENTS
A	NEW SANITARY SEWER MAINS PARALLEL TO EXISTING WATER MAINS SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT PRIOR WRITTEN APPROVAL FROM THE STATE BOARD AND PUBLIC WATER SYSTEM PURVEYOR.
B	IF THE EXISTING WATER MAIN PARALLELING THE NEW SANITARY SEWER MAIN DOES NOT MEET THE CASE 2 / ZONE B REQUIREMENTS, THE SANITARY SEWER MAIN SHOULD BE CONSTRUCTED OF ONE OF THE FOLLOWING 1. HDPE PIPE WITH FUSION WELDED JOINTS PER AWWA C906; 2. SPIRALLY–REINFORCED HDPE PIPE WITH GASKETED JOINTS PER ASTM F–894; 3. EXTRA STRENGTH VITRIFIED CLAY PIPE WITH COMPRESSION JOINTS; 4. PVC SEWER PIPE WITH RUBBER RING JOINTS PER ASTM D3034; 5. DIP WITH COMPRESSION JOINTS; OR 6. REINFORCED CONCRETE PRESSURE PIPE WITH COMPRESSION JOINTS PER AWWA C302.
C	IF THE EXISTING WATER MAIN CROSSING BELOW THE SANITARY SEWER MAIN DOES NOT MEET THE REQUIREMENTS FOR CASE 2 / ZONE C, THE SANITARY SEWER MAIN SHOULD HAVE NO JOINTS WITHIN 10 FEET FROM EITHER SIDE OF THE WATER MAIN (IN ZONE C) AND SHOULD BE CONSTRUCTED OF ONE OF THE FOLLOWING: 1. A CONTINUOUS SECTION OF DIP WITH HOT DIP BITUMINOUS COATING; OR 2. ONE OF THE ZONE D OPTIONS 1, 3, 4, OR 5 BELOW.
D	IF THE EXISTING WATER MAIN CROSSING ABOVE THE NEW SANITARY SEWER MAIN DOES NOT MEET THE REQUIREMENTS FOR CASE 2 / ZONE D, THE NEW SANITARY SEWER MAIN SHOULD HAVE NO JOINTS WITHIN 4 FEET FROM EITHER SIDE OF THE EXISTING WATER MAIN (IN ZONE D) AND BE CONSTRUCTED OF ONE OF THE FOLLOWING: 1. HDPE PIPE WITH FUSION WELDED JOINTS PER AWWA C906; 2. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING AND MECHANICAL JOINTS (GASKETED, BOLTED JOINTS); 3. A CONTINUOUS SECTION OF DR 14 (CLASS 305) PVC PIPE PER AWWA C900 PVC PIPE, CENTERED OVER THE PIPE BEING CROSSED; 4. A CONTINUOUS SECTION OF REINFORCED CONCRETE PRESSURE PIPE PER AWWA C302¬, CENTERED OVER THE EXISTING WATER MAIN; OR 5. ANY SANITARY SEWER MAIN WITHIN A CONTINUOUS SLEEVE.

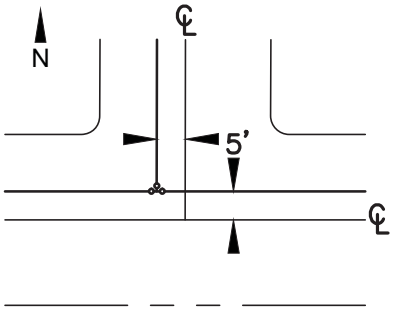
CASE 2 – NEW WATER MAIN (FOR PARALLEL CONSTRUCTION AND CROSSINGS)

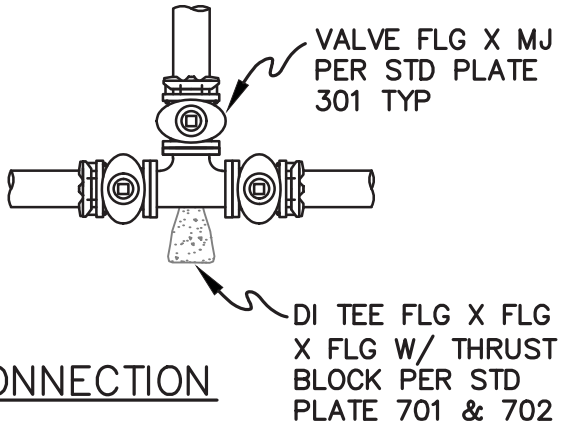
ZONE	SPECIAL CONSTRUCTION REQUIREMENTS
A	NEW WATER MAINS PARALLEL TO EXISTING SANITARY MAINS SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT PRIOR WRITTEN APPROVAL FROM THE STATE BOARD AND PUBLIC WATER SYSTEM PURVEYOR.
B	IF THE EXISTING SANITARY SEWER MAIN PARALLELING THE NEW WATER MAIN DOES NOT MEET THE CASE 1 / ZONE B REQUIREMENTS, THE NEW WATER MAIN SHOULD BE CONSTRUCTED OF ONE OF THE FOLLOWING: 1. HDPE PIPE WITH FUSION WELDED JOINTS PER AWWA C906; 2. DIP WITH HOT DIP BITUMINOUS COATING AND MECHANICAL JOINTS (GASKETED, BOLTED JOINTS); 3. DIPPED AND WRAPPED ¼ THICK WELDED STEEL PIPE; OR 4. DR 14 (CLASS 305) PVC PIPE PER AWWA C900/905 PVC; 5. REINFORCED CONCRETE PRESSURE PIPE, STEEL CYLINDER TYPE, PER AWWA C300, C302, OR C303.
C	IF THE EXISTING SANITARY SEWER MAIN CROSSING ABOVE THE NEW WATER MAIN DOES NOT MEET THE REQUIREMENTS FOR CASE 1 / ZONE C, THE NEW WATER MAIN SHOULD HAVE NO JOINTS WITHIN 10 FEET FROM EITHER SIDE OF THE SANITARY SEWER MAIN (IN ZONE C) AND SHOULD BE CONSTRUCTED OF ONE OF THE FOLLOWING: 1. HDPE PIPE WITH FUSION WELDED JOINTS PER AWWA C906; 2. DIP WITH HOT DIP BITUMINOUS COATING AND MECHANICAL JOINTS (GASKETED, BOLTED JOINTS); 3. DIPPED AND WRAPPED ¼ THICK WELDED STEEL PIPE; 4. DR 14 (CLASS 305) PVC PIPE PER AWWA C900/909 PVC; OR 5. REINFORCED CONCRETE PRESSURE PIPE, STEEL CYLINDER TYPE, PER AWWA C300, C302, OR C303.
D	IF THE EXISTING SANITARY SEWER MAIN CROSSING BELOW THE NEW WATER MAIN DOES NOT MEET THE REQUIREMENTS FOR CASE 1 / ZONE D, THE NEW WATER MAIN SHOULD HAVE NO JOINTS WITHIN 8 FEET FROM EITHER SIDE OF THE EXISTING SANITARY SEWER MAIN (IN ZONE D) AND SHOULD BE CONSTRUCTED AS FOR ZONE C.





TYPICAL DOUBLE TEE CONNECTION



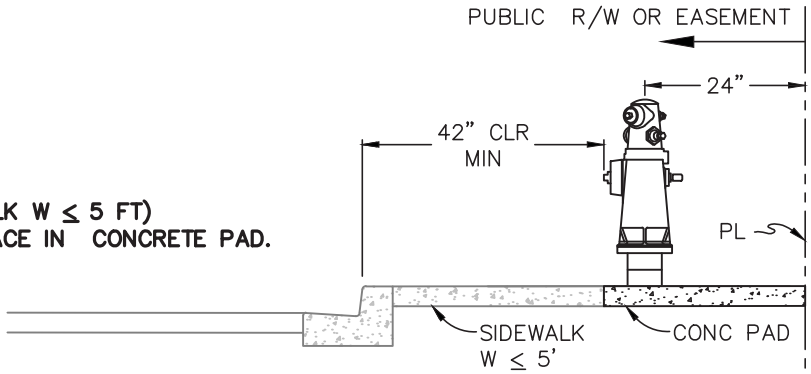


TYPICAL TEE CONNECTION

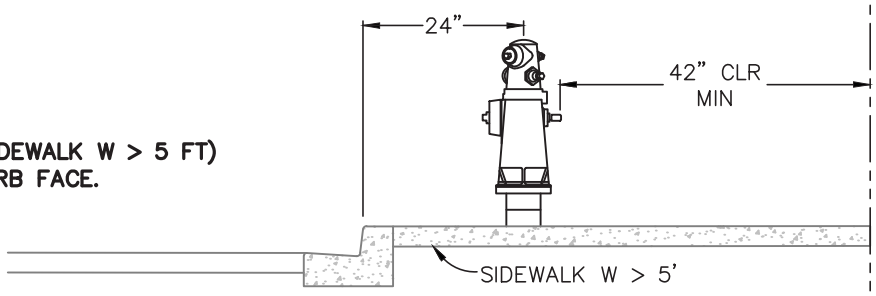
NOTES:

1. VALVES SHALL BE LOCATED ON EACH BRANCH OF WATER MAIN INTERSECTIONS. WHERE RELATIVELY SHORT LINES LESS THAN 500 FEET IN LENGTH ARE INVOLVED, ONE OF THE TWO VALVES BETWEEN INTERSECTIONS MAY BE OMITTED.
2. WATER MAINS IN PUBLIC STREETS SHALL BE LOCATED PARALLEL TO AND 5–FEET NORTH OR WEST OF STREET CENTERLINES WHENEVER POSSIBLE.
3. SEE PLATE NO. 701, 702, & 703 FOR THRUST & ANCHOR BLOCK DETAILS.
4. SEE PLATE NO. 301 FOR VALVE BOX DETAILS.
5. REFER TO SECTIONS 4.4 "MAIN LINE FITTINGS" AND SECTION 6.12 "INSTALLATION OF VALVES AND FITTINGS" FOR INFORMATION CONCERNING THE INSTALLATION AND WRAPPING OF BOLTED CONNECTIONS.
6. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
7. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S "APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS."

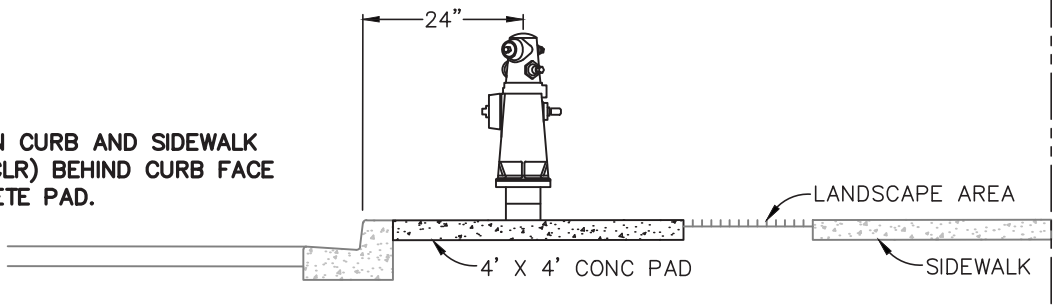
Ventura County Waterworks District No. 8	WATERMAIN CONNECTIONS AT INTERSECTIONS	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 207



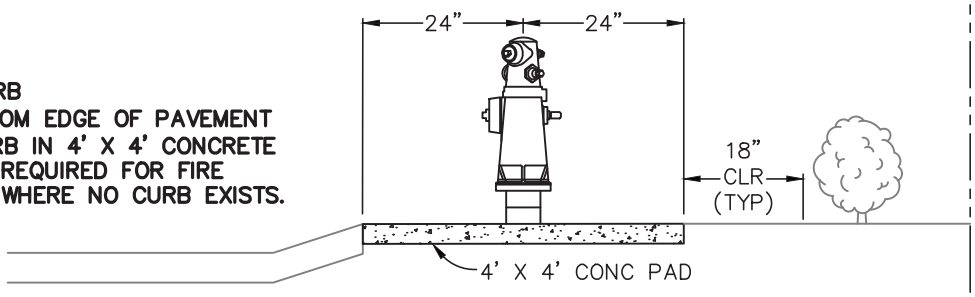
CASE A
SIDEWALK ADJACENT TO CURB (SIDEWALK W ≤ 5 FT)
INSTALL FH 42" (CLR) BEHIND CURB FACE IN CONCRETE PAD.



CASE B
SIDEWALK ADJACENT TO CURB (SIDEWALK W > 5 FT)
INSTALL FH 12" (CLR) BEHIND CURB FACE.



CASE C
PARKWAY BETWEEN CURB AND SIDEWALK
INSTALL FH 12" (CLR) BEHIND CURB FACE
IN 4' X 4' CONCRETE PAD.



CASE D
NO CURB OR ROLLED CURB
INSTALL FH 12" (CLR) FROM EDGE OF PAVEMENT OR BACK OF ROLLED CURB IN 4' X 4' CONCRETE PAD. GUARD POSTS ARE REQUIRED FOR FIRE HYDRANT INSTALLATIONS WHERE NO CURB EXISTS.

NOTES:
1. ABOVE GROUND FACILITIES, SUCH AS FIRE HYDRANTS, AIR-VACS, BLOW-OFFS, AND OTHER APPLICABLE ABOVE GROUND FACILITIES SHALL BE LOCATED AS SHOWN ABOVE. FIRE HYDRANTS ARE ILLUSTRATED IN THE ABOVE EXAMPLES; HOWEVER, THE REQUIREMENTS APPLY TO OTHER ABOVE GROUND FACILITIES AS WELL.
2. FIRE HYDRANT LOCATIONS SHALL BE AS DIRECTED AND APPROVED BY VCFD.
3. WHERE STREETS ARE WITHOUT CURBS, FIRE HYDRANTS SHALL BE PROTECTED WITH GUARD POSTS. POSTS SHALL BE 4" STD WT PIPE FILLED WITH GROUT, 6' IN LENGTH, SET 3' BELOW FINISH GRADE IN 18" DIA CONCRETE BASE. POST CONFIGURATION SHALL BE PER VCFD 14.5.3. & WWD8 PLATE 210.
4. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
5. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

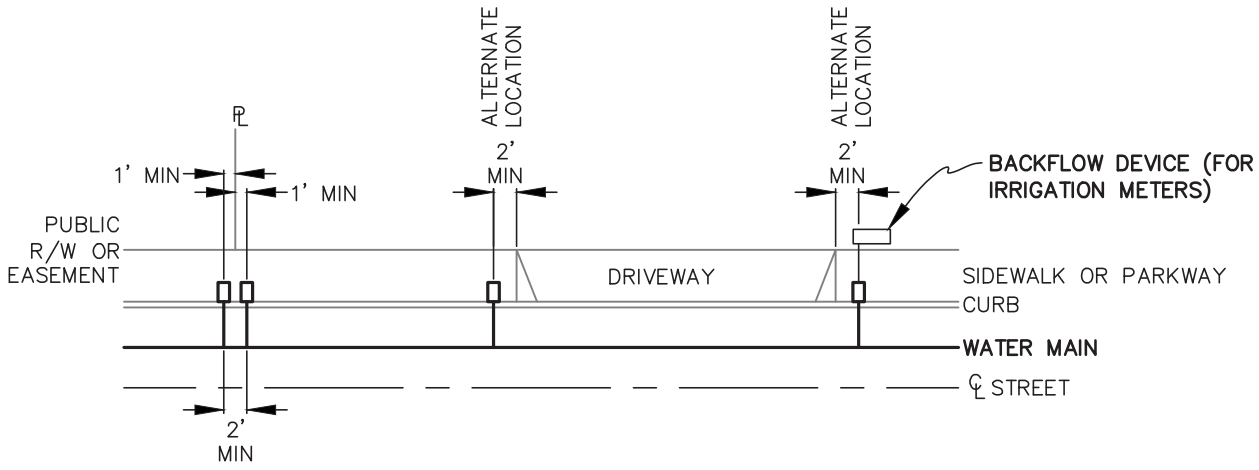
Ventura County Waterworks District No. 8

LOCATION OF ABOVE GROUND FACILITIES (HYDRANTS, AIR-VACS, BLOW-OFFS, ETC)

JUL 2021

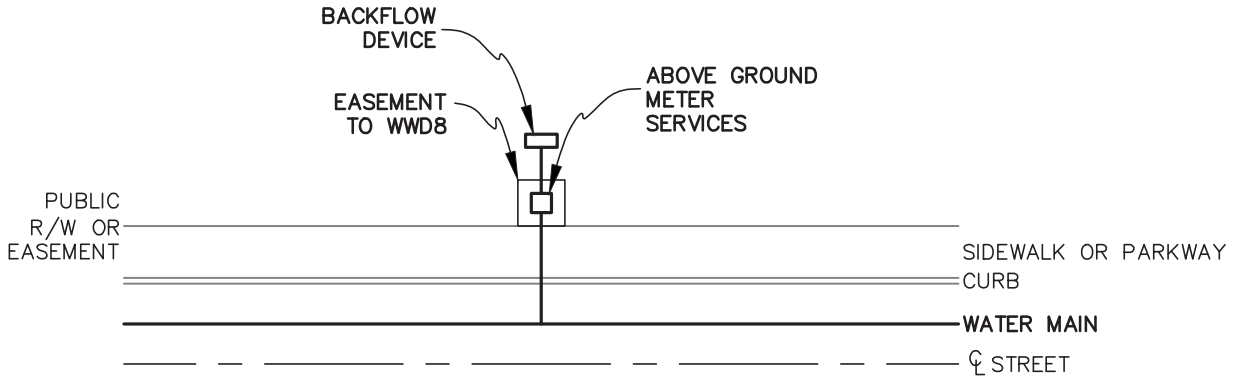
RECOMMENDED:	APPROVED:
/S/	/S/
DEPUTY DIRECTOR / DISTRICT ENGINEER	DIRECTOR OF PUBLIC WORKS

PLATE 208



UNDERGROUND WATER METER LOCATION FOR 1", 1 1/2", OR 2"

TYP FOR SINGLE FAMILY DETACHED OR IRRIGATION



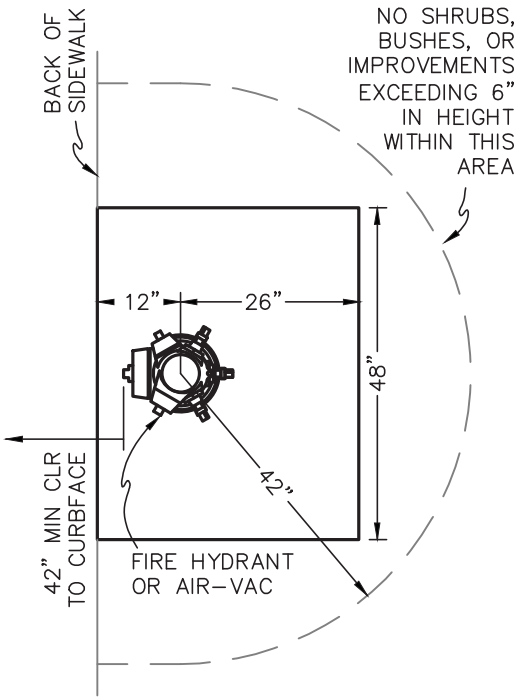
ABOVE GROUND MASTER WATER METER LOCATION FOR 3" AND LARGER

TYP FOR MULTI-FAMILY RESIDENTIAL OR COMMERCIAL

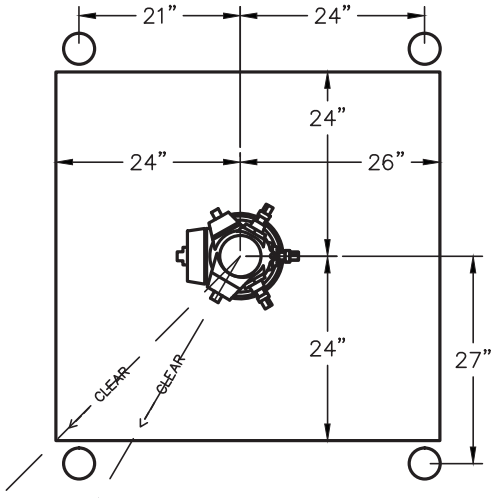
NOTES:

1. UNDERGROUND WATER METERS SHALL BE LOCATED 1 FT (MIN) FROM THE PROPERTY LINE, DIRECTLY BEHIND THE CURB.
2. PERMANENTLY MARK THE TOP OF CURB WITH A "W" AT METER LOCATIONS.
3. METER BOXES SHALL NOT BE INSTALLED ON DRIVEWAY APPROACHES OR WITHIN 2 FT FROM THE EDGE OF DRIVEWAYS.
4. MAINTAIN 10 FT (MIN) SEPARATION BETWEEN WATER SERVICES AND SEWER LATERALS.
5. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE CITY'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
6. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE CITY'S "APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS."

Ventura County Waterworks District No. 8	LOCATION OF WATER METERS	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 209

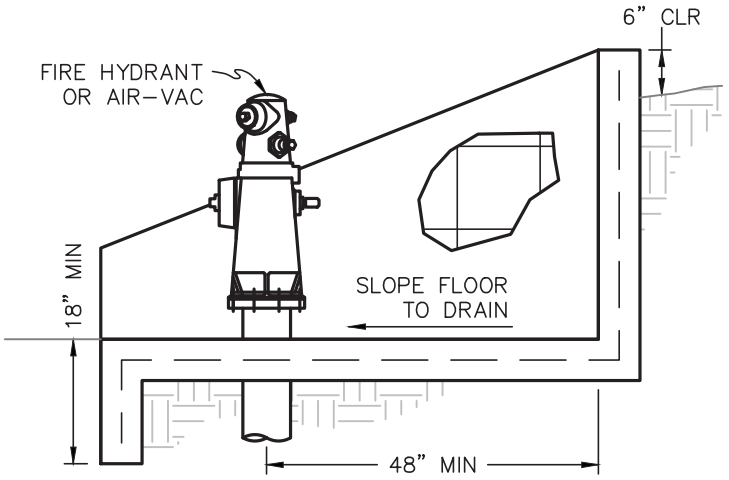


FIRE HYDRANT OR AIR/VAC BUMPOUT DETAIL



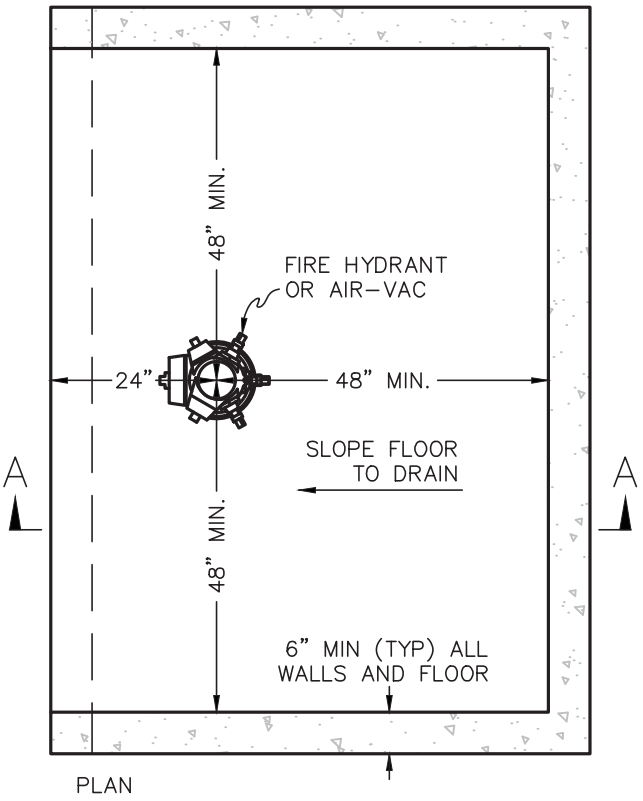
CONCRETE PAD AND GUARD POST PLACEMENT

(GUARD POSTS WHEN SPECIFIED)



SECTION A-A

CONCRETE (OR BLOCK)



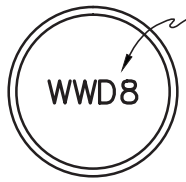
RETAINING WALL

(TO BE USED WHERE GROUND SLOPE EXCEEDS 30% OR AS REQUIRED)

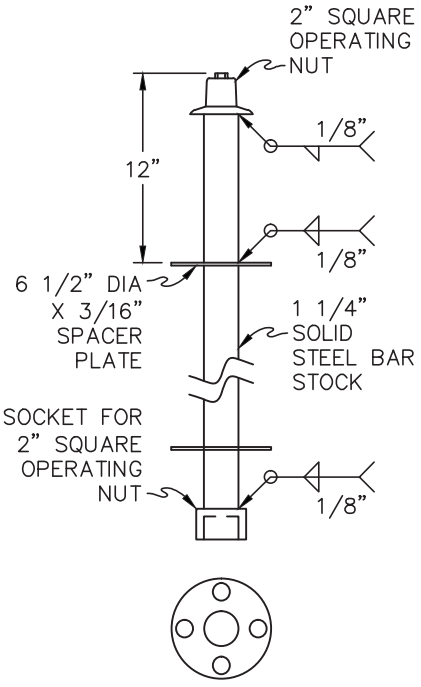
NOTES:

1. ALL INSTALLATIONS REQUIRE CONCRETE PAD, ALL REBAR #4 @ 12" ON CENTER.
2. CONCRETE BLOCK MAY BE SUBSTITUTED FOR WALL SECTIONS.
3. ALL WALLS EXCEEDING 30" IN HEIGHT REQUIRE BUILDING DEPT. PERMIT.
4. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
5. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S "APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS."

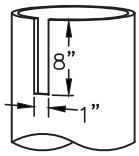
Ventura County Waterworks District No. 8	MISCELLANEOUS DETAILS FIRE HYDRANTS AND AIR/VAC VALVES	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 210



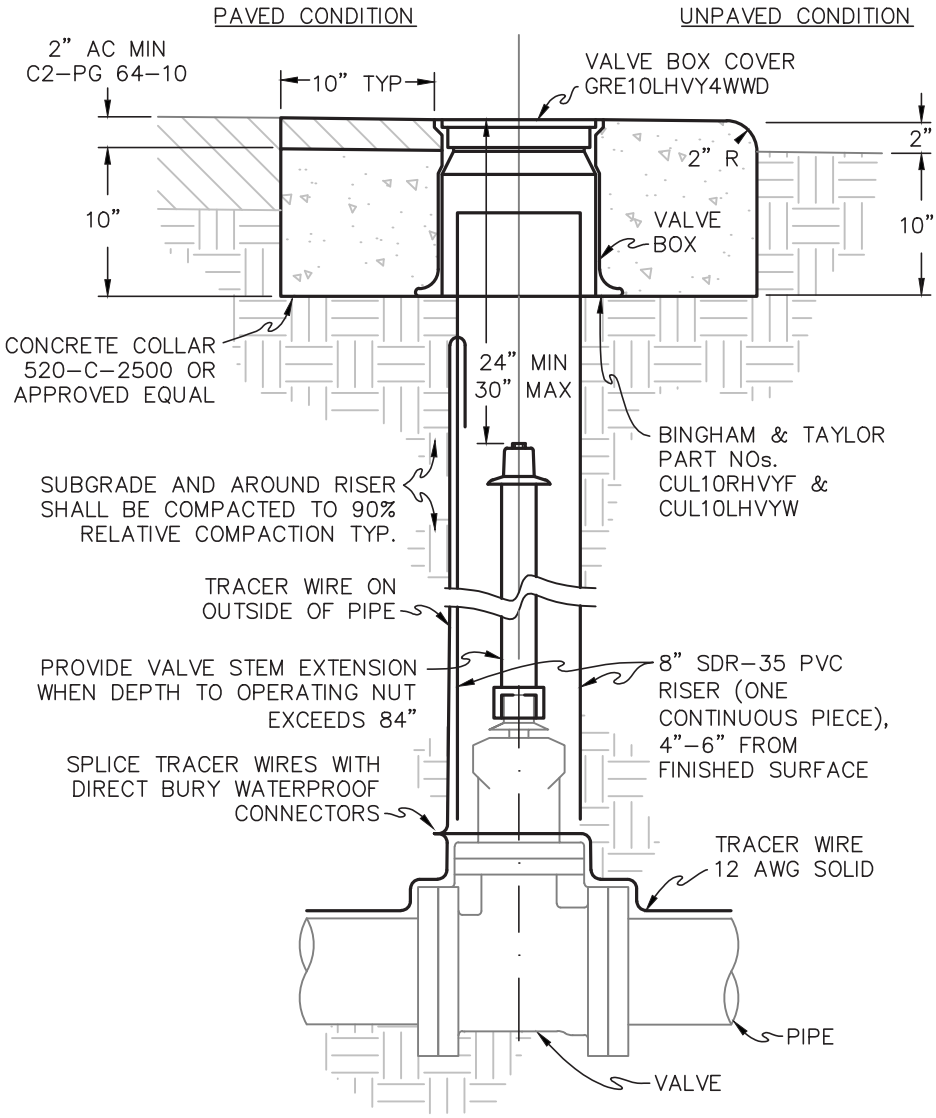
VALVE COVER



STEM EXTENSION DETAIL



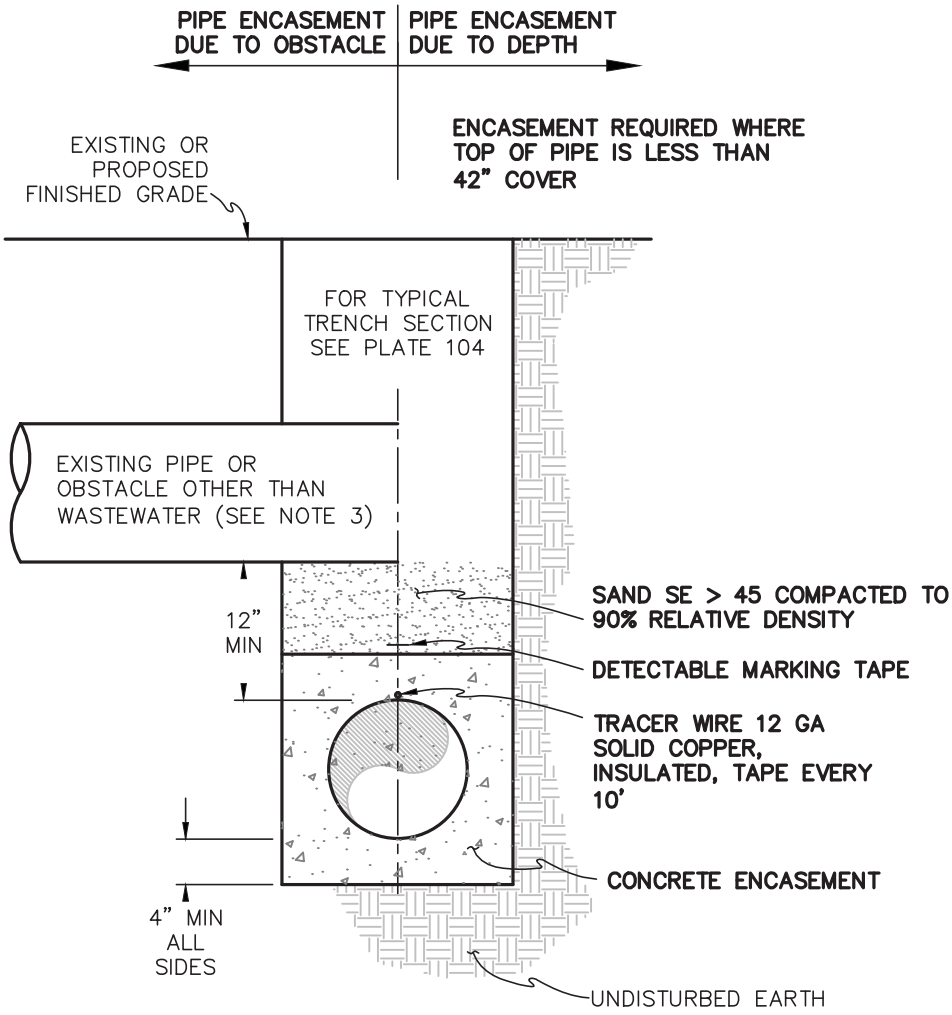
RISER PIPE OPENING FOR TRACER WIRE



NOTES:

1. **ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE CITY'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.**
2. **NO "CLOVER LEAFS" AT VALVE BOX CLUSTERS (IE AT A TEE), CONCRETE COLLAR SHALL BE CIRCULAR**
3. **PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE CITY'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.**

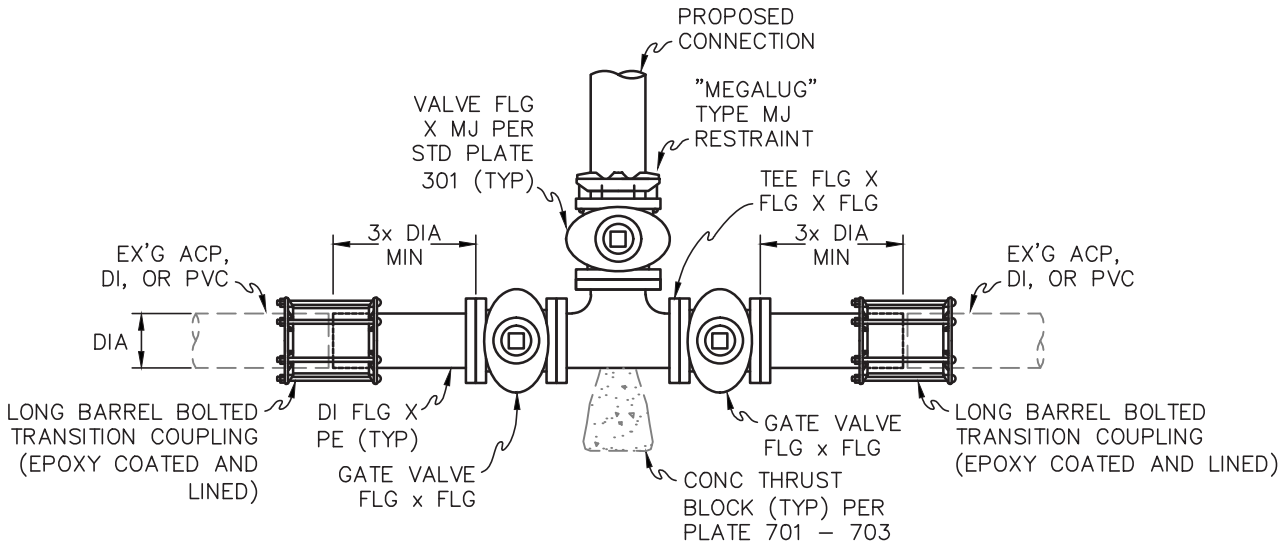
Ventura County Waterworks District No. 8	VALVE ASSEMBLY DETAILS	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 301



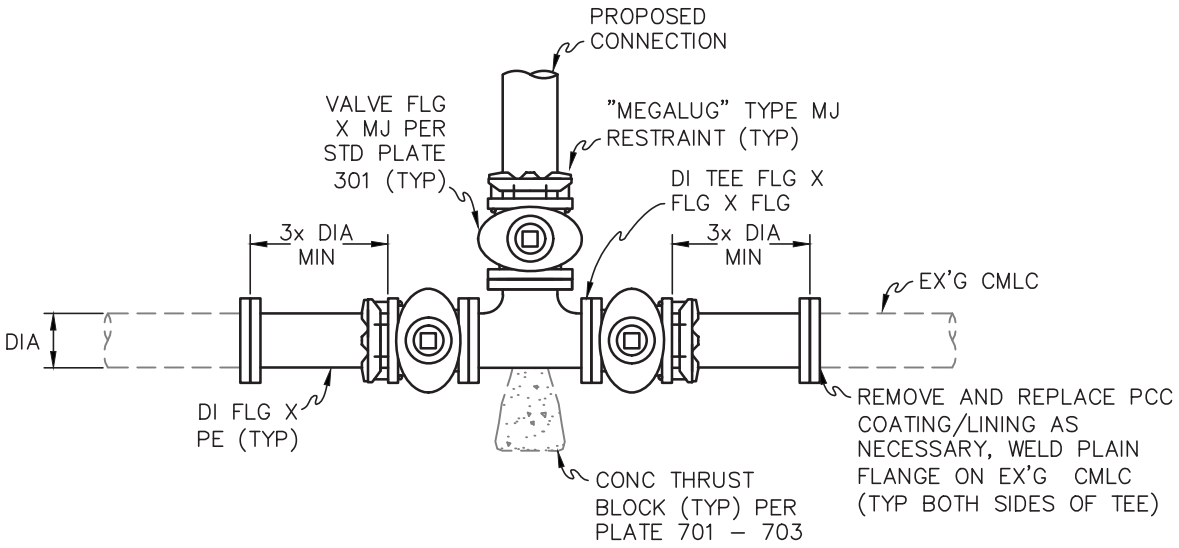
NOTES:

1. SEE PLATES 201–206 FOR WASTEWATER LINE CROSSING REQUIREMENTS.
2. CONCRETE STRENGTH SHALL BE 3000 PSI. (MINIMUM)
3. ENCASEMENT SHALL EXTEND BEYOND THE EDGE OF THE OBSTRUCTION IN BOTH DIRECTIONS AN EQUAL DISTANCE FROM THE WATER MAIN TO THE OBSTRUCTION.
4. ENCASEMENT ALONG THE WATER MAIN SHALL EXTEND UNTIL DEPTH OF PIPELINE COVER REACHES 42".
5. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
6. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S "APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS."

Ventura County Waterworks District No. 8	WATER PIPELINE ENCASEMENT	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 302



EX'G AC, PVC, OR DI CONNECTION



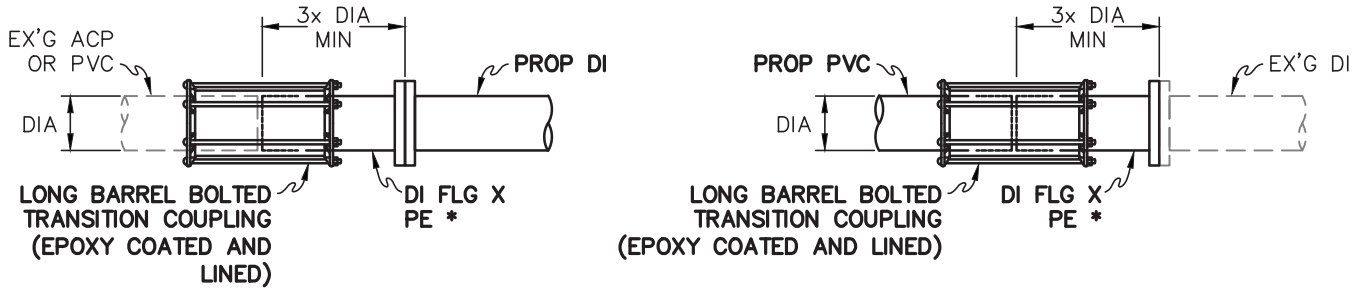
EX'G CMLC CONNECTION

NOTES:

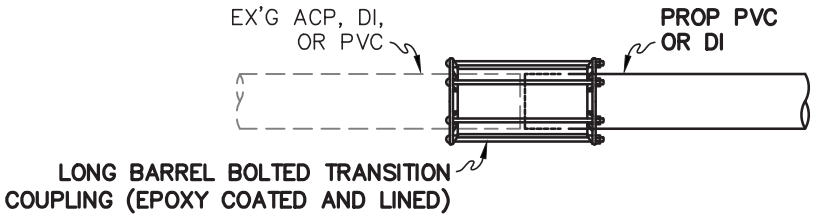
1. **ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.**

2. **PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.**

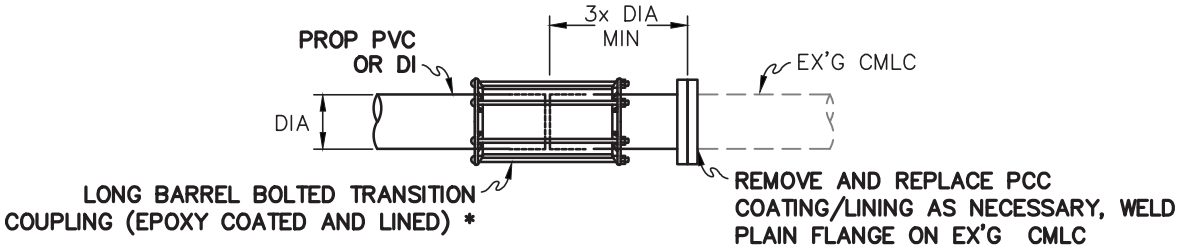
Ventura County Waterworks District No. 8	CUT–IN TEE	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 303



* MAY SUBSTITUTE WITH 3X DIA
C-900 and MJ X FLG ADAPTER



EX'G AC, PVC, OR DI CONNECTION



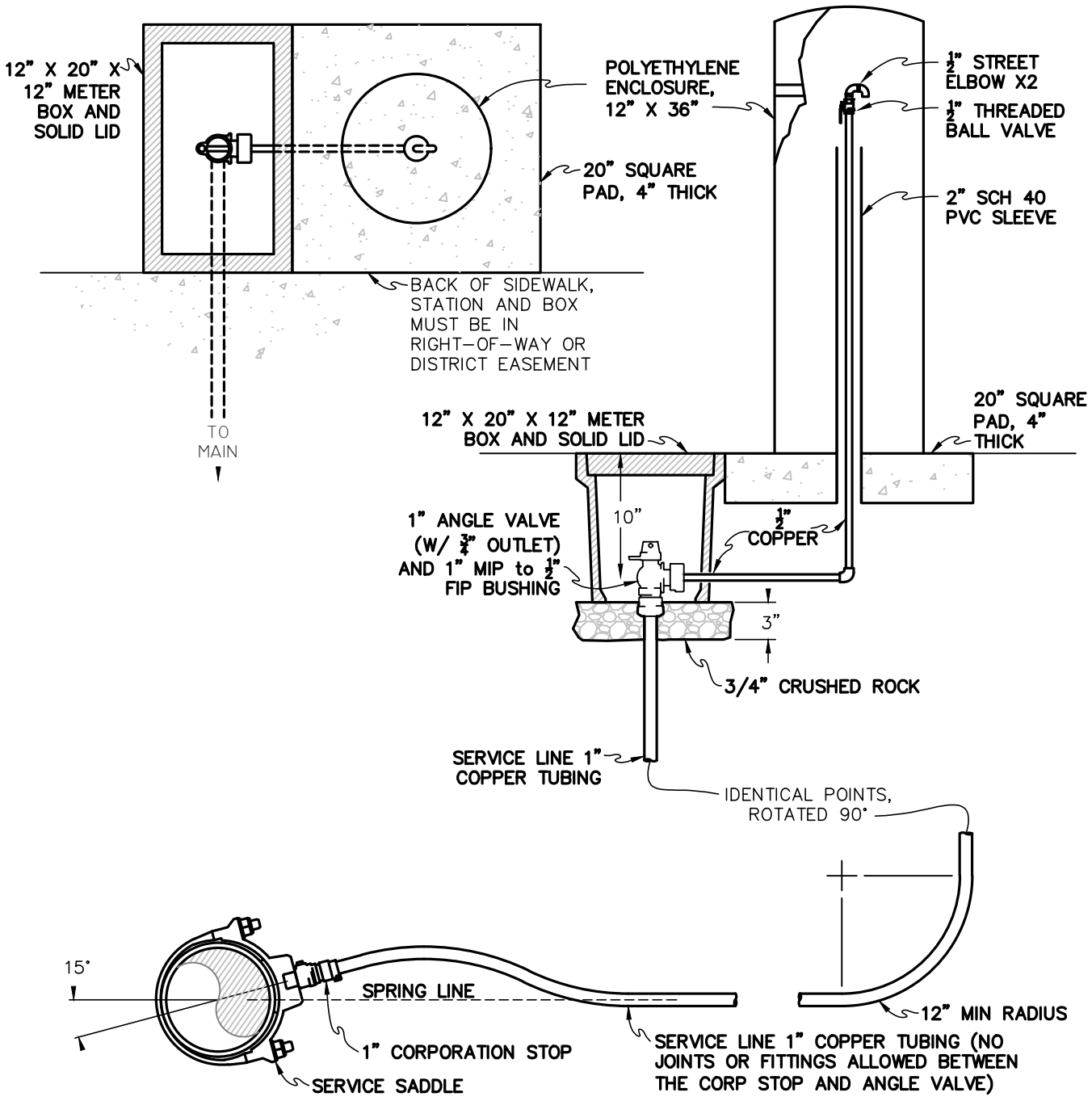
* MAY OMIT IF USING DI BELL
FOR NEXT PIPE SECTION

EX'G CMLC CONNECTION

NOTES:

1. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
2. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

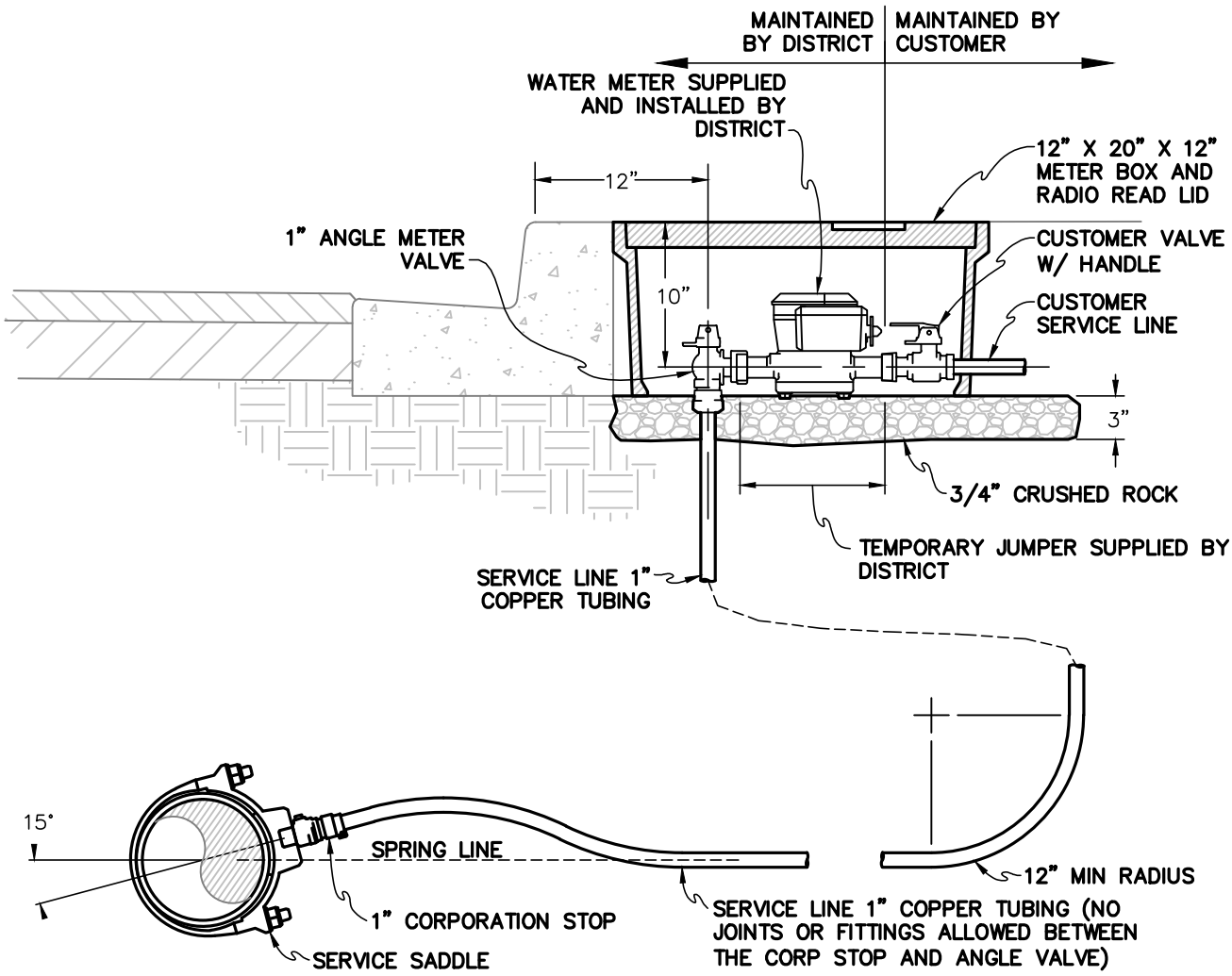
Ventura County Waterworks District No. 8	DISSIMILAR PIPE CONNECTIONS	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 304



NOTES:

1. SAMPLING STATION SHALL BE LOCATED BEHIND THE SIDEWALK, AND WITHIN PUBLIC R/W OR DEDICATED EASEMENT TO WWD8.
2. IN CORROSIVE SOIL, PEX-A MAY BE SUBSTITUTED FOR THE 1" COPPER SERVICE LINE UPON APPROVAL.
3. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
4. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S "APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS."

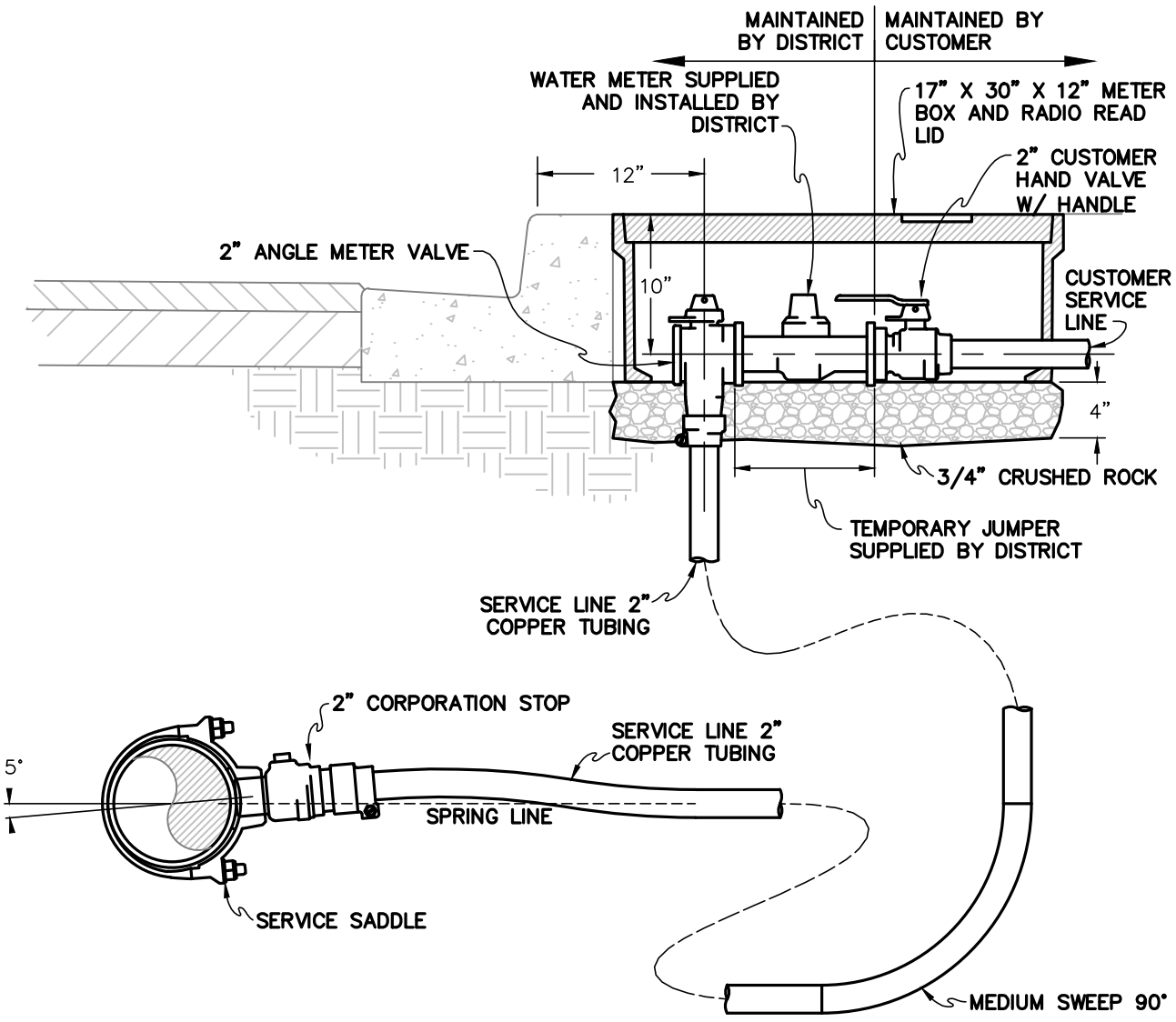
Ventura County Waterworks District No. 8	WATER SAMPLE STATION	JUL 2022
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 305



NOTES:

1. DISTRICT WILL INSTALL A SPACER OR JUMPER PIPE BETWEEN THE ANGLE METER BALL VALVE STOP AND THE CUSTOMER HAND VALVE UNTIL THE WATER METER IS INSTALLED BY THE DISTRICT.
2. IN CORROSIVE SOIL, PEX-A MAY BE SUBSTITUTED FOR 1" SERVICE LINE UPON APPROVAL.
3. SERVICE LINE TO BE BACKFILLED WITH CLEAN SAND (SE >45) TO 6" ABOVE TUBING.
4. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
5. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

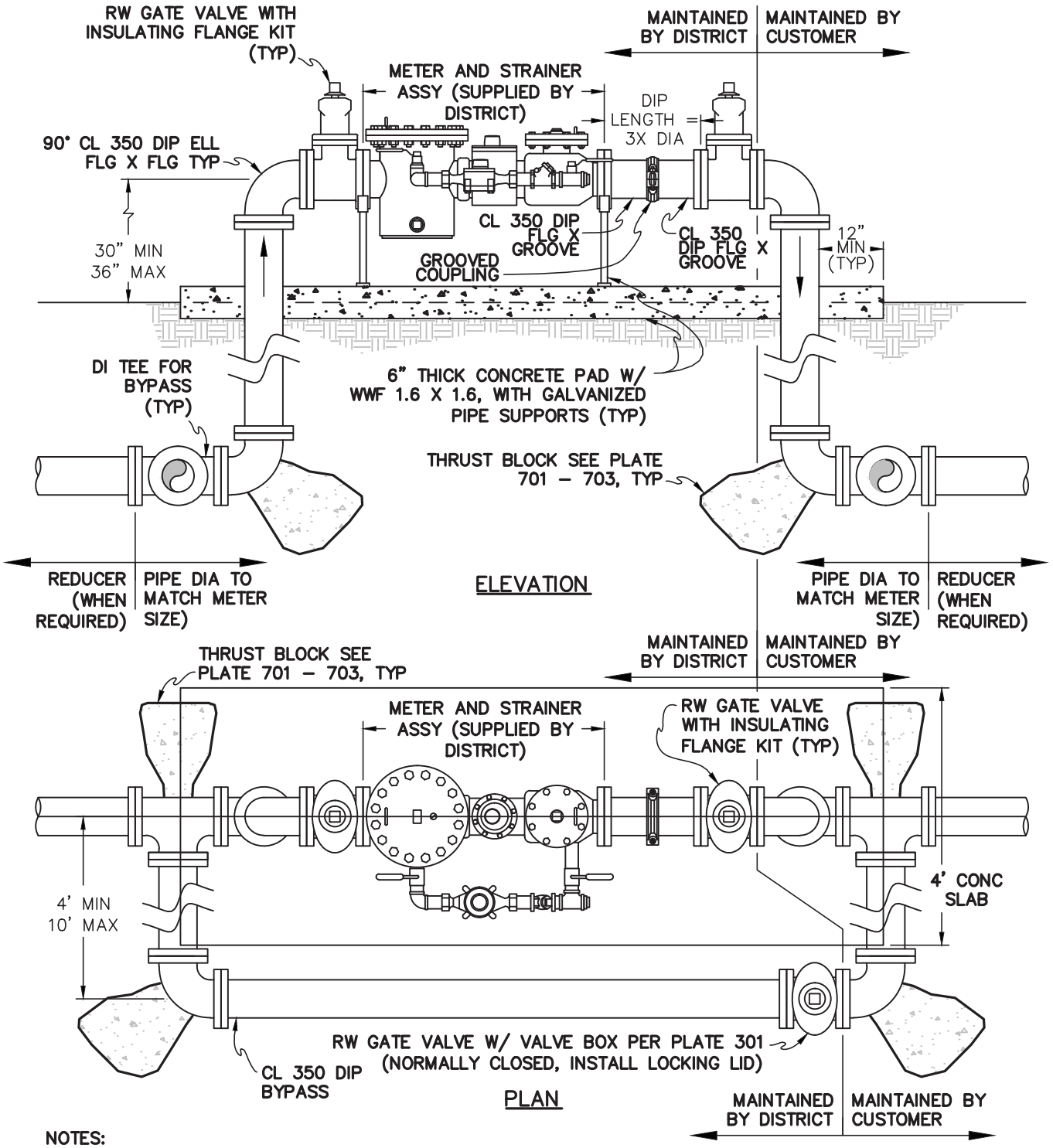
Ventura County Waterworks District No. 8	1" WATER METER SERVICE INSTALLATION	JUN 2022
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 401



NOTES:

1. 2" SERVICE LINE REQUIRED FOR ALL 1½" & 2" METER INSTALLATIONS.
2. DISTRICT WILL INSTALL A JUMPER PIPE BETWEEN THE ANGLE METER VALVE AND THE CUSTOMER VALVE UNTIL THE WATER METER IS INSTALLED BY THE DISTRICT.
3. SERVICE LINE TO BE BACKFILLED WITH CLEAN SAND (SE >45) TO 6" ABOVE TUBING.
4. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
5. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

Ventura County Waterworks District No. 8	1½" & 2" WATER METER SERVICE INSTALLATION	JUN 2022
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 402



NOTES:

1. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
2. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.
3. PROVIDE 4' CLEARANCE AROUND PIPING (NO STRUCTURES, WALLS, ETC.)

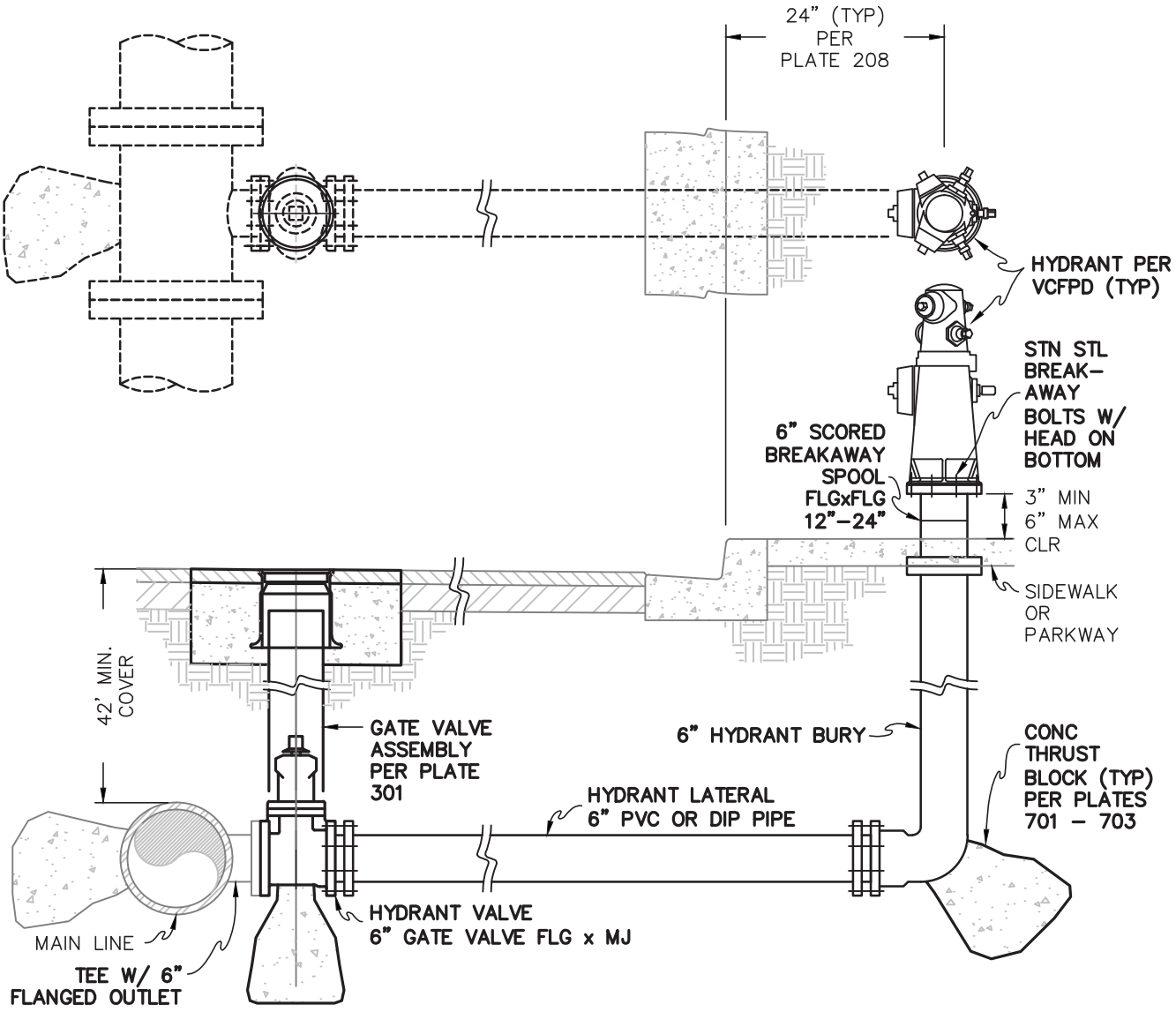
Ventura County Waterworks District No. 8

3" WATER METER AND LARGER SERVICE INSTALLATION

JUL 2021

RECOMMENDED: /S/	APPROVED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER	DIRECTOR OF PUBLIC WORKS

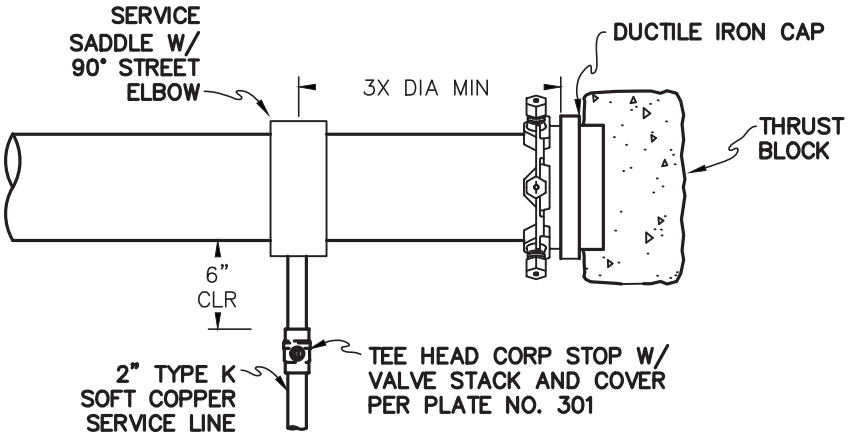
PLATE 403



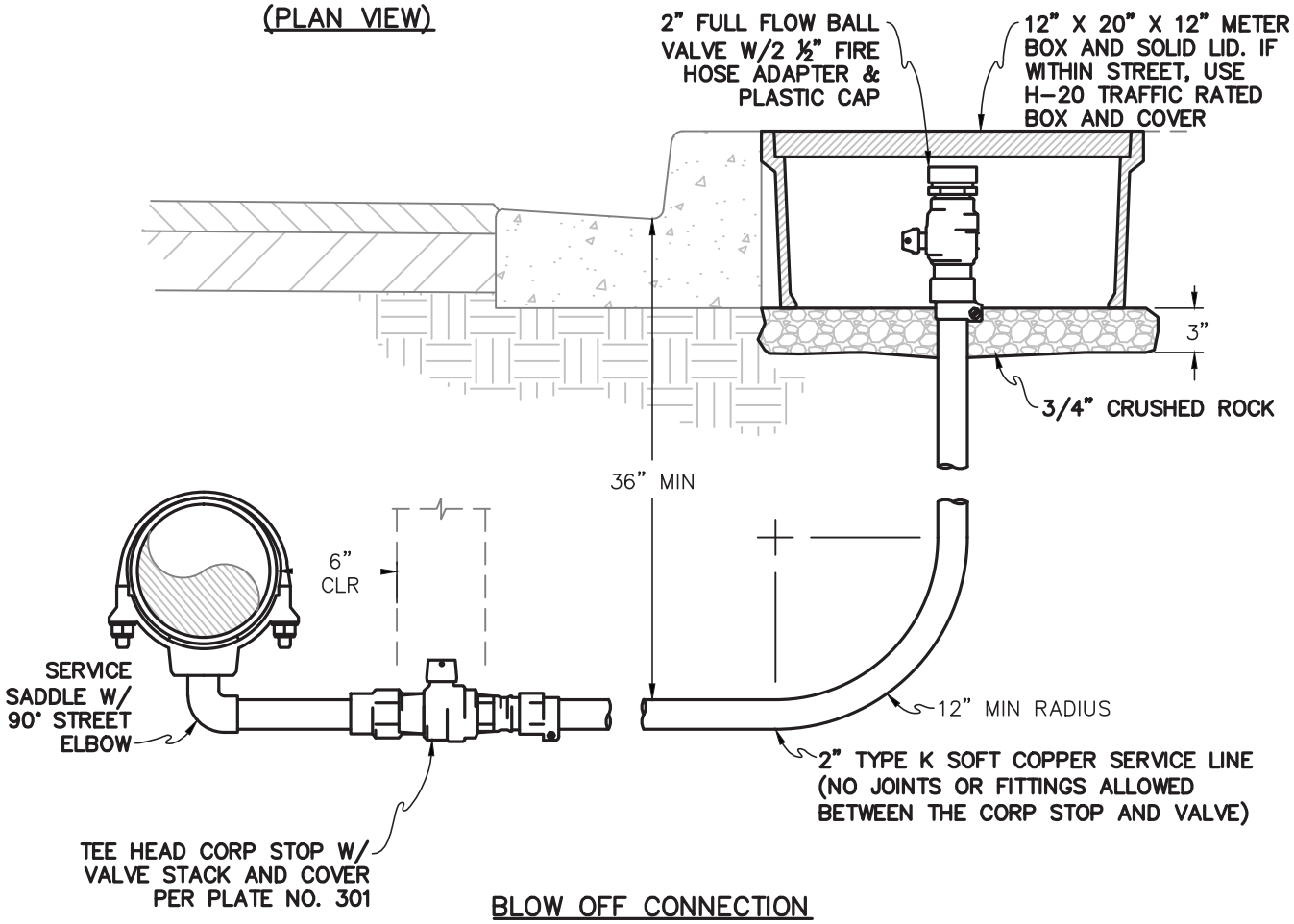
NOTES:

1. FIRE HYDRANT LOCATIONS, SIZE AND OUTLET CONFIGURATION SHALL BE AS DIRECTED AND APPROVED BY VCFPD.
2. WHERE STREETS ARE WITHOUT CURBS, FIRE HYDRANTS SHALL BE PROTECTED WITH GUARD POSTS. POSTS SHALL BE 4-INCH STD WT PIPE FILLED WITH GROUT, 6' IN LENGTH, SET 3' BELOW FINISH GRADE IN 18 DIA CONCRETE BASE. POST CONFIGURATION SHALL BE PER VCFD 14.5.3 AND WWD8 PLATE 210.
3. THE HYDRANT ISOLATION VALVE SHALL BE CONNECTED TO THE TEE ON THE MAIN, THE LATERAL SHALL RUN PERPENDICULAR TO THE STREET CENTERLINE.
4. FIRE HYDRANTS SHALL BE PAINTED IN ACCORDANCE WITH WWD8 DESIGN STANDARDS SECTION 4.16. APPROVED COLOR IS RUSTOLEUM #242258 SAFETY YELLOW".
5. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE CITY'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
6. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE CITY'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

Ventura County Waterworks District No. 8	FIRE HYDRANT INSTALLATION	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 501



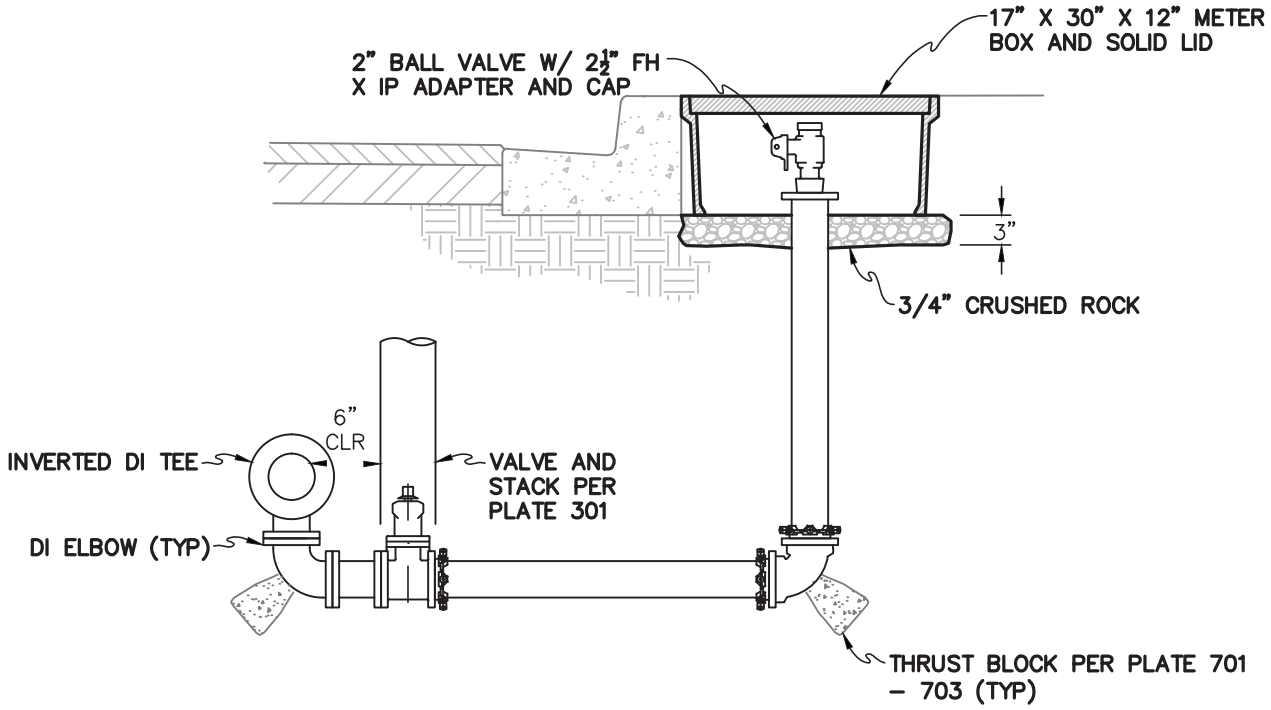
END–OF–MAIN CONNECTION
(PLAN VIEW)



BLOW OFF CONNECTION
AT LOW POINT ON MAIN

NOTES
1. SERVICE LINE TO BE LAID UPHILL AT POSITIVE SLOPE, 2% MIN.
2. ALL PIPING SHALL BE EXTRA STRONG BRASS, UNLESS OTHERWISE NOTED.
3. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
4. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST.

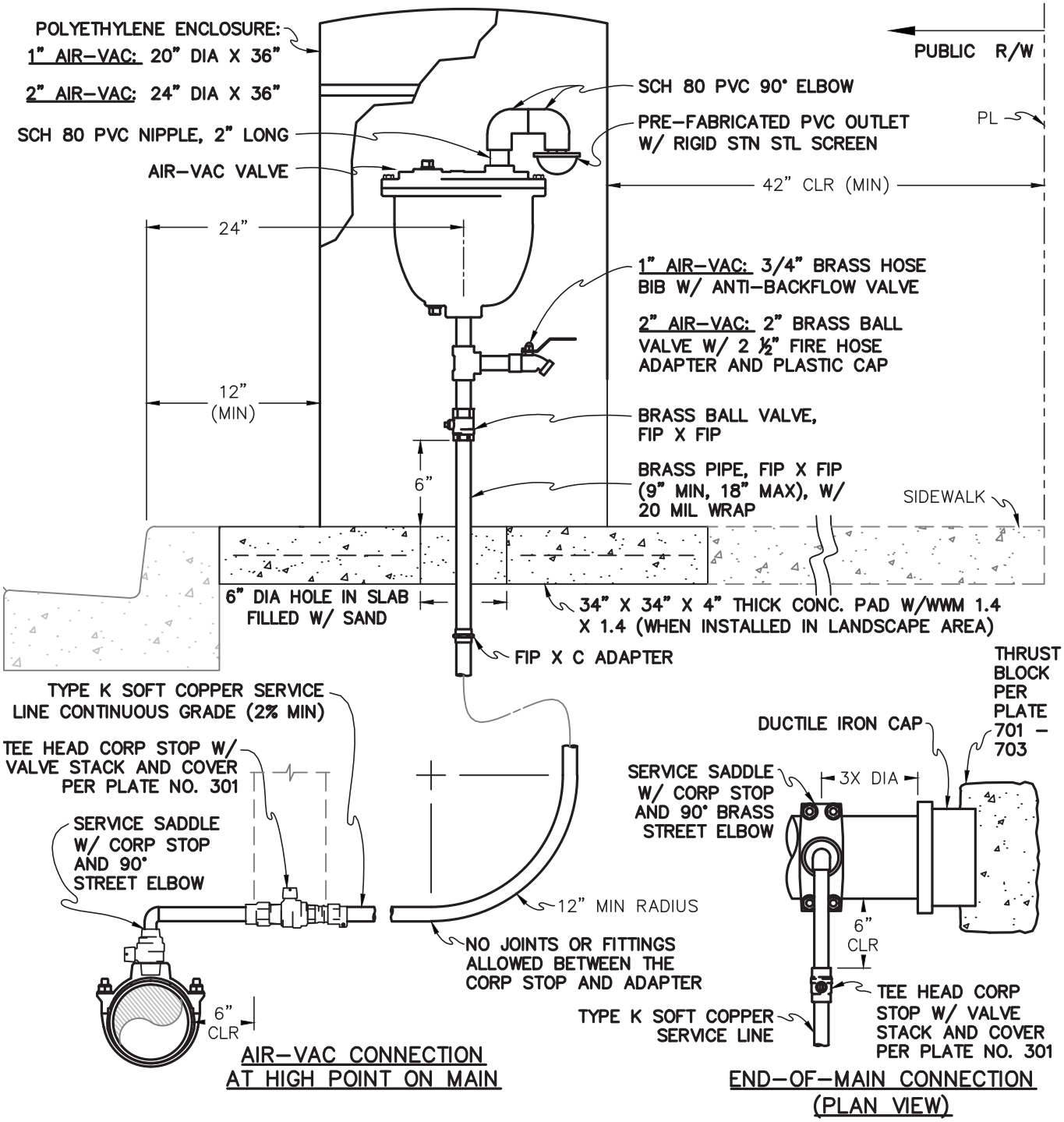
Ventura County Waterworks District No. 8	2" BLOW OFF INSTALLATION	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 502



NOTES:

1. REFER TO SECTION 4.4 "MAIN LINE FITTINGS", SECTION 6.12 "INSTALLATION OF VALVES AND FITTINGS", 6.13 INSTALLATION OF AIR–RELEASE & BLOW OFF ASSEMBLIES FOR INFORMATION CONCERNING THE INSTALLATION AND PROTECTION OF BOLTED CONNECTIONS.
2. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE CITY'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
3. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE CITY'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

Ventura County Waterworks District No. 8	4" BLOW OFF INSTALLATION	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 503

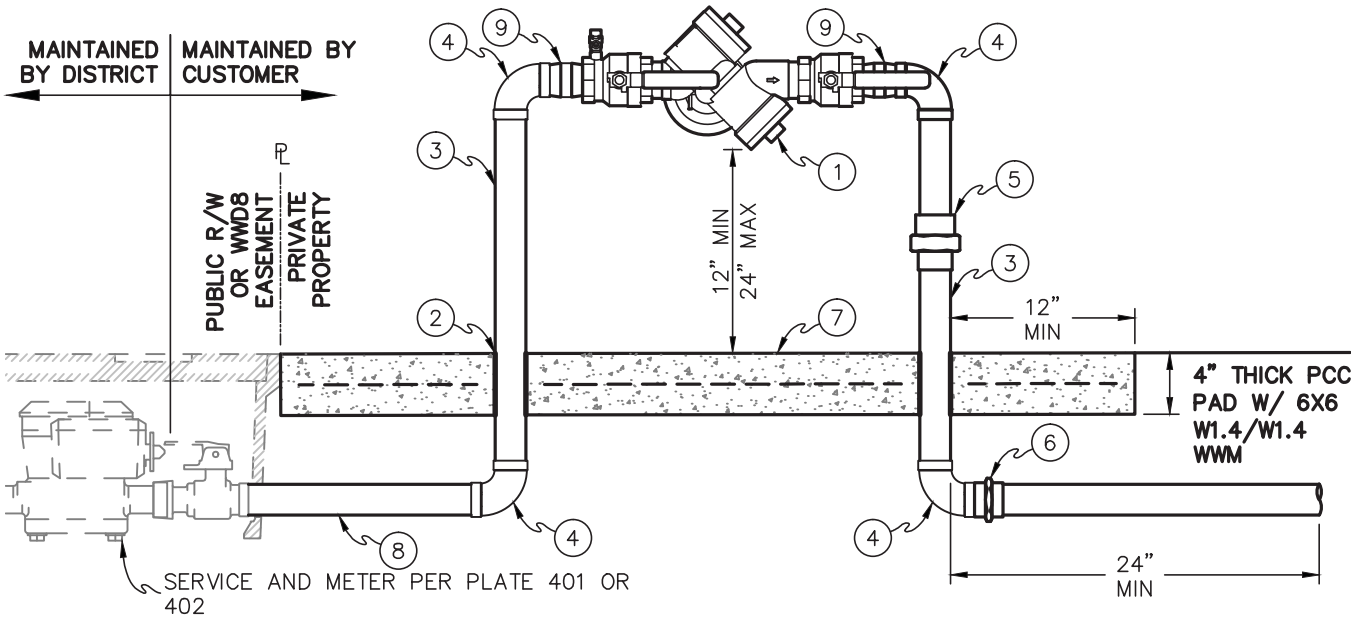


NOTES

1. ASSEMBLIES IN EASEMENTS OR STREETS WITHOUT CURBS REQUIRE GUARD POSTS. SEE STD PLATE NO. 210.
2. SECURE COVER TO CONCRETE WITH THREE ½" X 4" GALV. ANCHOR BOLT, WASHER, AND NUT.
3. USE 2" SERVICE LINES AND APPURTENANCES FOR END-OF-MAIN LOCATIONS REGARDLESS OF VALVE SIZE REQUIRED.
4. ALL PIPING SHALL BE EXTRA STRONG BRASS AND SHALL BE OF THE SAME NOMINAL SIZE AS THE VALVE, UNLESS OTHERWISE NOTED.
5. ALL MATERIALS, CONSTRUCTION, AND ASSEMBLY SIZING SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
6. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST.

Ventura County Waterworks District No. 8	1" & 2" COMBINATION AIR RELEASE AND VACUUM VALVE (AIR/VAC)	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER; APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 504

1. 1" THROUGH 2" REDUCED PRESSURE BACKFLOW PREVENTOR WITH BALL VALVES
2. WRAP W/ 10 MIL PE TAPE (TYP)
3. COPPER WATER TUBING, TYPE "K" RIGID
4. COPPER OR BRASS 90° ELBOW, NPT X C
5. COPPER OR BRASS UNION WITH COPPER SOLDER OR THREADED JOINTS
6. COPPER OR BRASS TO PVC ADAPTER, WHEN NEEDED
7. 18" WIDE X 4" THICK CONCRETE PAD, LENGTH VARIES PER ASSEMBLY SIZE
8. COPPER WATER TUBING, TYPE "L" SOFT
9. COPPER OR BRASS NIPPLE, NPT X NPT



NOTES:

1. PROVIDE A USC APPROVED BACKFLOW PREVENTION ASSEMBLY.
2. WWD8 MAINTENANCE RESPONSIBILITY STOPS AT THE METER. THE CUSTOMER IS RESPONSIBLE TO TEST AND MAINTAIN THE BACKFLOW PREVENTION ASSEMBLY. CERTIFICATION SHALL BE DELIVERED TO WWD8.
3. BACKFLOW CERTIFICATION TESTING IS REQUIRED ANNUALLY AT A MINIMUM BUT MAY BE MORE FREQUENT AS DEEMED NECESSARY BY WWD8. CERTIFICATION TESTING IS REQUIRED IMMEDIATELY AFTER AN ASSEMBLY IS RELOCATED, REPLACED, AND/OR REPAIRED.
4. BACKFLOW PREVENTION ASSEMBLY SIZE SHALL MATCH THE DIAMETER OF THE METER IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE; CHAPTER 6, SECTION 610 AS AMENDED, OR UP TO 1" LARGER.
5. BACKFLOW PREVENTION ASSEMBLY INSTALLATIONS INCLUDING ALL APPURTENANCES FOR THE SUPPLY OF DOMESTIC WATER SHALL COMPLY WITH THE REQUIREMENTS OF THE CALIFORNIA LEAD–FREE ACT AB1953.
6. BACKFLOW PREVENTION ASSEMBLY SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE WATER METER BUT NOT FURTHER THAN 10' UNLESS A VARIANCE IS OBTAINED FROM WWD8 PRIOR TO INSTALLATION.
7. NO OUTLETS, TEES, OR CONNECTIONS SHALL BE ALLOWED BETWEEN THE METER AND THE BACKFLOW PREVENTION ASSEMBLY.
8. BACKFLOW PREVENTION ASSEMBLIES SHALL MAINTAIN A VERTICAL CLEARANCE FROM THE LOWEST POINT OF 12" (MIN) TO 24" (MAX) ABOVE FINISHED GRADE, WITH SIDE AND TOP CLEARANCES OF 12" (MIN) FOR ANY OBSTRUCTIONS IN ALL DIRECTIONS.
9. PARALLEL INSTALLATIONS OF THE SAME BACKFLOW PREVENTION ASSEMBLIES ARE RECOMMENDED FOR ALL FACILITIES REQUIRING UNINTERRUPTED WATER SUPPLY, SUCH AS, HOSPITALS AND SCHOOLS.
10. THEFT PREVENTION DEVICES ARE RECOMMENDED FOR BRASS ASSEMBLIES ALLOWING ADEQUATE ACCESS TO THE ASSEMBLY FOR TESTING, MAINTENANCE, AND PROPER DRAINAGE.
11. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
12. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

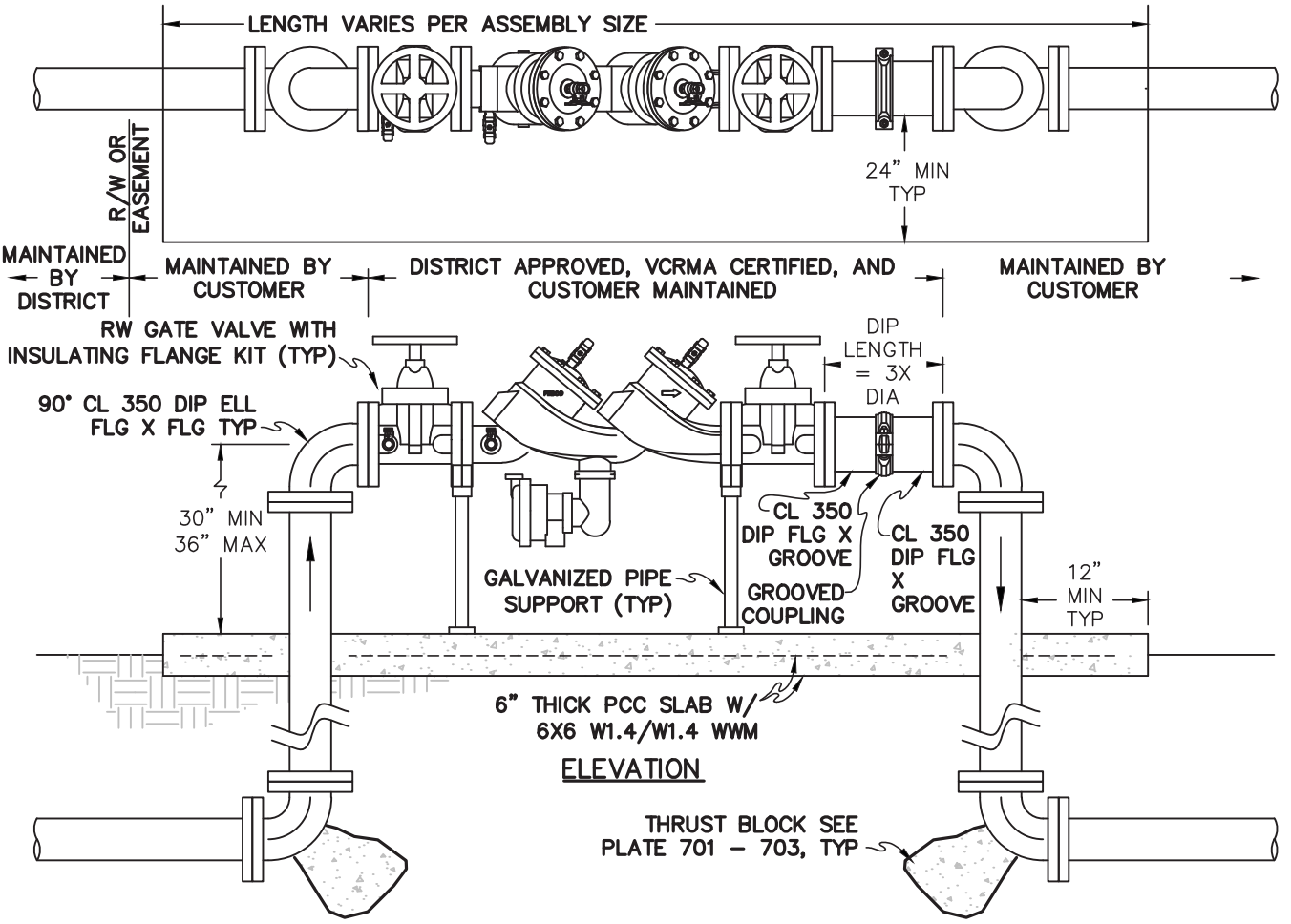
Ventura County Waterworks District No. 8

REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY, 2" AND SMALLER

JUL 2021

RECOMMENDED: /S/	APPROVED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER	DIRECTOR OF PUBLIC WORKS

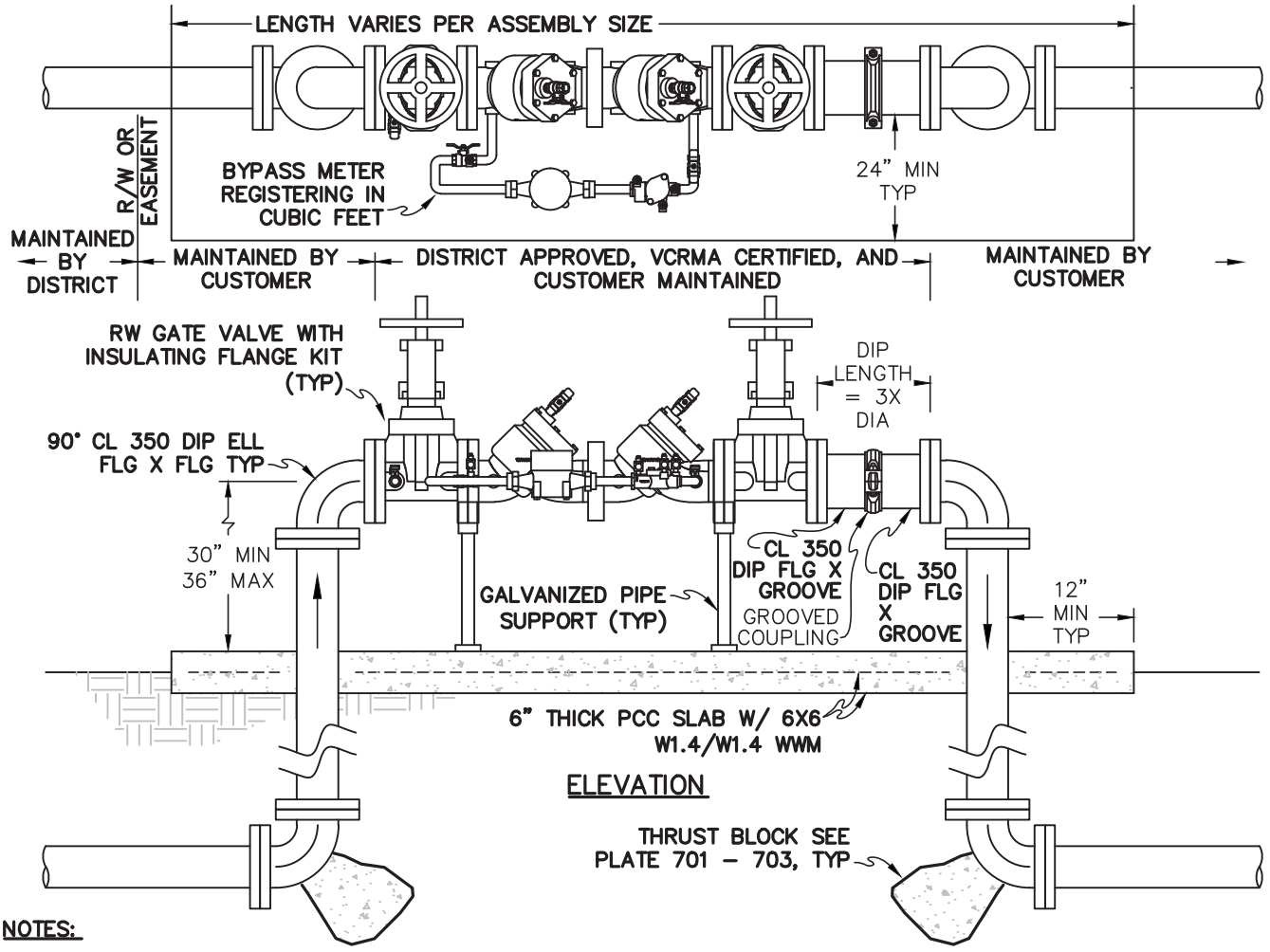
PLATE 601



NOTES:

1. PROVIDE A USC APPROVED BACKFLOW PREVENTION ASSEMBLY.
2. WWD8 MAINTENANCE RESPONSIBILITY STOPS AT THE METER. THE CUSTOMER IS RESPONSIBLE TO TEST AND MAINTAIN THE BACKFLOW PREVENTION ASSEMBLY. CERTIFICATION SHALL BE DELIVERED TO WWD8.
3. BACKFLOW CERTIFICATION TESTING IS REQUIRED ANNUALLY AT A MINIMUM BUT MAY BE MORE FREQUENT AS DEEMED NECESSARY BY WWD8. CERTIFICATION TESTING IS REQUIRED IMMEDIATELY AFTER AN ASSEMBLY IS RELOCATED, REPLACED, AND/OR REPAIRED.
4. BACKFLOW PREVENTION ASSEMBLY SIZE SHALL MATCH THE DIAMETER OF THE METER IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE; CHAPTER 6, SECTION 610 AS AMENDED, OR UP TO 1" LARGER.
5. BACKFLOW PREVENTION ASSEMBLY INSTALLATIONS INCLUDING ALL APPURTENANCES FOR THE SUPPLY OF DOMESTIC WATER SHALL COMPLY WITH THE REQUIREMENTS OF THE CALIFORNIA LEAD–FREE ACT AB1953.
6. BACKFLOW PREVENTION ASSEMBLY SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE WATER METER BUT NOT FURTHER THAN 10' UNLESS A VARIANCE IS OBTAINED FROM WWD8 PRIOR TO INSTALLATION.
7. NO OUTLETS, TEES, OR CONNECTIONS SHALL BE ALLOWED BETWEEN THE METER AND THE BACKFLOW PREVENTION ASSEMBLY.
8. BACKFLOW PREVENTION ASSEMBLIES SHALL MAINTAIN A VERTICAL CLEARANCE FROM THE LOWEST POINT OF 12" (MIN) TO 24" (MAX) ABOVE FINISHED GRADE, WITH SIDE AND TOP CLEARANCES OF 12" (MIN) FOR ANY OBSTRUCTIONS IN ALL DIRECTIONS.
9. PARALLEL INSTALLATIONS OF THE SAME BACKFLOW PREVENTION ASSEMBLIES ARE RECOMMENDED FOR ALL FACILITIES REQUIRING UNINTERRUPTED WATER SUPPLY, SUCH AS, HOSPITALS AND SCHOOLS.
10. THEFT PREVENTION DEVICES ARE RECOMMENDED FOR BRASS ASSEMBLIES ALLOWING ADEQUATE ACCESS TO THE ASSEMBLY FOR TESTING, MAINTENANCE, AND PROPER DRAINAGE.
11. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S "WATER DESIGN AND CONSTRUCTION STANDARDS" MANUAL.
12. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S "APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS."

Ventura County Waterworks District No. 8	REDUCED PRESSURE PRINCIPLE (RPP) BACKFLOW ASSEMBLY, 3" AND LARGER (DW)	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 602



NOTES:

1. PROVIDE A USC APPROVED BACKFLOW PREVENTION ASSEMBLY.
2. WWD8 MAINTENANCE RESPONSIBILITY STOPS AT THE CITY R/W OR DEDICATED EASEMENT TO WWD8, THE CUSTOMER IS RESPONSIBLE TO TEST AND MAINTAIN THE BACKFLOW PREVENTION ASSEMBLY. CERTIFICATION SHALL BE DELIVERED TO WWD8.
3. BACKFLOW CERTIFICATION TESTING IS REQUIRED ANNUALLY AT A MINIMUM BUT MAY BE MORE FREQUENT AS DEEMED NECESSARY BY WWD8. CERTIFICATION TESTING IS REQUIRED IMMEDIATELY AFTER AN ASSEMBLY IS RELOCATED, REPLACED, AND/OR REPAIRED.
4. BACKFLOW PREVENTION ASSEMBLY SIZE SHALL MATCH THE DIAMETER OF THE METER IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE; CHAPTER 6, SECTION 610 AS AMENDED, OR UP TO 1" LARGER.
5. BACKFLOW PREVENTION ASSEMBLY INSTALLATIONS INCLUDING ALL APPURTENANCES FOR THE SUPPLY OF DOMESTIC WATER SHALL COMPLY WITH THE REQUIREMENTS OF THE CALIFORNIA LEAD–FREE ACT AB1953.
6. BACKFLOW PREVENTION ASSEMBLY SHALL BE LOCATED ON PRIVATE PROPERTY AS CLOSE AS PRACTICAL TO THE CITY R/W or DEDICATED EASEMENT TO WWD8 BUT NOT FURTHER THAN 10' UNLESS A VARIANCE IS OBTAINED FROM WWD8 PRIOR TO INSTALLATION.
7. NO OUTLETS, TEES, OR CONNECTIONS SHALL BE ALLOWED BETWEEN THE WATER MAIN CONNECTION AND THE BACKFLOW PREVENTION ASSEMBLY.
8. BACKFLOW PREVENTION ASSEMBLIES SHALL MAINTAIN A VERTICAL CLEARANCE FROM THE LOWEST POINT OF 12" (MIN) TO 24" (MAX) ABOVE FINISHED GRADE, WITH SIDE AND TOP CLEARANCES OF 12" (MIN) FOR ANY OBSTRUCTIONS IN ALL DIRECTIONS.
9. PARALLEL INSTALLATIONS OF THE SAME BACKFLOW PREVENTION ASSEMBLIES ARE RECOMMENDED FOR ALL FACILITIES REQUIRING UNINTERRUPTED WATER SUPPLY, SUCH AS, HOSPITALS AND SCHOOLS.
10. THEFT PREVENTION DEVICES ARE RECOMMENDED FOR BRASS ASSEMBLIES ALLOWING ADEQUATE ACCESS TO THE ASSEMBLY FOR TESTING, MAINTENANCE, AND PROPER DRAINAGE.
11. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
12. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

Ventura County Waterworks District No. 8

DOUBLE DETECTOR CHECK BACKFLOW ASSEMBLY 3" AND LARGER (FIRE)

JUL 2021

RECOMMENDED: /S/	APPROVED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER	DIRECTOR OF PUBLIC WORKS

PLATE 603

THRUST BLOCK SIZES

(MINIMUM BEARING AREA IN SQUARE FEET LOCATIONS)

PIPE SIZE	ELBOWS				CAPPED END OR TEE	REDUCER H	REBAR
	90	45	22 1/2	11 1/4			
6"	8 / 10	5 / 6	3 / 3	3 / 3	6 / 8	2'–0" / 2'–0"	NO. 3
8"	13 / 16	8 / 11	4 / 6	4 / 6	10 / 14	2'–0" / 2'–6"	NO. 4
10"	16 / 20	10 / 12	7 / 9	7 / 9	13 / 16	2'–6" / 3'–0"	NO. 5
12"	20 / 26	11 / 14	9 / 12	9 / 12	16 / 20	3'–0" / 3'–0"	NO. 5

FOR CLASS 150 PIPE → 14 / 19 ← FOR CLASS 200 PIPE

ANCHOR BLOCK SIZES

(DIMENSIONS LOCATIONS FLANGED VALVE)

PIPE SIZE	IN LINE VALVE		CONNECTIONS			ELBOWS		REBAR
	T	REBAR	T	L	REBAR			
6"	12"	NO. 5	12"	2'–6"	NO. 5	3'–0"	12"	NO. 5
8"	18"	NO. 5	18"	3'–9"	NO. 5	3'–6"	18"	NO. 5
10"	24"	NO. 6	24"	4'–10"	NO. 6	4'–6"	24"	NO. 6
12"	24"	NO. 6	24"	5'–0"	NO. 6	5'–6"	24"	NO. 6

NOTES:

1. **SIZES BASED ON 1500 PSF BEARING SOIL. SPECIAL DESIGN REQUIRED FOR SOILS OF LOWER BEARING STRENGTH.**

Ventura County Waterworks District No. 8

THRUST AND ANCHOR BLOCK SIZES

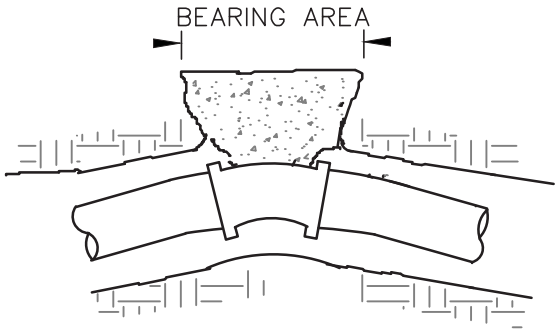
JUL 2021

RECOMMENDED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER

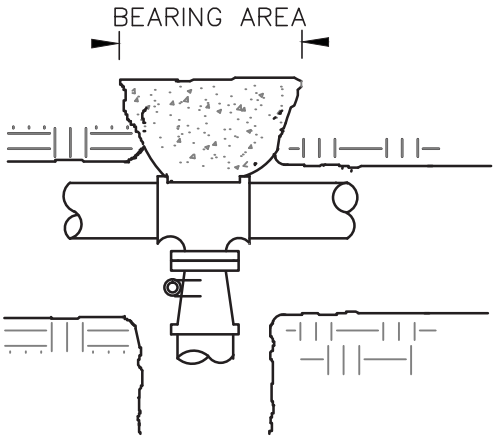
APPROVED: /S/
DIRECTOR OF PUBLIC WORKS

PLATE 701

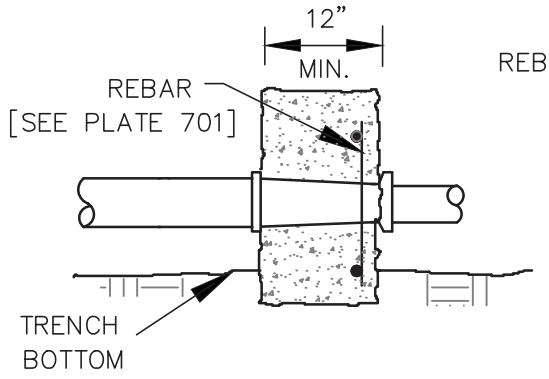
△ =90°,45°,22.5°,11.25°

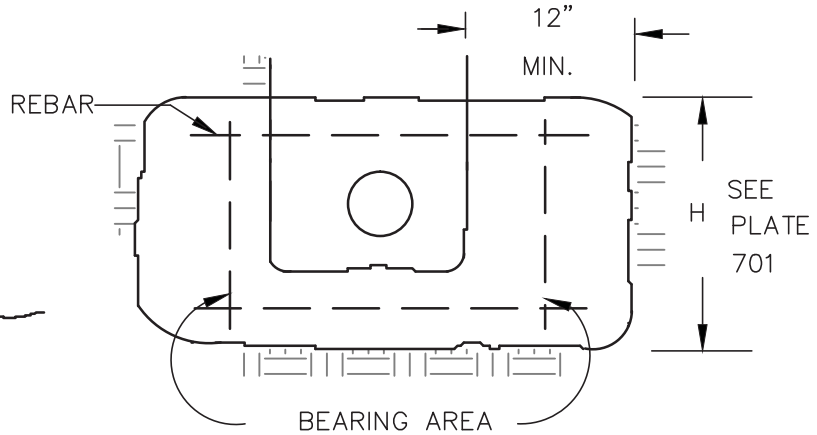


ELBOWS



TEES





REDUCER

NOTES:

1. THRUST BLOCKS SHALL BEAR ON UNDISTURBED SOIL.
2. FOR THRUST BLOCK SIZES SEE PLATE 701.
3. SPECIAL DESIGN & DISTRICT ENGINEER APPROVAL REQUIRED FOR VERTICAL ANGLES GREATER THAN 45°.
4. CONCRETE TO EXTEND MIN. 12" AT OUTSIDE OF PIPE RADIUS AND 6" AT INSIDE OF PIPE RADIUS PIPE INTO UNDISTURBED SOIL.
5. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE CITY'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
6. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE CITY'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS

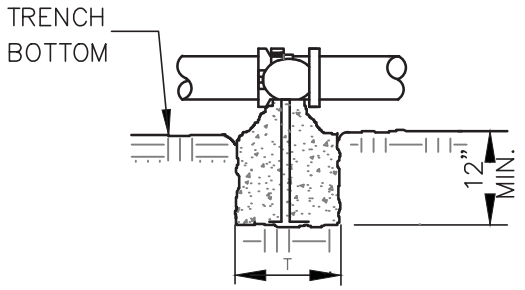
Ventura County Waterworks District No. 8

THRUST BLOCK FOR PUSH JOINT/ MECHANICAL JOINT CONNECTIONS

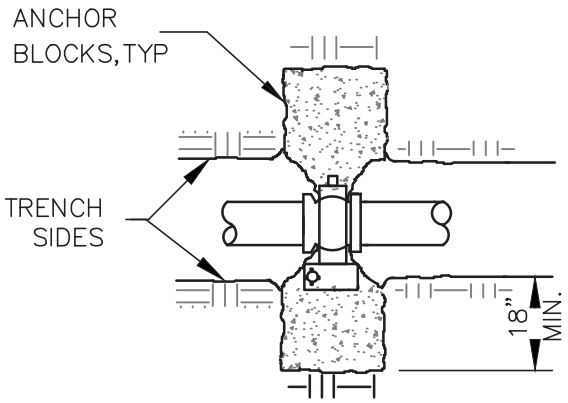
JUL 2021

RECOMMENDED: /S/	APPROVED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER	DIRECTOR OF PUBLIC WORKS

PLATE 702

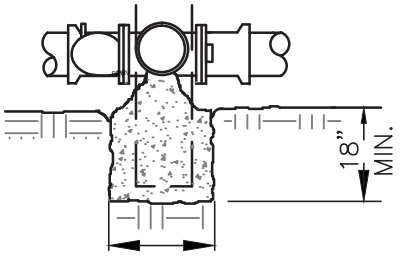


ELEVATION

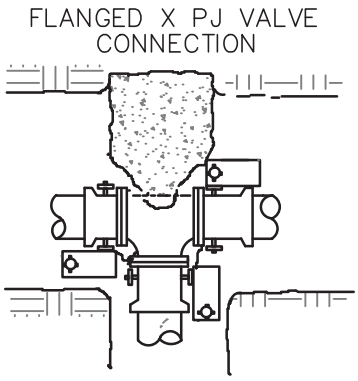


PLAN

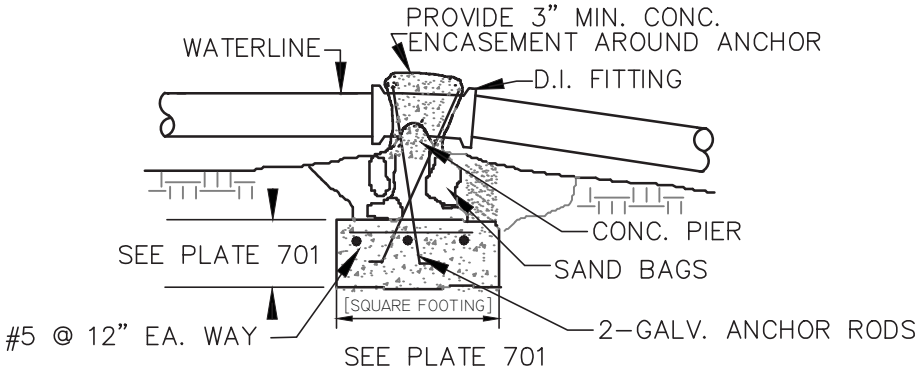
IN-LINE VALVES



SEE PLATE 701



TEES

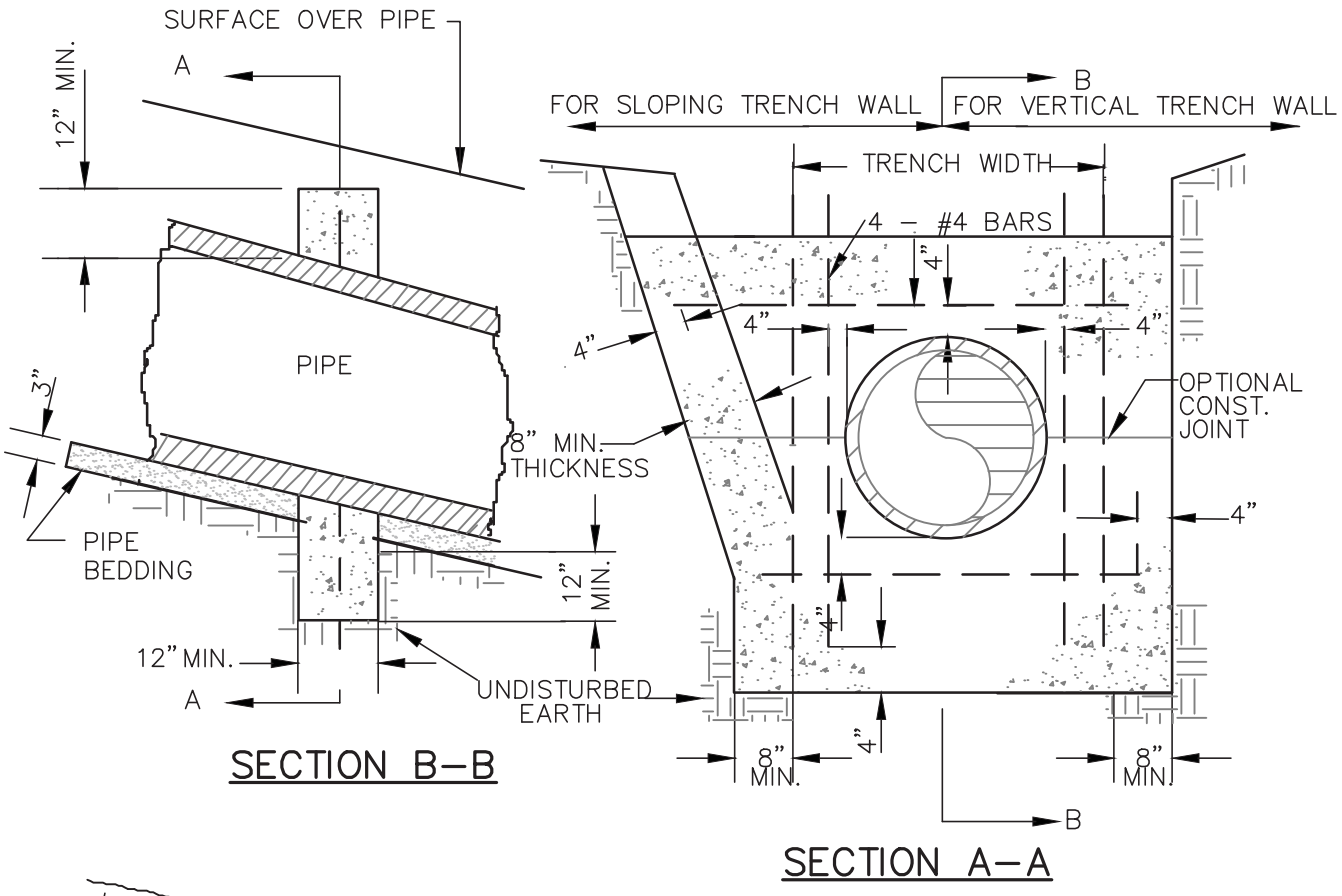


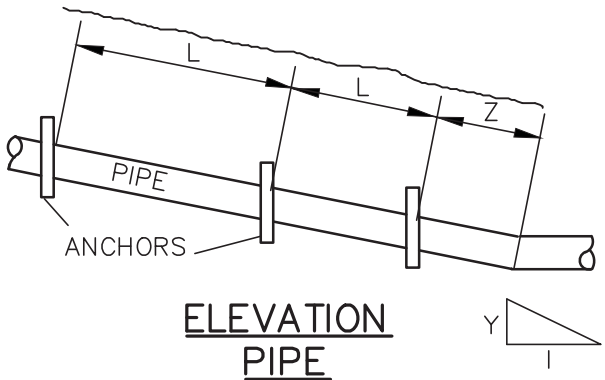
ELBOWS

NOTES:

1. ANCHOR BLOCKS SHALL BEAR ON UNDISTURBED SOIL.
2. FOR ANCHOR BLOCK DIMENSIONS SEE PLATE 701.
3. SPECIAL DESIGN AND DISTRICT ENGINEER APPROVAL REQUIRED FOR VERTICAL ANGLES GREATER THAN 22 1/2 DEGREES.
4. REFER TO SECTION 4.4 "MAIN LINE FITTINGS" AND SECTION 6.12 "INSTALLATION OF VALVES AND FITTINGS" FOR INFORMATION CONCERNING THE INSTALLATION AND PROTECTION OF BOLTED CONNECTIONS.
5. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE CITY'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
6. PRE-APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE CITY'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

Ventura County Waterworks District No. 8	ANCHOR BLOCKS	JUL 2021
	RECOMMENDED: /S/ DEPUTY DIRECTOR / DISTRICT ENGINEER APPROVED: /S/ DIRECTOR OF PUBLIC WORKS	PLATE 703





ELEVATION
PIPE
ANCHORS

PIPE SLOPE [%] Y:1 [100]	L DISTANCE [MAX]	Z DISTANCE [MAX]
100	12'	4'
67	14'	8'
50	16'	12'
40	18'	18'
33	20'	20'

ANCHORS

NOTES:

1. ANCHORS SHALL BE CLASS 520–C–2500 CONCRETE.
2. FOR CLAY PIPE, ANCHORS SHALL NOT BE PLACED WITHIN 6" OF THE PIPE JOINT
3. TRENCH SHALL BE BACKFILLED IN ACCORDANCE WITH PLATE 104.
4. SPACING OF ANCHORS FOR PIPE SLOPES BETWEEN VALUES SHOWN IN TABLE "A" MAY BE INTERPOLATED.
5. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
6. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

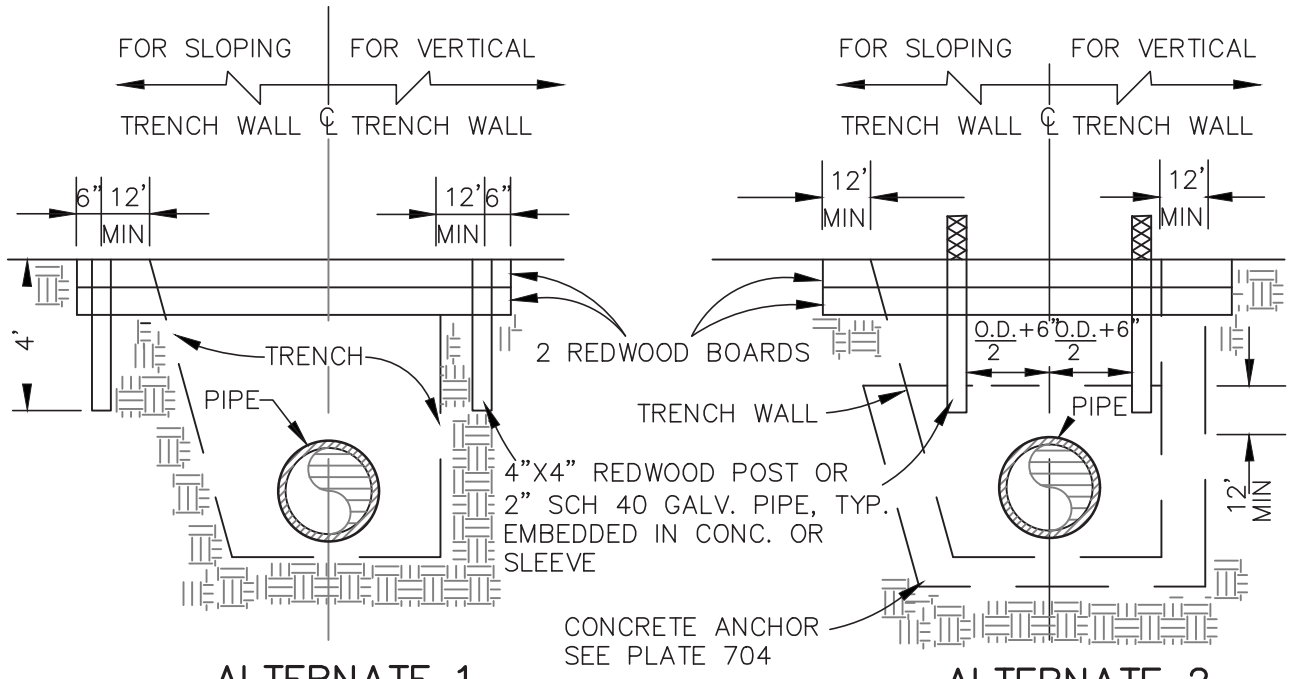
Ventura County Waterworks District No. 8

PIPE ANCHORS AND BACKFILL STABILIZERS

JUL 2021

RECOMMENDED: /S/	APPROVED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER	DIRECTOR OF PUBLIC WORKS

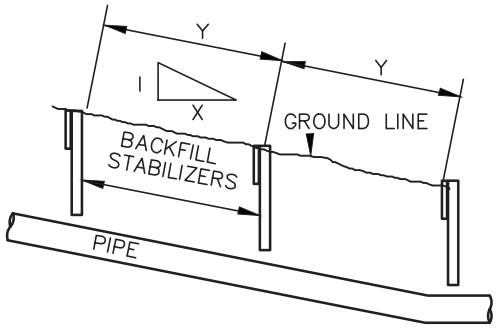
PLATE 704



ALTERNATE 1

ALTERNATE 2

SECTION



ELEVATION BACKFILL STABILIZERS

GROUND SLOPE X:1	SPACING Y [MAX]
1:1	5'
1 1/2:1	9'
2:1	12'
2 1/2:1	16'
3:1	20'

STABILIZERS

NOTES:

1. REDWOOD BOARDS SHALL BE 2" X 12" WHERE DEPTH OF COVER OVER PIPES PERMITS, OTHERWISE USE 2" X 10"
2. REDWOOD BOARDS SHALL BE PLACED ON THE HIGH GROUND SIDE OF THE POSTS.
3. EACH REDWOOD BOARD SHALL BE FASTENED BY USING 2–16D NAILS TO EACH REDWOOD POST OR A 3/8" BOLT AND NUT WITH WASHERS TO EACH GALVANIZED PIPE. ALL HARDWARE SHALL BE GALVANIZED.
4. TRENCH BACKFILL SHALL BE CONSOLIDATED BY MECHANICAL COMPACTION. IN LIEU OF MECHANICALLY COMPACTION, SOIL CEMENT MAY BE USED; HOWEVER, THE TOP 12" OF BACKFILL SHALL BE NATIVE SOIL, MECHANICALLY COMPACTED.
5. SPACING OF STABILIZERS FOR GROUND SLOPES BETWEEN VALUES SHOWN IN TABLE "B" MAY BE PROPORTIONED.
6. THE CONTRACTOR MAY, AT ITS OPTION, SUBSTITUTE DOUGLAS FIR FOR THE REDWOOD PROVIDED IT HAS BEEN TREATED WITH PRESERVATIVES.
7. ALL MATERIALS AND CONSTRUCTION SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE DISTRICT'S WATER DESIGN AND CONSTRUCTION STANDARDS MANUAL.
8. PRE–APPROVED MANUFACTURES AND MODEL NUMBERS ARE LISTED IN THE DISTRICT'S APPROVED MATERIALS LIST FOR WATER IMPROVEMENT PROJECTS.

Ventura County Waterworks District No. 8

PIPE ANCHORS AND BACKFILL STABILIZERS

JUL 2021

RECOMMENDED: /S/	APPROVED: /S/
DEPUTY DIRECTOR / DISTRICT ENGINEER	DIRECTOR OF PUBLIC WORKS

PLATE 705