SANTA NELLA COUNTY WATER DISTRICT

IMPROVEMENT STANDARDS AND SPECIFICATIONS

ADOPTED: JUNE 13, 2024

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TABLE OF CONTENTS

SECTION 1: GENERAL

1.1 PURPOSE

The Santa Nella County Water District (District) Improvement Standards and Specifications (Improvement Standards) was prepared to provide minimum standards for the design, construction, repair, and alterations for sewer system and water system facilities and all associated appurtenances, within the District's jurisdiction. The Improvement Standards may be applied to privately owned and Capital Improvement Projects (CIPs) to assure that owned improvements within the District's jurisdiction meet the minimum design standards.

1.2 GENERAL

Design Engineers and Construction Contractors working within the District's jurisdiction should be familiar with both the District's Improvement Standards and Standard Drawings. All plans and specifications for construction of improvements to be accepted by the District shall be prepared and constructed in accordance with these Improvement Standards.

The Improvement Standards do not cover all the work which may require acceptance by the District. Work that is not covered by these Improvement Standards shall be designed in accordance with generally accepted engineering principles. It is recommended that the criteria for work that is to be accepted by the District and that is not covered by these Improvement Standards be reviewed by the District Engineer prior to the actual design to establish the acceptable design criteria. Design criteria will be based on current codes and regulations applicable to the work and the latest accepted principles of engineering. The Design Engineer may be required to submit applicable engineering calculations to verify that the proposed work meets the design criteria set forth by the District Engineer.

The Merced County Design and Construction Standards, the District's 2020 Sewer System Management Plan (SSMP), the District's 2019 Water Master Plan, and the District's 2019 Sewer Master Plan, along with nearby agencies standards were used to prepare the District's Improvement Standards. The most recently updated District planning documents, laws, and regulations shall take precedence over any of the information outlined in these Improvement Standards. These Improvement Standards shall be periodically reviewed and updated as necessary to ensure the standards remain current and effective.

SECTION 2: DEFINITIONS AND TERMS

2.1 ABBREVIATIONS

AB	Aggregate Base
ADWF	Average Dry Weather Flow
AI	Analog Input
ANSI	American National Standards Institute
ANSI/HI	American National Standards Institute/Hydraulic Institute
ARV	Air Release Valve
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CAL FIRE	California Department of Forestry and Fire Protection
CFC	California Fire Code, California Code of Regulations, Title 24, Part 9
CIP	Capital Improvement Project
CPU	Central Processing Unit
CRT	Cathode Ray Tube
d/D ratio	Normal Flow Depth to Pipe Diameter Ratio
dB	Decibel
DC	Direct Current
DI	Digital Input
DIP	Ductile Iron Pipe
District	Santa Nella County Water District
DO	Digital Output
ft	Feet
fps	Feet per Second
gpm	Gallons per Minute
GV	Gate valve
HDPE	High-Density Polyethylene
HMI	Human-Machine Interface
HOA	Hand-Off-Auto
Hz	Hertz
I.D.	Inside Diameter
I/I	Inflow and Infiltration
I/O	Input/Output
Improvement Standards	Improvement Standards and Specifications
lbs	Pounds
mA	Milliampere
MCC	Motor Control Center
MDD	Maximum Day Demand
NACM	National Association of Chain Manufacturers
NAVD 88	North American Vertical Datum of 1988
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NIST	National Institute of Standards and Technology
NPT	National Pipe Thread
N.S.T.	Non-Swivel Thread

NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
P&ID	Process and Instrument Diagrams
PF	Peaking Factor
PHD	Peak Hourly Demand
PID	Proportional, Integral, Derivative
PLC	Programmable Logic Controller
PPM	Parts per Million
Psi	Pounds per square inch
psig	Pound-Force per Square Inch
PUE	Public Easement
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
ROW	Right-of-Way
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SDR	Standard Dimension Ratio
SS	Stainless Steel
SSMP	Sewer System Management Plan
VAC	Volts Alternating Current
VCP	Vitrified Clay Pipe
VDC	Volts of Direct Current
VFD	Variable Frequency Drive
Waterworks Standards	California Waterworks Standards in the California Code of Regulations, Title 22, Division 4, Chapter 16
WGRs	Wastewater Generation Rates

2.2 DEFINITIONS

As-Built Plans: Plans reviewed by the Inspector, signed by the District, and labeled as the Final As-Built Plans.

CALTRANS Standard Plans: The most recent edition of the Standard Plans of the California Department of Transportation, including all revisions.

CALTRANS Standard Specifications: The most recent edition of the Standard Specifications of the California Department of Transportation, including all revisions.

Contractor: Any person, firm, corporation, partnership, association, or agent thereof who has entered into a contract with the District for the construction of any improvements within the District's jurisdiction.

County: The County of Merced, State of California.

Design Engineer: Any person, firm, corporation, partnership, or agent thereof, legally authorized to practice Civil Engineering in the State of California, who prepares or submits Improvement Plans and specifications to the District, and who may represent a Developer during planning, design, or construction of an improvement project within the County of Merced.

Developer: Any person, firm, corporation, partnership, or agent thereof who has applied for a permit or subdivision within the County of Merced.

District: The Santa Nella County Water District or any persons to whom the power of the District has been delegated.

District Engineer: District Engineer of the Santa Nella County Water District acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

Fire Department: The Merced County Fire Department or California Department of Forestry and Fire Protection (CAL FIRE).

Improvement Plans: Plans prepared by a Design Engineer and approved by the District.

Improvement Standards: Improvement Standards of the Santa Nella County Water District and shall include the Design Standards, Construction Standard Specifications, and Standard Details.

Inspector: Any person employed by the District under the authority of the District to inspect ongoing construction projects.

Record Drawings: Drawings submitted to the District by the Design Engineer showing final improvement details, corrected improvement elevations and locations, as well as any changes that occurred during construction.

SECTION 3: IMPROVEMENT PLANS

3.1 GENERAL REQUIREMENTS

Improvement Plans and supplemental information shall be approved by the District Engineer for all projects that are subject to the approval of the District prior to any construction being allowed to begin. The Improvement Plans and supplemental information described herein shall be prepared by an engineer legally authorized to practice Civil Engineering in the State of California. All plans and calculations submitted for review shall be stamped and signed by a Civil Engineer.

3.2 IMPROVEMENT PLAN DETAILS

The following details and supplemental information shall be shown on the plans submitted for approval:

General Requirements

Improvement Plans shall show all existing facilities and all improvements to be constructed. The plans shall be original drawings.

A. Size: The size of the improvement plan sheets shall be 24" x 36".
B. Scale: The scales selected shall be sufficient to clearly show all required details when reproduced. Preferred horizontal scales are 1" = 50' or 1" = 40'. Preferred vertical scales are 1" = 2' in flat areas or 1" = 4' in steep areas.
C. Title Block: Each sheet within the set shall have a title block showing the project name, District project number, sheet title, date of drawing and revisions, scale of drawings, page number, and the Design Engineer's name, registration number, expiration date of registration, and signature.
D. Vertical Control: If a project is located within a special flood hazard zone, the elevations used in the Improvement Plans shall be based on the North American Vertical Datum of 1988 (NAVD 88).
E. If a project is not located within a special flood hazard zone, the elevations shown in the Improvement Plans may be based on an assumed elevation; however, if the project is located adjacent to a recently completed project, the elevations should be based on elevations contained in the as-built plans of the adjacent project.
F. Orientation and Stationing: Insofar as practical, the plans shall be arranged so North is at the top of the sheet. The stationing on the plan and profile sheet shall read from left to right or from the bottom to top.

Title Sheet

On Improvement Plans exceeding two sheets per set, a title sheet shall be prepared showing all the following:

A. The entire project, drawn at whatever engineering scale seems appropriate, complete with street names and lot numbers.
B. Vicinity map and North Arrow.
C. Index of sheets.
D. A legend of symbols.
E. Location, description, and elevation of the reference benchmark as well as the temporary benchmark used for the project.

F. The name, address, and telephone number of any agency whose facilities will be installed or modified as part of the improvements as well as a signature block for their approval.
G. The name, address and telephone number of the Developer or their authorized representative.
H. The following notes shall be placed on the title sheet:
    a. This set of plans is valid for construction purposes only after being signed by the District Engineer.
    b. All contractors involved in the construction of this project shall attend a pre-job conference arranged by the Developer at the District for construction and inspection coordination.
    c. The Contractor shall comply with all applicable requirements of the San Joaquin Valley Air Pollution Control District. Regulation VIII Record Keeping Forms and District Rules and Regulations may be obtained at www.valleyair.org or by calling (209) 557-6400.
    d. The Contractor shall comply with Federal Regulations for storm water runoff issued by the U.S. EPA on November 16, 1990 (40 Code of Federal Regulations Parts 122, 123, and 124). For information and direction, contact the State Water Resources Control Board's Construction Activity Storm Water Hotline at (916) 341-5537, e-mail: stormwater@swrcb.ca.gov, or visit their website at www.swrcb.ca.gov.
I. The following items should not be included on the title sheet:
    a. Quantities List.

Topography Sheets

Topographical survey sheets shall be included in the Improvement Plans and shall show spot elevations at an appropriate interval, fences, structures, pipelines, ditches, utility poles, trees, driveways, roads, pavement, rights-of-way (ROW), easements, etc.

The topography sheets may also be used to indicate demolition activities.

Utilities Sheets

Utilities sheets shall be prepared as part of the Improvement Plans and shall show streetlights and streetlight conduit, fire hydrants, water lines, valves, blow-offs, sanitary sewer lines and manholes, leach fields, clean outs, sewer and water service locations, water wells, power lines, gas lines, TV cable lines, utility boxes, telephone lines, public easements (PUEs), driveways, centerline monuments, street signs, etc.

Some of the above utilities may not be able to be finalized prior to Improvement Plans approval. Schematic drawings with details identifying the location of planned utilities shall be submitted to the District at the pre-job construction conference. These utilities shall be shown on the required Record Drawings prior to acceptance of improvements.

Plan and Profile Sheets

Plan and profile sheets shall be included in the set of Improvement Plans showing the existing and proposed profiles of all roadways. These sheets shall show elevations, grade breaks, vertical curves, percent slope, road stationing, storm drainage lines, water lines, sewer lines, irrigation lines and any areas of possible conflict between underground utilities. Indicate length and type of pipe between manholes and catch basins. Show elevations of pipe inverts and finished surfaces of catch basins. Show elevations of pipe inverts in manholes.

Detail Sheets

Detail sheets shall be included in Improvement Plans showing typical road cross sections, pump stations, and any other design standard that is not covered in this manual. It is not necessary for the standards included in this manual to be reproduced in the set of Improvement Plans. However, each standard from this manual utilized in a set of Improvement Plans shall be clearly referenced.

3.3 RECORD DRAWINGS

Prior to the acceptance of the improvements by the District, the Design Engineer shall compile and submit a set of Record Drawings showing final improvement details, corrected improvement elevations and locations, as well as any changes that occurred during construction.

A. Record Drawings shall be submitted to the District electronically and shall be submitted in a full-size hard copy.
B. Original data that has been superseded shall be crossed out, but not eradicated.
C. All utilities that could not be shown on the construction plans shall be drawn on the Record Drawings.
D. The Design Engineer shall provide final elevations of all lot corners, building pads, catch basin grates, storm drainage pipe inverts, sewer flowline elevations at manholes as well as curb and gutter flowline.
E. All lettering must be clear and legible. Extensive changes which cannot be shown clearly on an original sheet should be drawn on a supplemental sheet. Any supplemental sheets shall be signed by the Design Engineer and included as part of the Record Drawings. The Design Engineer shall put his original stamp and signature on the Record Drawings.

Record Drawings shall become the property of the District.

3.4 AS-BUILT PLANS

The Inspector shall review the Record Drawings to confirm that they reflect what has actually been constructed. After this review, the District shall sign the Record Drawings and clearly label them as being the official As-Built Plans for the improvement project.

The District will scan the As-Built Plans into pdf format. The pdf files of As-Built Plans will be made available to the public as requested. As-Built Plans must be approved before the District will accept any offer of dedication for any facilities.

SECTION 4: SANITARY SEWER SYSTEM

4.1 GENERAL

Sewers shall be installed by a Developer or Contractor holding the appropriate license for such work under the provisions of the State of California Business and Professions Code. The criteria set forth in this section have been established to protect public facilities where sanitary sewer systems are being proposed.

4.2 REGULATORY STANDARDS

Pertinent requirements of the following District standards, including all changes thereto, shall be considered and complied with, except that in the event of conflict, the stricter design criteria shall govern.

A. Santa Nella County Water District Ordinances.
B. State Water Resources Control Board Laws and Regulations.
    a. Statewide Waste Discharge Requirements General Order for Sanitary Sewer Systems
C. United States Environmental Protection Agency.
D. Merced County Division of Environmental Health
E. California Regional Water Quality Control Board, Central Valley Region.
F. Others as appropriate.

4.3 DESIGN PROCEDURE

A design for each project proposed to be constructed under District agreement shall be submitted to, and approved by, the District Engineer in accordance with Section 3, Improvement Plans, of these Improvement Standards.

4.3.1 DESIGN FLOW

Flow determination shall be based on the most recent land use designation. Wastewater generation rates (WGRs) were developed to estimate average dry weather flow (ADWF) generated by future development. Table 4-1 summarizes the recommended WGRs for development of planned land uses.

Table 4-1: Wastewater Generation Rates

Land Use Designation	Wastewater Generation Rate	
	gpd/du	gpd/ac
Low Density Residential	174	-
Medium Density Residential	120	-
High Density Residential	103	-
Commercial	-	957
Light Industrial	-	131

The sewer collection system and pump station facilities should be designed to convey peak wet weather flow (PWWF), defined as the highest observed hourly flow that occurs during or following a rainfall event. The PWWF consists of ADWF and inflow and infiltration (I/I). Inflow is stormwater that enters the sewer system. Groundwater infiltration is expected in the District's system due to the close proximity to the surface water bodies.

The PWWF shall be obtained by multiplying the ADWF by a peaking factor (PF) of 3.0.

$$PWWF = ADWF * PF,$$
where PF = 3.0

4.3.2 CAPACITY EVALUATION

The primary evaluation criterion for hydraulic capacity in gravity sewers is the ratio of normal flow depth to pipe diameter (d/D ratio). New sewers are typically designed for d/D ratios ranging from 0.50 to 0.75, depending on diameter. Higher d/D ratios, up to 1.00, may be accepted for existing sewers on a case-by-case basis. Any gravity segment with a d/D ratio greater than 0.75 (75% full by depth) will be deemed hydraulically at capacity. Proposed gravity sewers will be sized for a d/D ratio less than or equal to 0.50 (50% full by depth).

4.4 SEWER COLLECTION SYSTEM

4.4.1 GRAVITY SEWER PIPELINE

The following criteria will be used in the design of new gravity sewers:

A. New gravity sewer pipelines should be 8-inch or larger in nominal diameter. Terminal runs less than 500 ft in length that have no potential for further extension, such as cul-de-sacs, may be 6-inch in diameter.
B. The minimum depth of cover is 4 feet.
C. The maximum depth of cover is 25 feet.
D. Sewers with a cover less than 4 feet may be approved by the District Engineer. If approved, sewers with less than 4 feet of cover must be constructed of cast iron or ductile iron pipe.
E. Sewers within 100 feet of domestic wells must be cast iron or ductile iron pipe.
F. For analytical purposes, a Manning's "n" of 0.013 will be assumed for all sewer pipelines.
G. The minimum velocity shall be 2 feet per second (fps) when the pipe is half full or full, unless the District Engineer has approved a specific exemption.
H. The maximum velocity shall be 10 fps.

4.4.2 MINIMUM SLOPES

Minimum slopes for specific sewer pipe sizes are listed in Table 4-2. Minimum slopes may be modified on a project-by-project basis with approval from the District.

Table 4-2: Gravity Sewer Slopes

Pipe Size (in)	Minimum Slope (ft/ft)
4	0.0084
6	0.0049
8	0.0033
10	0.0025
12	0.0019
15	0.0014
18	0.0011

4.4.3 MATERIALS AND FITTINGS

All pipes, couplings, and fittings shall be marked with the manufacturer's name, nominal inside diameter (I.D.), class, or pressure ratings. The appropriate specifications as given below shall apply:

A. Sewer pipe shall be polyvinyl chloride (PVC) gravity sewer pipe (SDR 26) and fittings must meet or exceed the requirements of American Society for Testing and Materials (ASTM) D3034 (SDR 26) and be installed to conform to ASTM D2321 requirements. The maximum pipe deflection for PVC pipe is 5 percent.
B. Sewer pipe shall be vitrified clay pipe (VCP), cast iron pipe, or ductile iron pipe (DIP).
    a. VCP must be clay bell and spigot end joint pipe and must conform to the current standard specification of ASTM C700 for extra strength clay pipe. No glazed pipe is permitted.
    b. Cast iron pipe must conform to the current standard specifications of American National Standards Institute (ANSI) A21.6 and must be bell and spigot joints. Cast iron fittings must conform to ANSI/American Water Works Association (AWWA) C110.
    c. Cement Mortar Lined DIP must conform to the AWWA C-151 with a minimum cover based on the Marston's Formula and the manufacturer's specifications.
C. Compression joints must be used for all pipes and must conform to ASTM C425.
D. Joints, fittings, solvents and/or coupling shall be furnished by the pipe manufacturer and shall be suitable for the pipe with which they shall be used and shall be manufactured in accordance with the specification for the pipe used. Jointing must be accomplished in strict accordance with the manufacturer's written directions. Gaskets and rings, where used, shall conform to ASTM F477.
E. Pipe and fittings shall be marked continuously at intervals not greater than two feet with the Manufacturer's Name or Trade Mark, the Nominal Pipe Size, the Materials Designation, the Standard Dimension Ratio or Design Terminology or Design Pressure Rating as may be appropriate, and the ASTM Fabrication Specification.

4.4.4 LAYING PIPE

All pipe must be laid to conform with the prescribed lines and grades. All adjustments of pipe to the line and grade must be made by scraping away or filling in and tamping under the body of the pipe, not blocking or wedging.

All pipe must be laid with bell end upstream and must be laid upstream from structure to structure. A minimum of three grade stakes per 100 ft interval must be provided, and each stake must be used in establishing the grade and alignment for the sewer.

4.4.5 FORCE MAINS

Force mains convey wastewater through pressurized pipelines from lift stations that pump sewage from a low elevation to a high elevation when gravity flow is not feasible. Typically, wastewater force mains are constructed from ductile iron or polyvinyl chloride material. Sizing the pipe, friction losses, pressure surges, and maintenance are factors to consider when designing a force main. Usually, the Hazen-Williams formula is used to design force mains since the formula contains a roughness coefficient C that accounts for pipeline hydraulic friction characteristics.

Typically, the velocities for force mains range between 4 to 8 fps. The maximum force main velocity at peak conditions is recommended not to exceed 10 fps.

The following criteria will be used for the design of sewer force mains:

A. Sewer force mains shall not be installed within 10 feet (horizontally) of a water main.
B. When a sewer force main must cross a water main, the crossing should be as close as practical to the perpendicular. The sewer force main should be at least 1 foot below the water main (wall to wall).
C. When a new sewer force main crosses under an existing water main, and a 1-foot vertical separation cannot be provided, all portions of the sewer force main within 8 feet (horizontally) of the outside walls of the water main shall be enclosed in a continuous sleeve. In these cases, a minimum vertical separation distance of 4 inches should be maintained between the outside edge of the bottom of the water main and the top of the continuous sleeve.
D. When a new water main crosses over an existing sewer force main, the water main should be constructed of pipe materials with a minimum rated working pressure of 200 pound-force per square inch (psig).

4.4.6 LIFT STATIONS

Lift stations and pumps are less desirable than gravity conveyance, though may be necessary components of collection system improvements depending on system constraints. Lift stations will be evaluated based on the following criteria. Additional design criteria such as wet well sizing, flow metering, remote monitoring capabilities, and housing of electrical equipment in a building or weatherproof enclosure will be established as needed.

A. Lift stations will be furnished with submersible pumps and are to include one stand-by pump.
B. Each pump in a duplex lift station will be designed to meet 100 percent of the PWWF.
C. Lift stations will be designed to meet 100 percent of the PWWF with the largest pump out of service.
D. Pump and impeller sizes will be selected with operating points within 60-115 percent of the pump's best efficiency point.
E. Pump drives will be either constant speed or variable frequency drive (VFD).

<u>Appurtenances for Submersible Pump Removal</u>

Submersible pumps shall be fitted with a Type 316 stainless-steel (SS) pump chain sized per the manufacturer's requirements, and a stainless-steel grip eye lifting system. A 9/32" chain, grade 63, working load 2,700 lbs, 316SS, National Association of Chain Manufacturers (NACM) standard, rated for lifting to be used for 50 horsepower and less pumps. ½" chain, grade 63, working load 9,300 lbs, 316 SS, NACM standard, rated for lifting to be used for greater than 50 horsepower pumps. The design shall be such that the pumping units will have a quick-disconnect sealing flange that automatically connects to the discharge piping by positively locking the volute into position to prevent any movement when lowered into place. Guiderail systems shall be compatible with approved pumps. Intermediate rail supports shall be provided as required.

<u>Wet Well Requirements</u>

The following sections describe the requirements for the wet well. Wet wells shall be as hazard-free as possible, and all pipes, materials, and equipment used in wet wells shall be corrosion-resistant and epoxy coated.

A. Sizing
    a. Wet well sizing criteria shall assume constant-speed pumps with a maximum six starts per hour at buildout; anything more complex (i.e., VFDs to reduce working volume) will require submittal of design calculations to the District. An analysis of VFD versus constant-

rate pumps will be required to demonstrate that VFDs will not provide long-term operational benefit. The station wet well shall be 60-inch-diameter or greater. The station shall have the ability to accommodate the size and number of pumps with rails and pipe, and be deep enough to accommodate passive filling and draining of emergency storage tanks. Pump spacing and clearances shall be in accordance with the most recent version of the American National Standards Institute/Hydraulic Institute (ANSI/HI) standards 9.8.

B. Calculations
    a. The wet well supplier shall submit calculations and information providing dimensions, weights, and reinforced concrete collar/footing dimensions required such that buoyant uplift can be prevented. Weight of the wet well plus the submerged weight of the backfill and collar/footing must be greater than, or equal to, 115 percent of the buoyant uplift when empty. The weight of the pumps cannot be included in the calculations.

Pump Valves

The Design Engineer may select alternative valves for use in pumping stations and force mains, but shall provide a detailed justification for their use, which will be subject to the review and approval of the District Engineer.

Check valves shall be placed in an accessible location within the valve vault or above ground on each individual pump discharge pipeline. Each check valve shall be a stainless-steel wafer type flanged Keystone (or equal) flapper valve, fitted with an external lever, and spring or weight designed to handle raw sewage. Check valves shall be mounted horizontally per the manufacturer's instructions. Valves shall be fusion-bonded, epoxy-lined, and coated.

Gate valves (GVs) shall be placed in an accessible location within the valve vault or above ground for isolation on each pump discharge downstream of the check valve. At the bypass vault the check valve shall be located between the GV and Cam-Lock fitting. The GVs shall be flanged and of resilient seat type with a 2-inch operator nut. GVs shall also be used for isolating sections of the force main, and for isolating the bypass pump and pig launcher connections. A GV shall be installed between the wet well and the first upstream manhole to allow isolation of the wet well for maintenance. Isolation of the emergency storage tanks will require a GV on the bypass fill piping from the influent manhole, and on the fill/drain piping connected directly to the wet well.

Perimeter Fence and Gates

All pump stations shall have at minimum an 8-foot-high cyclone fence with barbed wires that discourages unauthorized access. The fence shall be chain-link. Other types of fencing may be required for aesthetic reasons. The perimeter fence will include a 3-foot-wide man-gate and two sets of 10-foot-wide motorized swinging gates (20 feet total) with a keypad and access code. 20-foot-wide motorized sliding gates may be allowed in lieu of swinging gates if circumstances warrant. All gates shall achieve full open position with a single human operator (starting force 50 lbs or less for opening and closing, rolling force of 40 lbs or less). All gates shall have a hatch mechanism or chain for multiple locks to suit a minimum of three padlocks. In addition, all gates shall have drop-bolt type gate stops with receiver sleeves installed in both the open and closed position for both gates. There shall be an entrance gate and a large gate near the wet well.

4.4.7 SEWER LIFT STATION BYPASS

All sewer lift stations shall have a sewer bypass.

A. See Drawings SS-01 and SS-02.

4.4.8 SEWER LATERALS

A. See Drawing SS-03.
B. Minimum residential sewer lateral pipe diameter shall be 4 inches.
C. In no case shall a lateral connect directly on top of the main or below the springline of the sewer main.
D. Sewer laterals shall have a minimum slope of 2% (1/4 inch per foot).
E. All joints for sewer lateral pipe shall be compression type.
F. A manhole shall be installed at the sewer main whenever a lateral exceeds 4 inches in diameter.
G. Laterals shall either be encased in concrete or class 50 ductile iron pipe shall be used whenever a 2-foot minimum cover cannot be achieved within the roadway right-of-way.
H. Sewer laterals shall be placed at least 10 feet from water service connection laterals and other potable water sources.

The following summarizes the installation requirements for service laterals:

A. No direct connections are permitted on sewer mains of 12-inch or larger diameter without approval from the District Engineer. Upon approval by the District Engineer, a service lateral may be connected to these mains by one of the following methods:
    a. A lateral (4-inch diameter minimum) may be extended from an existing manhole to the property, parallel to the main line, which must end in a terminal manhole. The building lateral must then be connected from the lateral extension to the right-of-way line.
    b. If no manhole exists immediately adjacent to the property, a manhole may be placed over the main.
    c. If manhole exists immediately adjacent to the property, the building lateral may be connected directly from the existing manhole to the right-of-way line.

4.4.9 SEWER LATERAL ABANDONMENT

Refer to Drawing SS-04.

A. Permanent Abandonment
    a. If lateral material is cast iron or vitrified clay pipe with neoprene seals, the cap may be installed at property line.
B. Temporary Abandonment
    a. Cap at property line will be allowed if the lateral is in good condition and if it will be used in immediate future on an active project.
    b. Sketch of capped lateral with measurements from street centerline and from nearest manhole shall be provided to engineering department.
    c. Notes for permanent abandonments apply to temporary caps also.

4.5 SEWER STRUCTURES

4.5.1 SEWER MANHOLES AND DROP CONNECTIONS

A. See Drawing SS-05 for normal installation.
B. Manholes shall be constructed of precast materials in conformance with ASTM C-478-97.
C. Manhole lid frame and cover (See Drawing SS-06) shall be raised to finish grade after the street has been paved.

D. All straight pipes shall be laid through manholes with the top half removed and rough broken edges mortared smooth.
E. All miscellaneous concrete shall have a minimum cement content of 463 pounds per cubic yard or better.
F. Sewer pipe sizes and materials shall be in conformance with the Improvement Plans.
G. See Drawing SS-07 for sewer drop manhole modifications.
H. Manholes are required at all changes in vertical or horizontal alignment.
I. Manholes are required at all pipe intersections.
J. Manholes are assumed at maximum intervals of 350 feet for 6-inch and 8-inch mains. Manholes for 10-inch and larger mains will be set at maximum intervals of 500 feet. Manholes are also assumed at junctions, angle points, change in pipe diameter or gradient, and at the termination of sewer lines.
K. The channel through manholes is formed by laying the pipe through the manhole and removing the upper half of the pipe after the concrete is set.

4.5.2 MANHOLE INTERIOR COATINGS

General – The interior of all new manholes along sanitary sewer lines 24-inch and larger, which will be maintained by the District, shall be coated. In addition, the interior of any existing District manhole(s), downstream from a new sanitary sewer system, determined by the District Engineer, to be adversely affected by the additional sewage, shall be either lined or coated.

The coating shall be resistant to attack from the following: bleaches; sulfuric, acetic, hydrochloric, phosphoric, nitric, chromic, oleic, and stearic acids; sodium and calcium hydroxides; ammonium, sodium, calcium, magnesium, and ferric chlorides; ferric sulfate, hydrogen sulfides, petroleum oils and greases, vegetable and animal oils, fats, greases, soaps, and detergents. The coating shall be impermeable to sewage gases and liquids and shall be non-conducive to bacterial or fungus growth.

Acceptable coatings are as follows (or approved equal):

PRODUCT NAME	PRODUCT TYPE	MANUFACTURER
SewerGard 210	Epoxy	Sauereisen
Raven 405	Epoxy	Raven Lining Systems
Hydro-pox 204	Epoxy	Con-Tech
Mainstay DS-4	Epoxy	Madewell Products Corporation
SprayWall	Epoxy	SprayRoq, Inc.

The District has the authority, at their discretion, to determine at any time that a product is not suitable for specific applications.

Surface Preparation – For coatings, it is the intent of this standard that the application surface be clean and dry. Surfaces shall be cleaned to achieve an ASTM D-4259 Standard by abrasive blast cleaning methods. All surfaces shall be cleaned to remove all dirt, dust, corrosion products, loose concrete, debris, grease, oils, growths, and foreign matter. On new concrete and metal surfaces, sandblasting shall be used to remove all laitance. Coatings shall be applied only to a sound clean surface profile consistent with the manufacturer's published recommendation.

New concrete shall be aged no less than 30 days prior to application.

Cracks, joints, eroded, and damaged areas shall be sealed with a compatible grout/putty as recommended by the coating manufacturer prior to the application of the coating material.

Application – All coating materials shall be applied in a manner and thickness consistent with the manufacturer's published recommendation.

All coatings shall be applied in a manner consistent with all applicable environmental and health and safety regulations. At a minimum, during application, the applicators shall use protective clothing, eye protection, chemical resistant gloves, and air respirators.

The coating shall be free of blisters, pinholes, holidays, or discontinuities.

Inspection – All coating work shall be performed in the presence of the designated District Inspector. All coating work done in the absence of the Inspector is subject to rejection unless specifically allowed by the Inspector. The Inspector shall be provided with access to the construction site and to those areas subject to the performance of work under this standard.

Testing – All testing shall be performed by the Contractor in the presence of a District Inspector. All lining and coating work shall be high-voltage spark tested at a minimum 125 volts per mil film thickness of coating. Contractor shall verify to the District that the test equipment is in proper working condition prior to spark testing. Use Tinker-Rasor AP-W test equipment or approved equal.

Repairs of Holidays or Pinholes – All areas to be repaired, as determined by inspection and testing, shall be repaired in accordance with the product manufacturer's recommendations.

4.5.3 CLEAN-OUTS AND FLUSHING

A. See Drawing SS-08.
B. Frame and cover shall be South Bay Foundry B-12 for a 6” clean-out or South Bay Foundry B-11 for an 8” clean-out or approved equals.
C. Locate outside driveways wherever possible.

The size and kind of pipe and fitting shall be the same as the sewer to which the flushing branch connects.

4.5.4 PRESSURE RELIEFS

Pressure reliefs shall be designed and installed on all types of mainline sewer pipe, when the difference in elevation between two consecutive structures, measured from the inlet flow line of the downstream structure to the top of the frame and cover castings of the upstream structure, is greater than 50 feet or at intervals of less elevation differential as may be recommended by the pipe manufacturer. As an example, when the difference in elevation between two consecutive structures exceeds 50 feet but is not greater than 100 feet, a pressure relief shall be designed and installed at a point that equally divides the elevation differential.

4.5.5 GREASE INTERCEPTOR, SAND AND OIL INTERCEPTOR

See Drawings SS-9 and SS-10 for details of a typical grease interceptor and a sand and oil interceptor. Installation of an interceptor may be required by the District or Merced County Division of Environmental Health. If required, the actual design of the interceptor must be approved by either the District and/or the Merced County Division of Environmental Health.

4.5.6 TRACER WIRE FOR SEWER FORCE MAIN

A. Secure tracer wire to sewer facilities.
B. Tracer wire shall be laid on top of the sewer force main and shall be taped to the pipe at every 10' interval and at all fittings.
C. Contractor shall conduct a continuity test on all wires in the presence of Inspector.

4.6 PIPE CONNECTION TO EXISTING

Pipe connections to existing manholes and other structures shall be made by carefully boring an opening in the wall of the manhole or other structure and inserting the end of the pipe through the wall of the manhole or other structure, flush with the inside wall. The appropriate manufactured water seal shall be placed on the pipe and inserted into the bored hole with an annular space tightly packed with a non-shrink cement mortar. The mortar shall be troweled smooth and flush with the interior surface of the manhole or structure.

Channelizing of the flow through sanitary sewer manholes shall conform to the details shown on the standard drawing for new manholes.

The Contractor shall notify the District Engineer 24 hours in advance before a connection is made to an existing structure. The Contractor shall schedule their work so that interruption of flow is held to a minimum.

4.7 SEWER CROSSINGS

A. Utility Crossing, Drawing SS-11. This detail shall be used whenever a new utility is installed, or any construction occurs under an existing sewer main or lateral. The inside diameter of ductile iron or another approved pipe shall be the same as the pipe to which it connects.
B. Storm Drain Crossing, Drawing SS-12. This detail should be used whenever a new storm drain crosses an existing sewer main or lateral.
C. Water Main Crossing, Drawing SS-13. This detail should be used whenever a sewer crosses a water main.

4.8 EASEMENT WIDTH

The minimum easement width for sewer pipelines shall be 20 feet. Easement width shall be located all on one property.

4.9 INSPECTION

The District is to inspect all sewer lines prior to backfilling of trenches to verify proper installation. Prior to inspection, it is the Contractor's responsibility to confirm that all sewer lines are free of dirt and debris, manholes are cleaned, broken pipe has been removed, trenches have been compacted, manhole rims are at grade, and that other deficiencies have been corrected.

Sewer mains and laterals should be tested by means of air tests. The air test consists of pressurizing a length of pipe not greater than the distance between two manholes to 3.5 pounds per square inch (psi) and holding the pressure at a minimum of 3.0 psi for at least 5 minutes. Air should be added if needed to keep the pressure in the pipe section above 3.0 psi. After the 5-minute saturation period, the pressure in the pipe is noted and the test time period begins. If the pressure in the test section drops 0.5 psi in less time than specified in Table 4-3, then the section has failed the air test.

Table 4-3: Air Test Requirements

Pipe Size (in)	Minimum Time (seconds)
6	185
8	254
10	310
12	450

If the time for the pressure to drop 0.5 psi is 125 percent or less of the time indicated, the line is immediately re-pressurized to 3.0 psi and the test is repeated. If during the 5-minute saturation period the pressure drops less than 0.5 psi after the initial pressurization and air is not added, then the test section has passed. Otherwise, the leak must be found by the Contractor and repaired to the satisfaction of District. The section must be retested after repair.

4.10 SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)

4.10.1 PRODUCTS

Programmable Logic Controller (PLC) and Programming Software

A. General: Furnish, install, test, and place the PLCs into satisfactory operation. All programming shall follow the District's guidelines and the latest naming standards asset hierarchy document and station test script.
B. Hardware: Provide each PLC with the following hardware:
    a. Central processing unit: The central processing unit (CPU) shall be powered by 115 volts alternating current (VAC), 60 hertz (Hz), and shall have the standard instruction set which shall include analog signal processing and Proportional, Integral, Derivative (PID) functions:
        i. Battery backup shall be provided together with a discrete output corresponding to a low voltage alarm condition at PLC.
        ii. Provide spare memory over and above what is required for realizing the control program. Minimum spare memory is 25% of the total used or 1 K words, whichever is greater.
        iii. Provide a watchdog timer that monitors CPU activity and a relay output for the watchdog timer alarm.
    b. Inputs and outputs:
        i. Analog inputs shall meet the following requirements:
            1. 4 to 20 made inputs, 250-ohm impedance maximum.
            2. Accuracy of +/-0.1% of span.
            3. Resolution of +/-0.05% of span.
            4. Common mode rejection of 90 decible (dB) at 60 Hz, minimum.
            5. Normal mode rejection of 45 dB at 60 Hz, minimum.
            6. Isolation shall meet or exceed surge-withstand test, IEEE-472.
            7. Drift shall not exceed 0.25% within a 30-day period.
        ii. Discrete inputs shall meet the following requirements:
            1. Unpowered contact inputs.

2. Input isolation shall meet or exceed IEEE-472. Relay isolation is unacceptable.
3. Provide filtering on a per unit point basis to provide contact bounce protection.
4. Discrete inputs shall be powered by the PLC at a minimum of 24 volts, but less than 125 volts. The power supply shall be currently limited to conform with National Electrical Code (NEC) Class 2 remote control and signal wiring circuits.
5. Discrete output motor modules shall be capable of interfacing size 5 magnetic starters. Relay isolation is acceptable.
6. Analog outputs shall meet the following requirements.
    a. Output: 4-20 milliampere (mA) direct current (DC).
    b. Isolation: from the multiplexer ground.
    c. Resolution: +/-0.1% of electric span, 10 bits.
    d. Accuracy: +/-0.25% of span.
    e. Drift: shall not exceed 0.25% in a 30-day period.
7. For each PLC, provide the following minimum spare, installed, inputs and outputs: 2 discrete inputs, 2 discrete outputs, and 1 analog input. Provide spare space in all PLCs for a 50% increase in the number of input/output modules.

c. Power line voltage regulation transformer: Provide a UL-recognized power line voltage regulation transformer to provide 115 VAC power for the PLC, in addition to any isolation transformer(s) required for UL labeling of the PLC enclosure.
d. Human-machine interface: Provide a human-machine interface (HMI) panel consisting of the 5.7-inch minimum touchscreen to allow operator interface with PLC. HMI shall allow monitoring of process variables and registers in engineering units. Display messages in an English language format. HMI is to be programmed with password protection user accounts. The different levels of user account permissions are read-only or edit variables values. HMI, 5.7-inch touchscreen by Schneider electronic model HMISTU855, Modbus protocol, no equal.
e. Bentek Cellular SCADA modem

C. PLC programming software:
    a. Provide software that compiles programs generated from ladder-logic Cathode Ray Tube (CRT) displays directly to PLC object mode. Provide software that permits on-screen text editing for purposes of documenting the ladder-logic diagrams on standard 8-1/2-inch-wide printer paper with:
        i. Contact and coil numbers.
        ii. Contact and coil functional descriptions.
        iii. Rung number cross references.
        iv. Functional descriptions to the right of the coils.
    b. Software shall permit entering the control program from HMI with functionality corresponding to the commonly used relay ladder diagram symbols.
    c. Provide the following real-time functions:
        i. Monitor and display power flow through the logic.
        ii. Monitor and display register contents.
        iii. The ability to force outputs high or low regardless of the state corresponding to the solved relay-ladder-diagram expression.

D. Spare parts:
    a. Provide the following spare parts:
        i. One input/output module for each type provided.
        ii. PLC processor card including memory.
        iii. Power supply.
        iv. One license, latest Unity Pro software by Schneider Electric.
E. PLC manufacturer: Modicon 340 BMX p34 2020 with Modbus and ethernet. The District will not accept any substitutions.
    a. The PLC communication should be configured at 9600 7E1 BAUD.

Instruments

A. Level transmitter, general purpose:
    a. General: Electronic indicating-type pressure transmitters shall convert a gauge or absolute pressure measurement to a 4-20 mA DC linear electrical output signal capable of transmission into at least a 600-ohm maximum load at 24 volts of direct current (VDC) or less. Signal and power transmission shall be provided on a single pair of wires. Operating ambient temperature limits shall be at least -40°c to +82°c.
    b. Range shall be indicated in the input/output list. Over-range protection shall be at least 1-1/2 times span without degradation of accuracy. Reference accuracy shall be ±1/2% or better.
    c. Construction: The transmitter enclosure shall be NEMA 4x rated. The process connection for clean liquid service shall be 1/4-inch National Pipe Thread (NPT). Enclosure and wetted surface material shall be corrosion-resistant and suitable for water.
    d. Manufacturers: kpsi 700 with scaling at 0-ft to 20-ft = 4-20ma, no equal.
B. Float switches - non-mercury type.

Battery Backup

A. Battery backup: Provide model APC 750 or equivalent for PLC, HMI, radio, and level transmitters.
B. Batteries shall be mounted on a slide tray.

Cabinet

A. The cabinet will enclose a power meter, main breakers, disconnect switches, reset control, Motor Control Center (MCC), Remote Terminal Unit (RTU), Hand-Off-Auto (HOA) switches, and HMI.
B. The panel enclosure shall be National Electrical Manufacturers Association (NEMA) Type 3R with approximate minimum dimensions 32-inch x 20-inch x 60-inch by Tesco or equivalent.
C. The cabinet shall contain a shade hood, a 100-amp Appleton receptacle for backup generator connections, and a slide tray for backup batteries.

4.10.2 EXECUTION

Equipment

A. Instruments:
    a. Indicated units: provide indicators scaled in actual engineering units, i.e., gpm, feet, psi, etc., rather than 0 to 100%.
    b. Calibration:

i. Each field instrument shall be calibrated at 0%, 25%, 50%, 75% and 100% of the span using test instruments to simulate inputs and read outputs that are rated to an accuracy of at least 5 times greater than the specified accuracy of the instrument being calibrated. Such test instruments have accuracies traceable to the National Institute of Standards and Technology (NIST).
ii. Submit a written report (hard copy and electronic file) to the District Engineer on each instrument. This report shall include a laboratory calibration sheet or the manufacturer's standards calibration sheet on each instrument and calibration reading as finally adjusted within tolerances.

Applications Programming

A. PLC and RTU programs:
    a. Provide 3 copies of USB/CD media containing a copy of the program software, including modifications made through final acceptance testing, shop drawings, process and instrument diagrams (P&ID), loop diagrams, and data maps. A “read me” file shall contain the company name, date, version, purpose of drawing, diagram, or program and describe all modifications.
    b. All programming shall follow the district's latest naming standards asset hierarchy document and station test scripts.

4.10.3 INPUT/OUTPUT (I/O) LISTS

Input/Output List

A. General: The below summarizes the inputs and outputs for the water and booster systems.
B. Typical pump station input/output list
    a. Flow meter (AI) ** not used **
    b. Pump 1 run (DI)
    c. Pump 2 run (DI)
    d. Pump 1 overload (DI)
    e. Pump 2 overload (DI)
    f. Pump 1 switch status: hand (DI)
    g. Pump 1 switch status: auto (DI)
    h. Pump 2 switch status: hand (DI)
    i. Pump 2 switch status: auto (DI)
    j. Power failure alarm (DI)
    k. Sump Level level (AI)
    l. Remote command: pump 1 start (DO)
    m. Remote command: pump 1 stop (DO)
    n. Remote command: pump 2 start (DO)
    o. Remote command: pump 2 stop (DO)
    p. Intrusion alarm (DI)
    q. Low off float (DI)
    r. Lead start float (DI)
    s. Lag star float (DI)
    t. High alarm float (DI)

C. Float system to start and stop both pumps if the plc system should fail.

Control Strategies

A. General: Provide and process and instrumentation diagram and software for a complete and fully functioning telemetry system for operating and monitoring the sump levels to start and stop pumps to draw down the sump level. The below summarizes the major control strategies required.
    a. Required RTU/PLC operator interface and HMI digital displays
        i. Sump level indicator
        ii. Pump run time indicator
        iii. Pump HOA switch status
        iv. Motor overload alarm
        v. Sump High-level alarm
        vi. Sump High High level Alarm
        vii. Sump Low-level alarm
        viii. Intrusion alarm
        ix. Power failure alarm
    b. Required controls
        i. Pump start/stop locally or remotely
        ii. Level set point adjustment for turning the pump on and off
        iii. Pump automatic alternation
        iv. Level set point adjustment for alarms
        v. Password protected HMI
        vi. HMI user account permission, types, read-only set points, and edit set points
        vii. Station in local mode, set points are editable
        viii. Station in automatic mode, set points are read-only

SECTION 5: DOMESTIC WATER SYSTEM

5.1 GENERAL

These Improvement Standards apply to all public water facilities designed for installation within the public right-of-way or public easement in the District and are limited to mains, meters, valve boxes, and services 12-inches or less in diameter. Standards and requirements for larger sizes will be determined by the District Engineer. In all developments, on-site mains and hydrants for fire protection shall be public. Other on-site facilities, unless specifically noted in these Improvement Standards or as required as part of project approval, shall be private and shall be designed and constructed in accordance with the provisions of the Uniform Plumbing Code, as adopted by the District.

Water lines shall be designed in accordance with acceptable engineering principles, California Occupational Safety and Health Administration (OSHA) Standards, and California Department of Health Service Regulations, Title 22, Chapter 16, California Waterworks Standards, and shall conform to these Improvement Standards.

5.2 REGULATORY STANDARDS

Pertinent requirements of the following District's Improvement Standards, including all changes thereto, shall be considered and complied with, except that in the event of conflict, the stricter design criteria shall govern.

A. Santa Nella County Water District Ordinances.
B. State Water Resources Control Board Division of Drinking Water Laws and Regulations.
C. California Regulations Related to Drinking Water, California Waterworks Standards.
D. United States Environmental Protection Agency Water Quality Standards Regulations.
E. Merced County Division of Environmental Health.
F. California Regional Water Quality Control Board, Central Valley Region.
G. Others as appropriate.

5.3 DESIGN PROCEDURE

A design for each project proposed to be constructed under District agreement shall be submitted to, and approved by, the District Engineer in accordance with Section 3, Improvement Plans, of these Improvement Standards.

5.3.1 DESIGN CRITERIA

The design criteria established the requirements for water supply capacity, storage capacity, treatment, acceptable service pressures, and overall system performance based on the 2017 California Waterworks Standards in the California Code of Regulations, Title 22, Division 4, Chapter 16 (California Waterworks Standards) at a minimum, as well as operation and maintenance considerations. Table 5-1 summarizes the operational and performance criteria for transmission and distribution pipelines and system pressures for maximum day, maximum day with fire flow, and peak hour demand conditions.

Table 5-1: Operational and Performance Design Criteria

Component		Criteria
Water Distribution Main Sizing (Pipes Less than 16-inches in Diameter):		
Maximum Day with Fire Flow Demand Condition		
	Minimum Pressure (at fire node)	20 psi (single event)
	Maximum Velocity	12 fps
Peak Hour Demand Condition		
	Minimum Pressure	40 psi
	Maximum Velocity	8 fps
Minimum Pipe Diameter		
	General	8 inches
	Hazen-Williams "C" Factor	130
	Pipeline Material	PVC C-900
Water Transmission Main Sizing (Pipes Greater than 16-inches in Diameter):		
Maximum Day with Fire Flow Demand Condition		
	Minimum Pressure	20 psi
	Maximum Velocity	7 fps
Peak Hour Demand Condition		
	Minimum Pressure	40
	Maximum Velocity	7 fps
Surface Water Treatment Plant: Treatment capacity and equipment capacity shall be equal to System Maximum Day Demand, with redundant capacity during operations and maintenance.		

5.3.2 SOURCE CAPACITY

The District water source capacity design criteria are as follows:

A. At all times, a public water system's water source(s) shall have the capacity to meet the system's maximum day demand (MDD).
B. The system shall be able to meet 4 hours of peak hourly demand (PHD) with source capacity, storage capacity, and/or emergency source connections.
C. Both the MDD and PHD requirements shall be met in the system as a whole.
D. The source capacity of a surface water supply shall be the lowest anticipated daily yield based on adequately supported and documented data.
E. A public water system shall determine the total capacity of its groundwater sources by summing the capacity of its individual active sources. If a source is influenced by concurrent operation of another source, the total capacity shall be reduced to account for such influence. Where the capacity of a source varies seasonally, it shall be determined at the time of MDD.

5.3.3 PEAKING FACTORS

Peaking factors are used to calculate water demands expected during high demand conditions (maximum day and peak hour). The system's distribution, transmission, storage, and water supply capacity requirements are evaluated based on these calculated maximum day and peak hour demand conditions. Table 5-2 summarizes the established peaking factors for the District.

Table 5-2: Peaking Factors

Parameter	Peaking Factor
Average Day Demand to Maximum Day Demand	1.5
Maximum Day Demand to Peak Hour Demand	1.5

5.3.4 WATER DEMAND FACTORS

Water demand factors are established for the following land use designations: low-density residential, medium-density residential, high-density residential, commercial, office, light industrial and institutional, and open space (parks). Table 5-3 summarizes the recommended unit water demand factors to determine future development of the District areas.

Table 5-3: Summary of Unit Water Demand Factors

Land Use Designation	Unit Water Demand Factor	
	gpd/du	af/ac/yr
Low Density Residential	284	-
Medium Density Residential	152	-
High Density Residential	126	-
Commercial	-	2.0
Office	-	1.4
Light Industrial	-	1.4
Institutional	-	1.4
Open Space/Park	-	3.5

Water losses in the system are estimated to be approximately 5.5 percent of overall water demand. Water losses are not included in the unit water demand factor and should be applied when projecting future water demands.

5.3.5 STORAGE

The design criteria established for storage capacity is to ensure that there is sufficient reserve water supply for operation equalization, fire protection, and emergency needs. The District water storage facilities shall:

A. Provide operational storage to supply peak hour demands.
B. Provide fire storage and fire flow to meet fire flow requirements.
C. Provide emergency storage to meet demands during a supply emergency.

Operational Storage

Operational storage is the volume of water used to meet peak demand periods over any 24-hour period. As demands fluctuate over the 24-hour demand periods, the operational storage provides the supply to compensate for higher demand periods. The required operational storage volume is equal to 4 hours of the peak hour demand of the system.

Fire Storage

Fire storage is storage volume needed for the purpose of meeting firefighting needs. The fire flow requirement and duration are based on the 2022 California Fire Code California Code of Regulations, Title 24, Part 9 (2022 CFC) Appendix BB. It is anticipated that future development will be of similar type and square footage for light industrial or commercial land uses that require a fire flow of 8,000 gallons per minute (gpm) for a duration of 4 hours, per the 2022 CFC. With an applied reduction of 75 percent for buildings equipped with an approved fire sprinkler system, the requirement is reduced to 2,000 gpm for a duration of 4 hours. The recommendations for the required fire flow, compliant with the 2022 CFC, are shown on Table 5-4.

Table 5-4: Recommended Fire Flow

Land Use Designation	Fire Flow (gpm)	Duration (hours)
Residential	1,500	2
Commercial	3,000	3
Industrial	3,000	3

The required fire flow storage volume is equal to the largest fire flow anticipated in the system, equal to 3,000 gpm for commercial and light industrial land use areas.

Emergency Storage

Emergency storage is reserve volume to meet demands during a supply emergency, such as failures in infrastructure and equipment or power outages. Due to the existing system layout and lack of redundancy of the surface water transmission pipeline and groundwater sources with back-up power supply, the required storage volume is equal to the system average day demand.

5.4 WATER DISTRIBUTION SYSTEM

5.4.1 WATER MAIN MATERIAL

A. Schedule 80, AWWA C-900, Class 150 PVC pipe or AWWA C-900, Class 235 PVC pipe with a minimum cover of 3.5’ when using a Type B-2 backfill or 3’ when using a Type B-1 backfill.
B. In areas where the minimum cover cannot be achieved or where separation from sewer mains is critical, AWWA C-900, Class 200 PVC pipe should be used. The minimum cover over Class 200 PVC pipe shall be 24 inches when using a Type A backfill.
C. All pipes that come in contact with drinking water must conform with the NSF/ANSI 61.
D. Other pipes will be considered for approval on a case-by-case basis with appropriate supporting evidence.

5.4.2 WATER PIPE INSTALLATION

Pipe installation shall be in accordance with AWWA C600 and C605. Unless otherwise specifically authorized by the District Engineer, all pipes shall be laid with the bells facing the direction of laying and shall be laid in accurate conformity with the prescribed lines and grades. Each length shall be joined to

the preceding section as hereinafter specified; and after said jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Each pipe shall have a firm bearing for its full length in the trench, except at bell holes and field joints.

Whenever necessary to deflect the pipe from a straight line either in the vertical or horizontal plane to avoid obstructions, or where long radius curves are permitted, the degree of deflection at joints shall be per pipe manufacturer's recommendations as approved by the District Engineer.

Before the pipe is laid, it shall be as free as possible of all foreign matter. If, in the opinion of the District Engineer or their field representative, the pipe contains dirt that will not be removed during the flushing operation, the interior of the pipe shall be cleaned of all dirt, then swabbed with an antibacterial solution as approved by the District Engineer.

Every precaution shall be taken to protect the pipe against the entrance of foreign material during and after installation. At the close of the day's work, or whenever workmen are absent from the job site, the last section of pipe shall be plugged, capped, or otherwise tightly closed to prevent the entry of foreign matter of any nature. If foreign material enters a water main, and the main cannot (in the opinion of the District Engineer) be satisfactorily cleaned, the main shall be removed and replaced.

All water improvements covered prior to observation shall be uncovered as directed by the District Engineer.

5.5 WATER STRUCTURE

5.5.1 FIRE HYDRANTS

Fire hydrants are provided for the purpose of extinguishing fire and are to be opened and used only by the District, and by such persons as may be officially authorized by the District. To ensure the safety of fire hydrants, any person or persons authorized to open fire hydrants will be required to use only an approved spanner wrench as failure to do so will be sufficient cause to prohibit further use of fire hydrants. Every person authorized to open fire hydrants must replace the caps on the outlets when not in use, and failure to do so is hereby declared to be sufficient cause to prohibit further use of fire hydrants by such person or persons. It shall be unlawful for any person, firm, or corporation to conduct or carry water in any way from any fire hydrant without written permission to do so from the District.

The plans of the proposed water distribution systems including size and location of mains, type and location of hydrants, and size and capacity of storage tanks shall be subject to the approval of the Fire Department.

A. See Drawing W-01.
B. Hydrants shall be Waterous Pacer, Mueller Super Centurion A-423, M & H Style 129, American-Darling B-84-B-5 or approved equal.
C. Hydrants shall be dry barrel compression type with break flange construction.
D. Hydrants shall have a 5" minimum internal valve opening.
E. Hydrants shall have two non-swivel thread (N.S.T.) 2-1/2" diameter nozzles and one N.S.T. 4-1/2" diameter nozzle.
F. Nozzle and control nuts shall be 1" minimum to 1-3/4" maximum and shall be pentagon shaped.
G. Hydrants shall turn on in a counter clockwise direction.

H. All hydrants shall face the street unless otherwise determined by the Fire Department.
I. Spacing of fire hydrants shall be started at corners wherever possible. The spacing of hydrants shall be as follows:
    a. Residential Zones: 500 feet maximum with 250 feet maximum to the ends of dead-end roads and cul-de-sacs.
    b. Commercial and Industrial Zones: Spaced at the discretion of the Fire Department.

A Blue Pavement Marker shall be placed on the road adjacent to fire hydrant locations as shown in Drawing W-02.

5.5.2 TEMPORARY AND PERMANENT BLOW-OFF VALVE

Temporary and permanent blow-offs shall be installed at the locations shown on the plans in conformance with Drawing W-03 unless otherwise required by the District Engineer. The final length of pipe, prior to the blow-off, shall be 18 to 39 inches.

All salvaged temporary blow-offs shall become the property of the Developer or Contractor and shall be removed from the job site before completion.

5.5.3 WATER VALVES

Water distribution main valves shall have a maximum spacing of 500 linear feet. See Drawing W-04 for a typical water valve detail.

5.5.4 AIR RELEASE VALVE

See Drawing W-05 for an air release valve (ARV) detail.

5.5.5 TRAFFIC VALVE BOX

Traffic valve boxes shall be Christy G-5, Brooks 4-TT, or approved equal with a cast iron face and the cover marked “WATER”.

5.5.6 THRUST BLOCKING

Thrust blocking shall be in conformance with the pipe manufacturer’s specifications as well as the District’s requirements. See Drawing W-06 for typical thrust block placement details.

5.5.7 TEMPORARY WATER SAMPLING POINT

See Drawing W-07.

5.5.8 SAMPLING STATIONS

See Drawing W-08.

5.5.9 TRACER WIRE FOR PVC WATER MAIN

See Drawing W-09 and Drawing W-10.

5.5.10 WATER SERVICE AND METER

All new services shall be metered. Water meter type shall be Sensus as shown in Drawings W-11 and W-12 for service lateral and meter detail. Each commercial service shall have a separate service lateral and meter for domestic and land irrigation.

Smart point technology shall be integrated into all water meters. The consumer shall supply the meter and meter box together with the corporation stop, piping, connection saddles, and all other materials required to make a water service connection. The installation shall be inspected by the District prior to backfill to ensure that the installation complies with the approved installation details. The consumer shall contact the District 48 hours prior to completing the installation and request said inspection giving the estimated time for completion.

See Drawing W-13 for typical water service connection detail.

See Drawing W-14 for multiple service conduit installation detail.

See Drawing W-15 for water lateral abandonment detail.

5.5.11 BACKFLOW PREVENTION DEVICES

Testing shall be performed by a certified backflow specialist and the certification shall be filed with the District before water service begins.

A. Equipment to be supplied shall be as approved by the District Engineer. Complete assembly required (No Substitution).
B. No outlet, tee, tap, or connection of any kind to or from supply pipe between water meter and device.
C. Notify District Engineer 24 hours in advance of installation. Do not backfill until installation has been inspected and approved by the District Engineer or District personnel.
D. Flush lines thoroughly to remove foreign material prior to installation.
E. Device must be readily accessible for testing and maintenance.
F. Discharge port (Reduced Pressure Principle Backflow Preventer) must have approved air gap.
G. Protection may be necessary in areas subject to freezing.
H. For a continuous supply of water, contact District Engineer for additional requirements.
I. Supports must not interfere with testing or maintenance.
J. Deviation from the District Standard Drawing will not be permitted unless approved in writing by the District Engineer.
K. See Drawings W-16 and W-17 for additional requirements.

Backflow prevention devices shall be installed on all water services where an actual or potential cross connection exists between the District's water system and any source or system containing used, reclaimed, recycled or unapproved water, industrial fluid, gas, or other substance that is not or cannot be approved as safe, wholesome and suitable for human consumption.

Types of backflow devices that may be required include:

A. Double Check Valve Assembly
B. Reduced Pressure Principle Assembly
C. Air Gap Separation

5.6 WATER AND SEWER SEPARATION

Refer to Drawing SS-13.

5.7 VERTICAL ALIGNMENT

The minimum cover over water mains shall be 3 feet in paved street sections and unpaved areas. The maximum cover over water lines should not exceed 5 feet.

When crossing a wastewater or storm line, it is desirable that the water main be installed above the other pipeline with a clearance of 12 inches. Refer to the California Waterworks Standard for the minimum separation requirements.

5.8 HORIZONTAL ALIGNMENT

Water mains shall be installed within street rights-of-way unless placement in an easement is specifically approved by the District Engineer. Alignment shall be parallel to the street centerline wherever possible.

Water mains shall not be placed in easements across low density or medium density residential lots.

A minimum horizontal clearance of 10 feet shall be maintained between water mains and wastewater or storm drain lines, unless otherwise approved by the District Engineer. Refer to the California Waterworks Standard for minimum separation requirements.

Curved water mains are allowed; however, joint deflection or pipe curvature shall not exceed the pipe manufacturer's recommendations.

5.9 EASEMENT WIDTHS

The minimum pipeline easement width for water pipelines shall be 20 feet. Easement width shall be located all on one property.

5.10 TESTING

The Contractor shall provide all necessary materials and equipment and shall perform all work required in connection with the testing and sterilization of all water lines. All tests shall be made after trenches have been backfilled, compacted, and approved for testing.

Hydrostatic and Leakage Tests

A. All pipe work, including all joints, connection, and fittings, shall be subjected by the Contractor to a hydrostatic pressure test of 200 psi (or 150 psi if allowed by Merced County Fire Department). Before testing, all valves shall be fully opened, and all air shall be expelled from the line. Such pressure shall be maintained for a period of not less than 2 hours. Any leaks, failures, or imperfect construction revealed by such test must be promptly corrected by the Contractor at his sole expense, and retested until all leakage has been stopped. Contractor shall also coordinate testing with the Merced County Fire Department as required.
B. Pressure tests shall not be made until the pipe has been backfilled and completed as indicated in the preceding sections. Tests shall not be made until at least 36 hours after the last concrete thrust or reaction backing has been cast with high early strength cement or at least 7 days after the last concrete thrust or reaction backing has been cast with standard cement.

Sterilization

A. The system shall be disinfected in accordance with the AWWA Standard C651 with the following modifications:
    a. Step 1
        i. A chlorine concentration of approximately 100 parts of chlorine per million parts of water (PPM) is introduced into the water mains. This shall produce a residual chlorine concentration of not less than 25 PPM after 24 hours. All methods of chlorination included in AWWA Standard C651 are approved except that the tablet method will not be used where a continuous run of 2,500 feet is to be chlorinated, nor for mains over 12 inches in diameter, nor where trench water or foreign material has entered the system as determined by the District.
        ii. Silicone or any non-soluble adhesives are not allowed for adhering chlorine tablets to the interior of water mains during construction.
    b. Step 2
        i. 24 to 48 hours after introduction of chlorinated water, treated water (minimum 25 PPM residual chlorine required) is flushed from the water mains and the chlorine concentration reduced to less than 1 milligram per liter by the use of a State Health Department approved neutralizing agent. The residual chlorine concentration in the new water main after flushing shall be equal to or less than the concentration in the existing distribution system. Flushing water is to be discharged into a storm drain system or other approved location. Discharge into sanitary sewer system is strictly prohibited. In addition, dichlorination shall meet all applicable State and Federal requirements.
        ii. No water is to accumulate on public rights-of-way or easements or in any manner as to create a potential hazard to existing public improvements or under construction.
    c. Step 3
        i. 48 hours after flushing the system, water samples are taken by a State certified testing laboratory approved by the District at the Contractor's expense for bacteriological testing. Should any water be removed from the new system during this 48-hour period, the tests will be invalidated resulting in restarting test procedures at Step 1. Sampling locations shall be as directed by the District. Fire hydrants shall not be used. Should a water service by designated as a sampling point, the Contractor shall make the service accessible for testing. The standard number of samples (may be more or less as determined by the District) shall be one for each 1,000 feet of main plus one for each 10 services plus one for each 10 fire hydrants. Testing locations are to be evenly distributed with a minimum of 4 samples taken. Each dead end main will be sampled at a minimum of two locations. Hoses will not be permitted at a sampling point.
        ii. Unless otherwise directed by the District, one sample shall be taken at each sampling point.
    d. Step 4
        i. If all bacteriological test samples show the absence of coliform organisms after a 48-hour testing period, the water mains are considered clear. In the event that

the coliform organisms are detected, the sterilization procedure must be restarted at Step 1 within 24 hours of notice.

Notes

A. Bacteriological samples may be obtained from a temporary blowoff or service connection or temporary service connection.
B. The Contractor will not be permitted to operate any valves on the system being sterilized once sterilization procedures have begun. Any such operation will invalidate the testing resulting the sterilization procedure at Step 1. After sterilization procedures are complete and the system accepted by the District, the Contractor will not be permitted to operate any valves. District forces alone will have the authority to operate valves after sterilization.
C. Note the disinfection includes, but not limited to, the requirements contained in AWWA C651.
D. Basic disinfection procedures described in AWWA C651 are:
    a. Preventing contaminating materials from entering the water main during storage, construction, or repair.
    b. Removing, by flushing, pigging, or other means, those materials that may have entered the water main.
    c. Chlorinating any residual contamination that may remain and flushing the chlorinated water from the main.
    d. Protecting the existing distribution system from backflow due to hydrostatic pressure test and disinfection procedures.
    e. Determining the bacterial quality by laboratory tests after disinfection.
    f. Disinfection of the initial connection to the existing system, including temporary reduced pressure backflow preventer, and final connections of the approved new water main to the existing system. See Section 4.6 of AWWA C651, Use a 5% chlorine solution.

5.11 DISINFECTION OF WATER MAINS

Water mains shall be disinfected in conformance with the procedure specified in the current standards for AWWA C651 or other procedure satisfactory to the District Engineer. Calcium hypochlorite disinfecting compound in granular, pellet, or tablet form, conforming to the current standards for AWWA B300, may be introduced into the pipe while laying. A sufficient amount shall be placed so as to obtain approximately 50 parts per million of chlorine in all parts of the line when the line is filled with water.

Valves and hydrants shall not be opened or closed while the system is being disinfected. Treated water shall be retained at least 24 hours after which time it shall be tested for residual chlorine. If less than 5 parts per million is indicated, additional chlorine in solution shall be added until disinfection satisfactory to the District Engineer is obtained. When disinfection has been completed and approved by the District Engineer, the system shall be flushed and filled with clean water. The clear water shall then be flushed into a sewer manhole until all foreign material has been removed from the lines.

A testing laboratory, approved by the District, shall test the water after the line is refilled. If the water is not found to be safe of bacteriological quality, the Contractor shall re-chlorinate the line until the quality of the water is proven to be satisfactory. All tests shall be drawn in the presence of the District during normal working hours. All tests shall be at the Contractor’s expense.

The number of bacteriological tests on new water lines will be determined by the District. Location of tests will also be determined by the District.

New water mains must pass two consecutive negative bacteriological tests, when the first test fails, before lines can be accepted.

New lines shall not be opened into existing water mains until the District has copies of the passing bacteriological tests taken.

5.12 SCADA

5.12.1 PRODUCTS

Programmable Logic Controller (PLC) and Programming Software

A. General: Furnish, install, test, and place the PLCs into satisfactory operation. All programming shall follow the District's guidelines and the latest naming standards asset hierarchy document and station test script.
B. Hardware: Provide each PLC with the following hardware:
    a. Central processing unit: The central processing unit (CPU) shall be powered by 115 volts alternating current (VAC), 60 hertz (Hz), and shall have the standard instruction set which shall include analog signal processing and Proportional, Integral, Derivative (PID) functions:
        i. Battery backup shall be provided together with a discrete output corresponding to a low voltage alarm condition at PLC.
        ii. Provide spare memory over and above what is required for realizing the control program. Minimum spare memory is 25% of the total used or 1 K words, whichever is greater.
        iii. Provide a watchdog timer that monitors CPU activity and a relay output for the watchdog timer alarm.
    b. Inputs and outputs:
        i. Analog inputs shall meet the following requirements:
            1. 4 to 20 made inputs, 250-ohm impedance maximum.
            2. Accuracy of +/-0.1% of span.
            3. Resolution of +/-0.05% of span.
            4. Common mode rejection of 90 decible (dB) at 60 Hz, minimum.
            5. Normal mode rejection of 45 dB at 60 Hz, minimum.
            6. Isolation shall meet or exceed surge-withstand test, IEEE-472.
            7. Drift shall not exceed 0.25% within a 30-day period.
        ii. Discrete inputs shall meet the following requirements:
            1. Unpowered contact inputs.
            2. Input isolation shall meet or exceed IEEE-472. Relay isolation is unacceptable.
            3. Provide filtering on a per unit point basis to provide contact bounce protection.
            4. Discrete inputs shall be powered by the PLC at a minimum of 24 volts, but less than 125 volts. The power supply shall be currently limited to conform with National Electrical Code (NEC) Class 2 remote control and signal wiring circuits.

5. Discrete output motor modules shall be capable of interfacing size 5 magnetic starters. Relay isolation is acceptable.
6. Analog outputs shall meet the following requirements.
    a. Output: 4-20 milliampere (mA) direct current (DC).
    b. Isolation: from the multiplexer ground.
    c. Resolution: +/-0.1% of electric span, 10 bits.
    d. Accuracy: +/-0.25% of span.
    e. Drift: shall not exceed 0.25% in a 30-day period.
7. For each PLC, provide the following minimum spare, installed, inputs and outputs: 2 discrete inputs, 2 discrete outputs, and 1 analog input. Provide spare space in all PLCs for a 50% increase in the number of input/output modules.

c. Power line voltage regulation transformer: Provide a UL-recognized power line voltage regulation transformer to provide 115 VAC power for the PLC, in addition to any isolation transformer(s) required for UL labeling of the PLC enclosure.
d. Human-machine interface: Provide a human-machine interface (HMI) panel consisting of the 5.7-inch minimum touchscreen to allow operator interface with PLC. HMI shall allow monitoring of process variables and registers in engineering units. Display messages in an English language format. HMI is to be programmed with password protection user accounts. The different levels of user account permissions are read-only or edit variables values. HMI, 5.7-inch touchscreen by Schneider electronic model HMISTU855, Modbus protocol, no equal.
e. Bentek Cellular SCADA modem

C. PLC programming software:
    a. Provide software that compiles programs generated from ladder-logic Cathode Ray Tube (CRT) displays directly to PLC object mode. Provide software that permits on-screen text editing for purposes of documenting the ladder-logic diagrams on standard 8-1/2-inch-wide printer paper with:
        i. Contact and coil numbers.
        ii. Contact and coil functional descriptions.
        iii. Rung number cross references.
        iv. Functional descriptions to the right of the coils.
    b. Software shall permit entering the control program from HMI with functionality corresponding to the commonly used relay ladder diagram symbols.
    c. Provide the following real-time functions:
        i. Monitor and display power flow through the logic.
        ii. Monitor and display register contents.
        iii. The ability to force outputs high or low regardless of the state corresponding to the solved relay-ladder-diagram expression.

D. Spare parts:
    a. Provide the following spare parts:
        i. One input/output module for each type provided.
        ii. PLC processor card including memory.
        iii. Power supply.
        iv. One license, latest Unity Pro software by Schneider Electric.

E. PLC manufacturer: Modicon 340 BMX p34 2020 with Modbus and ethernet. The District will not accept any substitutions.
    a. The PLC communication should be configured at 9600 7E1 BAUD.

Instruments

A. Level transmitter, general purpose:
    a. General: Electronic indicating-type pressure transmitters shall convert a gauge or absolute pressure measurement to a 4-20 mA DC linear electrical output signal capable of transmission into at least a 600-ohm maximum load at 24 volts of direct current (VDC) or less. Signal and power transmission shall be provided on a single pair of wires. Operating ambient temperature limits shall be at least -40°c to +82°c.
    b. Range shall be indicated in the input/output list. Over-range protection shall be at least 1-1/2 times span without degradation of accuracy. Reference accuracy shall be ±1/2% or better.
    c. Construction: The transmitter enclosure shall be NEMA 4x rated. The process connection for clean liquid service shall be 1/4-inch National Pipe Thread (NPT). Enclosure and wetted surface material shall be corrosion-resistant and suitable for water.
    d. Manufacturers: kpsi 700 with scaling at 0-ft to 20-ft = 4-20ma, no equal.
B. Float switches - non-mercury type.

Battery Backup

A. Battery backup: Provide model APC 750 or equivalent for PLC, HMI, radio, and level transmitters.
B. Batteries shall be mounted on a slide tray.

Flow Meter

A. Rosemount model 8750W, no equal.
B. Flow meter must be calibrated and volumetric tested for accuracy.
C. Flow meter display located inside instrumentation cabinet.

Cabinet

A. The cabinet will enclose a power meter, main breakers, disconnect switches, reset control, Motor Control Center (MCC), Remote Terminal Unit (RTU), Hand-Off-Auto (HOA) switches, and HMI.
B. The panel enclosure shall be National Electrical Manufacturers Association (NEMA) Type 3R with approximate minimum dimensions 32-inch x 20-inch x 60-inch by Tesco or equivalent.
C. The cabinet shall contain a shade hood, a 100-amp Appleton receptacle for backup generator connections, and a slide tray for backup batteries.

5.12.2 EXECUTION

Equipment

A. Instruments:
    a. Indicated units: provide indicators scaled in actual engineering units, i.e., gpm, feet, psi, etc., rather than 0 to 100%.
    b. Calibration:
        i. Each field instrument shall be calibrated at 0%, 25%, 50%, 75% and 100% of the span using test instruments to simulate inputs and read outputs that are rated to an accuracy of at least 5 times greater than the specified accuracy of the

instrument being calibrated. Such test instruments have accuracies traceable to the National Institute of Standards and Technology (NIST).

ii. Submit a written report (hard copy and electronic file) to the District Engineer on each instrument. This report shall include a laboratory calibration sheet or the manufacturer's standards calibration sheet on each instrument and calibration reading as finally adjusted within tolerances.

Applications Programming

A. PLC and RTU programs:
    a. Provide 3 copies of USB/CD media containing a copy of the program software, including modifications made through final acceptance testing, shop drawings, process and instrument diagrams (P&ID), loop diagrams, and data maps. A “read me” file shall contain the company name, date, version, purpose of drawing, diagram, or program and describe all modifications.
    b. All programming shall follow the district's latest naming standards asset hierarchy document and station test scripts.

5.12.3 INPUT/OUTPUT (I/O) LISTS

Input/Output List

A. General: The below summarizes the inputs and outputs for the water and booster systems.
B. Typical pump station input/output list
    a. Flow meter (AI) ** not used **
    b. Pump 1 run (DI)
    c. Pump 2 run (DI)
    d. Pump 3 run (DI)
    e. Pump 1 overload (DI)
    f. Pump 2 overload (DI)
    g. Pump 3 overload (DI)
    h. Pump 1 switch status: hand (DI)
    i. Pump 1 switch status: auto (DI)
    j. Pump 2 switch status: hand (DI)
    k. Pump 2 switch status: auto (DI)
    l. Pump 3 switch status: hand (DI)
    m. Pump 3 switch status: auto (DI)
    n. Power failure alarm (DI)
    o. Well level (AI)
    p. Remote command: pump 1 start (DO)
    q. Remote command: pump 1 stop (DO)
    r. Remote command: pump 2 start (DO)
    s. Remote command: pump 2 stop (DO)
    t. Remote command: pump 3 start (DO)
    u. Remote command: pump 3 stop (DO)
    v. Battery backup (DI) ** not used **
    w. Stormwater separator level (AI) ** not used **
    x. Intrusion alarm (DI)
    y. Low off float (DI)

z. Lead start float (DI)
aa. Lag star float (DI)
bb. High alarm float (DI)
cc. Pump to waste valve (120V DO)
dd. Pump to system valve (120V DO)
ee. Flow meter (AI)
ff. Reservoir level (AI)

C. Float system to start and stop both pumps if the plc system should fail.

Control Strategies

A. General: Provide and process and instrumentation diagram and software for a complete and fully functioning telemetry system for operating and monitoring the pump station system. The below summarizes the major control strategies required.
    a. Required RTU/PLC operator interface and HMI digital displays
        i. Well level indicator
        ii. Pump run time indicator
        iii. Pump HOA switch status
        iv. Motor overload alarm
        v. High-level alarm
        vi. Low-level alarm
        vii. Intrusion alarm
        viii. Power failure alarm
        ix. Battery backup low voltage
        x. Flow meter total indicator
        xi. Resettable flow meter totalizer indicator
        xii. Pump to system valve open/closed
        xiii. Pump to waste valve open/closed
        xiv. Flow meter rate
        xv. Reservoir level
    b. Required controls
        i. Pump start/stop locally or remotely
        ii. Level set point adjustment for turning the pump on and off
        iii. Pump automatic alternation
        iv. Level set point adjustment for alarms
        v. Downstream high-level lockout
        vi. Password protected HMI
        vii. HMI user account permission, types, read-only set points, and edit set points
        viii. Station in local mode, set points are editable
        ix. Station in automatic mode, set points are read-only
        x. Pump to system valve
        xi. Pump to waste valve

SECTION 6: EARTHWORK

6.1 GENERAL

A. Earthwork: Refer to Section 19 of the CALTRANS Standard Specifications for information on earthwork not covered in this section.

B. Pipe Placement:
   a. See Sections 4 and 5 for additional requirements for sewer and water pipes.
   b. All pipes shall be bedded true to the line and grade as shown in the approved Improvement Plans.
   c. Blocking shall not be used to bring pipe up to grade.
   d. Pipe shall not bear on bells or joints. The trench shall be excavated to provide at least 1½ inches of bedding material below the bell.
   e. The pipe bedding and backfill as specified in these standards shall be followed for all pipes placed within the public right-of-way as well as for all pipes that are to be relinquished to the public for maintenance.

6.2 COMPACTION AND BACKFILL TYPES

See Drawing T-01 for the backfill cross-section.

A. Use Class 3 sand for embedment material.
B. Use native material at 95% relative compaction.
C. Use Class 2 Aggregate Base (AB) at 95% relative compaction.

6.3 TRENCH CONSTRUCTION

The Developer and their contractor shall be responsible for expediting all trench and pipe work performed within the public right-of-way. Trenches within the existing public right-of-way will not be allowed to remain open overnight. Work shall be scheduled so that trenching does not exceed the expected work for the day. If work is not completed at the end of the day, the trench shall be backfilled and re-dug the following scheduled workday. Immediately after the pipes have been placed and inspected by the District's Inspector, the trench shall be backfilled in accordance with this standard.

A. Trench Excavation
   a. The extracts from the Construction Safety Orders issued by the California Division of Occupational Safety & Health dealing with "Excavation and Trenches" shall be strictly adhered to (Section 6705, Labor Code).
   b. When the project requires the construction of a trench or other excavation, which will be 5 feet or more in depth, a special permit required by the California Labor Code, Section 6500 must be obtained from the Division of Occupational Safety and Health prior to commencing work. A copy of this permit and a shoring detail shall be submitted prior to any required pre-job conference or prior to approval of an encroachment permit.
   c. Control of Water. When water is encountered, either ground water or surface runoff, the Contractor shall furnish, install, maintain, and operate all necessary machinery and equipment to keep the excavation free from water until the placing of bedding material, laying and joining of pipe, and initial backfill has been completed and inspected and until all danger of flotation and other damage is removed.

B. Stable and Unstable Trench
    a. Stable Trench. A trench is considered to be stable if the results of penetration resistance test (ASTM D-1586-99) in the bedding zone are greater than 8 blows per foot. The trench width at the top of the pipe in a stable soil shall be a minimum of 6 inches to a maximum of 12 inches on each side of the pipe.
    b. Unstable Trench. A trench is considered to be unstable if the results of a penetration resistance test (ASTM D-1586-99) in the bedding zone are equal to or less than 8 blows per foot.
        i. PVC or High Density Polyethylene (HDPE) pipe shall not be used in unstable trench areas.

6.4 INSPECTION AND TESTING

The Developer is responsible for retaining a soil testing firm to conduct compaction tests on all trench work. The number and location of compaction tests shall be determined by the District.

Any excavation and backfill constructed without testing by a soil testing firm and inspection by the District's staff shall be uncovered for examination and properly restored at the Developer's expense.

- END OF DOCUMENT -

STANDARD DRAWINGS
FOLLOWING AS ATTACHMENT

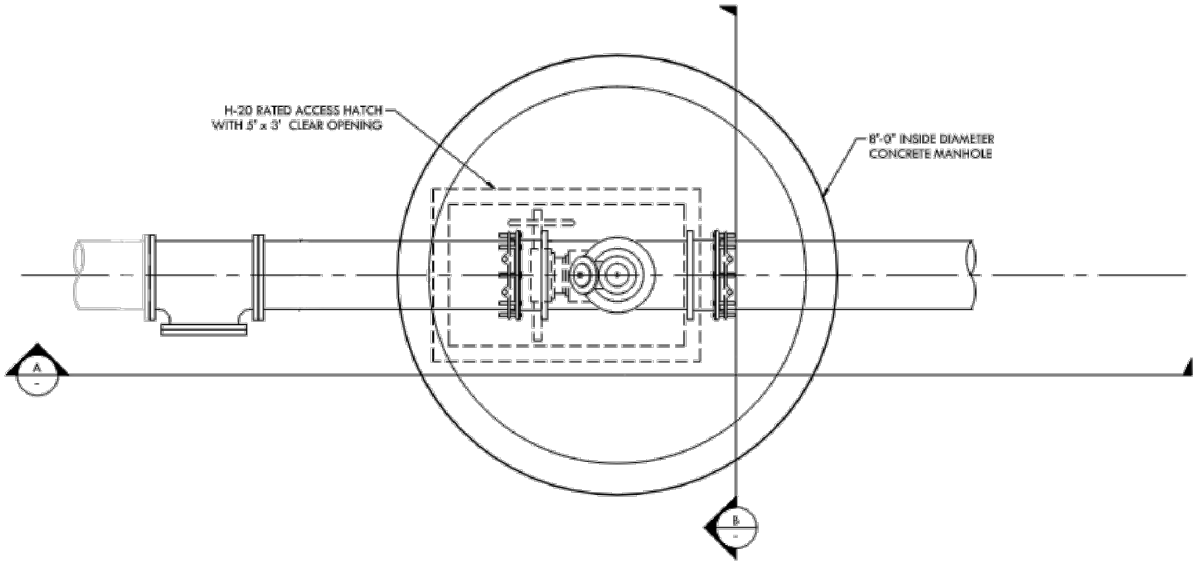
ATTACHMENT

STANDARD DRAWINGS

STANDARD DRAWINGS
TABLE OF CONTENTS

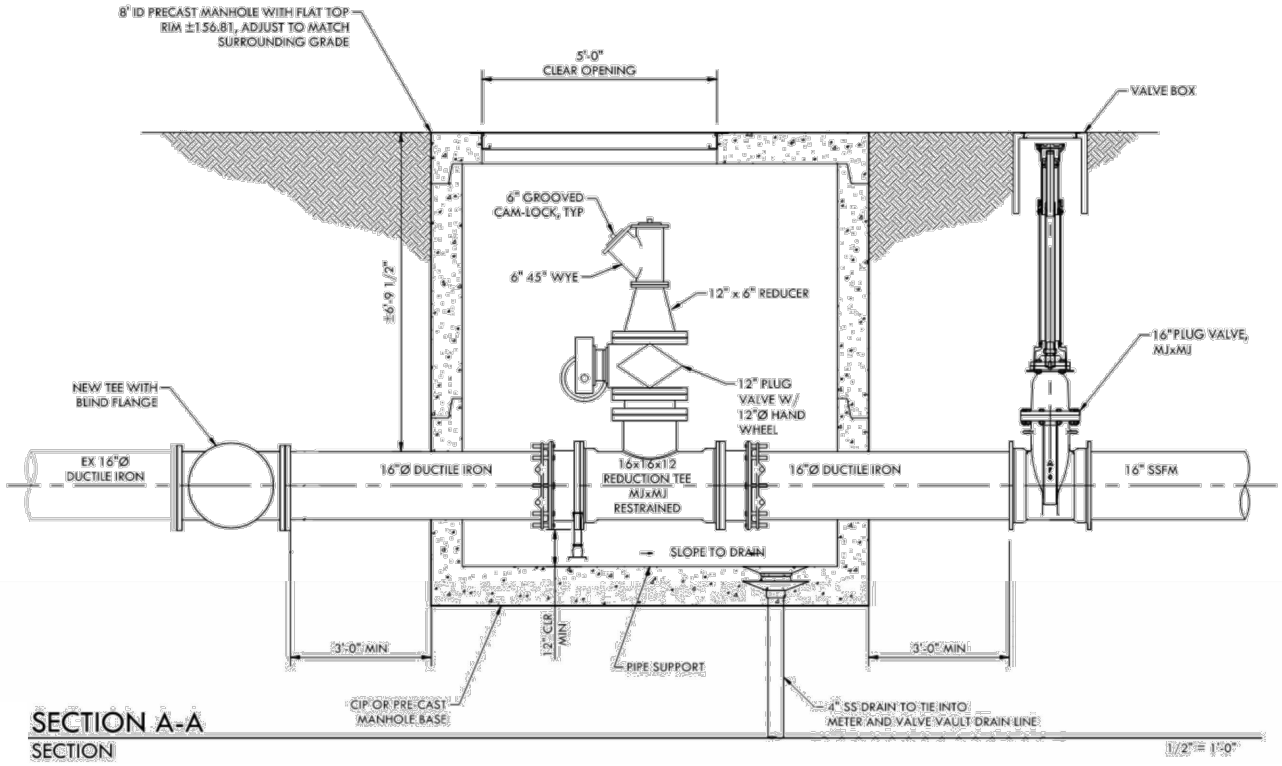
NOTES:

1. CONTRACTOR SHALL COORDINATE CENTER OF OPENING WITH 6" CAM-LOCK.
2. CONTRACTOR SHALL FIELD VERIFY INVERT ELEVATION OF 16" SSFM PRIOR TO ORDERING MATERIALS FOR THE BY-PASS STRUCTURE. ADJUSTMENTS TO THIS DETAIL MAY BE NECESSARY BASED ON FIELD CONDITIONS AND THE MANUFACTURER'S SUBMITTALS.



1 BY-PASS STRUCTURE DETAIL
PLAN VIEW

1/2" = 1'-0"



SECTION A-A
SECTION

1/2" = 1'-0"

Santa Nella County Water District™

IMPROVEMENT STANDARDS

SEWER LIFT STATION BY BASS STRUCTURE (PART 1)

STD. DWG. NO. **SS-01**

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX

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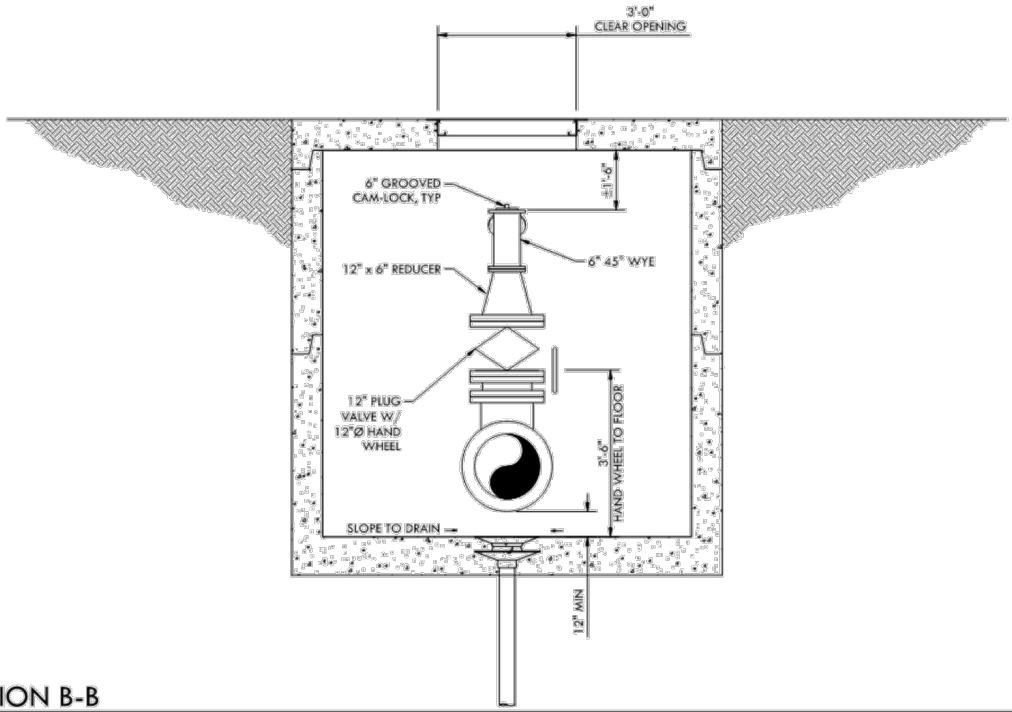

SECTION B-B
SECTION

1/2" = 1'-0"

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Santa Nella County Water District™

IMPROVEMENT STANDARDS

SEWER LIFT STATION BYBASS STRUCTURE (PART 2)

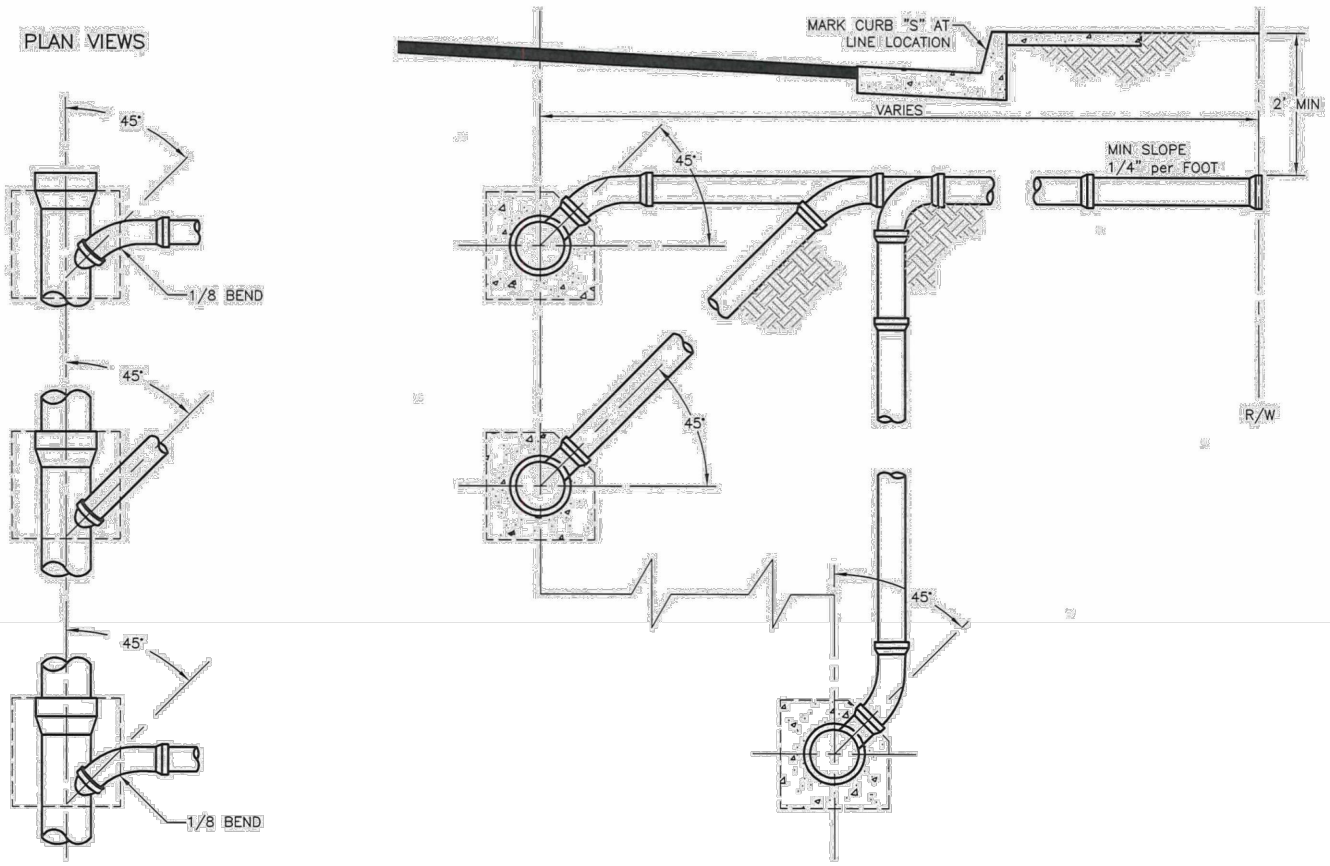
STD. DWG. NO. **SS-02**

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-03**

SEWER LATERAL

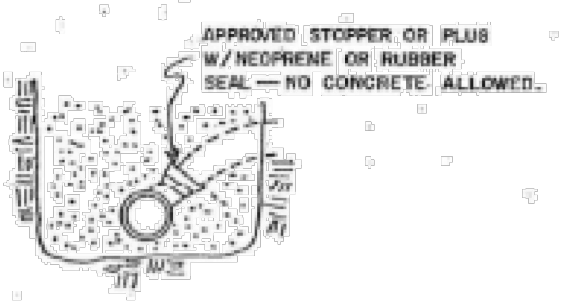
SCALE: NTS

APPROVED BY:

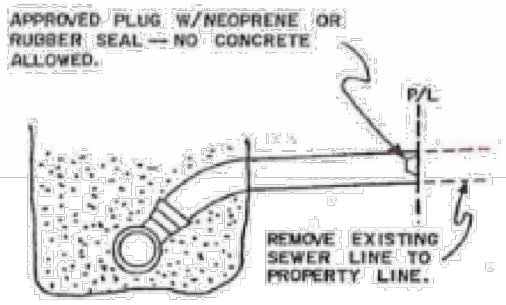
AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX

PERMANENT ABANDONMENT — LATERAL CAP AT MAIN



TEMPORARY ABANDONMENT — LATERAL CAP AT PROPERTY LINE



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-04**

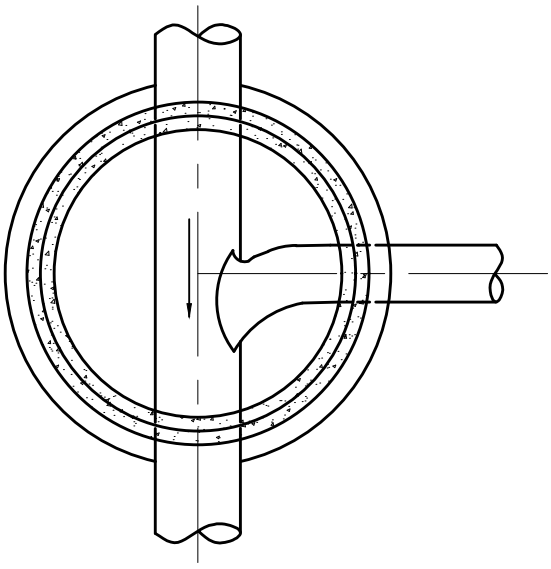
SEWER LATERAL ABANDONMENT

SCALE: NTS

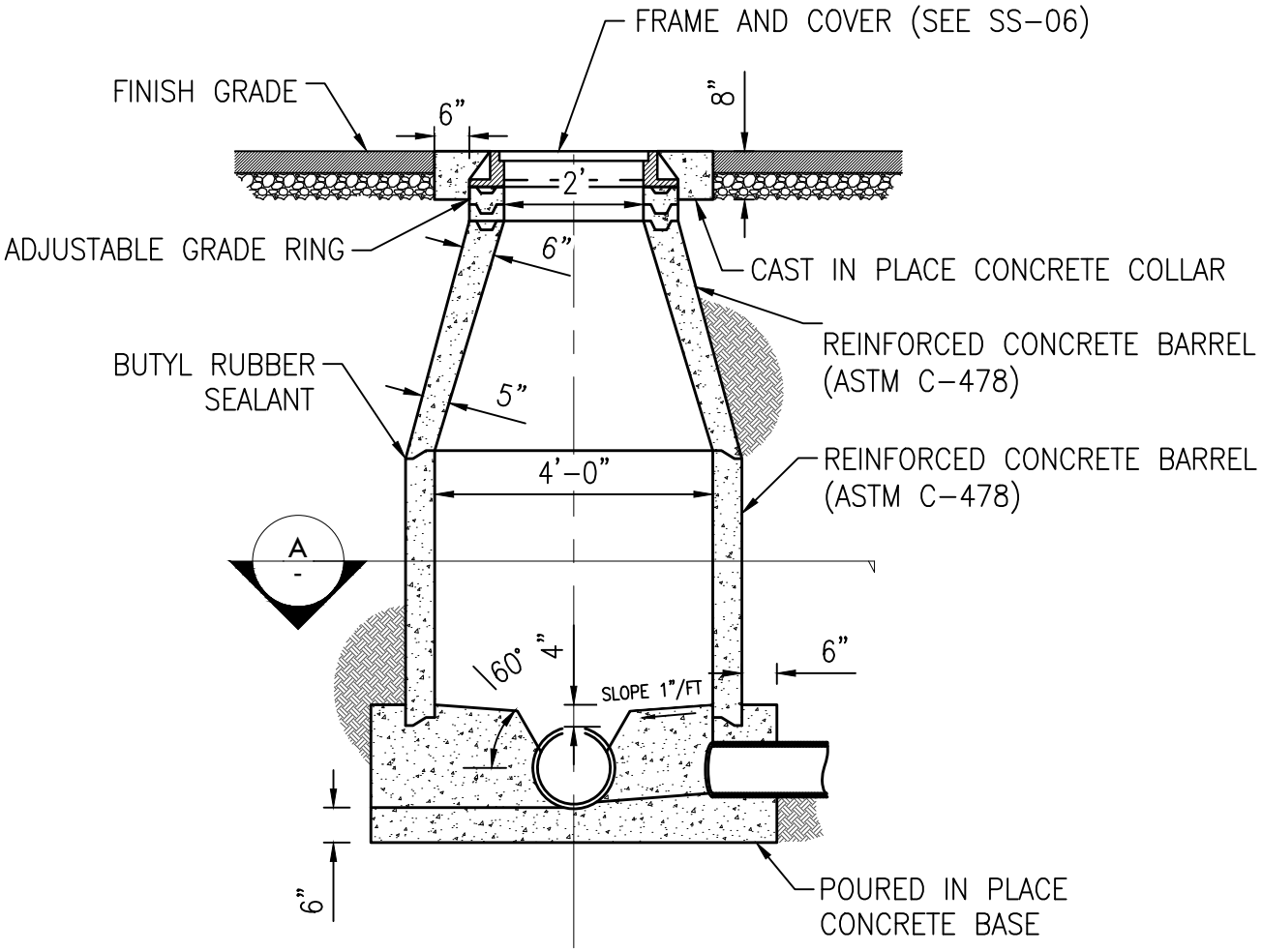
APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



SECTION A



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-05**

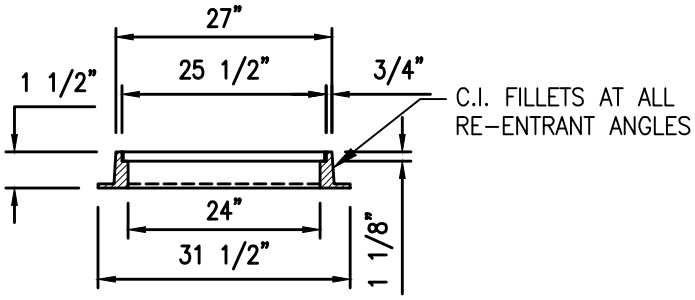
SEWER MANHOLE

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



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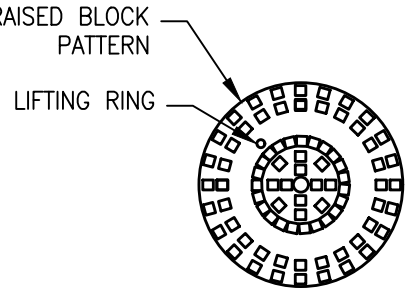

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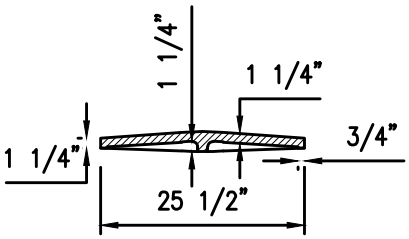
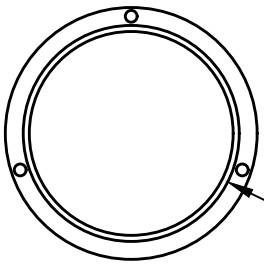
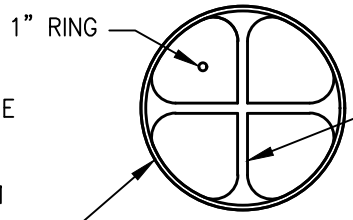


CROSS SECTION



PLAN

ALL MATING SURFACES ON THE FRAME & COVER SHALL BE MACHINED CASTINGS & SHALL MEET REQUIREMENTS OF ASTM A-48 CLASS 30. FRAME AND COVER SHALL BE PAINTED OR DIPPED IN A COMMERCIAL QUALITY ASPHALT PAINT.



BOTTOM

MANHOLE FRAME

MANHOLE COVER

NOTES:

1. 30" FRAME AND COVER SHALL BE USED WHERE SURFACE TO INVERT DEPTH EXCEEDS 12 FEET.
2. LEGEND SHALL BE 2" RAISED LETTERS. "STORM DRAIN" WITH "D" IN CENTER OR "SEWER" IN CENTER.
3. FOR OPENING LARGER THAN 30" COVER SHALL INCLUDE A SMALLER DIAMETER COVER (MAX. 30" DIAMETER) WITHIN THE LARGER COVER. D&L A-1425 HEAVY DUTY OR PAMREX 32" FRAME AND COVER.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

MANHOLE FRAME AND COVER

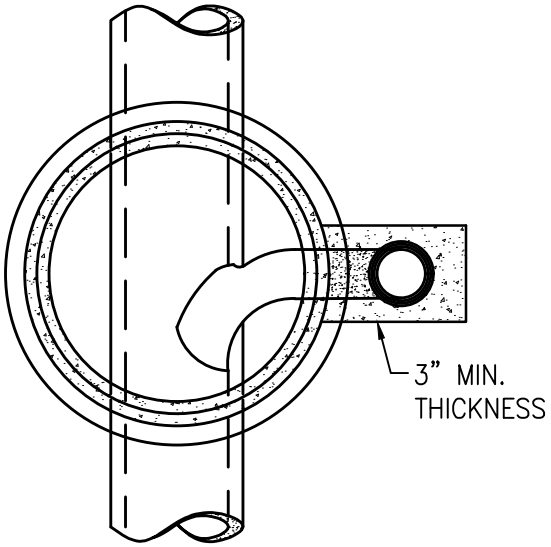
STD. DWG. NO. **SS-06**

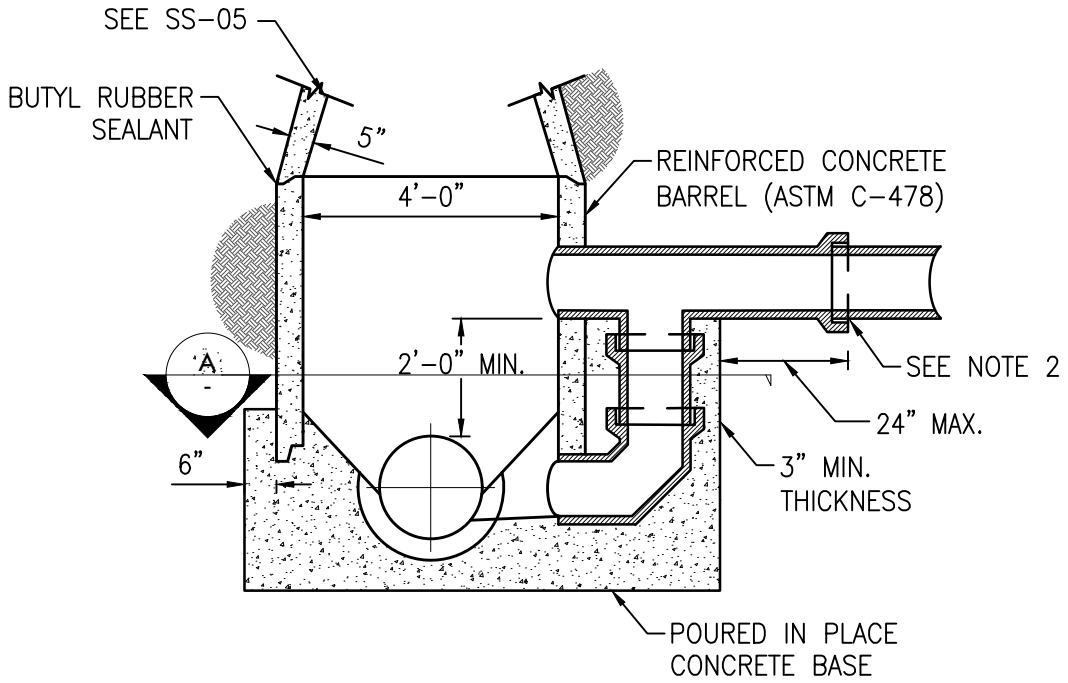
SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-23-24	REVISED: X-XX-XX





NOTES:

1. THIS INSTALLATION SHALL BE USED ON M.H. WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE OUTLET PIPE AND THE INVERT OF THE FEEDER OR COLLECTOR SEWER EXCEEDS 24".
2. FLEXIBLE JOINT-BELL AND SPIGOT OR CAULDER COUPLING. SOLVENT WELDED JOINT NOT PERMITTED.
3. THIS DETAIL SHALL ONLY BE USED FOR DROP PIPES 12" OR LESS. PIPE LARGER THAN 12" SHALL REQUIRE INDIVUAL DESIGN AND APPROVAL BY THE DISTRICT ENGINEER.
4. INTERIOR OF M.H. TO BE COATED IN ACCORDANCE WITH THE DISTRICT STANDARD SPECIFICATIONS.
5. SEAL ALL JOINTS WITH GASKETS OR RAMNECK. GROUT INSIDE ALL JOINTS.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-07**

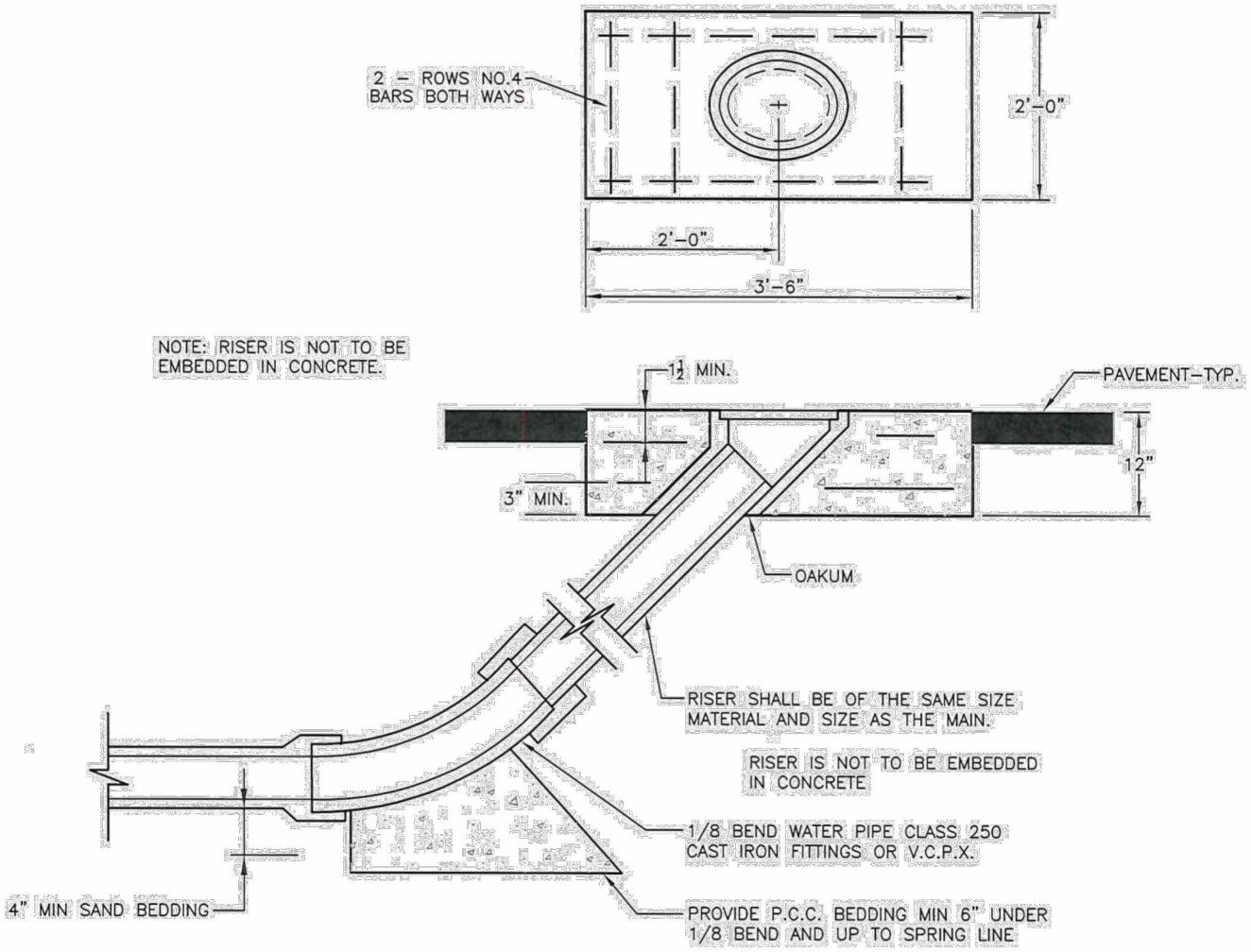
SEWER DROP MANHOLE

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-08**

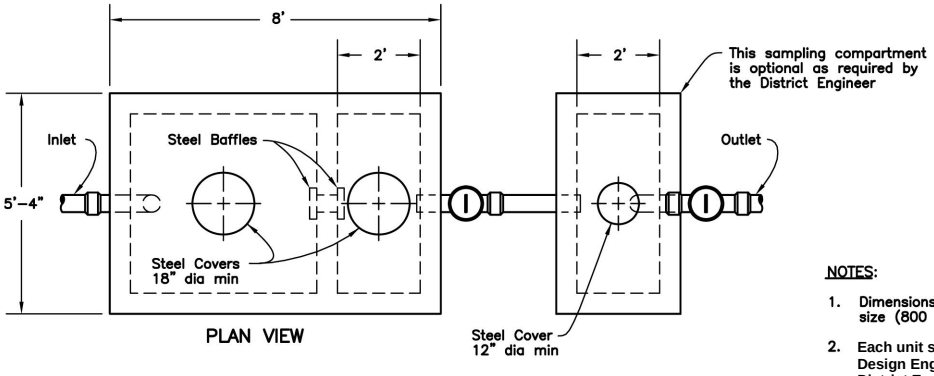
SEWER CLEANOUT

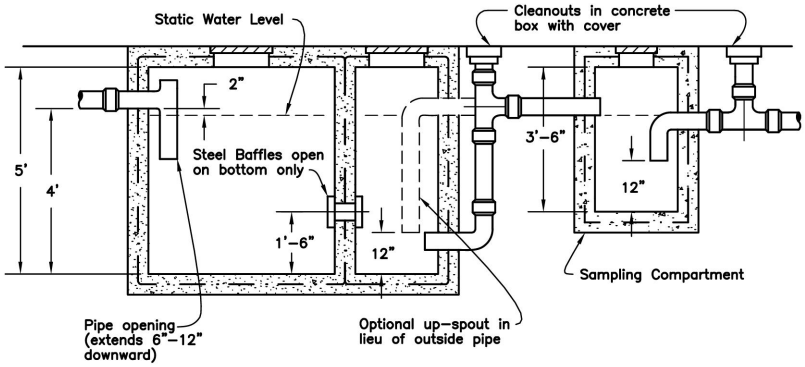
SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06–13–2024	REVISED: X–XX–XX





NOTES:

1. Dimensions shown are for minimum size (800 gallon) interceptor.
2. Each unit shall be designed by a registered Design Engineer and approved by the District Engineer if a larger size is required.
3. Concrete shall be minimum 3000 PSI at 28 days.
4. A sampling compartment will be required as directed by the District Engineer.
5. Covers shall be steel and shall be gas tight.
6. All waste shall enter interceptor through the inlet pipe only.
7. Reinforcement shall be adequate for traffic conditions in area where interceptor is located.
8. Provide 4" elevation drop between inlet and outlet pipes. Show pipe invert elevations at inlet and outlet on plan.
9. Vent pipes in conformance with the Uniform Plumbing Code.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

TYPICAL (ON SITE) GREASE INTERCEPTOR

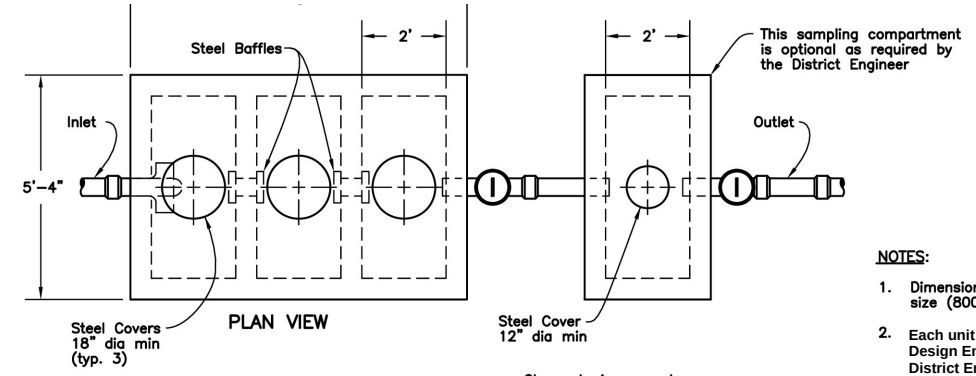
STD. DWG. NO. **SS-09**

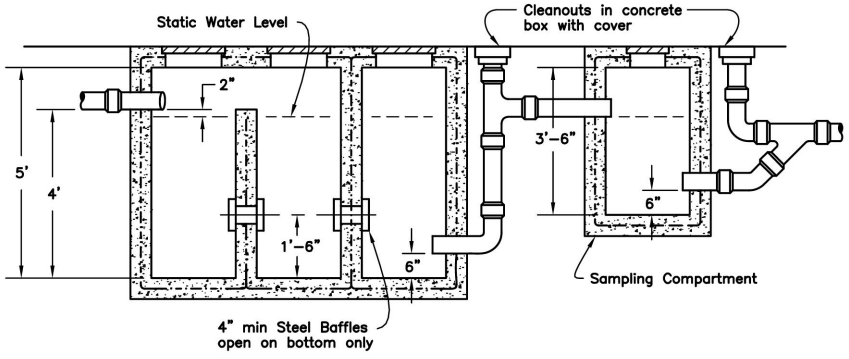
SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX





SECTION VIEW

NOTES:

1. Dimensions shown are for minimum size (800 gallon) interceptor.
2. Each unit shall be designed by a registered Design Engineer and approved by the District Engineer if a larger size is required.
3. Concrete shall be minimum 3000 PSI at 28 days.
4. A sampling compartment will be required as directed by the District Engineer.
5. Covers shall be steel and shall be gas tight.
6. All waste shall enter interceptor through the inlet pipe only.
7. Reinforcement shall be adequate for traffic conditions in area where interceptor is located.
8. Provide 4" elevation drop between inlet and outlet pipes. Show pipe invert elevations at inlet and outlet on plan.
9. Vent pipes in conformance with the Uniform Plumbing Code.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

TYPICAL (ON SITE) SAND & OIL INTERCEPTOR

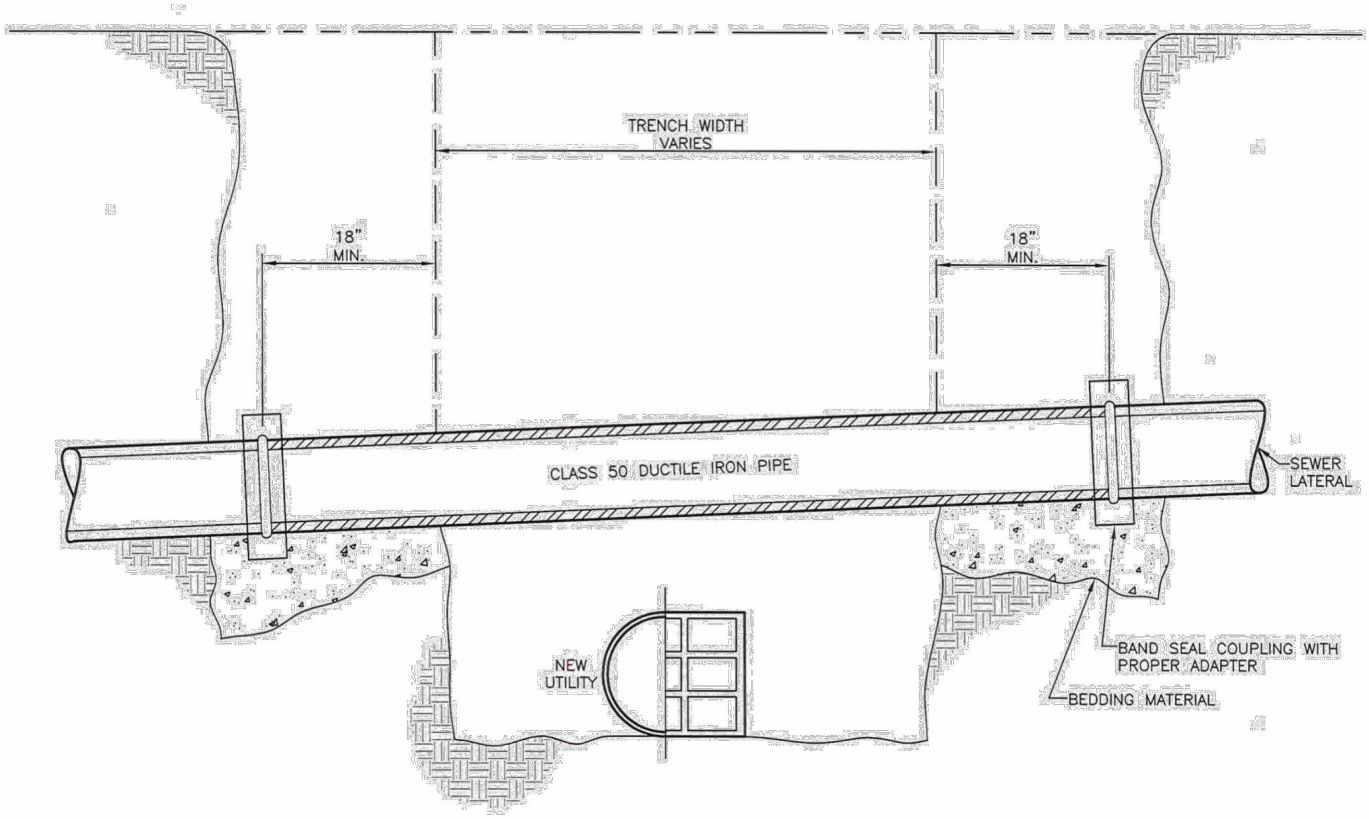
STD. DWG. NO. **SS-10**

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-11**

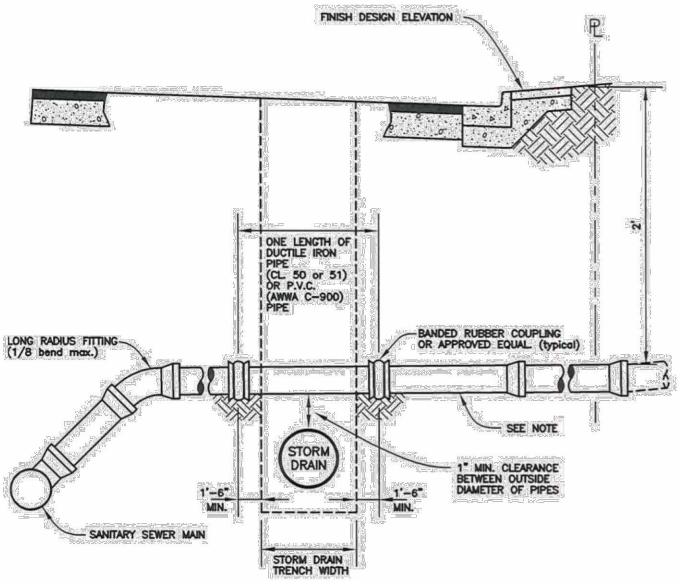
SEWER UTILITY CROSSING

SCALE: NTS

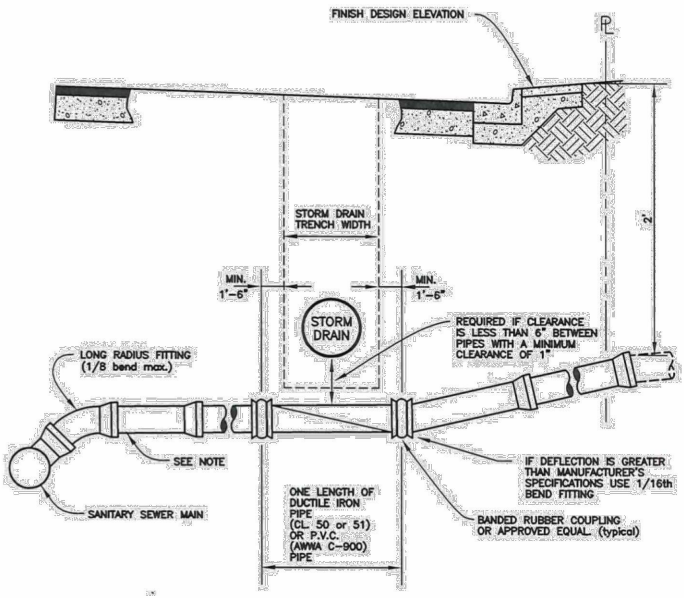
APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



TYPICAL CROSSING OVER STORM SEWER



TYPICAL CROSSING UNDER STORM SEWER

NOTE:
The above details are typical of main and sewer laterals when extra strength vitrified clay pipe materials are used.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-12**

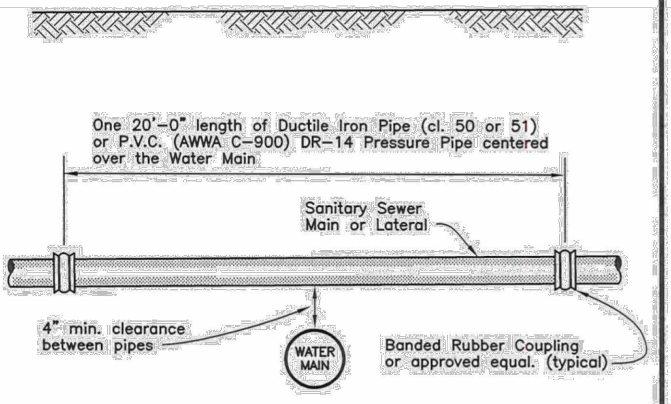
SEWER CROSSING STORM DRAIN

SCALE: NTS

APPROVED BY:

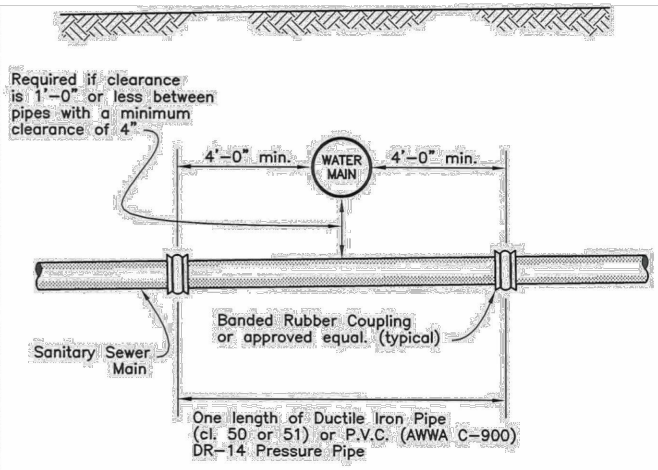
AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO | CHECKED BY: A. VERBURG | DATE: 06-13-2024 | REVISED: X-XX-XX



NOTE:
Required whenever a Sanitary Sewer Main or Lateral crosses over a Water Main.

TYPICAL CROSSING OVER WATER MAIN



TYPICAL CROSSING UNDER WATER MAIN

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **SS-13**

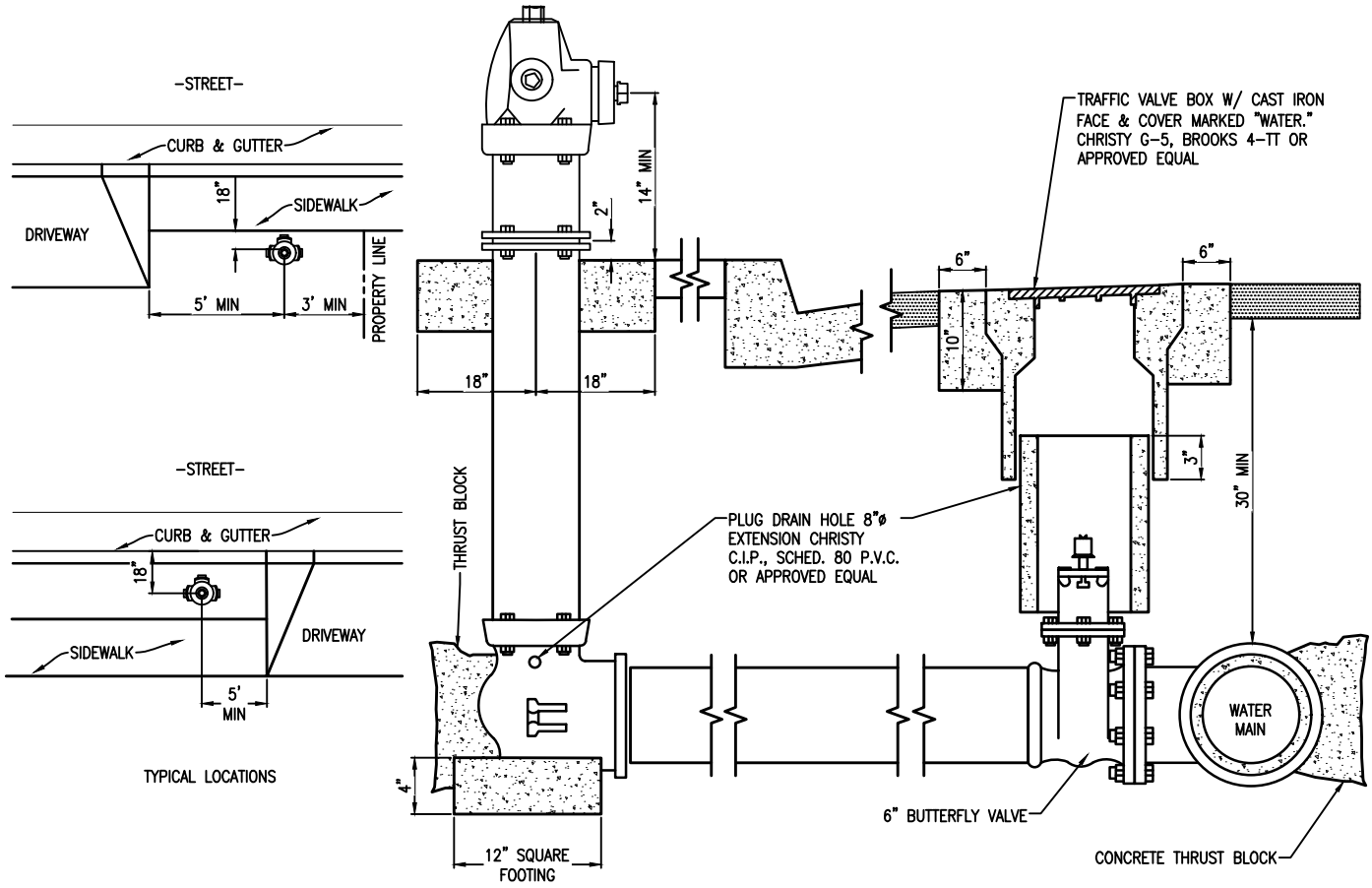
SEWER CROSSING WATER MAIN

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06–13–2024	REVISED: X–XX–XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-01**

FIRE HYDRANT

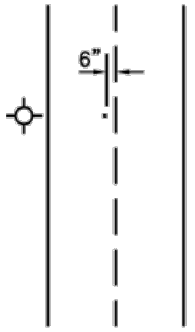
SCALE: NTS

APPROVED BY:

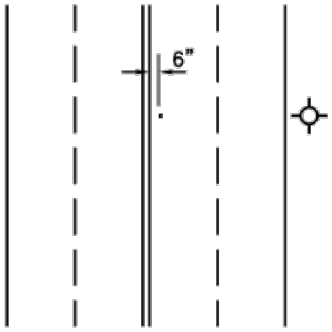
AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX

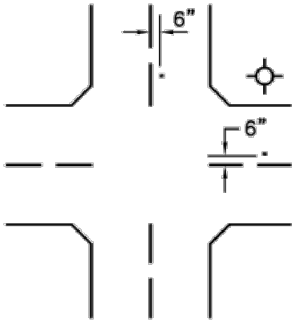
TWO LANE STREET



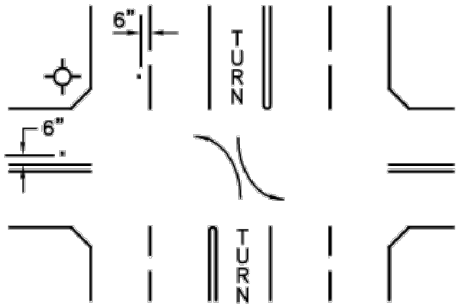
MULTI–LANE STREET



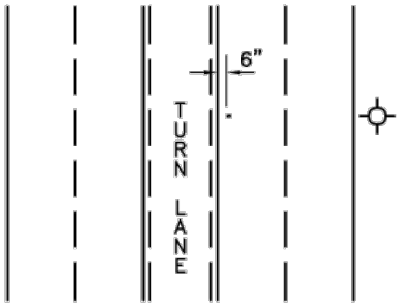
AN INTERSECTION



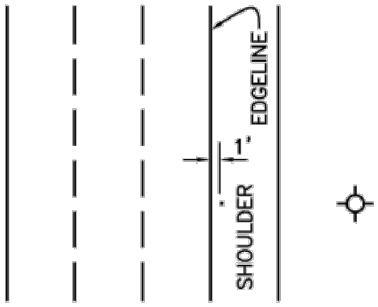
FOUR LANE STREET WITH TURN LANE AT INTERSECTION



MULTI–LANE STREET WITH TURN LANE



FREEWAYS AND EXPRESSWAYS



= FIRE HYDRANT · = BLUE PAVEMENT MARKER

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-02**

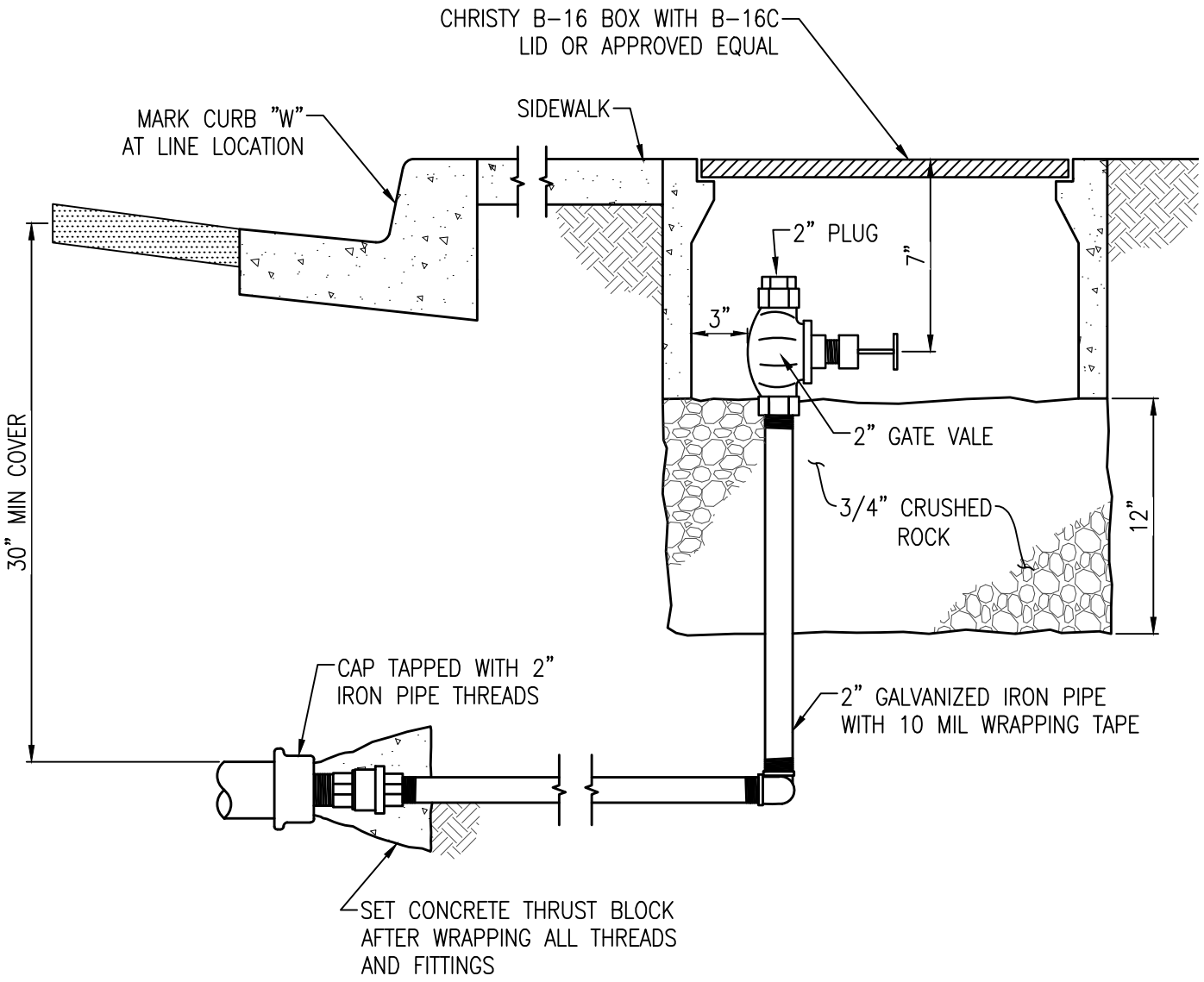
FIRE HYDRANT MARKER LOCATION

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06–13–2024	REVISED: X–XX–XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-03**

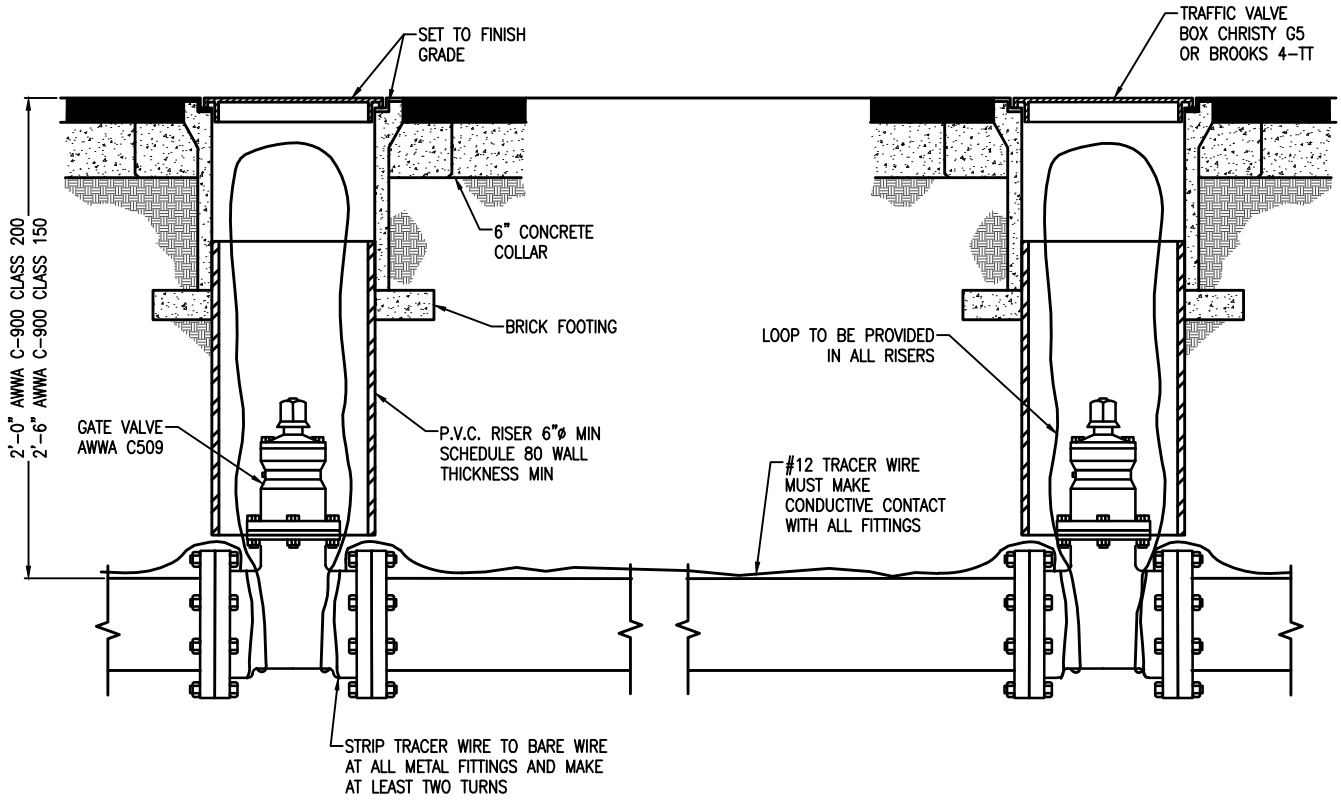
BLOW-OFF VALVE

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-04**

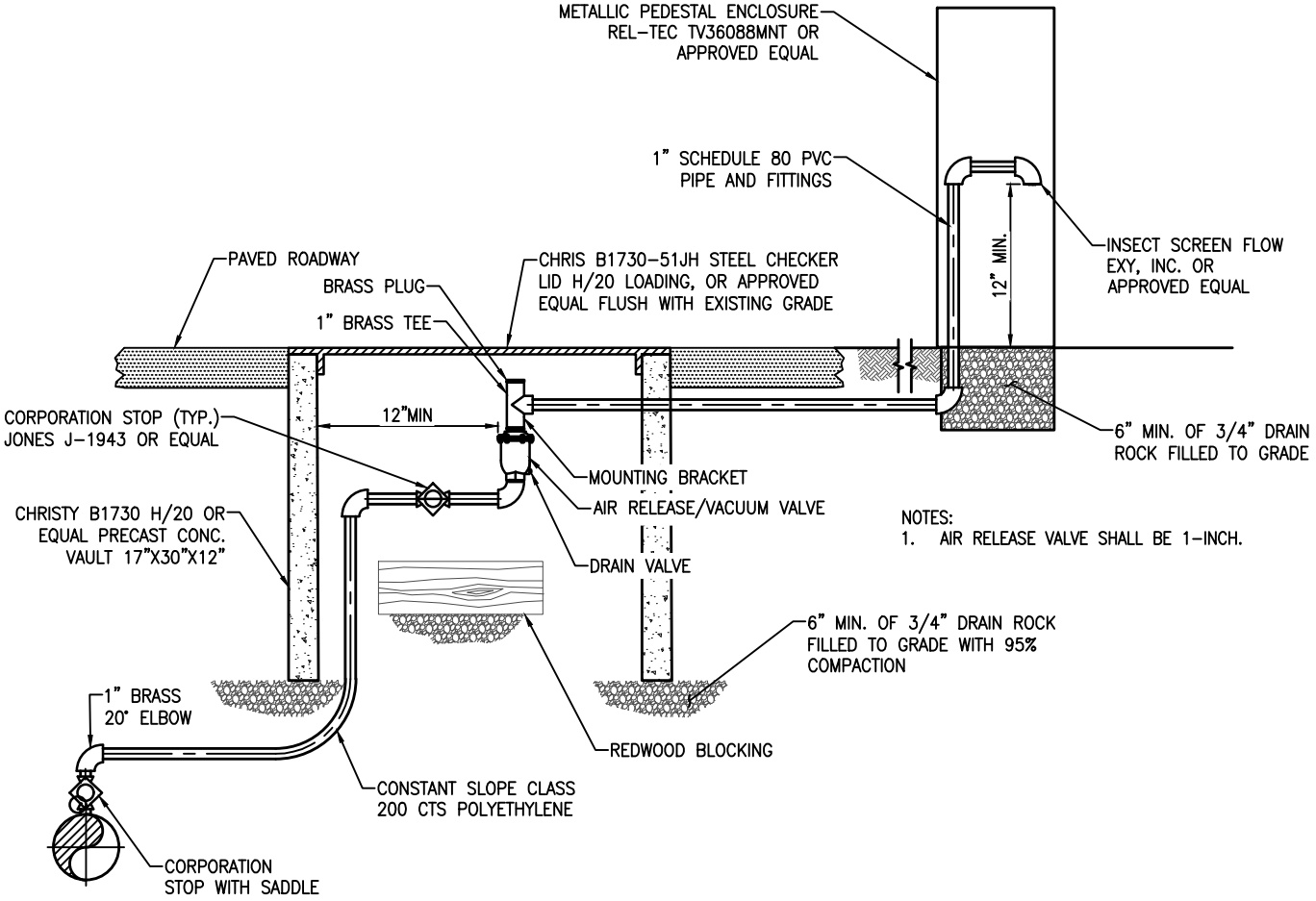
WATER LINE VALVES

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-05**

AIR RELEASE VALVE

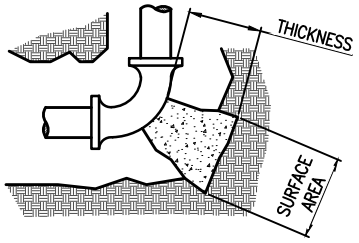
SCALE: NTS

APPROVED BY:

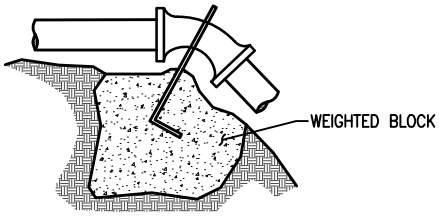
AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX

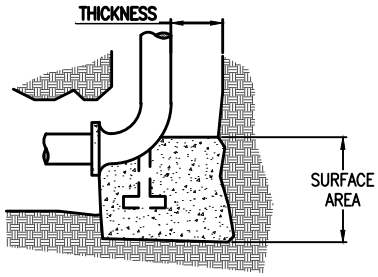
THRUST BLOCK DESCRIPTION



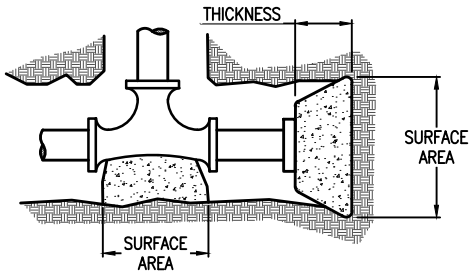
HORIZONTAL BENDS



VERTICAL BENDS



HYDRANT BURYS



TEES & DEAD-ENDS

THRUST BLOCK SIZE

DIAMETER OF PIPE IN INCHES	HORIZONTAL BEND		WEIGHT AT VERTICAL BENDS-LBS
	SURFACE AREA SQ. FT.	THICKNESS IN INCHES	
22-1/2° BENDS			
6 OR LESS	2	8	1,700
8	3	12	3,000
10	3.5	12	4,600
12	4	14	6,600
14	5	18	9,000
16	6	18	11,800
45° BEND			
6 OR LESS	4	12	3,200
8	5	14	4,600
10	6	18	9,000
12	7	18	13,000
14	8	24	17,000
16	11.5	24	23,200
90° BEND			
6 OR LESS	6	12	6,000
8	8	15	10,700
10	10	18	16,700
12	12	18	24,000
14	18	24	32,600
16	21	24	42,700
TEES & DEAD-ENDS			
6 OR LESS	3	12	–
8	4	15	–
10	6	18	–
12	8.5	18	–
14	11.5	24	–
16	16	24	–

NOTES:

1. ALL VALUES SHOWN ARE MINIMUM FOR A HYDROSTATIC PRESSURE OF 150 P.S.I. AND A SOIL RESISTANCE OF 2000 LBS/SQ.FT. WITH PIPELINE A MINIMUM OF 2 FT. OF COVER.
2. THE DISTRICT ENGINEER WILL CONSIDER REDUCTION OF THRUST BLOCK SURFACE AREA UPON SUBMITTAL OF APPROVED SOIL RESISTANCE TEST RESULTS GREATER THAN 2000 LBS/SQ.FT.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-06**

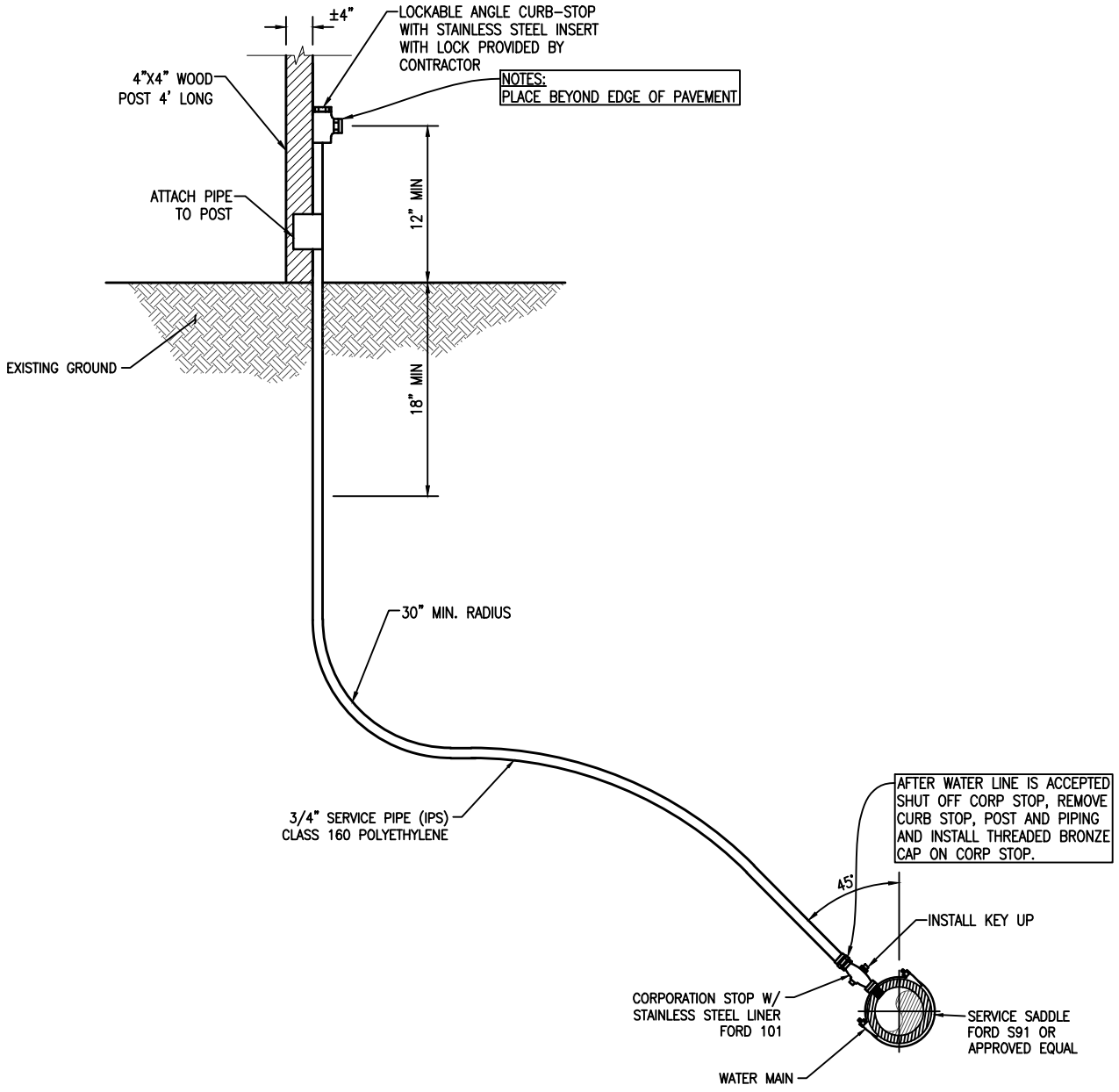
THRUST BLOCKS

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO | CHECKED BY: A. VERBURG | DATE: 06-13-2024 | REVISED: X-XX-XX



Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-07**

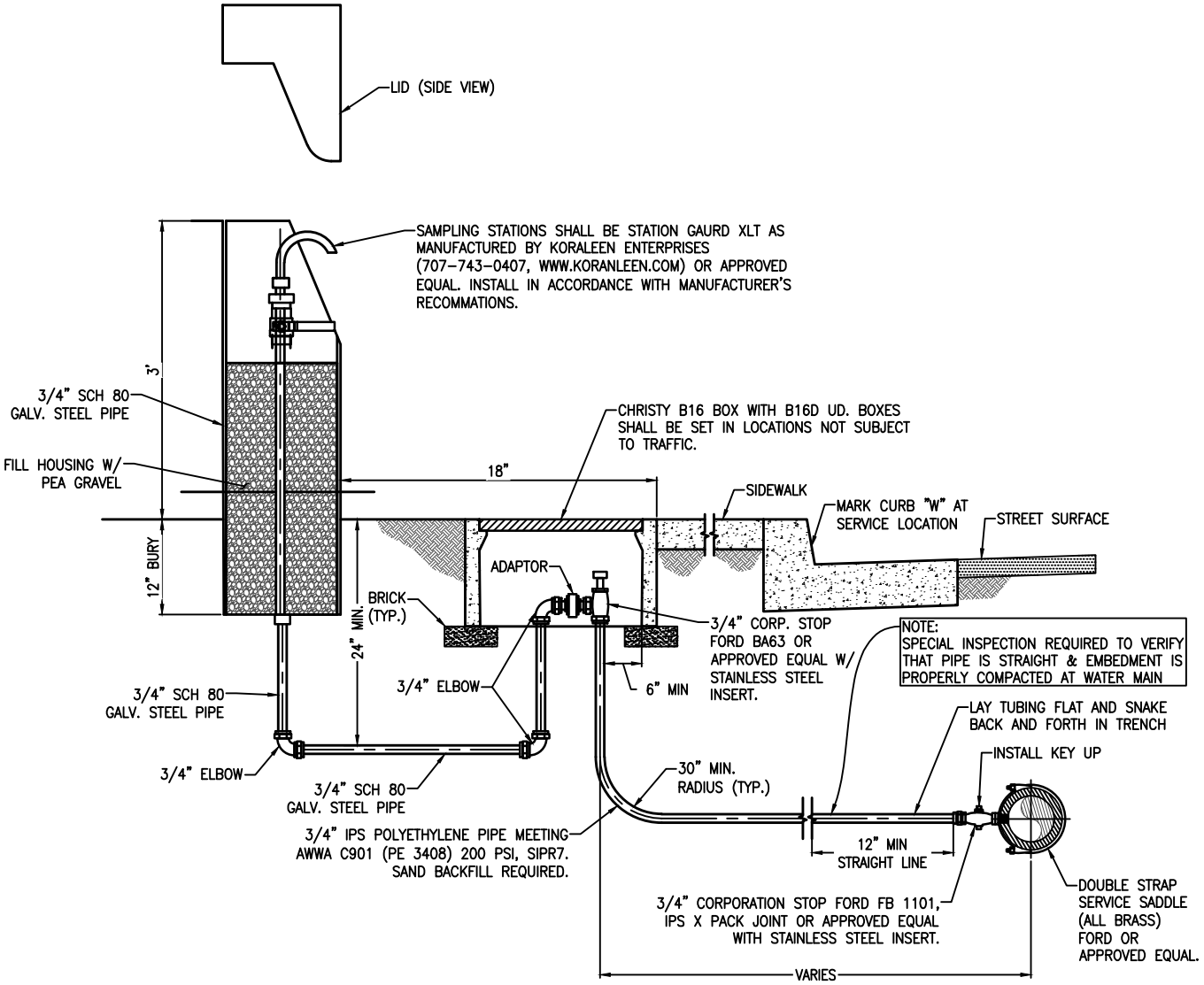
TEMPORARY WATER SAMPLING POINT

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



NOTES:
LOCATED CENTER OF SAMPLE STATION 18" FROM EDGE OF SIDEWALK

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-08**

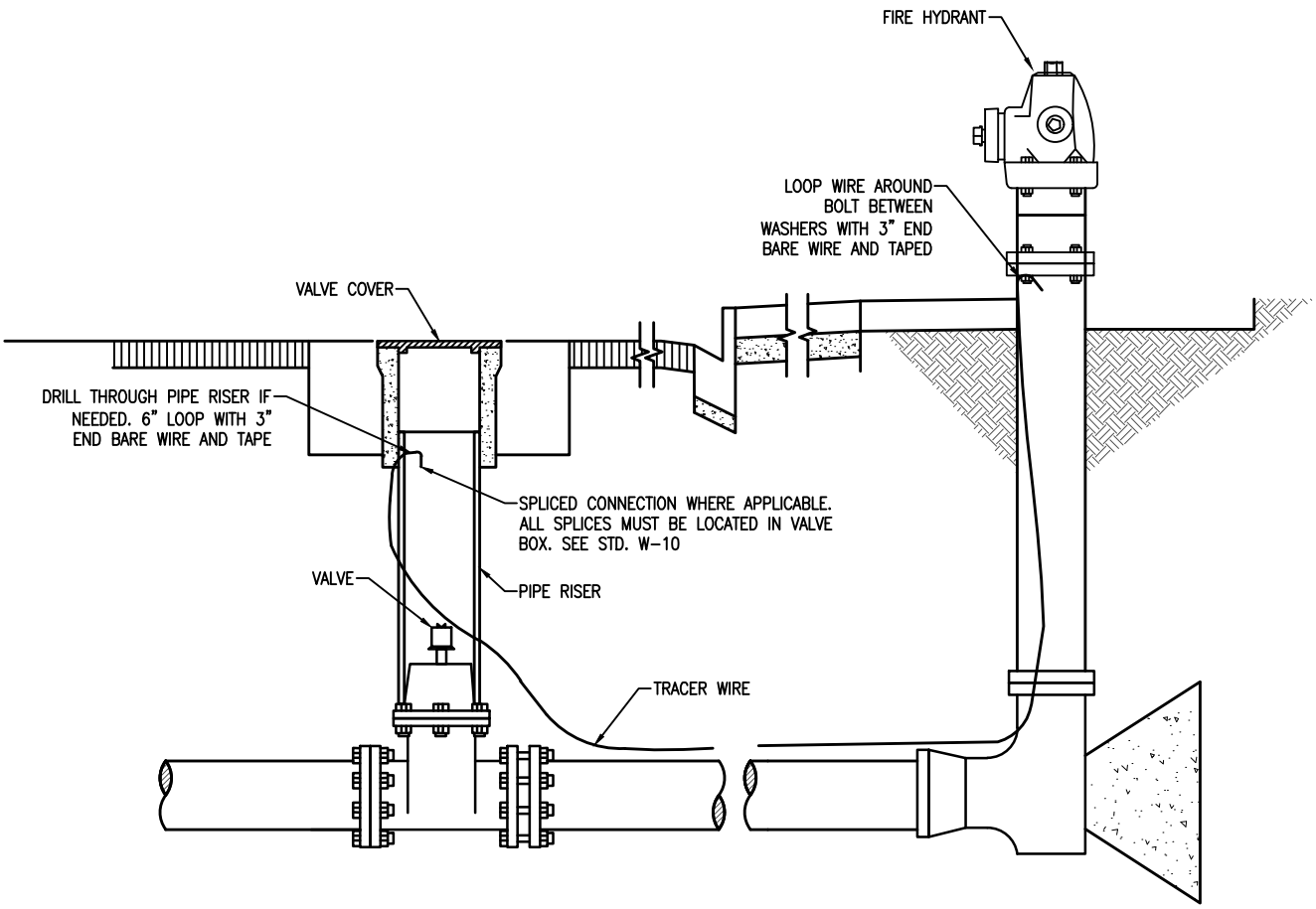
SAMPLING STATION

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX



NOTES:

1. SECURE TRACER WIRE TO EACH FIRE HYDRANT AND EACH MAIN LINE VALVE BOX.
2. TRACER WIRE SHALL BE LAID ON TOP OF THE WATER MAIN, AND SHALL BE TAPED TO THE PIPE AT EVERY 10' INTERVAL AND AT ALL FITTINGS.
3. CONTRACTOR SHALL CONDUCT A CONTINUITY TEST ON ALL WIRE IN THE PRESENCE OF CONSTRUCTION OBSERVER.
4. ALL SLICES MUST OCCUR IN A VALVE BOX.
5. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS, INCLUDING MATERIAL SPECIFICATION.
6. NOTE–TRACER WIRE ALSO SHALL BE INSTALLED ALONG WATER SERVICES. TERMINATE TRACER WIRE IN METER BOX.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-09**

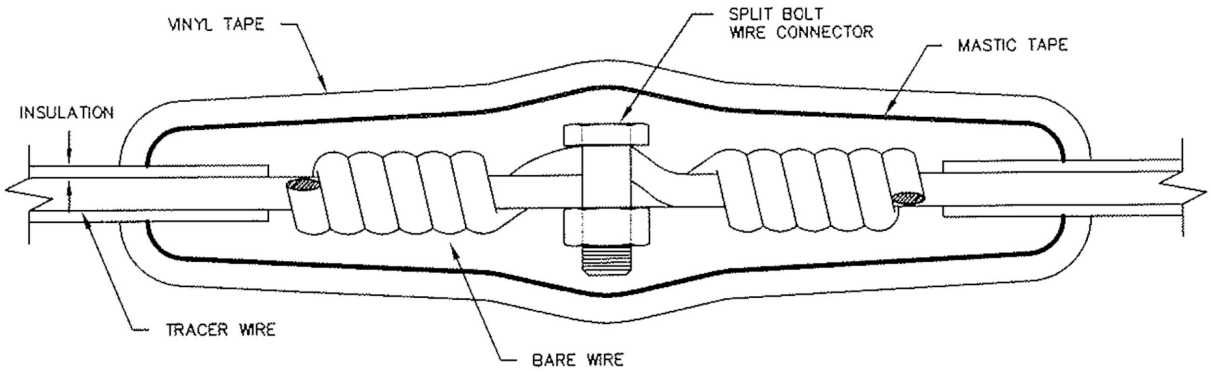
TRACER WIRE FOR PVC WATER MAIN

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06–13–2024	REVISED: X–XX–XX



NOTES:

(1) Twist the wire a minimum of five (5) times on each end.

(2) Install split bolt connector.

(3) Cover the entire splice with mastic tape wrap.

(4) Wrap mastic with vinyl tape.

(5) **All wire splices shall be located within a valve box.**

* Soldering may be included in addition to the above.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-10**

TRACER WIRE SPLICE

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06-13-2024	REVISED: X-XX-XX

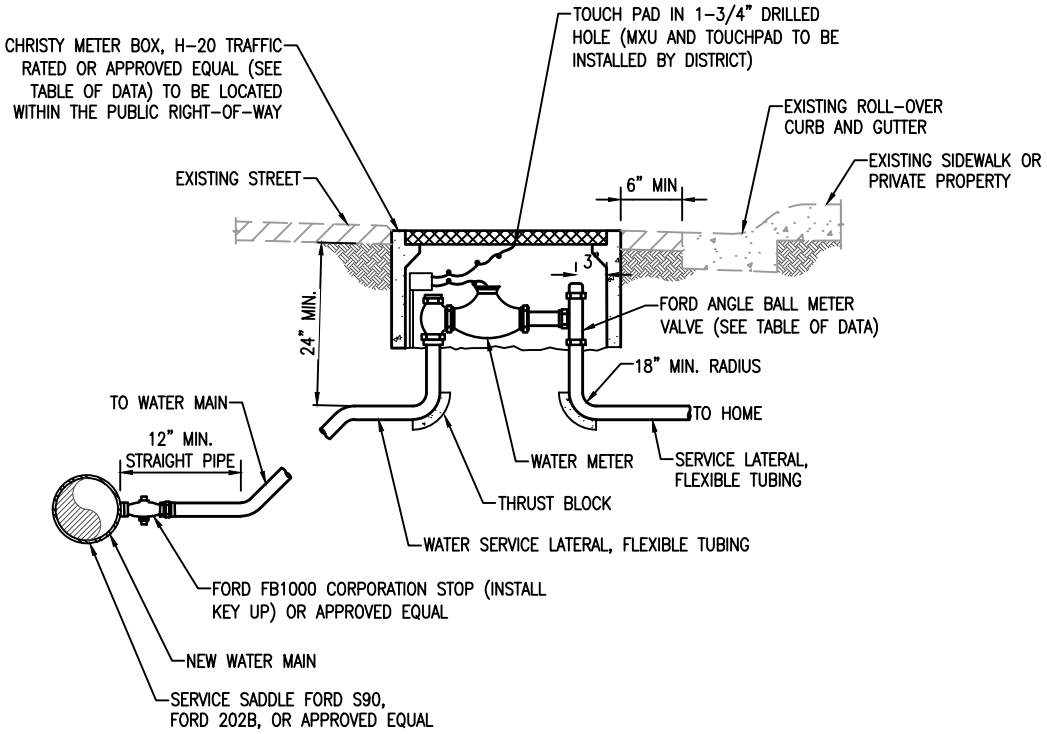


TABLE OF DATA				
METER SIZE	METER VALVE	BOX NO.	METER	LAY LENGTH
2"	BA43-444W	B1017	SENSUS iPERL	0'-10 3/4"

NOTES:

1. CERTIFICATE FOR SMART POINT TRANSCEIVER WITH SUPPORT MXU AND TRPL TO BE PURCHASED BY CONTRACTOR AND PROVIDED TO DISTRICT FOR INSTALLATION.
2. WATER SERVICE TUBING SHALL BE CLASS 160 POLYETHYLENE (PE3406, SDR7, PR160 PSI, CTS). NO JOINTS ARE PERMITTED BETWEEN THE CORPORATION STOP AND THE METER VALVE.
3. IF METER NOT INSTALLED AT TIME OF CONSTRUCTION, CONTRACTOR TO INSTALL METER SPACER/ALIGNMENT SLEEVE, PIPING APPURTENANCES AND BALL VALVES.
4. CERTIFICATE FOR SMART POINT TRANSCEIVER WITH SUPPORT MXU AND TRPL TO BE PURCHASED BY CONTRACTOR AND PROVIDED TO DISTRICT FOR INSTALLATION.
5. CONNECTION CONDUIT SHALL BE 1/2" SCHEDULE 80 PVC. TO BE INSTALLED CONTRACTOR TO CONNECT MULTIPLE METER BOXES. ENDS OF CONDUIT WILL BE CAPPED AND PROTECTED UPON INSTALLATION. SEE STANDARD DETAIL W-14.
6. DISCONNECTION OF EXISTING WATER SYSTEM AND CONNECTION OF NEW WATER MAINS AND SERVICE LATERALS SHALL NOT BE COMPLETED WITHOUT APPROVAL FROM THE DISTRICT ENGINEER.
7. CONTRACTOR SHALL DETERMINE THE LEAST INVASIVE SERVICE LINE ALIGNMENT TO CONNECT TO EACH HOME.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

1" SERVICE LATERAL AND METER

STD. DWG. NO. **W-11**

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

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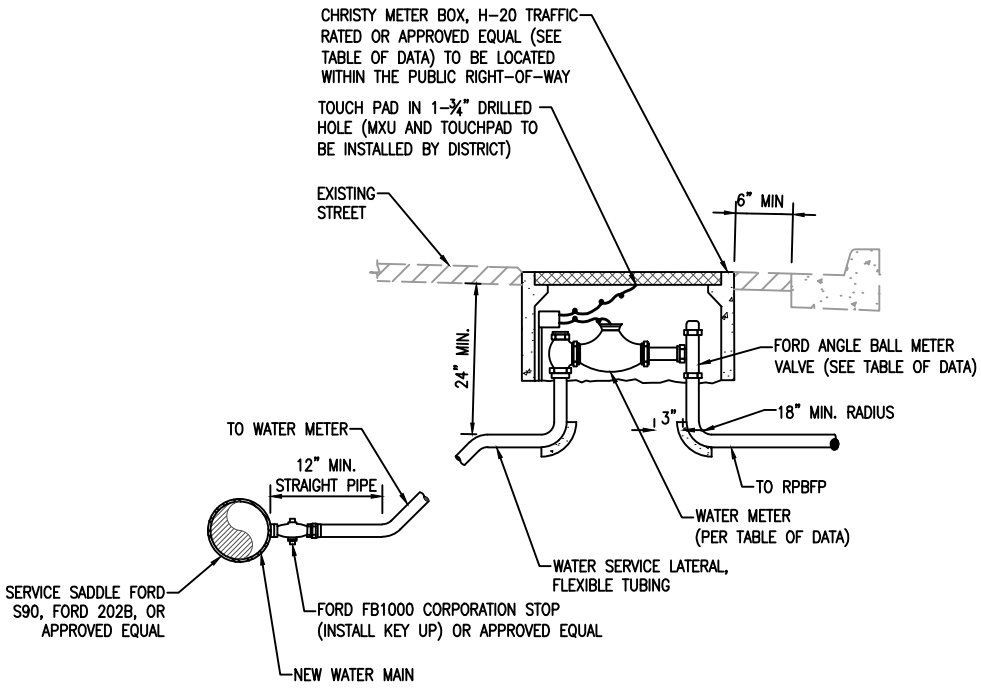

TABLE OF DATA				
METER SIZE	METER VALVE	BOX NO.	METER	LAY LENGTH
2"	FV43-777W	B1730	SENSUS OMNI C2	17"

NOTES:
1. CERTIFICATE FOR SMART POINT TRANSCEIVER WITH SUPPORT MXU AND TRPL TO BE PURCHASED BY CONTRACTOR AND PROVIDED TO DISTRICT FOR INSTALLATION.
2. CONNECTION CONDUIT SHALL BE ½" SCHEDULE 80 PVC. TO BE INSTALLED CONTRACTOR TO CONNECT MULTIPLE METER BOXES. ENDS OF CONDUIT WILL BE CAPPED AND PROTECTED UPON INSTALLATION. SEE STANDARD DETAIL W-14.
3. 2" SERVICE LATERAL SHALL BE FLEXIBLE TUBING & ABOVE GROUND RPBFP PIPING SHALL BE DIP.
4. DISCONNECTION OF EXISTING WATER SYSTEM AND CONNECTION OF NEW WATER MAINS AND SERVICE LATERALS SHALL NOT BE COMPLETED WITHOUT APPROVAL FROM THE DISTRICT ENGINEER.
5. LOCATION SHALL ALLOW A MIN. 24" CLEARANCE SURROUNDING RPBFP.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

2" COMMERCIAL/IRRIGATION SERVICE LATERAL

STD. DWG. NO. **W-12**

SCALE: NTS

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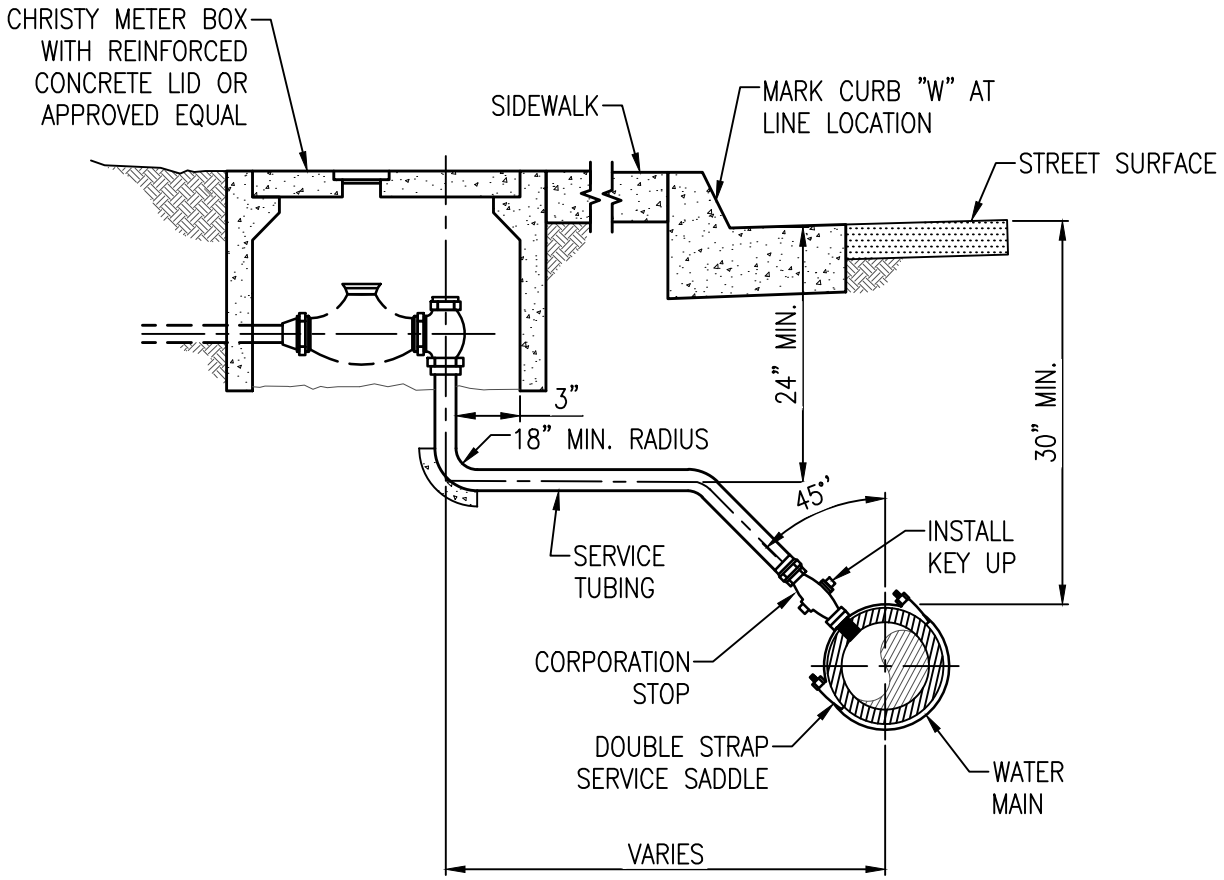

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-13**

TYPICAL WATER SERVICE CONNECTION

SCALE: NTS

APPROVED BY:

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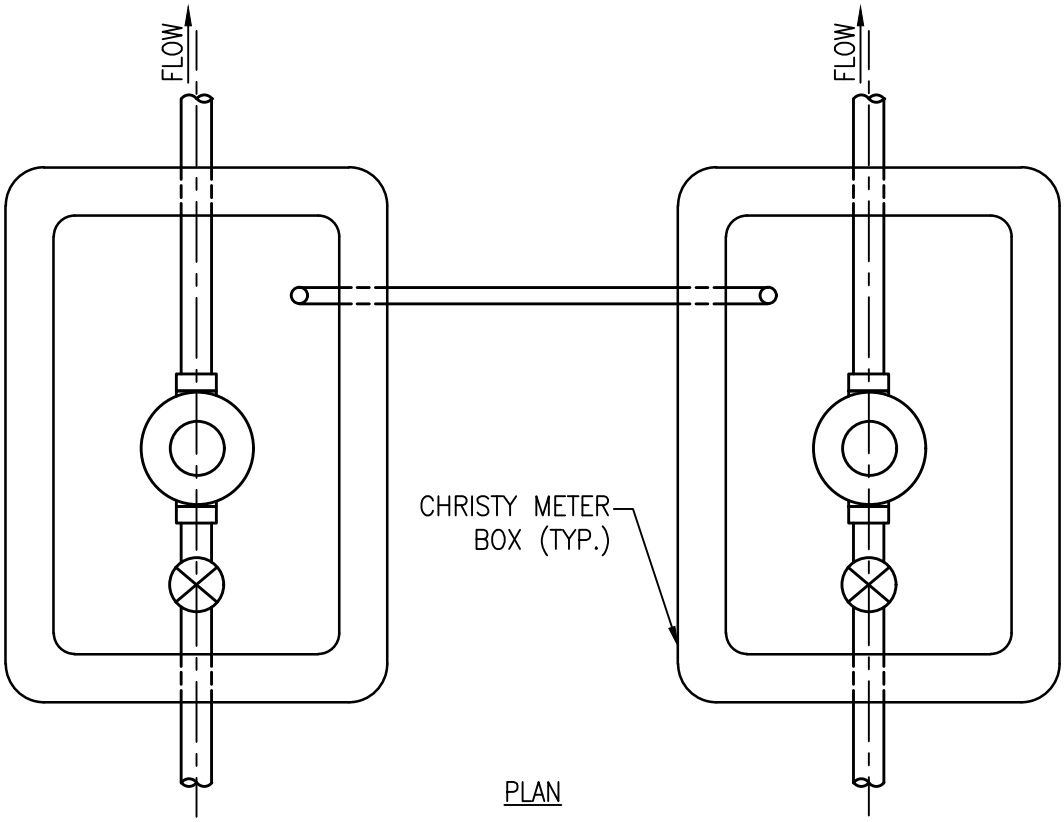
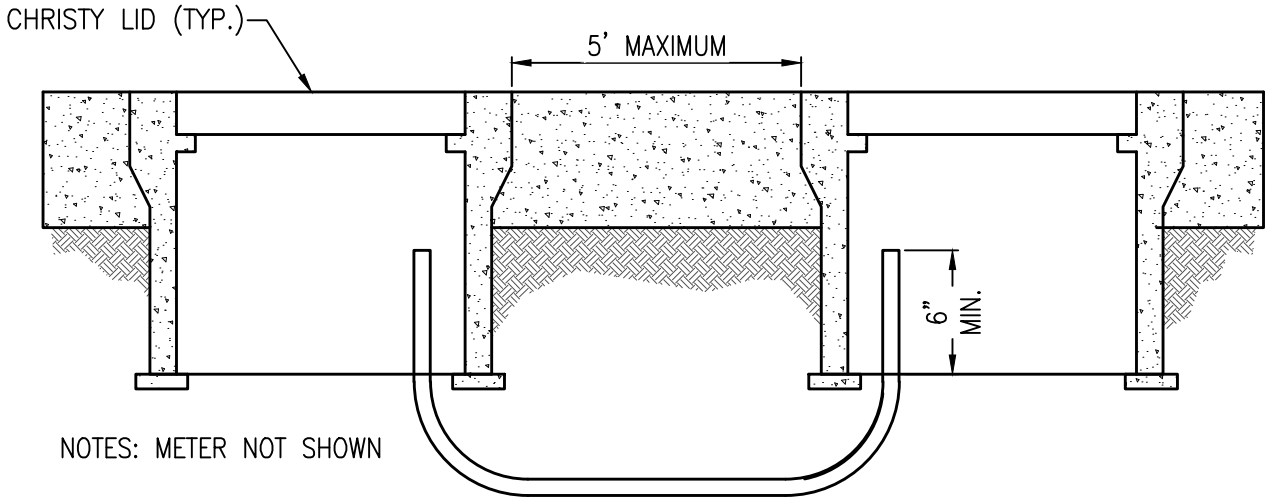


PLAN



NOTES: METER NOT SHOWN

SECTION A

NOTES:
1. INSTALL CONDUIT IN ALL MULTIPLE METER BOX APPLICATIONS.
2. METER BOXES TO BE WITHIN 5' OF EACH OTHER.
3. PROTECT EXPOSED ENDS OF CONDUIT WITH DUCT TAPE OR PVC CAP.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-14**

MULTIPLE SERVICE CONDUIT INSTALLATION

SCALE: NTS

APPROVED BY:

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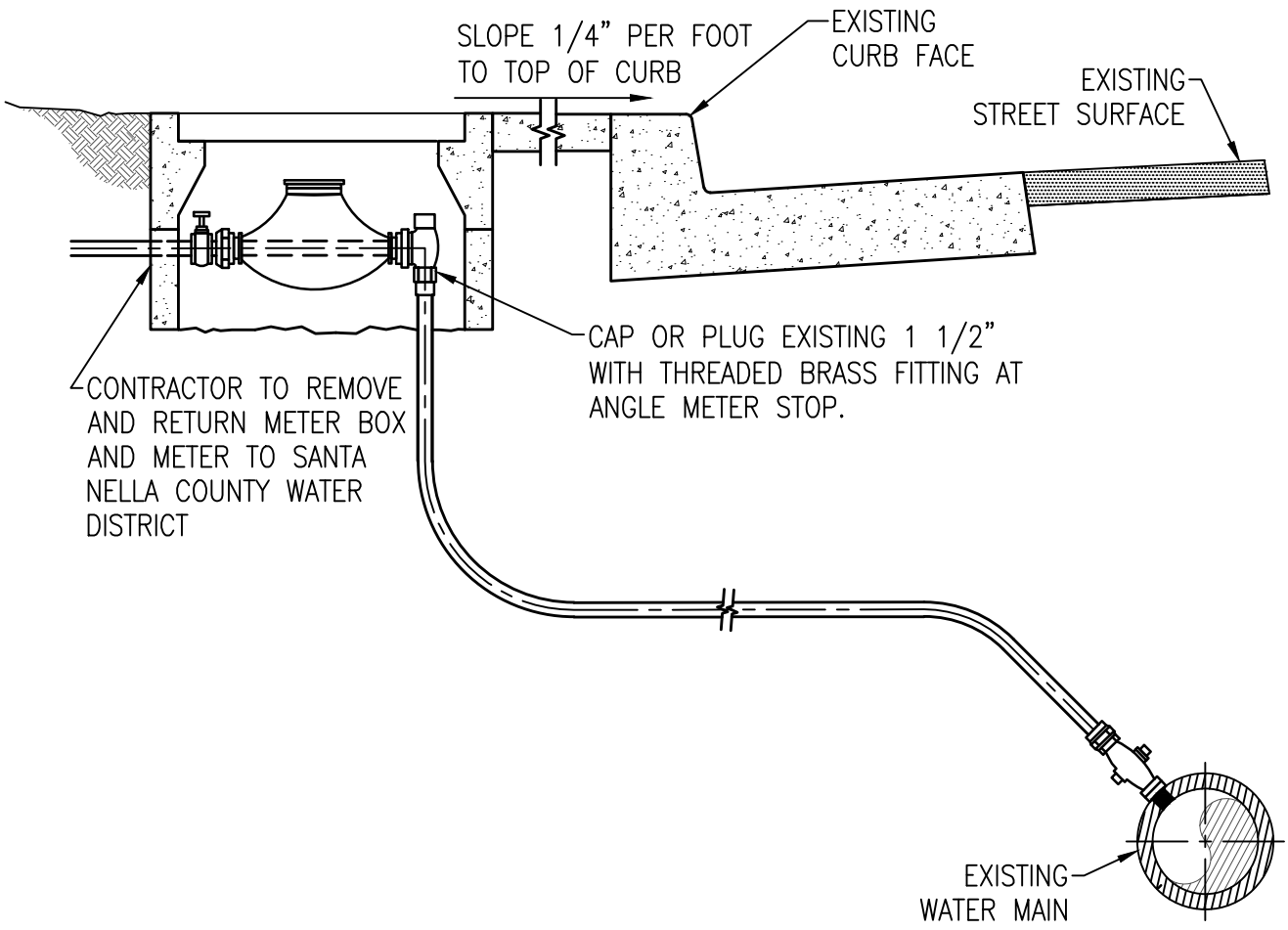

Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-15**

WATER LATERAL ABANDONMENT

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

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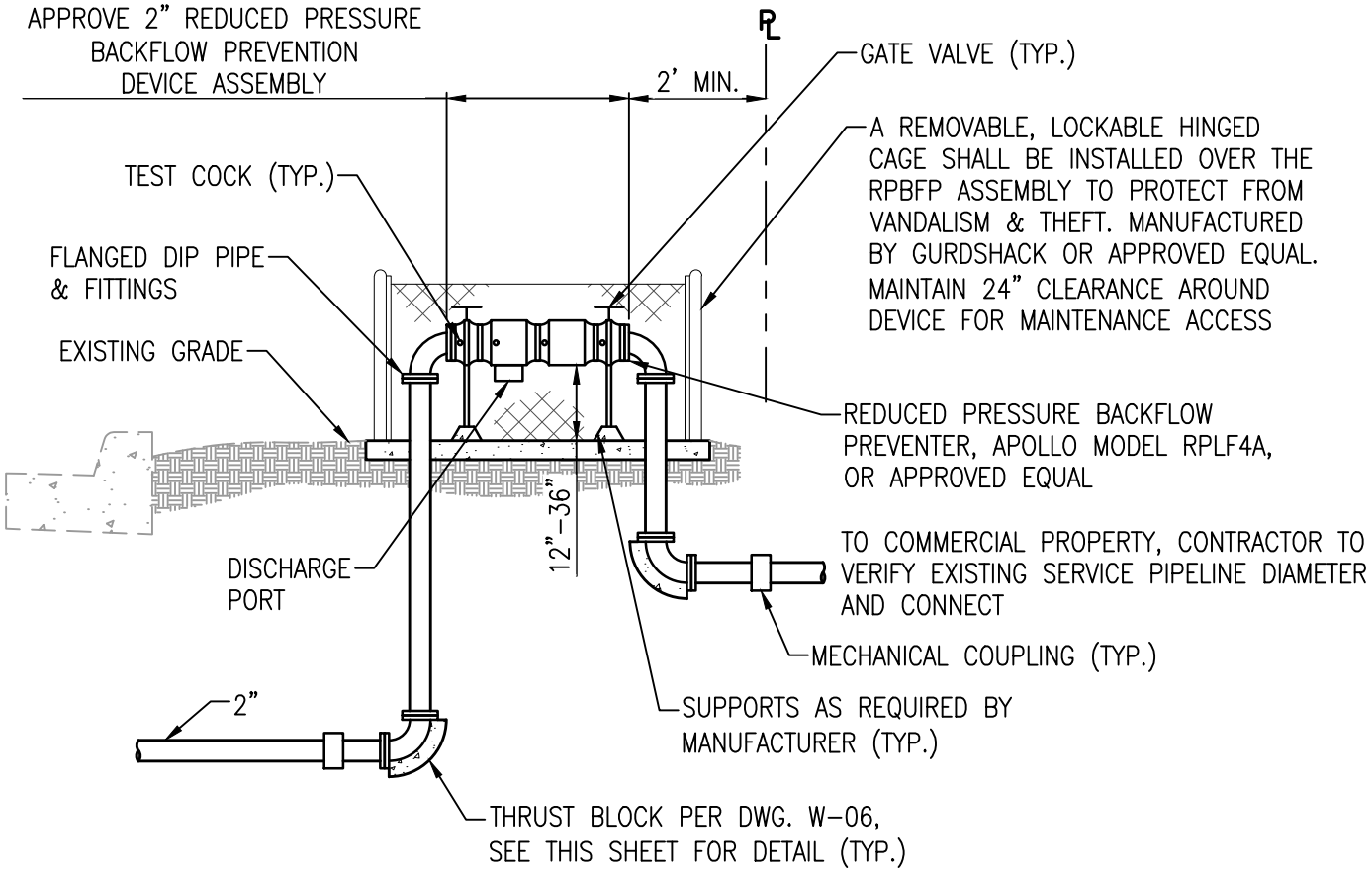


Santa Nella County Water District™

IMPROVEMENT STANDARDS

STD. DWG. NO. **W-16**

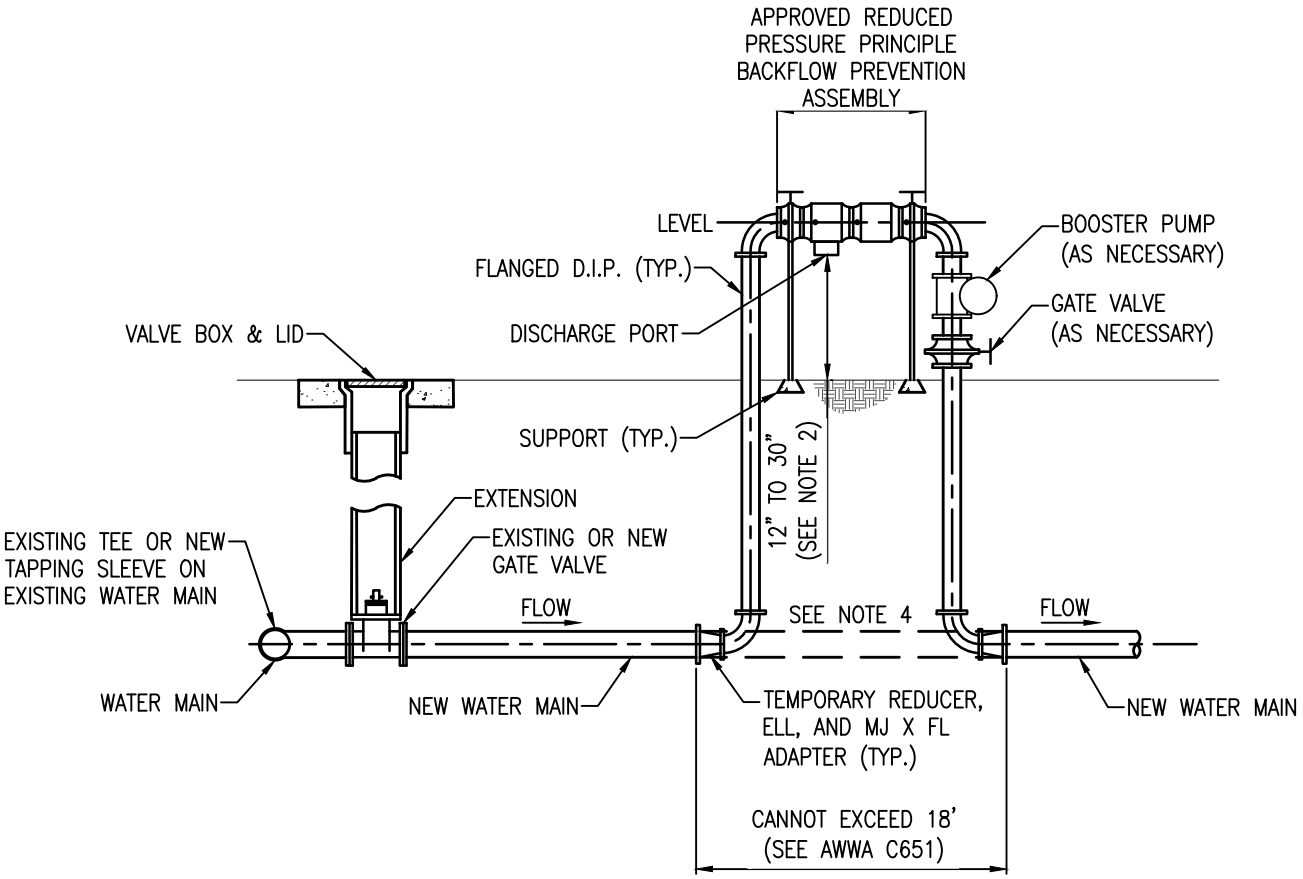
2" REDUCED PRESSURE BACKFLOW PREVENTER

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

DRAWN BY: S. DE MELO	CHECKED BY: A. VERBURG	DATE: 06–13–2024	REVISED: X–XX–XX



NOTES:

1. MUST BE ABOVE 100-YEAR FLOOD LEVEL DESIGNATED BY FEMA.
2. ALL NEW PIPE AND APPURTENANCES UPSTREAM OF BACKFLOW PREVENTER SHALL BE THOROUGHLY CLEANED AND DISINFECTED.
3. AFTER TESTING IS COMPLETE, REMOVE TEMPORARY BACKFLOW PREVENTER, PIPE, AND APPURTENANCES AND INSTALL NEW PIPE AND COUPLING (IF COUPLING NEEDED). DISINFECT PIPING AND COUPLING.
4. PROVIDE THRUST RESTRAINT AS NEEDED.
5. BACKFLOW PREVENTION ASSEMBLY DIAMETER SHALL BE EQUAL TO OR GREATER THAN 50% OF THE DIAMETER OF THE LARGEST MAIN IN THE NEW SYSTEM.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

TEMPORARY BACKFLOW PROTECTION FOR NEW WATER MAIN

STD. DWG. NO. **W-17**

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

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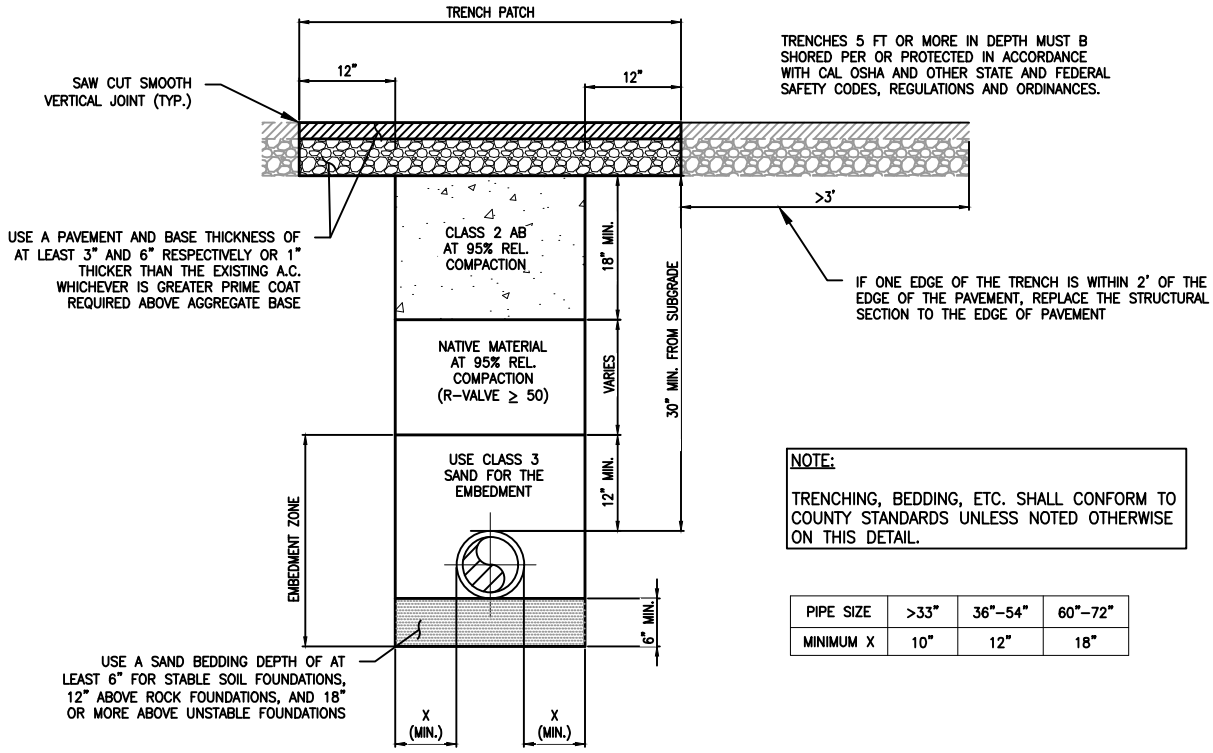
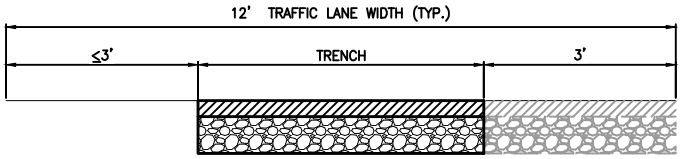


NOTE:

TRENCHING, BEDDING, ETC. SHALL CONFORM TO COUNTY STANDARDS UNLESS NOTED OTHERWISE ON THIS DETAIL.

PIPE SIZE	>33"	36"–54"	60"–72"
MINIMUM X	10"	12"	18"

LONGITUDINAL TRENCHES:



IF THE EDGE OF THE TRENCH ISM LESS THAT ≤3' FROM THE EDGE OF THE LANE, THEN OVERLAY THE LANE WITH 1" OF A.C.

NOTES:

- PROVIDE 95% COMPACTION IN 8" LAYERS FOR THE ENTIRE DEPTH OF TRENCH.
- PONDING OR JETTING WILL NOT BE ALLOWED.
- IF SOIL R-VALUE IS LESS THAN 50, USE CLASS 2 AB INSTEAD OF NATIVE MATERIAL. NOTE – AB NOT ALLOWED IN EMBEDMENT ZONE.
- COMPACTION TESTS SHALL BE PERFORMED BY CONTRACTOR AND BE SUBMITTED TO (AND APPROVED) BY COUNTY AND DISTRICT INSPECTORS PRIOR TO PAVING, USING CALTRANS TEST METHOD NO. 216 AND NO. 231.

Santa Nella County Water District™

IMPROVEMENT STANDARDS

TRENCHING EXCAVATION & BACKFILL

STD. DWG. NO. **T-01**

SCALE: NTS

APPROVED BY:

AJA VERBURG, DISTRICT ENGR.

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