MATERIALS

All pipe, fittings, valves, devices, appurtenances, and materials shall be lead free in accordance with the requirements of Section 116875 of the California Health and Safety Code.

1. Pipe

   A. Services:

      1. Minimum service size shall be 1". Service size shall be contingent on meeting fire flow requirements.
      2. Service sizes up to 2" shall be 200 PSI polyethylene tubing (CTS) meeting the requirements of ASTM D2737, AWWA C901, and NSF 14 and 61.

      Design and Construction Notes:

         a. 1" taps shall be a minimum of 2' apart. Taps larger than 1" shall be a minimum of 4' apart. All taps shall be a minimum of 4' from any joint, fitting, or coupler.
         b. Services shall consist of a continuous run of tubing from the main to the angle stop at the meter.
         c. Pipe materials used for the connection between meters and backflow prevention devices shall conform to Pages 431.10, 431.20, or 431.30.

   B. Water Mains:

      1. Minimum water main size shall be 8". Pipeline size shall be contingent on meeting fire flow requirements.
      2. 8" through 18" water mains shall be either Pressure Class 350* ductile iron pipe (DIP) per AWWA C151 or DR 18* PVC C900 per AWWA C900.
      3. Water mains larger than 18" shall be Pressure Class 350* ductile iron pipe per AWWA C151.
      4. Water main sizing shall conform to the City of Shasta Lake Water Master Plan (where applicable) or as approved by the City Engineer.
      5. DIP shall be cement mortar lined and bituminous coated per AWWA C104 and C153.

      * Class rating subject to change based on pressure, separation, and other requirements.

      Design and Construction Notes:

         a. Typical trench section, depths, and backfill shall conform to Page 610.10.
         b. Pipeline separation between potable water and non-potable pipelines shall conform to Page 661.01 and Page 661.02.
         c. System design layout, pipe sizing, and construction specifications shall be included with preliminary and final improvement plans.
         d. Localized distribution systems shall be allowed no more than two (2) transmission main connections, with all connection locations and configurations being approved by the City Engineer. All water services, fire hydrant runs, blowoffs, and other appurtenances shall only be connected to distribution mains.
         e. PVC C900 pipe shall not be stored or handled in a manner that will permit prolonged exposure to sunlight or high temperatures for extended periods.
         f. Where corrosive soil conditions exist (as determined by a geotechnical report or where petroleum odor exists in the trench):
            i. PVC C900 shall not be installed.
            ii. Buried DIP shall be tube encased with 8-mil polyethylene plastic per AWWA C105. Joints shall be securely sealed with adhesive tape.

MATERIALS (continued)

2. Fittings

A. General:

1. All miscellaneous fittings for water mains shall be ductile iron (DI) and shall conform to AWWA C110 or C153 for sizes 3" through 48".
2. DI fittings shall be cement mortar lined and bituminous coated per AWWA C104 and C153.
3. All exterior surfaces of all fittings shall have a petroleum asphaltic coating approximately 1 mil thick.
4. Bolts and nuts shall be low alloy steel with zinc coating/plating or stainless steel such that the bolts are cathodic to the coupling.

Design and Construction Notes:

a. All exposed nuts and bolts shall be sprayed with rubberized undercoating, and all fittings (including joint restraints, service saddles, and valves) shall be wrapped with 6-mil polyethylene plastic and securely taped closed in accordance with AWWA C105.

b. All mechanical joints shall be restrained.

B. Joint Restraints:

1. All joint restraint glands and harnesses shall be of DI casting, shall be of the type and size to fit the pipe being used (cast iron OD), shall have a pressure rating at least equal to that of the appurtenance the gland or harness is attaching to, and shall be capable of restraining joints that are fully deflected within the guidelines of AWWA C600 or C900 as applicable.
2. Mechanical joint restraint glands shall consist of one restraint gland coated with shopcoat, one wedge pie gasket, and nuts and t-bolts as needed, shall be capable of restraining standardized mechanical joint bells that conform to the requirements of AWWA C151 for sizes 3" through 64", and shall employ radial restraining pads with torque-off bolts. Full-circumference restraint rings are not allowed.
3. Bell and spigot restraint harness assemblies shall consist of two restraint glands coated with shopcoat and restraining rods (quantity as required). The bell-end gland shall either be full-circumference plain-ring gland (with no restraint grooves) or a half-circumference split-ring gland (with restraint grooves). The spigot-end gland shall be half-circumference split-ring gland with restraint grooves. Restraint glands shall employ either radial restraining pads with torque-off bolts or half-circumference restraint grooves.
4. Mechanical joint restraint fittings shall be EBAA Iron Series 1100 or 2000PV Megalug, Romac RomaGrip or PVC Romagrip, Sigma One-Lok, or approved equal. Restraint harnesses for bell and spigot connections shall be EBAA Iron Series 1500TD or 1900, Romac 600 series, Sigma PV-LOK, or approved equal.

C. Plain-End Couplers

1. Plain-end pipe couplers shall be sized based on the measured outside diameter (OD) of the pipes to be coupled and shall conform to AWWA C219.
2. Extended range (single adjustable gasket) couplers conforming to AWWA 219 shall be acceptable, as long as the gasket ranges of the coupler ends accommodate the measured OD of both pipes being coupled.
3. Couplers shall be ductile iron or steel and shall be fusion bonded epoxy or nylon coated.
4. Where joint restraint is required for plain-end pipe joints, integrated restraint plain-end couplers shall not be used. Where required, restraint harnesses shall be installed over the plain-end coupler (see Section 2 above).
5. Plain-end couplers shall be Romac 501 or XR501 series, Romac Macro HP, Smith Blair 411 or 441 series, or approved equal.

D. Flanged Coupling Adapters (FCA) and Restrained Flanged Coupling Adapters (RFCA)

1. FCAs and RFCAs shall be sized based on the measured outside diameter (OD) of the pipe to be coupled and shall conform to AWWA C219.
2. Extended range (single adjustable gasket) FCAs conforming to AWWA 219 shall be acceptable, as long as the gasket range of the coupler end accommodates the measured OD of the pipe being coupled.
3. Couplers shall be ductile iron or steel and shall be fusion bonded epoxy or nylon coated.
4. FCAs and RFCAs shall be Romac FCA501 series, Romac Macro HP FC series, Romac RFCA (DI and steel pipe), Romac RFCA-PVC (PVC C900), EBAA 2100 Series, or approved equal.

MATERIALS (continued)

3. Valves

   A. Resilient Wedge Gate Valve (RWGV)

      1. RWGV 2" through 24" shall conform to AWWA C509 or C515 and shall be NSF 61 certified.
      2. Valve bodies shall be iron, and interior and exterior surfaces shall be coated with fusion bonded epoxy in accordance with AWWA C550.
      3. Wedge shall be symmetrical and fully encapsulated with molded rubber.
      4. RWGV shall have a non-rising stem (NRS) and open to the left.
      5. Buried valves shall have a 2” square operating nut; exposed valves shall be hand wheel operated.

   B. Butterfly Valve (BFV)

      1. BFV 16” and larger shall conform to AWWA C504, Class 150B and shall be NSF 61 certified.
      2. Valve bodies shall be iron, and interior and exterior surfaces shall be coated with fusion bonded epoxy in accordance with AWWA C550.
      3. BFV shall be rubber seated. Disc edge shall be stainless steel.
      4. BFV shall have a non-rising stem (NRS) and open to the left.
      5. Buried valves shall have a 2” square operating nut; exposed valves shall be hand wheel operated.

      Design and Construction Notes:

         a. The use of butterfly valves in place of RWGV shall be approved by the City Engineer prior to inclusion in the project.
         b. Above-ground BFV used at well sites, pump stations, and backflow devices may require Outside Screw and Yoke (OS&Y) rising stem operation.

   C. Angle Meter Stop, Corporation Stop, and Curb Stop

      1. All stops shall be full port ball valves, shall be lead-free, shall be NSF 61 certified, and shall be A.Y. McDonald, Ford, Jones, Mueller, or approved equal.
      2. Angle stops shall have locking wings and shall be compression CTS x meter.
      3. Corporation stops shall be AWWA taper thread x compression CTS.
      4. Stainless steel insert stiffeners shall be used for all water service tubing connections.

   D. Blowoff Valve

      Blowoff valves shall be A. Y. McDonald model #76109BF or approved equal.

   E. Combination Air / Vacuum Valve (CAVV)

      1. CAVV shall have an iron body, a stainless steel float and trim, and a Buna-N seat or seal, and shall conform to AWWA C512.
      2. CAVV shall be APCO, Valmatic, or approved equal.

4. Backflow Prevention Assembly

   The City of Shasta Lake water utility requires backflow prevention assemblies to be installed as point of connection protection for the city's water distribution system where required by the City Engineer. These locations typically include, but are not limited to, commercial and industrial land uses, connections used for landscape irrigation purposes, properties with both City water service and wells, locations with booster pumps, etc. All new construction and renovation permits will be evaluated by the City to evaluate the degree of cross-connection hazard and determine when the installation of backflow prevention assemblies will be required.

   Additionally, all connections to the City of Shasta Lake water distribution system for construction water purposes shall require the installation of a backflow prevention assembly provided by the City. The Contractor shall contact the City of Shasta Lake Public Works Department for additional information and current deposit and usage costs. Filling an untested or unapproved pipeline by opening gate valves connected to the City water system is not allowed.

   Backflow prevention assemblies shall consist of a reduced pressure principle or double check assemblies. Assemblies shall be Febco, Watts, Wilkins, or approved equal.

MATERIALS (continued)

5. Water Service Saddles

   Water service saddles shall have ductile iron bodies and stainless steel straps, shall be capable of withstanding 150 psi internal pressure without leakage or overstressing.

   Saddle bodies shall be either epoxy or nylon coated, and taps shall have iron pipe (IP) threads.

   Service saddles shall be Ford FC 202 series, Smith Blair 317 series, Romac 202 NS series, or approved equal.

   NOTE: For tapping saddles, see Page 400.40.

6. Fire Hydrants

   Fire hydrants shall be dry barrel and shall conform to AWWA C502. All parts and accessories purchased for fire hydrants shall be manufactured and warranted by the hydrant manufacturer.

   Fire hydrants shall have 5 1/4" main valve opening, two 2 1/2" hose nozzles and one 4 1/2" pumper nozzle, shall have a 1 1/2" pentagon operating nut, shall open left, and shall be painted red.

   A blue retroreflective pavement marker shall be placed 1' off the centerline of the street on the hydrant side. See Page 100.00 for additional information.

   Fire hydrants shall be Mueller Super Centurion A423 - 250, American AVK series 2780, Clow Medallion, or approved equal.

7. Water Meter Boxes

Meter Size	Box Size (min)	Cook Concrete ID*	Christy ID*
1”	11 3/4” x 22”	#1.2 Box	B16
1 1/2”	13 ¼” x 24 ¼”	#1.5 Box	N30
2”	17” x 30”	#2.0 Box	N36

   * or Approved Equal

   Design and Construction Notes:

   1. Generally, meter box lids shall be reinforced concrete with an AMR antenna hole.
   2. In driveways, areas with rolled curb, and other locations where vehicle traffic is possible over the box, meter box lids shall be HS-20 steel checker plate.
   3. Boxes and vaults for meters larger than 2” shall be approved by the City Engineer.

8. Traffic Box

   Traffic boxes shall be concrete with cast iron lid and box trim. Extensions shall be either 8” PVC C-900 or 8” PVC SDR-35 pipe.

   Traffic boxes shall be Christy G5 or approved equal.

9. Combination Air / Vacuum Valve Enclosure

   A. Above ground assemblies:

      1. Above ground CAVV enclosures shall be fully accessible rectangular steel (14 gauge minimum) powder-coated insulated structures. There shall be no exterior hinges or anchor fasteners, and the door shall have a recessed lock. Structure shall have a continuous air gap at the base frame, and the top shall be crowned to allow for drainage.
      2. Above ground CAVV enclosures shall be Placer Waterworks SJARVW or approved equal.

   B. Below ground assemblies:

      1. Below ground CAVV enclosures shall consist of concrete boxes with steel lids and riser pipes. Boxes shall be sized as follows:

Meter Size	Box Size (min)	Cook Concrete ID*	Christy ID*
2”, 3”, 4”	17” x 30”	#2.0 Box	N36
6”, 8”	30” x 48”	#4.0 Box	N48

         * or Approved Equal

      2. Lids shall be powder-coated steel checker plate and be sized to fix the concrete box. A 5 ½” x 5 ½” air vent tube opening shall be integrated into the lid, and a 6” x 8” x 18” power-coated air release vent tube riser shall be attached with welded hold-down nuts.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

WATER MATERIALS and
DESIGN / CONSTRUCTION CRITERIA

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 400.04

MATERIALS (continued)

9. Combination Air / Vacuum Valve Enclosure (continued)

   B. Below ground assemblies (continued):

      3. Below ground CAVV enclosure lid assemblies shall be Placer Waterworks 218 lid with AV18-M vent tube riser or approved equal.

10. Trace Wire and Warning Tape

    Trace wire and warning tape shall be installed on all water pipelines and shall conform to Page 608.00. Trace wire branches shall terminate inside traffic boxes and enclosures.

11. Rubberized Undercoating

    Prior to thrust block placement and/or trench backfill, all buried nuts and bolts on appurtenances shall be sprayed with rubberized undercoating.

12. Pipe and Fittings Wrap

    Prior to thrust block placement and/or trench backfill, all buried appurtenances shall be wrapped with 6-mil polyethylene plastic and securely taped closed in accordance with AWWA C105.

13. Reflective Tape

    4" wide white reflective tape shall be applied to all above ground enclosures. Reflective tape shall be 3M Prismatic Conspicuity Tap Series 983 or approved equal.

CONTRACTOR QUALIFICATIONS FOR POTABLE WATER PROJECTS

All Contractors bidding on or performing work within the City of Shasta Lake involving connections to, or modifications of, the City's potable water distribution system shall carry a Water Distribution Operator, Grade 2 certification, and shall be required to maintain active certification throughout the entire duration of the project.

All work on new or existing potable systems shall be performed under the DIRECT SUPERVISION of the certified Operator employed by the Contractor. Note that this requirement applies to work performed on the City's system by a Contractor under contract with the City as well as with a private developer or property owner.

Examples of work that would require certification include, but are not limited to:

- Water distribution or transmission main installation, extension, or replacement
- Water main fitting, valve, or fire hydrant installation or replacement
- Miscellaneous work that involves depressurizing existing water mains for any reason

Contractors wishing to obtain certification shall contact the California Department of Public Health (CDPH). Contractors shall be aware that the certification process takes several months, due to exam scheduling requirements. Additional information can be obtained through the following website link:

https://www.waterboards.ca.gov/drinking_water/certlic/occupations/DWopcert.html

Effective Date 01/01/15

				CITY OF SHASTA LAKE Public Works Department	Approved: 09-30-2023 City Engineer Date
				STANDARD DRAWING	
				CONTRACTOR QUALIFICATIONS FOR POTABLE WATER PROJECTS	Date: 09/2023 Dwg No.: 400.10 Scale: None
REVISION	BY	APPROVED	DATE		

WATER MAIN ACCEPTANCE - DISINFECTION AND BACTERIOLOGICAL TESTING

AWWA C651 (latest revision) presents essential procedures for disinfecting new or repaired water mains. All new water mains shall be disinfected before they are placed into service. All water mains taken out of service for inspection, repair, or other activity that might lead to contamination of water shall be disinfected before they are returned to service. Bacteria test results shall be approved by the City Engineer prior to placing the main into service.

The City requires that new water mains be disinfected by the introduction of chlorine such that the final solution should have a residual of 25 mg/l (25 ppm) and shall remain in contact for a minimum of 24 hrs. This may be accomplished by the tablet method on small diameter mains, which is described as follows. Other chlorination methods as described in AWWA C651 may be used with prior approval from the City Engineer.

1. 5-gram calcium hypochlorite tablets shall be placed in the upstream end of each section of pipe to be disinfected, per the table below. At least one tablet shall be placed in each hydrant branch and in other appurtenances. The tablets shall be attached by an NSF/ANSI 61 approved adhesive on the inside/top of the pipe. There shall be no adhesive on the tablet, except on the broad side attached to the surface of the pipe. If the tablets are attached before the pipe section is placed in the trench, their position shall be marked on the section, so it can be readily determined that the pipe is installed with the tablets at the top.

   A chlorine concentration requirement of 25 mg/l (25 ppm) can be achieved as follows for both PVC C900 and Ductile Iron pipe using tablets containing 3.25-g of available chlorine per tablet:

Pipe Diameter	Tablets per Nominal Pipe Lay Length
4"	1
6"	1
8"	2
10"	3
12"	4

2. When installation has been completed, the main shall be filled slowly with water at a rate such that water within the main will flow at a velocity no greater than 1 ft/sec. Precautions shall be taken to assure that air pockets are eliminated. This water shall remain in the pipe for at least 24 hours. Valves shall be positioned such that the strong chlorine solution in the treated main will not flow into water mains in active service. After the required 24-hour soak period, CoSL Public Works will check that the free chlorine residual is 0.2 mg/l (0.2 ppm) or greater at each sampling point. If the residual is less than 0.2 mg/l (0.2 ppm), the disinfection process shall be repeated using alternate provisions listed in AWWA C651.

3. Following successful chlorine dosing, heavily chlorinated water shall then be flushed from the main, fittings, valves, and branches (see "Dewatering" below) until chlorine measurements show that the chlorine residual in the water leaving the main is equal to that of the surrounding area of the distribution system.

4. After flushing, CoSL Public Works will take an initial set of bacteriological samples and resample again after letting the main sit, with no water use, for a minimum of 16 hours. Samples shall be collected every 1,200 ft of the new water main, plus one set from the end of the line and at least one from each branch greater then one pipe length. Both sets of samples must pass for the main to be approved for release into the active water system. Alternate bacteriological testing options as listed in AWWA C651 may be used at the discretion of CoSL Public Works, as approved by the City Engineer.

5. At water tie-ins less than one pipe length (20') long, minimum disinfection shall be achieved by spray disinfecting or swabbing the new pipe sections and fittings with a 5%-minimum hypochlorite solution before installation and flushing the main from both directions, if possible, before returning the system to service.

FLUSHING

All flushing flows from pipelines shall be completely dechlorinated prior to release to the ground surface, and shall be released such that erosion and flooding of adjacent areas is avoided. Flushing into the City of Shasta Lake wastewater collection system shall require prior approval from the City Engineer.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
WATER MAIN ACCEPTANCE
DISINFECTING AND
BACTERIOLOGICAL TESTING

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None
Dwg No.: 400.20

WATER MAIN ACCEPTANCE - HYDROSTATIC PRESSURE TESTING

Hydrostatic pressure and leakage testing of new water mains shall be successfully performed prior to placing new pipelines into service. Testing shall be performed using potable water from a fire hydrant equipped with a meter and backflow preventer (see Page 400.03). Upon approval of the City Engineer, hydrostatic pressure testing may be performed during the 24-hour soak period of bacteriological testing (see Page 400.20, Step 2).

The Contractor shall conduct combination hydrostatic pressure and leakage testing in accordance with AWWA C600 or C605 (as applicable) on all new water mains, new water services, and temporary water service piping, and shall furnish all necessary equipment and material to complete the work, including a hydraulic force pump with a calibrated test gauge. The City Engineer shall monitor the test, and shall witness all gauge calibrations.

On buried pipelines, the Contractor may, if field conditions permit, partially backfill the trench and leave the joints open for inspection and conduct an initial pressure test to satisfy himself that the pipeline will pass. However, the acceptance test on buried water mains shall only be conducted once all backfilling has been completed. On exposed water mains, the acceptance test shall be conducted after the piping has been completely installed, including all supports and hangers.

The test pressure shall not be less than 150 psi at any location, and the test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section. Contact the Public Works Department at (530) 275-7400 to obtain working pressures for specific locations.

Hydrostatic pressure and leaking testing shall be conducted as follows:

1. After the pipeline has been installed, backfilled, and compacted, the Contractor shall conduct a combination hydrostatic pressure and leakage test of the pipeline between each valve section or pipe run as determined by the City Engineer. The pipe shall be slowly filled with water so that as much air as possible is removed, and the pipe shall be tested at the location and to the test pressure in the approved calculations for a minimum of two hours.

2. Leakage shall not exceed the allowable leakage calculated as follows:

$$L = \frac{S*D*\sqrt{P}}{148{,}000}$$

where:
L = Allowable leakage, gallons per hour
S = Length of pipeline tested, feet
D = Nominal diameter of pipe, inches
P = Average test

3. When the pressure test is conducted against closed metal-seated valves, an additional leakage allowance of 0.0078 gal/hour/nominal valve diameter (inches) for each closed valve within the section being tested shall be made.

4. If the pressure test discloses leakage greater than that allowed, the Contractor shall at his sole expense locate and repair the defective joints until the leakage is within the specified allowance. After the defects are corrected, the pressure test shall be repeated per the process listed above. This process shall be repeated as necessary until the new water main passes the pressure test.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

WATER MAIN ACCEPTANCE
HYDROSTATIC PRESSURE TESTING

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 400.30

OPERATION OF MAIN LINE WATER VALVES

Existing gate valves shall be turned only by City of Shasta Lake personnel. The Contractor shall not turn any gate valve not installed by him or her during the course of the project, unless specifically authorized in writing to do so by the City Engineer.

WATER MAIN SHUTDOWN PROCEDURES

1. Water main shutdowns may be required to install piping or appurtenances. Note that certification may be required to perform the work - see Page 400.10.

2. To schedule a shutdown or operation of distribution system valves by the City, the Contractor shall contact Public Works at least one (1) week in advance of the shutdown - 530.275.7400.

3. The Contractor will be required to coordinate the shutdown with the City, and to notify all affected customers at least two (2) full working days in advance of a shutdown. Public Works will assist the Contractor with identifying the limits of the shutdown area.

4. Shutdowns shall last no longer than 4 hours, unless otherwise approved by the City Engineer.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
OPERATION OF MAIN LINE VALVES
WATER MAIN SHUTDOWN PROCEDURES

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None
Dwg No.: 400.40

MAIN LINE HOT TAPS ON WATER DISTRIBUTION SYSTEM

1. Hot taps are allowed on PVC C900, ductile iron, cast iron, asbestos cement, and steel main line pipe. Pipe OD shall be measured at the tap point to ensure a proper fit for the tapping sleeve.

2. Hot taps are not allowed whenever the tap diameter of the service line is greater than three-quarters (3/4) of the diameter of the main. Maximum tap sizes are 4" tap on 6" main, 6" tap on 8" main, 8" tap on 12" main, 12" tap on 16" main, and 12" tap on 18" main.

3. Hot taps are not allowed within four feet of joints, fittings, or service taps. Pipe shall be exposed by the Contractor for confirmation of spacing.

4. The Contractor shall have the tapping sleeve and valve fully installed with concrete support under the valve prior to inspection. The installation shall be approved by the City Engineer prior to making the tap.

5. Tapping sleeves shall have a stainless steel body, a stainless steel or ductile iron flange, and shall meet the requirements of AWWA C223. Approved tapping sleeves include Ford FAST, Romac SST, or approved equal.

6. Tapping sleeves shall be air-pressure tested at 50 psi to ensure a leak-free fit prior to tapping.

7. Exterior coatings that are removed or damaged during sleeve installation or the tapping process shall be replaced. Epoxy coatings shall be replaced with 3M Scotchkote 323 liquid epoxy or approved equal. Bituminous coatings shall be replaced with rubberized undercoat.

8. Valves used for hot tapping shall be either resilient wedge gate valves or valves specifically designed for hot taps, and shall be approved by the City Engineer.

				CITY OF SHASTA LAKE Public Works Department	Approved: 09-30-2023 City Engineer Date
				STANDARD DRAWING	
				MAIN LINE HOT TAPS	Date: 09/2023 Dwg No.: 400.50 Scale: None
REVISION	BY	APPROVED	DATE		

ABANDONING WATER MAINS AND SERVICES

Generally, existing water main piping (including services) being taken out of service shall be removed and disposed of. Existing water mains shall only be abandoned in place if specifically shown on the Plans or approved by the City Engineer.

Pipelines shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended pipe abandonment. All existing gate valves on the pipeline being abandoned shall be closed AFTER the existing main is abandoned. The ends of pipelines being abandoned in place shall be securely closed by a tight-fitting mechanical plug, or a plug poured out of either structural concrete or slurry cement. At the direction of the Engineer, abandoned pipe which may be subjected to surge pressure shall be blind flanged and thrust blocked instead of plugged.

All unused water service(s) to a property that is to be developed or redeveloped shall be abandoned and either completely removed or plugged at the main and abandoned in place as approved by the City Engineer.

Services that are to be abandoned in place shall be disconnected from the water main. If the service was made via saddle, the Contractor shall remove the corporation stop and replace it with a brass plug. If the service was made via direct main tap, the Contractor shall remove the tap and cover the hole with a full circle repair clamp approved by the City.

The Contractor shall perform all notifications to existing customers that are affected by the shut down of the existing water main during the disconnection of the service(s) (see Page 400.40).

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

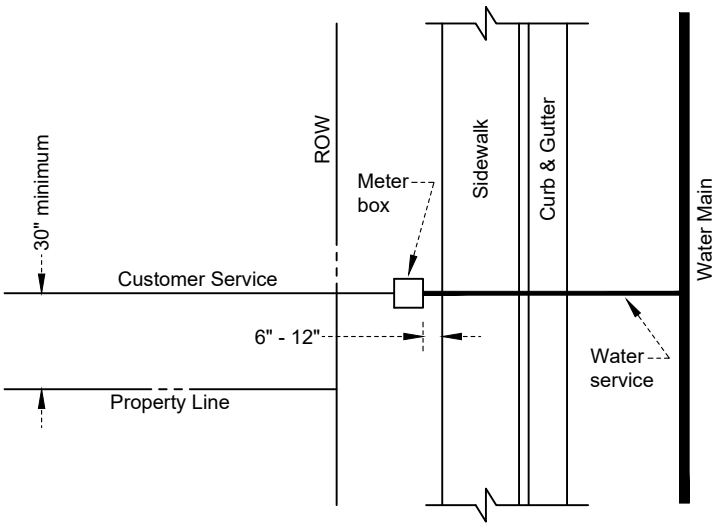
STANDARD DRAWING

ABANDONING WATER MAINS AND SERVICES

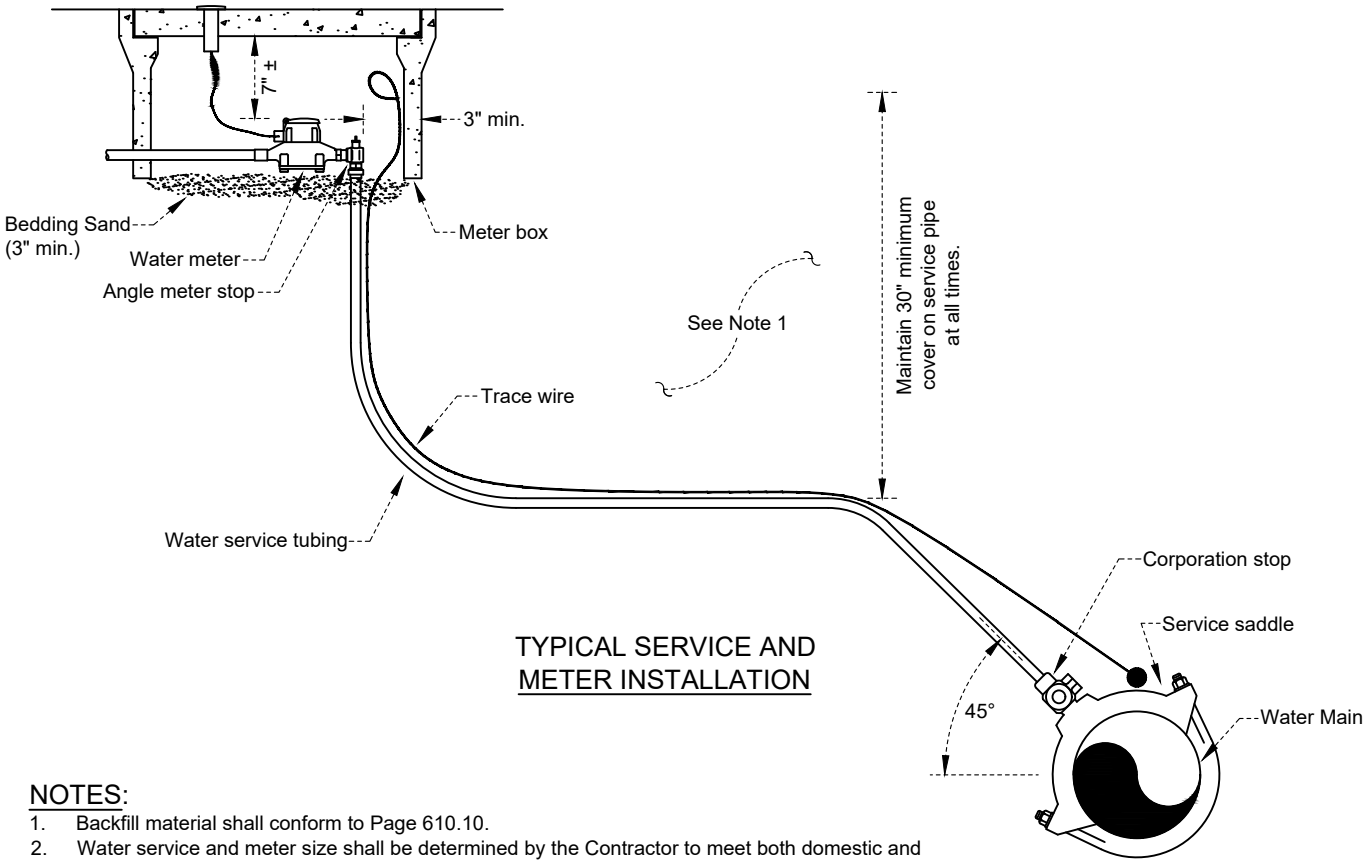
Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 400.60



SERVICE LAYOUT



TYPICAL SERVICE AND METER INSTALLATION

NOTES:

1. Backfill material shall conform to Page 610.10.
2. Water service and meter size shall be determined by the Contractor to meet both domestic and fire service demand at the same time. Minimum water service size shall be 1". Water meter shall be furnished and installed by the City of Shasta Lake.
3. Meter boxes and service piping shall be installed by the Contractor with a minimum horizontal clearance of 30" from all electrical transformers, light standards, and other utility boxes or vaults.
4. 1" and 1 1/2" service taps shall be at a 45° angle from horizontal.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

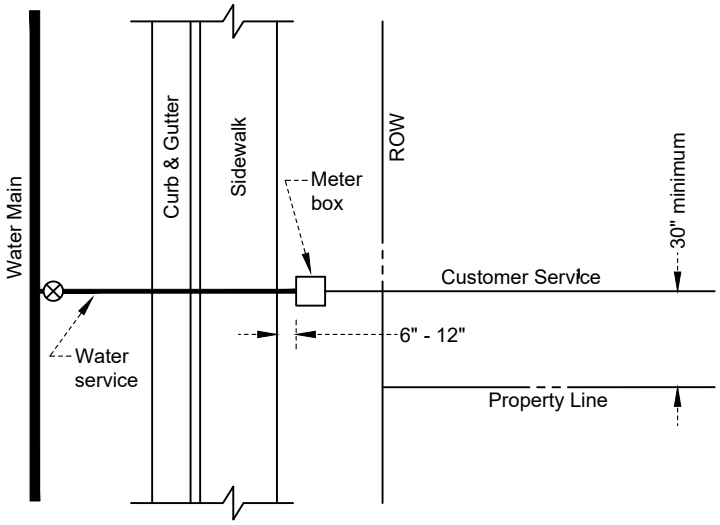
STANDARD DRAWING

WATER SERVICE CONNECTION
SINGLE SERVICE (1" AND 1 1/2")

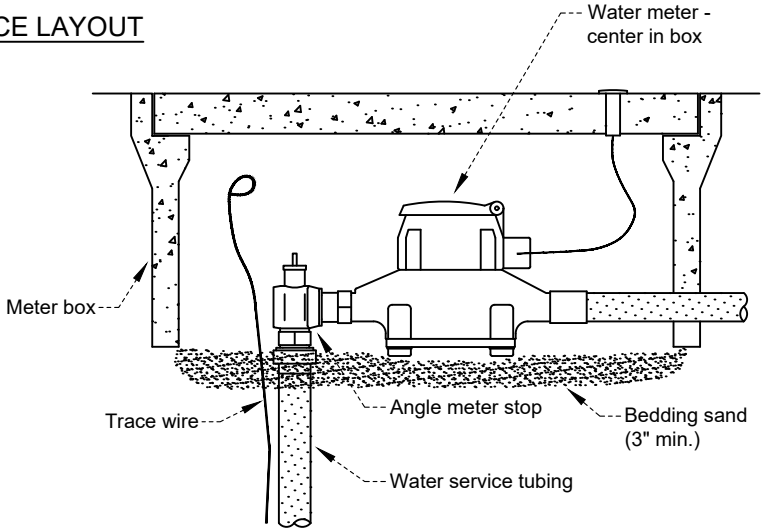
Approved: 09-30-2023
City Engineer Date

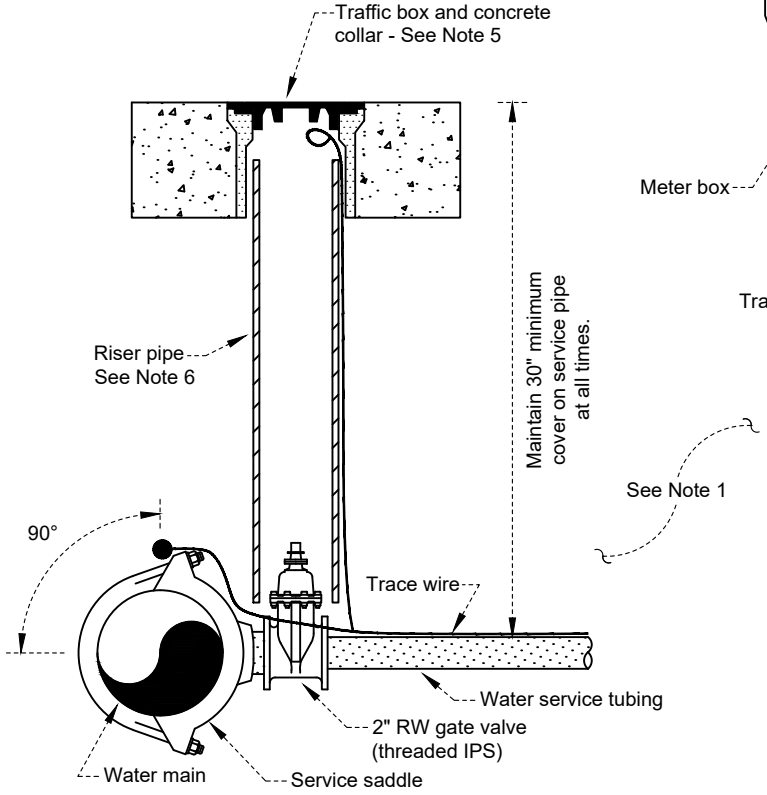
Date: 09/2023
Scale: None

Dwg No.: 401.10



SERVICE LAYOUT





TYPICAL SERVICE AND METER INSTALLATION

NOTES:

1. Backfill materiall shall conform to Page 610.10.
2. Water meter shall be furnished and installed by the City of Shasta Lake.
3. Meter boxes and service piping shall be installed by the Contractor with a minimum horizontal clearance of 30" from all electrical transformers, light standards, and other utility boxes or vaults.
4. 2" service taps shall be installed horizontally.
5. Traffic box and concrete collar installation shall conform with Page 612.10.
6. Riser pipe shall be 8" PVC SDR35. Trace wire shall be run on the OUTSIDE of the riser pipe.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

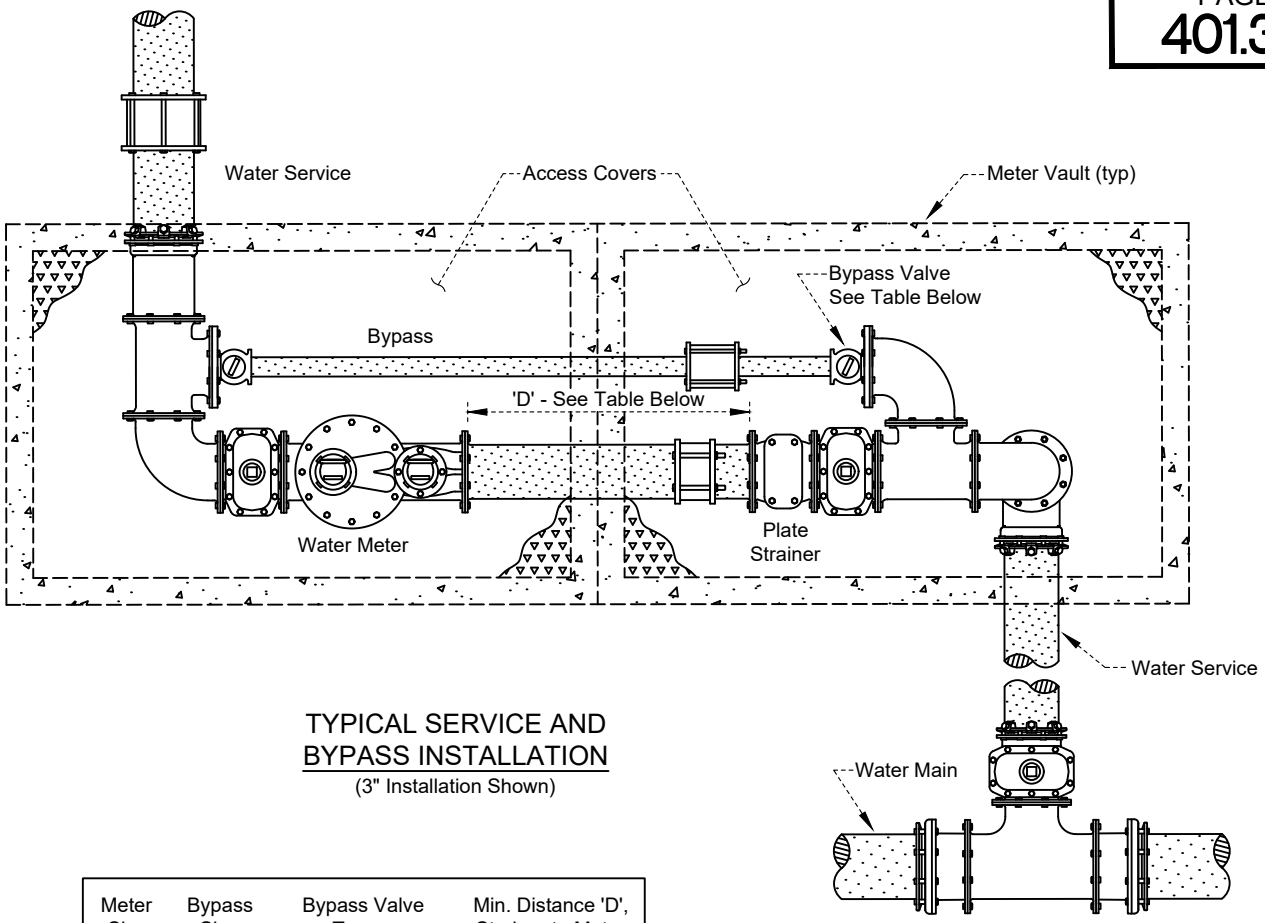
STANDARD DRAWING

WATER SERVICE CONNECTION
SINGLE SERVICE (2")

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 401.20



TYPICAL SERVICE AND
BYPASS INSTALLATION
(3" Installation Shown)

Meter Size	Bypass Size	Bypass Valve Type	Min. Distance 'D', Strainer to Meter
3"	2"	Locking Curb Stop	15"
4"	4"	RWGV	20"
6"	4"	RWGV	30"
8"	6"	RWGV	40"
10"	8"	RWGV	50"

NOTES:

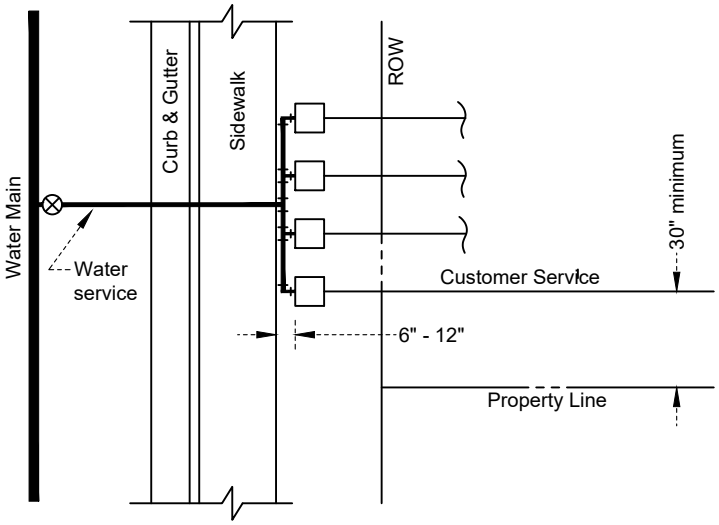
1. Backfill material shall conform to Page 610.10.
2. Vault drainage shall be provided by the Contractor.
3. Water service and meter size shall be determined by the Contractor. Water meter shall be furnished and installed by the City of Shasta Lake.
4. Meter vaults and service piping shall be installed by the Contractor with a minimum horizontal clearance of 30" from all electrical transformers, light standards, and other utility boxes or vaults.
5. Meter vault size shall be sufficient to enclose main service, bypass, and all components, and shall be approved by the City Engineer.
6. The maximum distance between the access vault lid and the top of the meter shall be 24"
7. Access covers shall provide direct access to all components for maintenance purposes. Covers shall be aluminum (non-traffic areas) or stainless steel (traffic areas), shall include lifting handles, slam locks, spring assist, and hold open latches, and shall be Halliday Products, Bilco, or approved equal.
8. Where power is available and where approved by the City Engineer, magnetic flow meters may be used for meters 8" and larger.

REVISION	BY	APPROVED	DATE

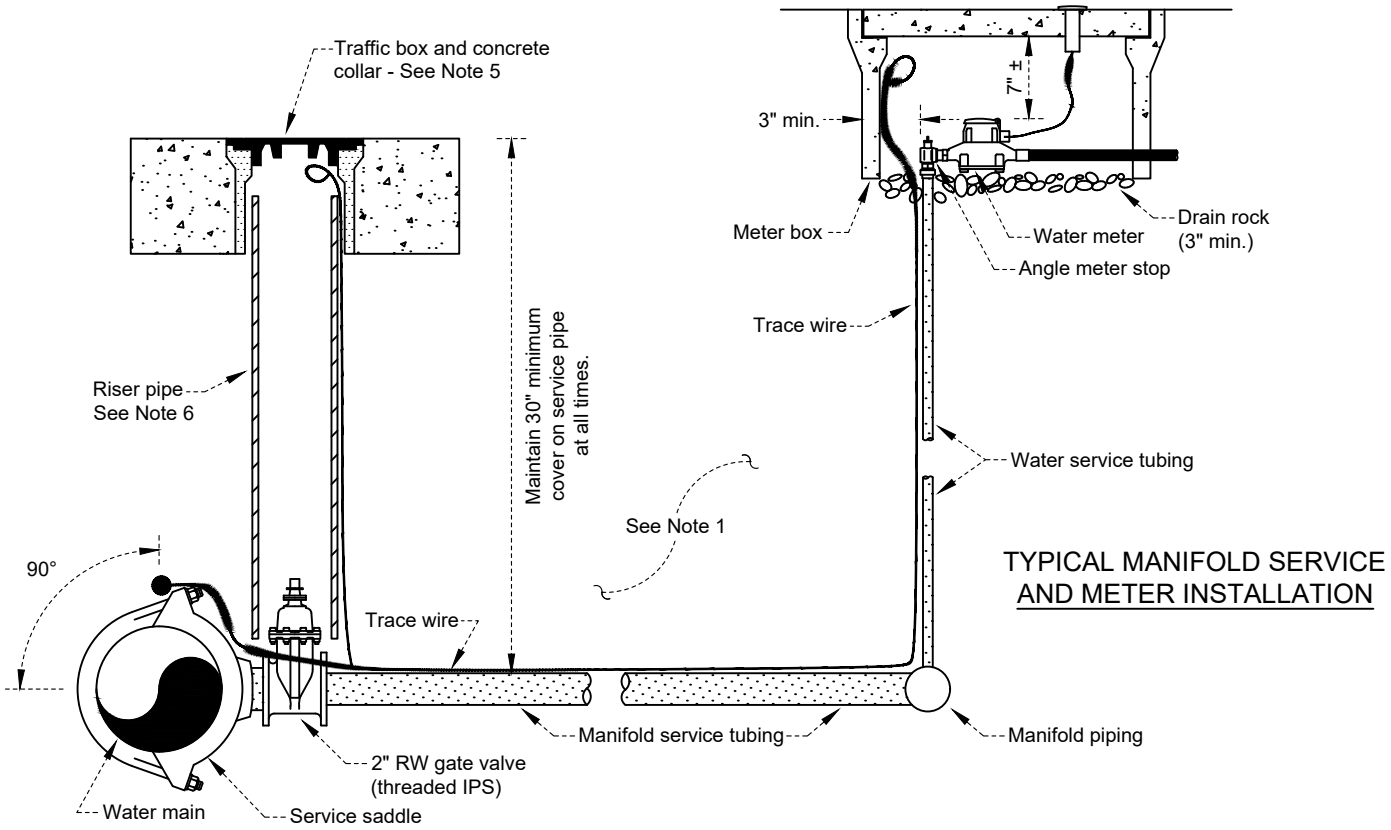
CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
WATER SERVICE CONNECTION
METER DETAIL - 3" AND LARGER

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None
Dwg No.: 401.30



MANIFOLD SERVICE LAYOUT



TYPICAL MANIFOLD SERVICE AND METER INSTALLATION

NOTES:

1. Backfill material shall conform to Page 610.10.
2. Manifold service tubing and manifold piping shall be 2" minimum, and manifold service and piping shall be the same size. Water services shall be 1" minimum. Water service and meter size shall be determined by the Contractor to meet both domestic and fire service demand at the same time. Water meter shall be furnished and installed by the City of Shasta Lake.
3. Meter boxes and service piping shall be installed by the Contractor with a minimum horizontal clearance of 30" from all electrical transformers, light standards, and other utility boxes or vaults.
4. 2" service taps shall be installed horizontally.
5. Manifolds shall be limited to four services.
5. Traffic box and concrete collar installation shall conform with Page 612.10.
6. Riser pipe shall be 8" PVC SDR35. Trace wire shall be run on the OUTSIDE of the riser pipe.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

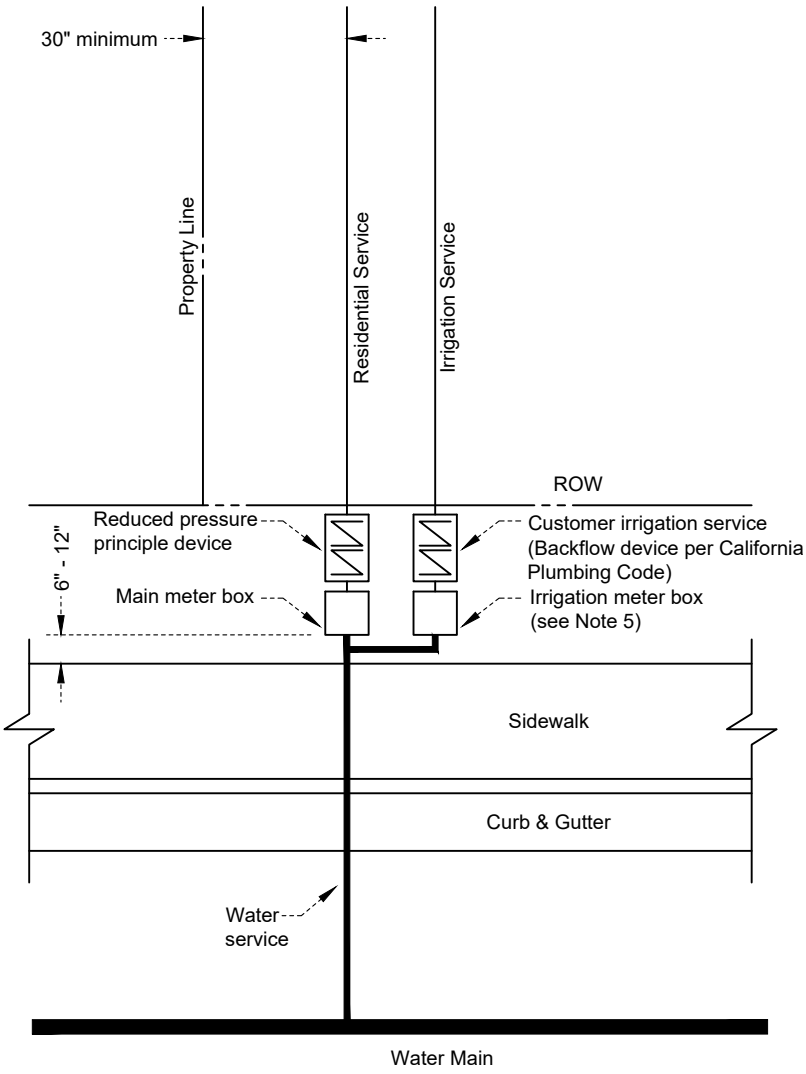
STANDARD DRAWING

WATER SERVICE CONNECTION
MANIFOLD SERVICE

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 401.40



NOTES:

1. Water service shall be installed per Page 401.10.
2. Residential water service and meter size shall be determined by the Contractor to meet both domestic and fire service demand at the same time, taking into account anticipated irrigation demand. Minimum water service size shall be 1". All water meters shall be furnished and installed by the City of Shasta Lake.
3. Meter boxes and service piping shall be installed by the Contractor with a minimum horizontal clearance of 30" from all electrical transformers, light standards, and other utility boxes or vaults.
4. An approved reduced pressure principle device shall be located as close as practical (within 3') to the back of the residental water meter box.
5. Irrigation meter shall be located adjacent to the residential water meter as shown.
6. The irrigation meter size shall be equal to or less than the residential water meter.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

NON-RESIDENTIAL
IRRIGATION SUB-METER

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 401.50

HORIZONAL BENDS, DEAD ENDS, AND INLINE VALVES

Pipe Size	11¼° Bend	22½° Bend	45° Bend	90° Bend	Dead End & Inline Valve
3"	2'	3'	6'	13'	39'
4"	2'	3'	6'	14'	43'
6"	2'	4'	8'	19'	60'
8"	3'	5'	11'	25'	79'
10"	3'	6'	13'	30'	94'
12"	4'	7'	15'	35'	111'
14"	4'	8'	17'	40'	129'
16"	5'	9'	18'	44'	143'
18"	5'	10'	20'	48'	158'

Required Length of Restrained Pipe

Required Length of Restrained Pipe

REDUCERS

	3"	4"	6"	8"	10"	12"	14"	16"	18"
3"	--	14'	40'	64'	82'	101'	121'	135'	151'
4"	14'	--	31'	57'	77'	96'	117'	132'	148'
6"	40'	31'	--	33'	58'	81'	103'	120'	138'
8"	64'	57'	33'	--	32'	59'	84'	104'	124'
10"	82'	77'	58'	32'	--	33'	62'	85'	107'
12"	101'	96'	81'	59'	33'	--	33'	61'	86'
14"	121'	117'	103'	84'	62'	33'	--	33'	61'
16"	135'	132'	120'	104'	85'	61'	33'	--	32'
18"	151'	148'	138'	124'	107'	86'	61'	32'	--

Required Length of Restrained Pipe

Required Length of Restrained Pipe

TEES

Run Size

Branch Size	3"	4"	6"	8"	10"	12"	14"	16"	18"
3"	1'	1'	1'	1'	1'	1'	1'	1'	1'
4"	1'	1'	1'	1'	1'	1'	1'	1'	1'
6"	18'	2'	1'	1'	1'	1'	1'	1'	1'
8"	46'	35'	13'	1'	1'	1'	1'	1'	1'
10"	68'	59'	42'	25'	6'	1'	1'	1'	1'
12"	90'	82'	68'	53'	38'	22'	8'	1'	1'
14"	111'	104'	92'	79'	66'	52'	40'	22'	6'
16"	127'	121'	110'	100'	88'	77'	66'	51'	38'
18"	143'	139'	129'	120'	110'	100'	90'	77'	65'

Required Length of Restrained Pipe

Required Length of Restrained Pipe

Note: All tee runs shall have 10' minimum restrained length on each side of tee.

NOTES:

1. Joint restraint devices shall be used in lieu of thrust blocking for all pressure main and appurtenance installations unless design conditions require thrust blocking.
2. The restrained lengths listed in the above tables are valid for the following installation conditions:

Soil Classification:	SW (ASTM Std. D2487); Includes well-graded sands and gravelly sands with little or no fines
Trench Type:	Type 5 (ANSI/AWWA C150/A21.50 and AWWA C605)
Test Pressure:	150 psi
Safety Factor:	2 to 1
Depth of Bury:	36" from surface to top of pipe
Pipe Type:	PVC C900

   Where installation conditions do not match those listed above, the required restrained lengths shall recalculated to match the actual site conditions. All revised calculations shall be made with a test pressure of 150 psi minimum and a safety factor of 2 to 1. Revised restrained lengths shall be approved by the City Engineer PRIOR to pipe installation.
3. All restraint fittings shall be factory manufactured and approved for use by the City Engineer PRIOR to pipe installation.
4. All mechanical joint connections at fittings shall be restrained.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

THRUST RESTRAINT LENGTHS
PVC C900 PIPE

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 402.10

HORIZONAL BENDS, DEAD ENDS, AND INLINE VALVES

Pipe Size	11¼° Bend	22½° Bend	45° Bend	90° Bend	Dead End & Inline Valve
3"	1'	2'	4'	10'	22'
4"	2'	3'	5'	12'	27'
6"	2'	4'	7'	16'	38'
8"	3'	5'	9'	21'	49'
10"	3'	5'	11'	25'	59'
12"	3'	6'	12'	29'	70'
14"	4'	7'	14'	33'	79'
16"	4'	8'	16'	37'	89'
18"	4'	8'	17'	41'	98'

Required Length of Restrained Pipe

Required Length of Restrained Pipe

REDUCERS

	3"	4"	6"	8"	10"	12"	14"	16"	18"
3"	--	9'	26'	40'	52'	63'	74'	65'	94'
4"	9'	--	20'	36'	48'	60'	72'	82'	92'
6"	26'	20'	--	21'	37'	51'	63'	75'	86'
8"	40'	36'	21'	--	20'	37'	52'	65'	77'
10"	52'	48'	37'	20'	--	21'	38'	53'	67'
12"	63'	60'	51'	37'	21'	--	21'	38'	53'
14"	74'	72'	63'	52'	38'	21'	--	21'	38'
16"	85'	82'	75'	65'	53'	38'	21'	--	20'
18"	94'	92'	86'	77'	67'	53'	38'	20'	--

Required Length of Restrained Pipe

Required Length of Restrained Pipe

TEES

Run Size

Branch Size	3"	4"	6"	8"	10"	12"	14"	16"	18"
3"	1'	1'	1'	1'	1'	1'	1'	1'	1'
4"	1'	1'	1'	1'	1'	1'	1'	1'	1'
6"	8'	2'	1'	1'	1'	1'	1'	1'	1'
8"	27'	22'	8'	1'	1'	1'	1'	1'	1'
10"	41'	37'	26'	16'	4'	1'	1'	1'	1'
12"	55'	51'	42'	33'	24'	14'	3'	1'	1'
14"	67'	64'	56'	49'	40'	32'	23'	14'	4'
16"	78'	76'	69'	62'	55'	48'	40'	32'	24'
18"	89'	86'	81'	75	68'	62'	55'	48'	41'

Required Length of Restrained Pipe

Required Length of Restrained Pipe

Note: All tee runs shall have 10' minimum restrained length on each side of tee.

NOTES:

1. Joint restraint devices shall be used in lieu of thrust blocking for all pressure main and appurtenance installations unless design conditions require thrust blocking.
2. The restrained lengths listed in the above tables are valid for the following installation conditions:

Soil Classification:	SW (ASTM Std. D2487); Includes well-graded sands and gravelly sands with little or no fines
Trench Type:	Type 5 (ANSI/AWWA C150/A21.50 and AWWA C605)
Test Pressure:	150 psi
Safety Factor:	2 to 1
Depth of Bury:	36" from surface to top of pipe
Pipe Type:	Ductile Iron (non-wrapped)

   Where installation conditions do not match those listed above, the required restrained lengths shall recalculated to match the actual site conditions. All revised calculations shall be made with a test pressure of 150 psi minimum and a safety factor of 2 to 1. Revised restrained lengths shall be approved by the City Engineer PRIOR to pipe installation.
3. All restraint fittings shall be factory manufactured and approved for use by the City Engineer PRIOR to pipe installation.
4. All mechanical joint connections at fittings shall be restrained.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

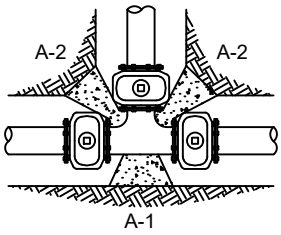
STANDARD DRAWING

THRUST RESTRAINT LENGTHS
DUCTILE IRON PIPE

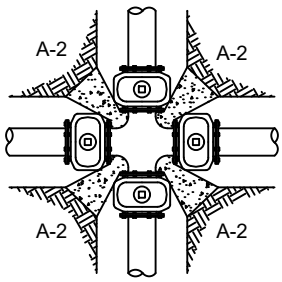
Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

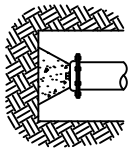
Dwg No.: 402.20



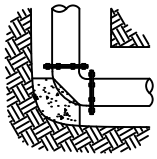
Tee



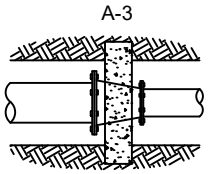
Cross



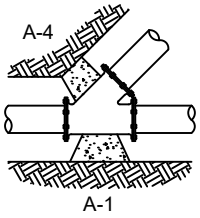
Dead End



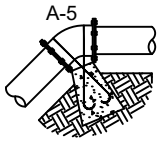
Bend



Straddle Block / Reducer



Wye



Vertical Bend

A-1 See table below.
A-2 See table below.
A-3 Bearing area based on blocking embedded in trench walls.
A-4 Bearing area to match that of 45° bend.
A-5 Tie bars shall be #6 rebar (up to 12" pipe diameter).

Horizontal Bearing Area of Thrust Blocks in Square Feet									Vertical Volume of Thrust Blocks in Cubic Yards			
FITTING SIZE	TEE, CROSS		VALVE, DEAD END, WYE, HYDRANT	STRADDLE BLOCK	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
	A-1	A-2										
4	1.9	1.4	1.0	1.6	1.4	1.0	---	---	---	---	---	---
6	4.3	3.0	2.1	3.7	3.0	1.6	1.0	---	1.3	---	---	---
8	7.6	5.4	3.8	6.5	5.3	2.9	1.5	1.0	2.3	1.1	---	---
10	11.8	8.4	5.9	10.2	8.4	4.6	2.4	1.2	3.7	1.8	---	---
12	17.0	12.0	8.5	14.7	12.0	6.6	3.4	1.7	5.5	2.8	1.2	---

NOTES:

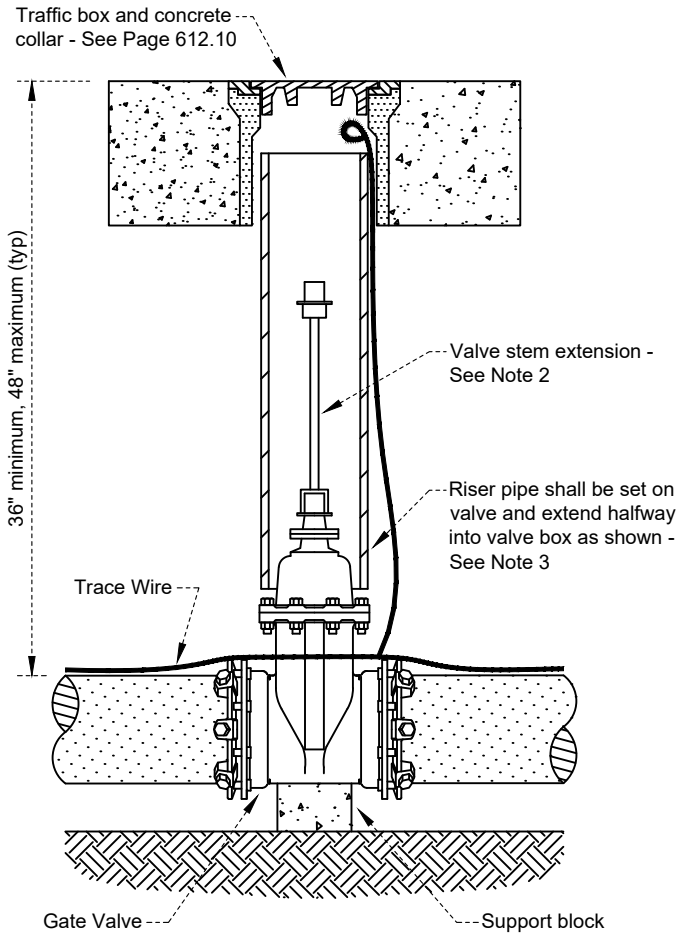
1. Concrete shall conform to Page 100.00.
2. Thrust blocking shall be poured against undisturbed earth, and shall be kept clear of all joints and appurtenances.
3. Tie rods shall be deformed galvanized cold rolled steel rebar, 40 ksi tensile strength.
4. Above horizontal bearing areas based on a test pressure of 150 psi and an allowable soil bearing stress of 2000 lbs/SF.
   To compute bearing areas for different test pressures and soil bearing stresses, use the following equation:
   Bearing Area = (Test Pressure / 150) x (2000 / Soil Bearing Stress) x Table Value
5. Above vertical volumes based on test pressure of 150 psi and a unit weight of concrete of 4050 lbs per cubic yard.
   To compute bearing areas for different test pressures and soil bearing stresses, use the following equation:
   Volume = (Test Pressure / 150) x Table Value
6. Per Page 402.10 and 402.20, all mechanical joints shall be restrained.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
THRUST BLOCKS
AND ANCHOR DETAILS

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None
Dwg No.: 403.00



NOTES:

1. Backfill material shall conform to Page 610.10.
2. Valve stem extension shall be required when the valve operating nut is more than 4' below finished grade. When an extension is required, the minimum length shall be 2' and it shall bring the top operating nut within 2' of finished grade.
3. Riser pipe shall be 8" PVC SDR35.
4. Trace wire shall be run on the OUTSIDE of the riser pipe and shall conform to Page 608.00.
5. Per Page 402.10 and 402.20, all mechanical joints shall be restrained.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

WATER VALVE DETAIL

Approved:

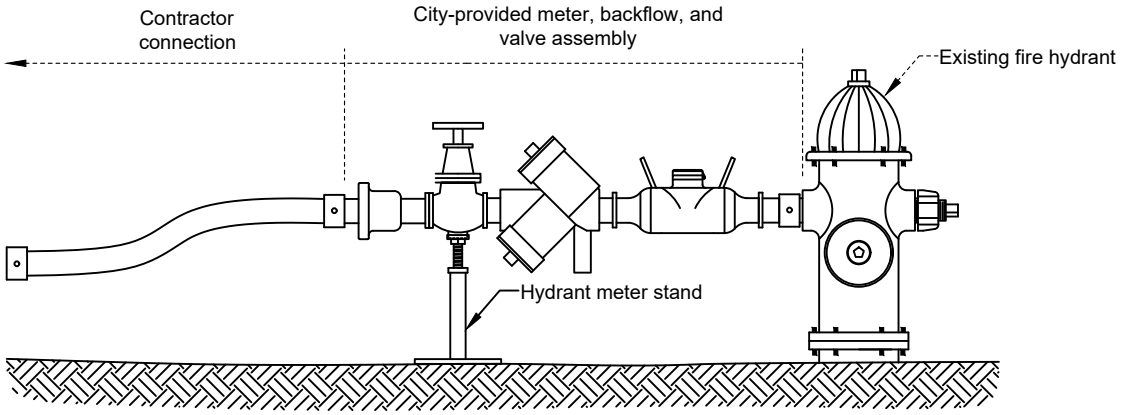
09-30-2023

City Engineer Date

Date: 09/2023

Scale: None

Dwg No.: 404.00

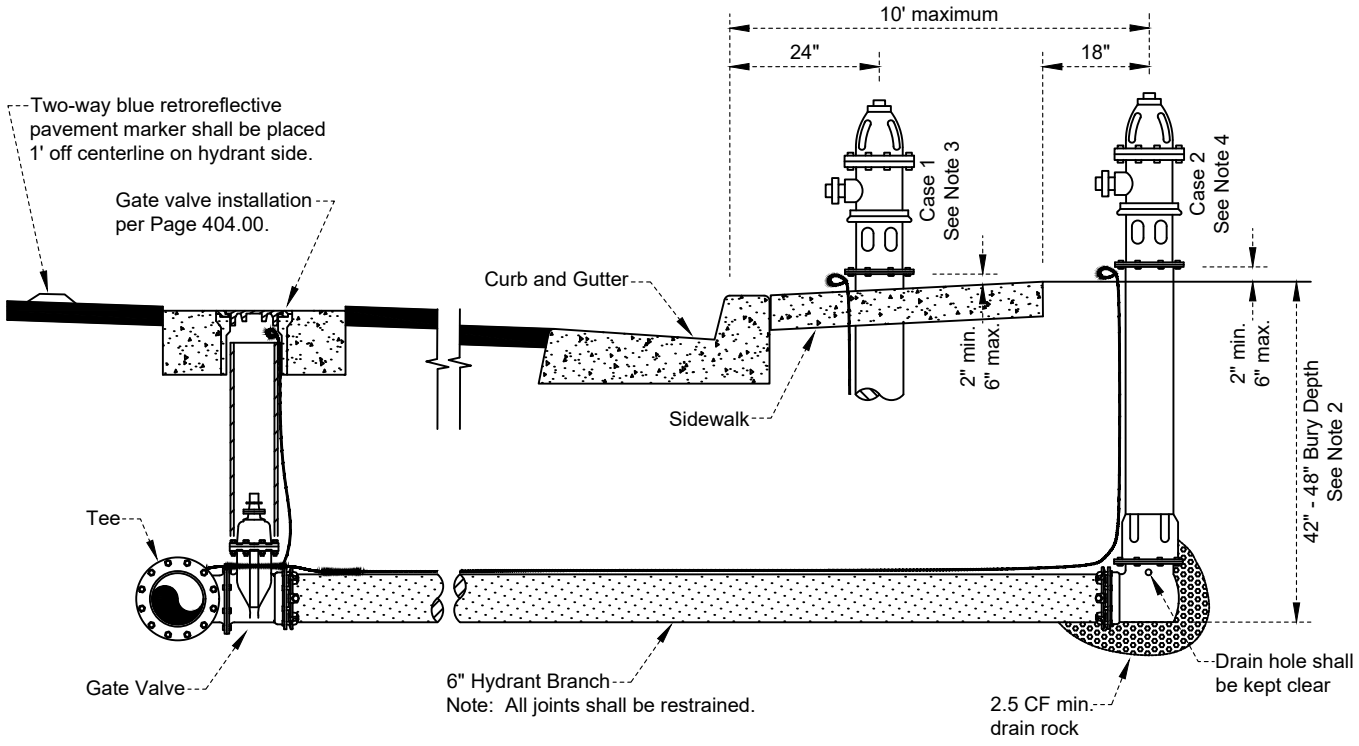


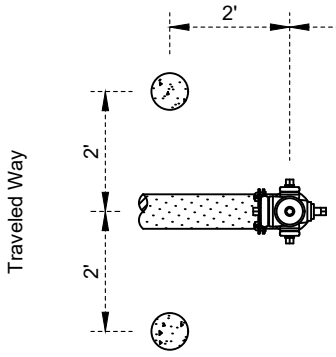
TEMPORARY WATER CONNECTION
FROM EXISTING FIRE HYDRANT

NOTES:

1. All connections to the City of Shasta Lake water distribution system for construction water purposes (including filling and flushing of new water mains) shall require the installation of a meter and backflow prevention assembly provided by the City. Filling an untested or unapproved pipeline by opening gate valves connected to the City water system is not allowed.
2. The Contractor shall contact the City of Shasta Lake Public Works Department for current deposit and usage costs. Hydrant meter applications can be obtained at City Hall, 4477 Main Street, Shasta Lake, California 96019, 530.275.7400.
3. Hydrants shall be operated by City personnel. Contractors shall utilize the shutoff valve provided by the City to operate the system.
4. Prior to placing new water mains into service, the new mains shall have passed hydrostatic pressure and bacteriological testing and have been approved for connection by the City.
5. Any final system tie-in components shall be cleaned and chlorinated prior to installation in the presence of City personnel.

				CITY OF SHASTA LAKE Public Works Department	Approved: 09-30-2023 City Engineer Date
				STANDARD DRAWING	
1	BA	W.Bond	11/25	TEMPORARY HYDRANT CONNECTION	Date: 09/2023 Dwg No.: 405.00
REVISION	BY	APPROVED	DATE		Scale: None





BOLLARD INSTALLATION DETAIL
See Note 7

NOTES:

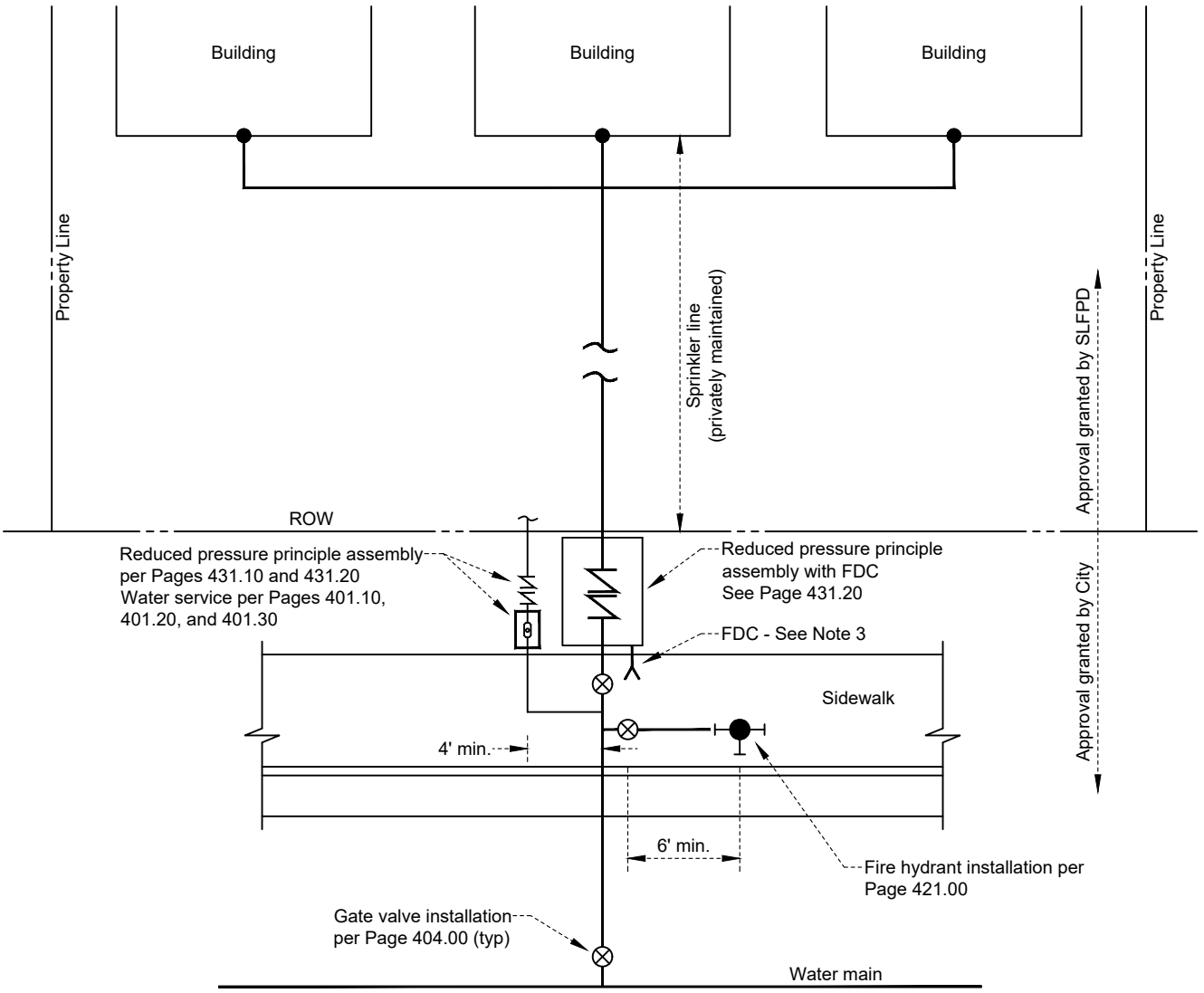
1. Backfill material shall conform to Page 610.10.
2. Hydrant bury depth may vary with prior approval of the City Engineer.
3. Case 1 installation: Hydrant location for residential areas with planter strips or commercial and industrial areas where sidewalk width is greater than 7'.
4. Case 2 installation: Hydrant location for new residential construction or commercial and industrial areas where sidewalk width is less than 7'.
5. A minimum radius of 3' around fire hydrants shall be clear of all vaults, cabinets, street lights, vegetation, and other obstructions per Uniform Fire Code section 10.206.
6. No parallel underground utility shall be located within 4' of the fire service pipeline.
7. Bollards shall be installed as shown when hydrants are installed adjacent to the traveled way and no curb exists. Bollards shall conform to Page 670.00.
8. Hydrants shall be covered with an approved 'out-of-service' bag until accepted and placed into service.
9. Centerline markers shall conform to Page 100.00.
10. Trace wire shall conform to Page 608.00.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
FIRE HYDRANT INSTALLATION

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None
Dwg No.: 421.00



CASE 1
(fire service with
sprinkler system only)

NOTES:

1. Backfill material shall conform to Page 610.10.
2. Fire service pipeline shall be 6" diameter minimum.
3. Fire Department Connections (FDC) shall be 'FM' or 'UL' listed.
4. Distance between FDC and fire hydrant shall be 40 feet maximum unless otherwise approved by the Shasta Lake Fire Protection District (SLFPD).
5. When valves are required on fire service lines, indicator type valves shall be 'FM' or 'UL' listed and shall be approved both by the City Engineer and the SLFPD.
6. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the SLFPD.
7. Locating wire shall be installed on all pipelines.

REVISION	BY	APPROVED	DATE

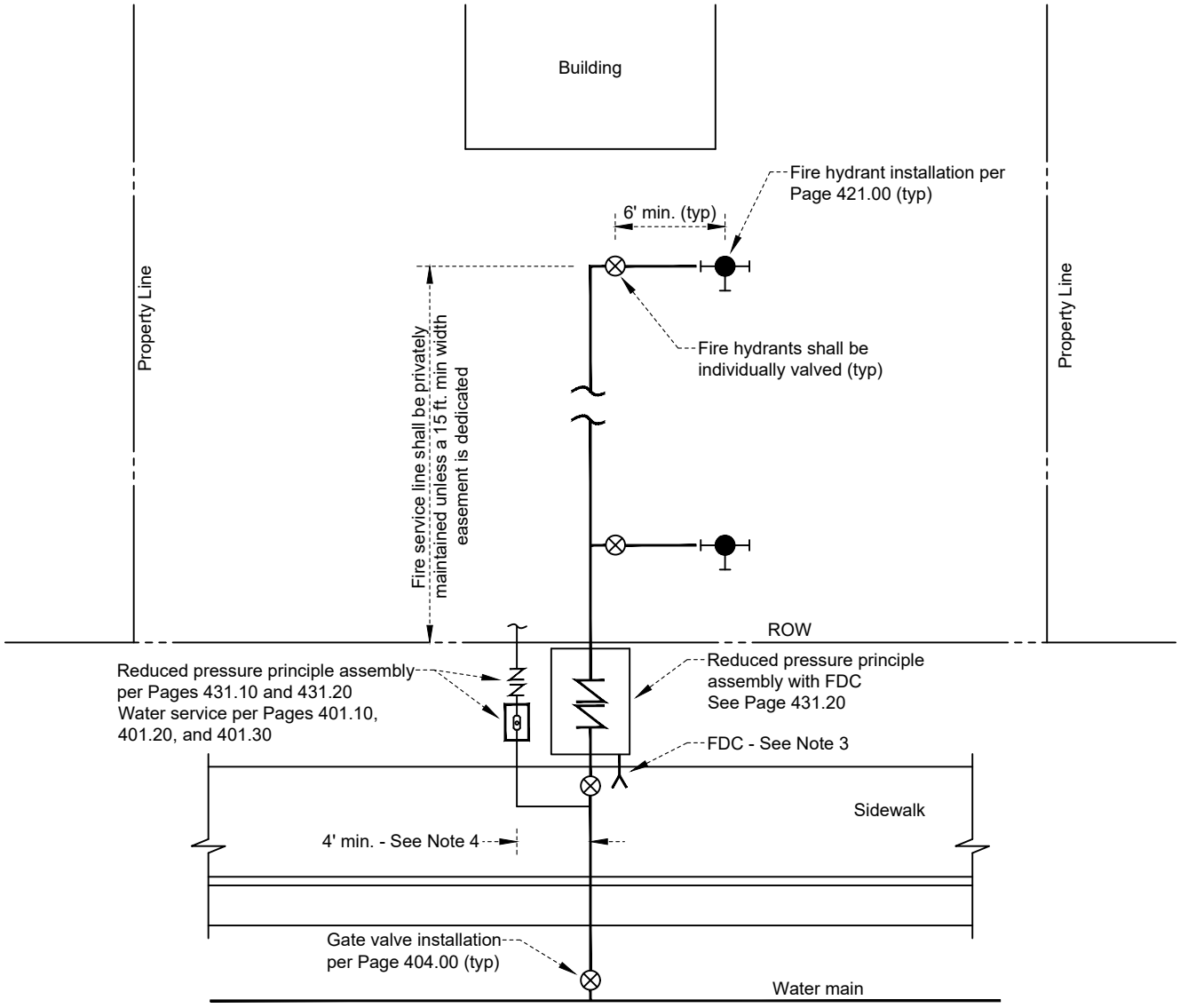
CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

CASE 1 FIRE SERVICE
(Typical)

Approved:
City Engineer — Date: 09-30-2023

Date: 09/2023
Scale: None
Dwg No.: 422.10



CASE 2
(fire service with hydrants only)

NOTES:

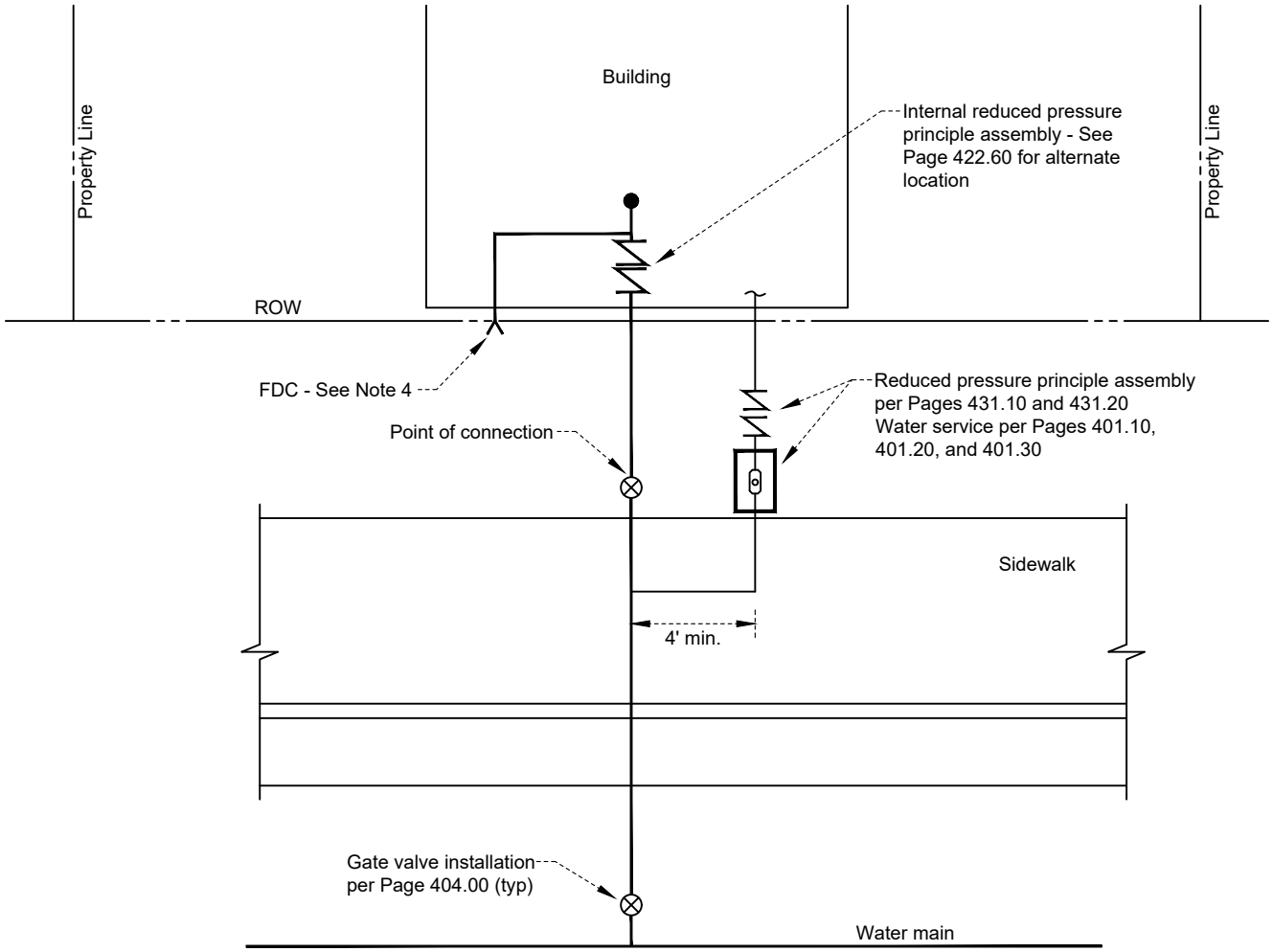
1. Backfill material shall conform to Page 610.10.
2. Fire service pipeline shall be 6" diameter minimum.
3. Fire Department Connections (FDC) shall be 'FM' or 'UL' listed.
4. Domestic services shall be outside of the fire service easement (when provided).
5. When valves are required on fire service lines, indicator type valves shall be 'FM' or 'UL' listed and shall be approved both by the City Engineer and the SLFPD.
6. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the SLFPD.
7. Locating wire shall be installed on all pipelines.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
CASE 2 FIRE SERVICE
(Typical)

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None
Dwg No.: 422.20



CASE 3
(fire service with
hydrants at internal location)

NOTES:

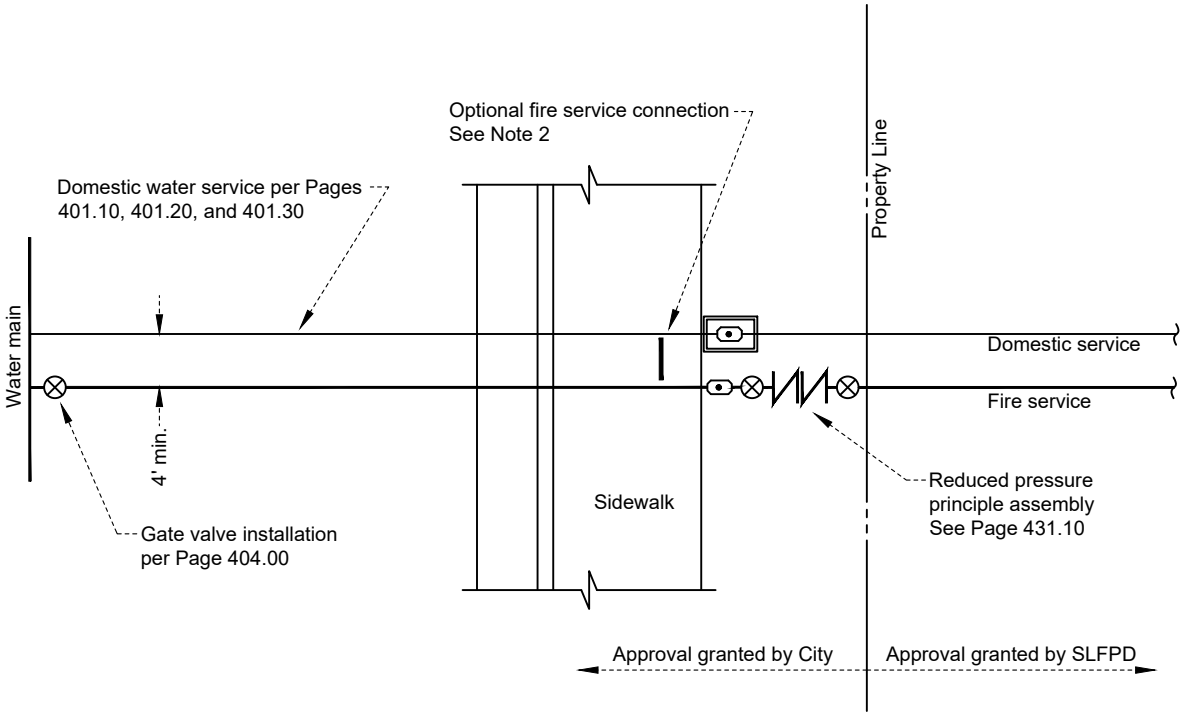
1. Backfill material shall conform to Page 610.10.
2. Fire service pipeline shall be 6" diameter minimum.
3. Internal location for RPP shall only be allowed with prior written approval from the Shasta Lake Fire Protection District (SLFPD)
4. Fire Department Connections (FDC) shall be 'FM' or 'UL' listed.
5. When valves are required on fire service lines, indicator type valves shall be 'FM' or 'UL' listed and shall be approved both by the City Engineer and the SLFPD.
6. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the SLFPD.
7. Locating wire shall be installed on all pipelines.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
CASE 3 FIRE SERVICE
(non-typical)

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None
Dwg No.: 422.30



NOTES:

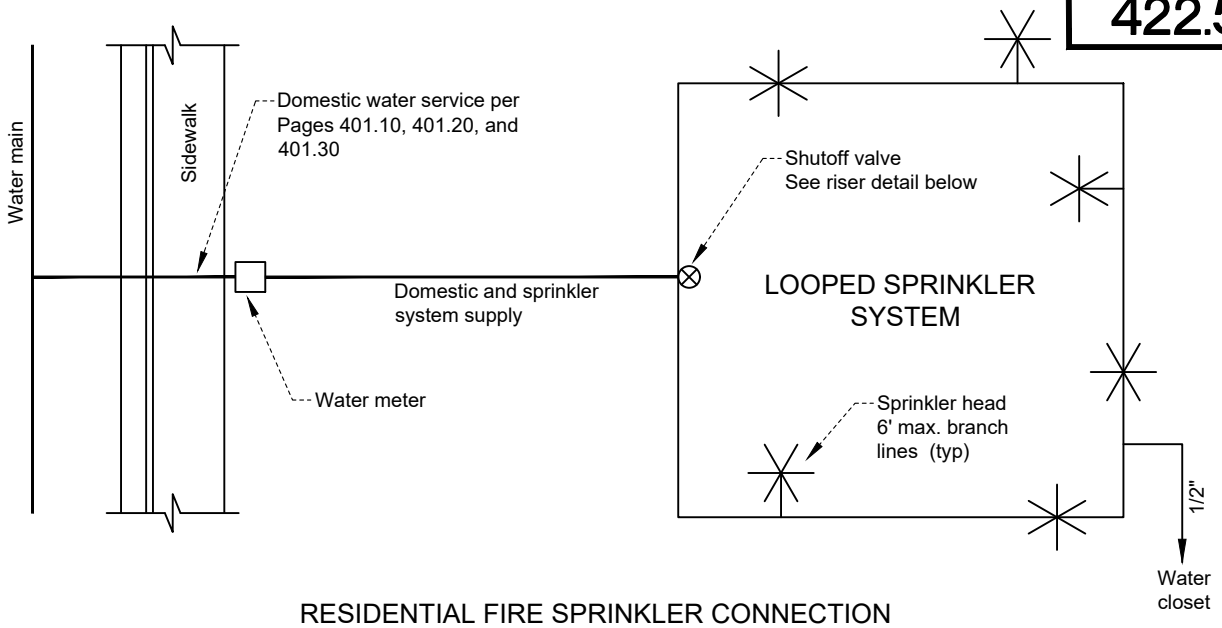
1. Backfill material shall conform to Page 610.10.
2. Where the existing domestic service is smaller than the required fire service, a separate fire service may be installed. A domestic service may be used to provide water for a fire service under the following conditions:
   A. The domestic service shall be 1" minimum and the required fire service shall not be larger than the domestic service.
   B. The fire service tap shall be installed upstream of the domestic water meter.
3. Reduced pressure principle (RPP) assemblies shall be inspected and tested by the City following installation.
4. An area 2' wide on all sides of the RPP enclosure shall be kept free of all vegetative obstructions.
5. When valves are required on fire service lines, indicator type valves shall be 'FM' or 'UL' listed and shall be approved both by the City Engineer and the SLFPD.
6. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the SLFPD.
7. Locating wire shall be installed on all pipelines.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
FIRE SERVICE - NON-TYPICAL
(1", 1 $\frac{1}{2}$", and 2")

Approved:
City Engineer — Date: 09-30-2023

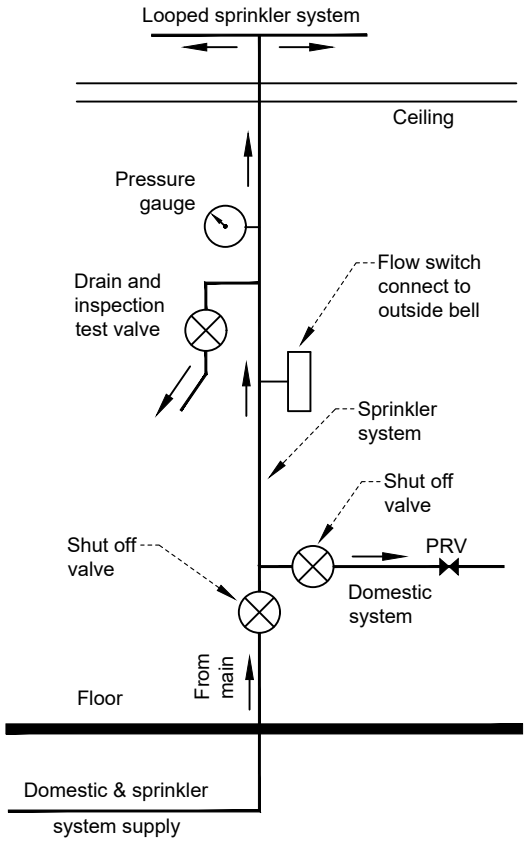
Date: 09/2023
Scale: None
Dwg No.: 422.40



RESIDENTIAL FIRE SPRINKLER CONNECTION

NOTES:

1. Backfill material within City right-of-way shall conform to Page 610.10.
2. All private property construction work shall conform to the Building Code, Plumbing Code, and National Fire Protection Association (NFPA) section 13D.
3. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the Shasta Lake Fire Protection District (SLFPD).
3. A separate fire service shall be installed where the existing domestic service is smaller than the required residential fire flow (see Page 422.40).
4. Reduced pressure principle (RPP) assemblies are not required for a looped system connected to a water closet at the most remote location as approved by the SLFPD.
5. Above grade piping and valves shall be protected with adequate insulation or other measures to prevent freezing.
6. Underground fire sprinkler system piping shall be wrapped with 2" wide detectable metalized warning tape or piped with fire sprinkler CPVC pipe.
7. All piping passing through a slab shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the system pipe.



RISER DETAIL

				CITY OF SHASTA LAKE Public Works Department	Approved: 09-30-2023 City Engineer Date
				STANDARD DRAWING	
				RESIDENTIAL FIRE SERVICES	Date: 09/2023 Dwg No.: 422.50 Scale: None
REVISION	BY	APPROVED	DATE		

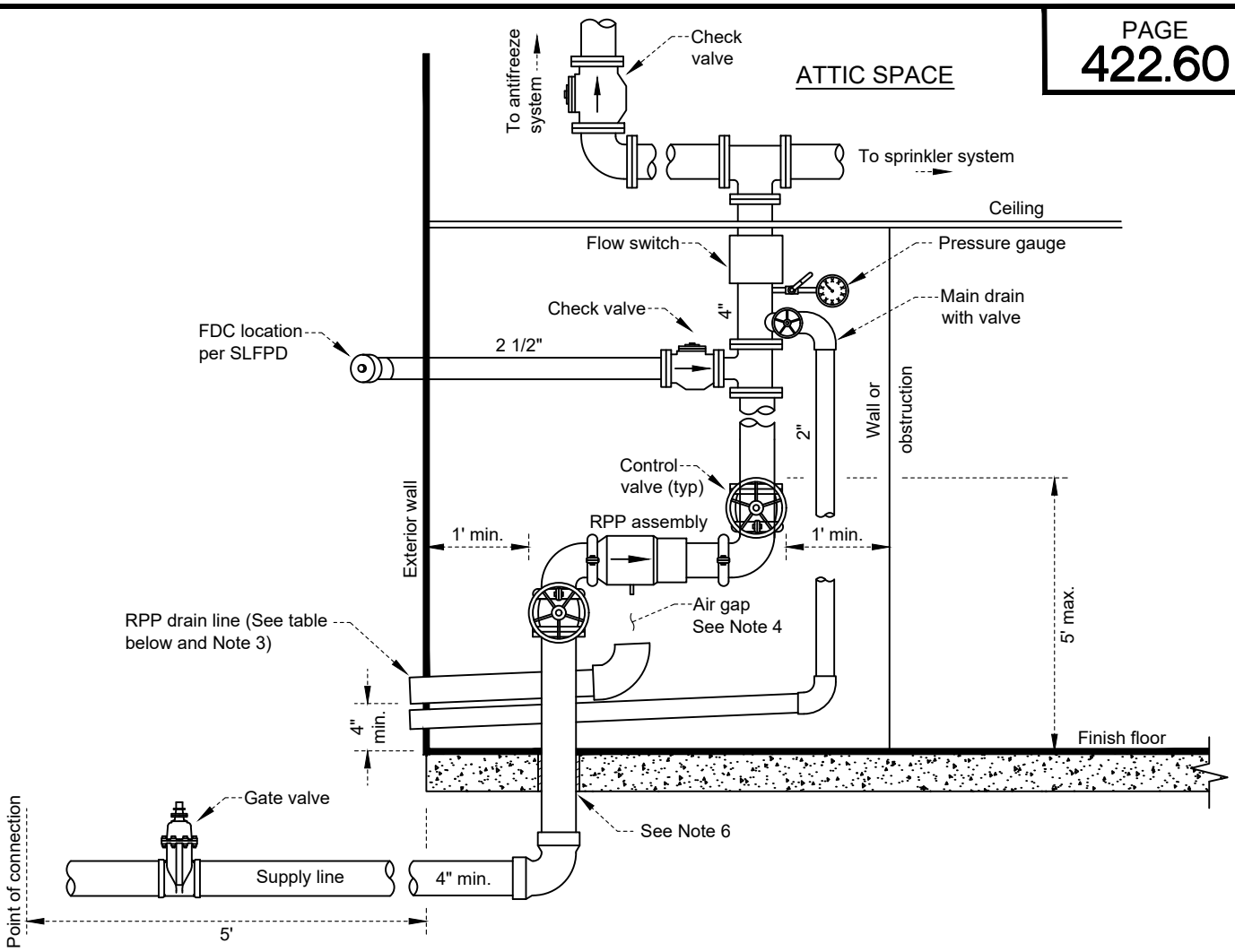


TABLE OF DIMENSIONS				
Supply main (Inches)	Assembly size (Inches)	Drain size (Inches)	Air Gap (Inches)	Install height (Inches)
4"	2"-3"	4"	8"	12"
6"	4"	6"	12"	18"
8"	6"	8"	16"	24"

NOTES:

1. This internal-alternate location shall be used only with prior approval from the City and Shasta Lake Fire Protection District (SLFPD).
2. All private property construction work shall conform to the Building Code, Plumbing Code, and National Fire Protection Association (NFPA) section 13D.
3. Reduced pressure principle (RPP) assemblies shall be inspected and tested by the City following installation. RPP assemblies installed within the confines of a structure shall be located on an exterior wall and shall have a drain to the outside of the structure as shown in this standard. Drain piping shall not be affixed to nor supported by the RPP assembly.
4. RPP assemblies may required tamper switches on the shutoff valves. Contact SLFPD for additional information.
5. An air gap of not less than 2 times the diameter of the supply pipe shall be provided between the relief valve opening and the opening of the drain pipe as shown. A minimum vertical clearance of 1' shall be provided between the relief valve opening and the finished floor.
6. All piping passing through a concrete slab or base shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE

Public Works Department

STANDARD DRAWING

REDUCED PRESSURE PRINCIPLE (RPP) BACKFLOW ASSEMBLY

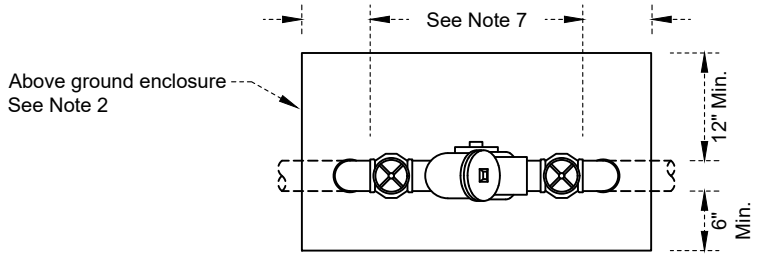
(Internal - Alternate Location)

Approved: 09-30-2023

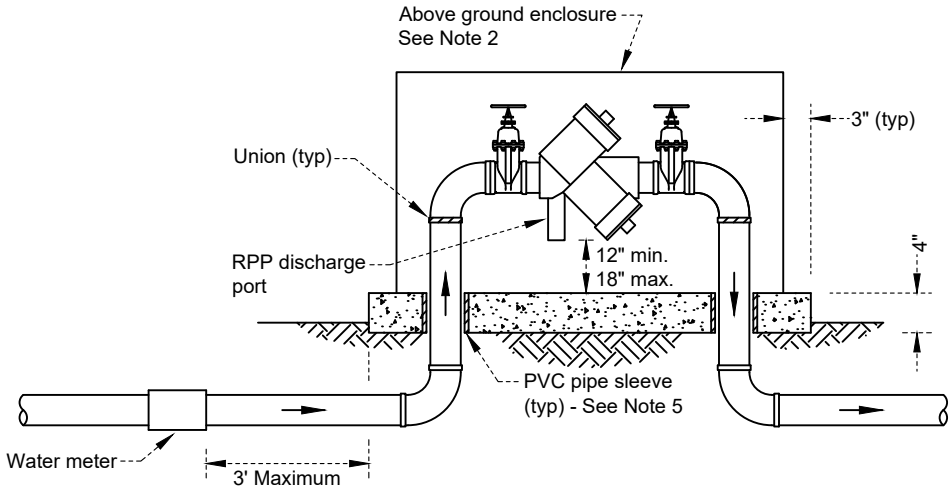
City Engineer Date

Date: 09/2023 Dwg No.: 422.60

Scale: None



CLEARANCE DETAIL



ABOVE GROUND
INSTALLATION

NOTES:

1. All private property construction work shall conform to the Building Code, Plumbing Code, and National Fire Protection Association (NFPA) section 13D.
2. Above ground enclosures are required on all reduced pressure principle (RPP) assemblies per Pages 432.10 through 432.40.
3. No connections of any type shall be made between the water main and the RPP assembly.
4. All above ground piping installations 2" and smaller shall be rigid copper or brass pipe.
5. All piping passing through a concrete slab or base shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.
6. All RPP assemblies shall be inspected and tested by the City following installation.
7. Riser spacing shall be adequate to allow access for maintenance, testing or removal of RPP assembly.
8. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the Shasta Lake Fire Protection District (SLFPD).

REVISION	BY	APPROVED	DATE

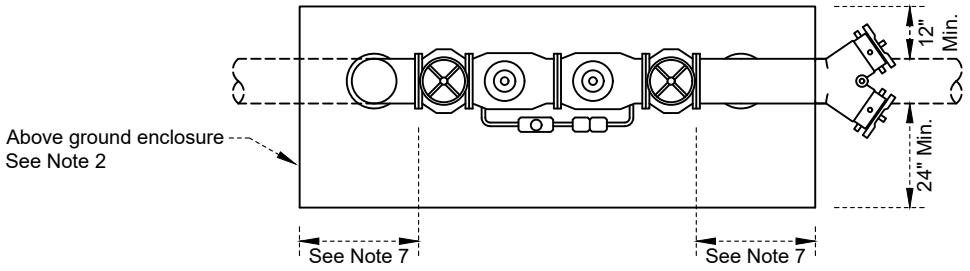
CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING
REDUCED PRESSURE PRINCIPLE (RPP)
BACKFLOW ASSEMBLY
3/4" through 2"

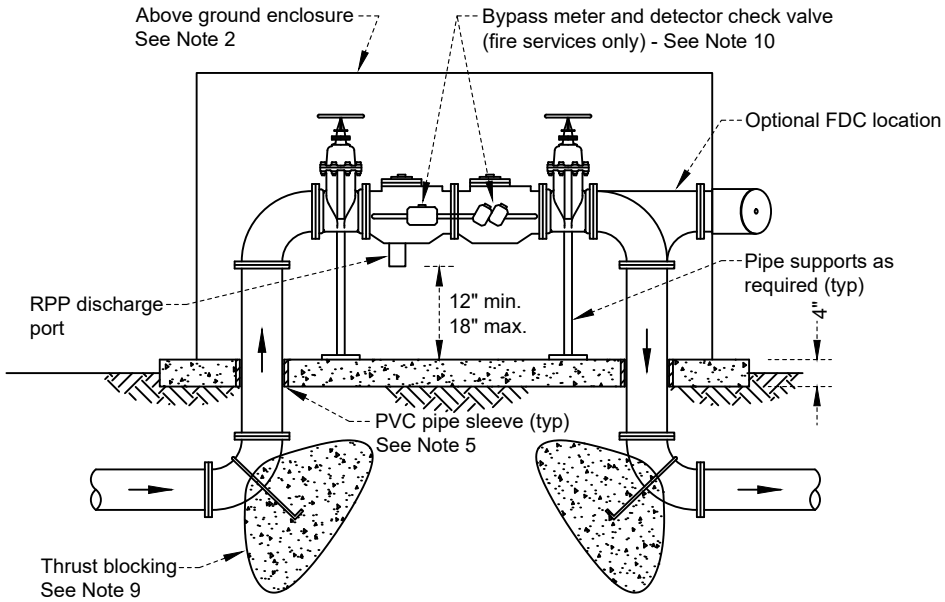
Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.:
431.10



CLEARANCE DETAIL



ABOVE GROUND INSTALLATION

NOTES:

1. All private property construction work shall conform to the Building Code, Plumbing Code, and National Fire Protection Association (NFPA) section 13D.
2. Above ground enclosures are required on all reduced pressure principle (RPP) assemblies per Pages 432.10 through 432.40.
3. No connections of any type shall be made between the water main and the RPP assembly.
4. All above ground piping installations 4" and larger shall be ductile iron with flanged fittings.
5. All piping passing through a concrete slab or base shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.
6. All RPP assemblies shall be inspected and tested by the City following installation.
7. Riser spacing shall be adequate to allow access for maintenance, testing or removal of RPP assembly.
8. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the Shasta Lake Fire Protection District (SLFPD).
9. Thrust blocking shall be installed on all base bends per Page 403.00. In lieu of individual blocking or anchors, the Contractor may also place a continuous concrete block between base bends.
10. Where RPP assemblies are installed on fire services, a bypass line with a detector check valve and meter shall be installed. At the direction of SLFPD, RPP assemblies on fire services may also require tamper switches on the gate valves.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

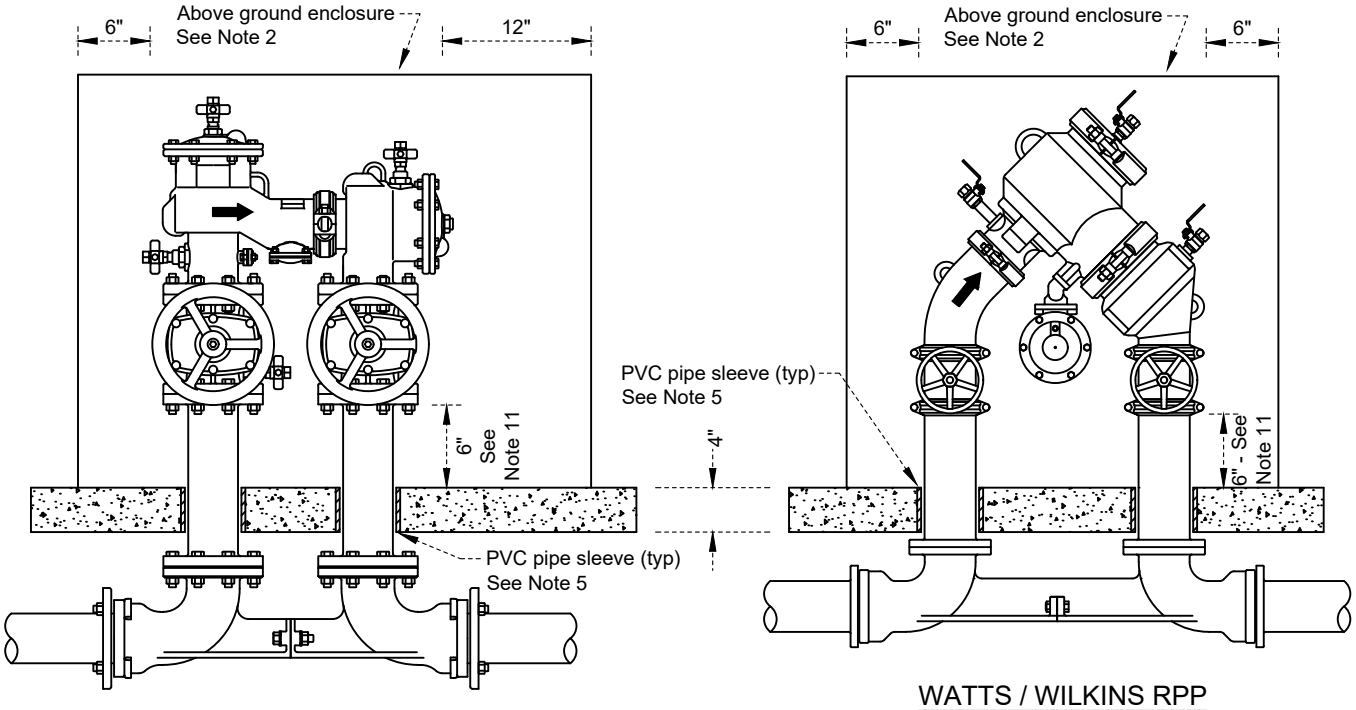
STANDARD DRAWING

REDUCED PRESSURE PRINCIPLE (RPP)
BACKFLOW ASSEMBLY
4" and Larger

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.:
431.20



FEBCO RPP

WATTS / WILKINS RPP

NOTES:

1. All private property construction work shall conform to the Building Code, Plumbing Code, and National Fire Protection Association (NFPA) section 13D.
2. Above ground enclosures are required on all reduced pressure principle (RPP) assemblies per Pages 432.10 through 432.40.
3. No connections of any type shall be made between the water main and the RPP assembly.
4. All above ground piping installations 4" and larger shall be ductile iron with flanged fittings.
5. All piping passing through a concrete slab or base shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.
6. All RPP assemblies shall be inspected and tested by the City following installation.
7. Riser spacing shall be adequate to allow access for maintenance, testing or removal of RPP assembly.
8. Fire service piping and appurtenances shall be inspected within the right-of-way by the City and on private property by the Shasta Lake Fire Protection District (SLFPD).
9. Thrust blocking shall be installed on all base bends per Page 403.00. In lieu of individual blocking or anchors, the Contractor may also place a continuous concrete block between base bends.
10. Where RPP assemblies are installed on fire services, a bypass line with a detector check valve and meter shall be installed. At the direction of SLFPD, RPP assemblies on fire services may also require tamper switches on the gate valves.
11. Valve handles shall be installed exactly 6" above the enclosure concrete base.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

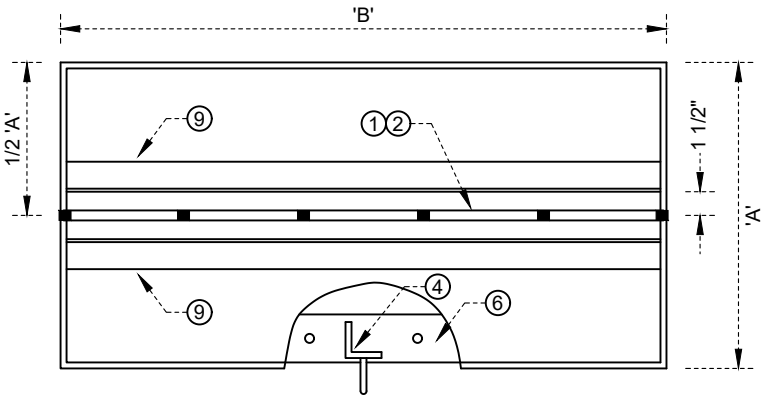
STANDARD DRAWING

BACKFLOW ASSEMBLY - "N" PATTERN
3" through 10"

Approved: 09-30-2023
City Engineer Date

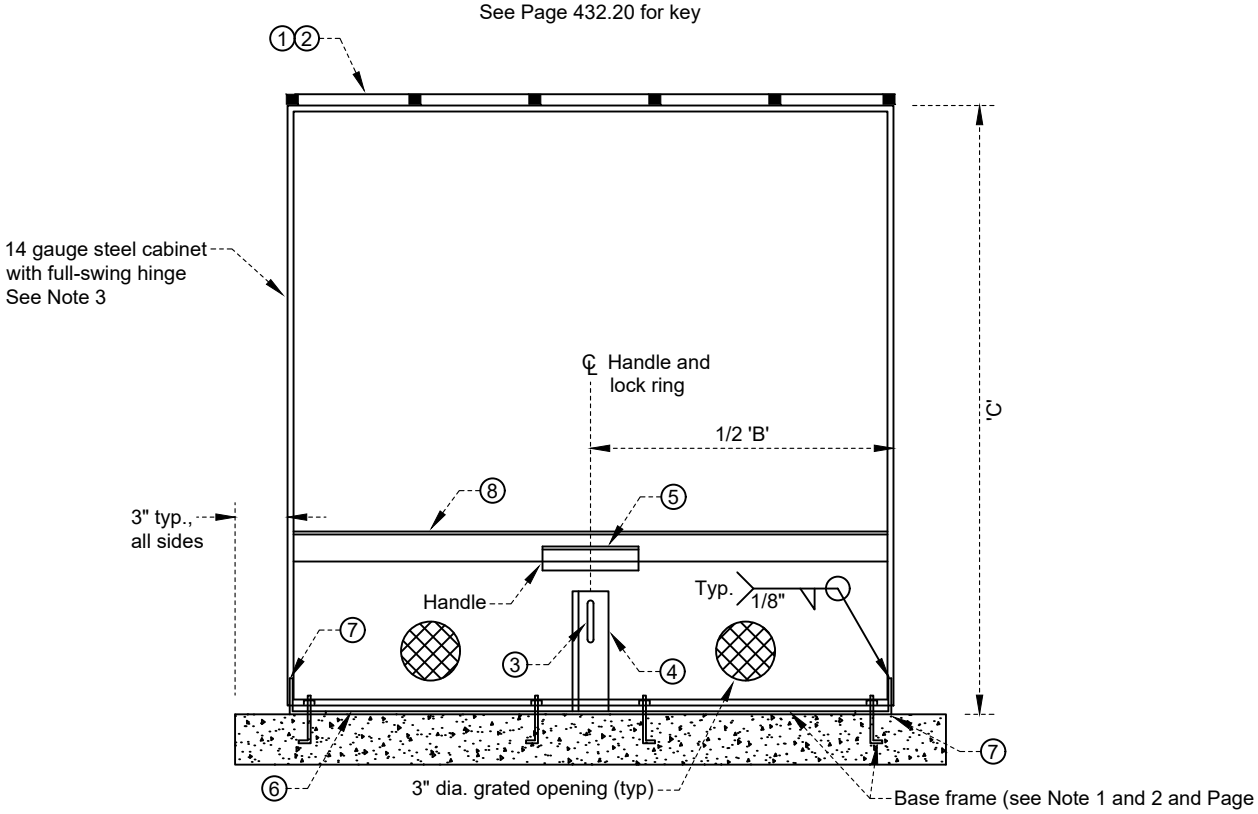
Date: 09/2023
Scale: None

Dwg No.: 431.30



TOP VIEW

See Page 432.20 for key



FRONT VIEW

See Page 432.20 for key

Cabinet Dimensions*			
Dimensions for:	'A'	'B'	'C'
3/4" and 1" Assemblies	12 1/2"	25"	25"
1 1/2" and 2" Assemblies	20 1/2"	32"	32"

* Note: Dimensions may vary to accomodate non-typical fire service assembly installations.

NOTES:

1. Cabinet shall be mounted on a 4" thick concrete slab with 3/8"x4" 'J' bolts (typical of six). Slab shall extend a minimum of 3" beyond cabinet.
2. All piping passing through the concrete slab shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.
3. Cabinet shall be painted with Olive Green powder coat paint inside and out.
4. Backflow assembly enclosures shall meet the manufacturer's specifications for all clearances and provide access for testing and maintenance as required.
5. Cabinet locks shall be provided by the City.

REVISION	BY	APPROVED	DATE

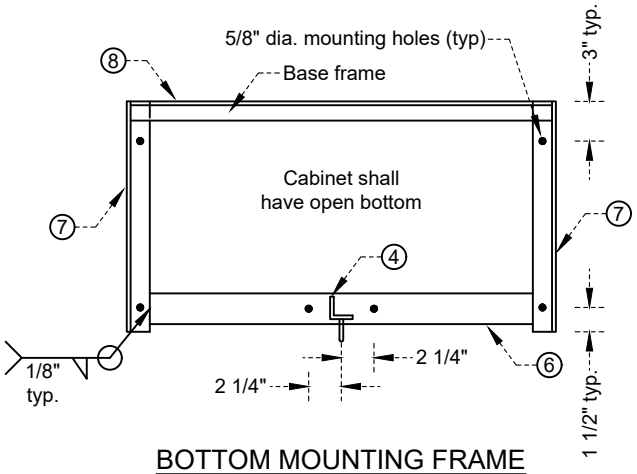
CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

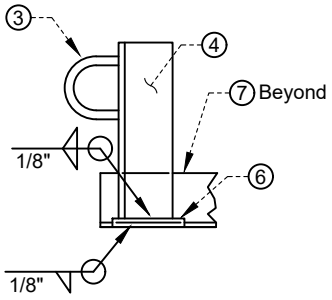
BACKFLOW ASSEMBLY ENCLOSURE
3/4" through 2"

Approved:
City Engineer — Date: 09-30-2023

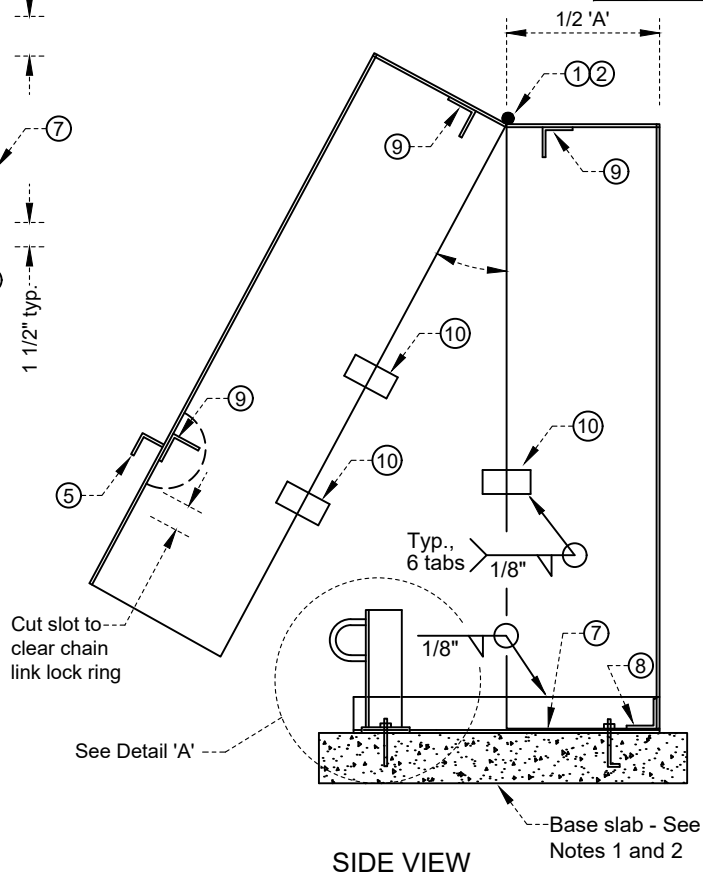
Date: 09/2023
Scale: None
Dwg No.: 432.10



BOTTOM MOUNTING FRAME



DETAIL 'A'



SIDE VIEW

MATERIALS LIST FOR BACKFLOW ASSEMBLY ENCLOSURE				
Item No.	Description	Length per Assembly Size		Qty.
		3/4" & 1"	1 1/2" & 2"	
①	5/16" Cold roll hinge pin	25"	32"	1
②	1/4" Pipe hinge	25"	32"	1
③	1/4" x 1 1/2" x 1 1/2" Chain link	n/a	n/a	1
④	1/4" x 1 1/2" x 1 1/2" Angle	5"	5"	1
⑤	1/8" x 1" x 1" Angle handle	4"	4"	1
⑥	1/4" x 2" Flat bar	22"	29"	1
⑦	1/8" x 1 1/2" x 1 1/2" Angle	12 1/2"	20 1/2"	2
⑧	1/8" x 1 1/4" x 1 1/4" Angle brace	24 3/4"	31 3/4"	1
⑨	1/8" x 1 1/4" x 1 1/4" Angle brace	25"	32"	3
⑩	1/8" x 1" Alignment tabs	2"	2"	6

NOTES:

1. Cabinet shall be mounted on a 4" thick concrete slab with 3/8"x4" 'J' bolts (typical of six). Slab shall extend a minimum of 3" beyond cabinet.
2. All piping passing through the concrete slab shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.
3. Cabinet shall be painted with Olive Green powder coat paint inside and out.
4. Backflow assembly enclosures shall meet the manufacturer's specifications for all clearances and provide access for testing and maintenance as required.
5. Cabinet locks shall be provided by the City.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE

Public Works Department

STANDARD DRAWING

BACKFLOW ASSEMBLY ENCLOSURE
3/4" through 2"

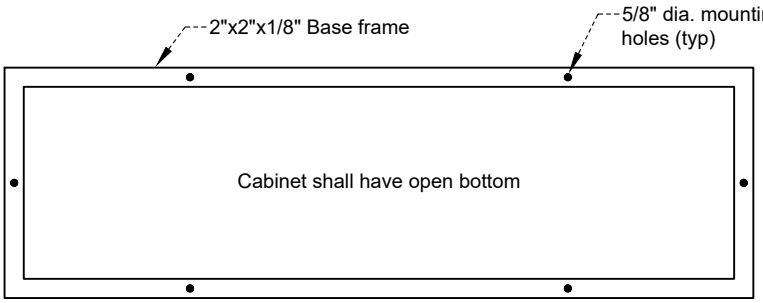
Approved: 09-30-2023

City Engineer Date

Date: 09/2023

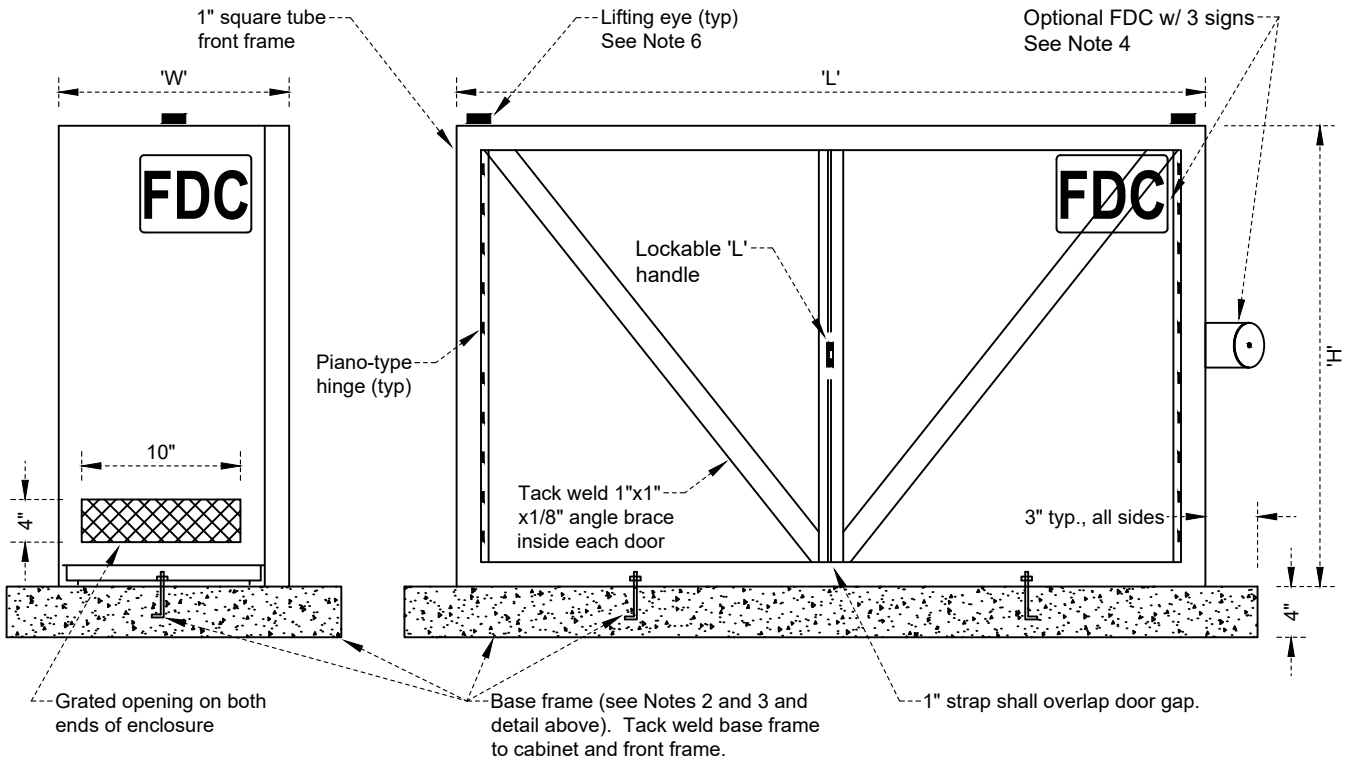
Scale: None

Dwg No.: 432.20



BOTTOM MOUNTING FRAME

CABINET DIMENSIONS			
UNIT SIZE	'L'	'W'	'H'
3" and 4"	78"	24"	52"
6"	96"	24"	60"
8"	108"	30"	69"



LEFT VIEW

FRONT VIEW

NOTES:

1. Cabinet and doors to be 14 Ga. steel painted olive green powder coat paint inside & out. Preferred door opening is on the bypass meter side.
2. Cabinet shall be mounted on a 4" thick concrete slab with 3/8"x4" 'J' bolts (typical of six). Slab shall extend a minimum of 3" beyond cabinet.
3. All piping passing through the concrete slab shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.
4. When a Fire Department Connection (FDC) is included with the backflow assembly, a sign shall be installed on the three (3) sides of the enclosure visible from the street in the upper corner as shown. The signs shall read "FDC" in 6" high red reflective block lettering.
5. Backflow enclosures shall meet the manufacturer's specifications for all clearances and provide access for testing and maintenance as required.
6. Lifting eyes shall be 1/2"-13 UMC nut welded in place. Nuts shall be plugged with bolts after installation.
7. Cabinet locks shall be provided by the City.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

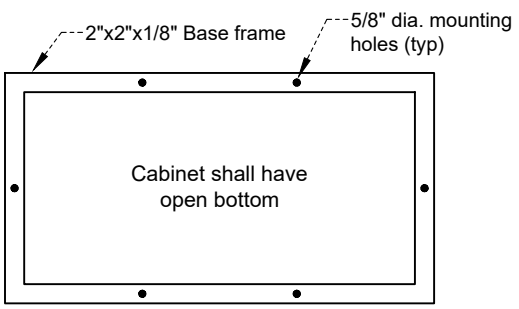
STANDARD DRAWING

BACKFLOW ASSEMBLY ENCLOSURE
3" and Larger

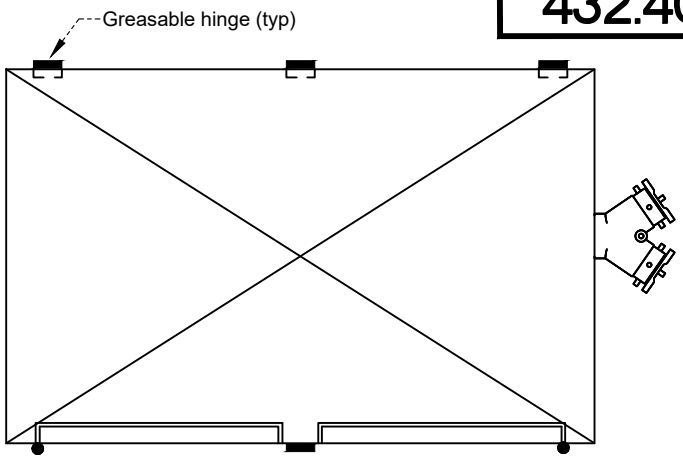
Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

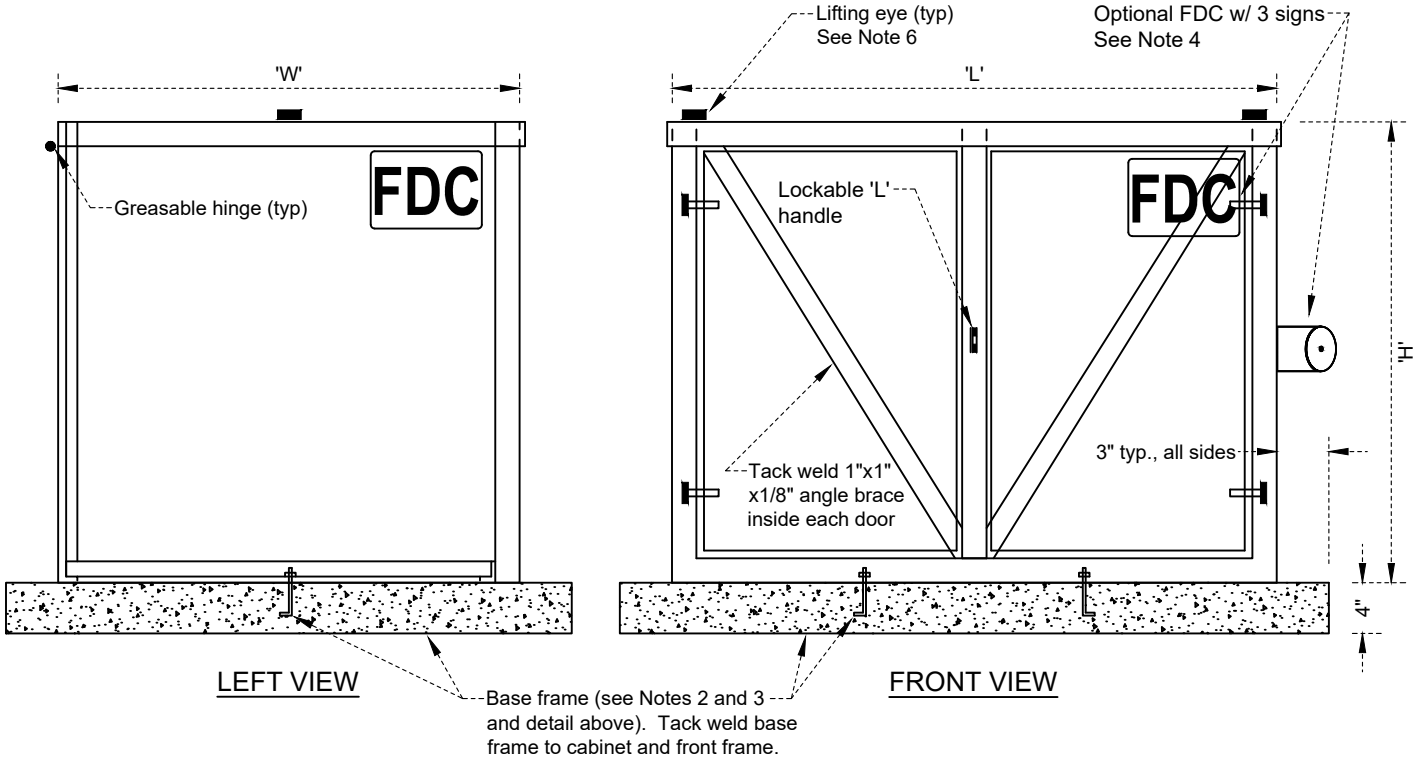
Dwg No.: 432.30



BOTTOM MOUNTING FRAME



TOP VIEW



NOTES:

1. Cabinet and doors to be 14 Ga. steel painted olive green powder coat paint inside & out. Preferred door opening is on the bypass meter side.
2. Cabinet shall be mounted on a 4" thick concrete slab with 3/8"x4" 'J' bolts (typical of six). Slab shall extend a minimum of 3" beyond cabinet.
3. All piping passing through the concrete slab shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.
4. When a Fire Department Connection (FDC) is included with the backflow assembly, a sign shall be installed on the three (3) sides of the enclosure visible from the street in the upper corner as shown. The signs shall read "FDC" in 6" high red reflective block lettering.
5. Backflow enclosures shall meet the manufacturer's specifications for all clearances and provide access for testing and maintenance as required.
6. Lifting eyes shall be 1/2"-13 UMC nut welded in place. Nuts shall be plugged with bolts after installation.
7. Cabinet locks shall be provided by the City.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE

Public Works Department

STANDARD DRAWING

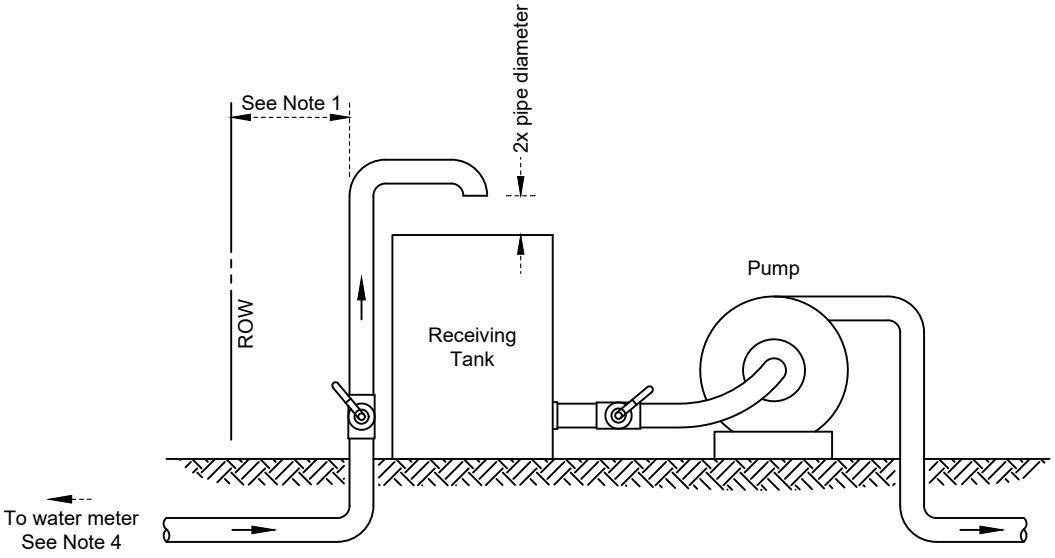
BACKFLOW ASSEMBLY ENCLOSURE
"N" Pattern, 3" through 10"

Approved: 09-30-2023

City Engineer Date

Date: 09/2023 | Dwg No.: 432.40

Scale: None



NOTES:

1. Receiving tank shall be located as close to property line as practical. Location to be approved by the City Engineer.
2. No connections or branches shall be installed between the water meter and receiving tank.
3. Service piping to the receiving tank shall be 1" minimum.
4. See Pages 401.10 through 401.50 for service connections.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

STANDARD DRAWING

AIR GAP SEPARATION DETAIL

Approved:

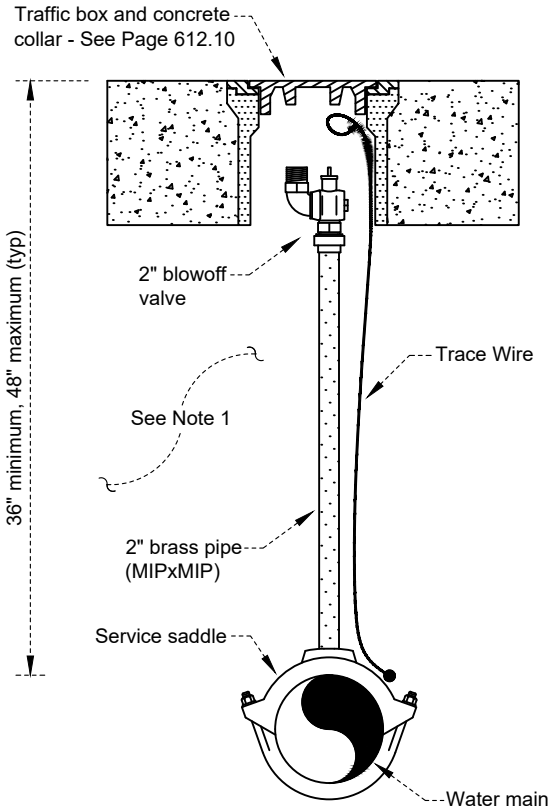
09-30-2023

City Engineer Date

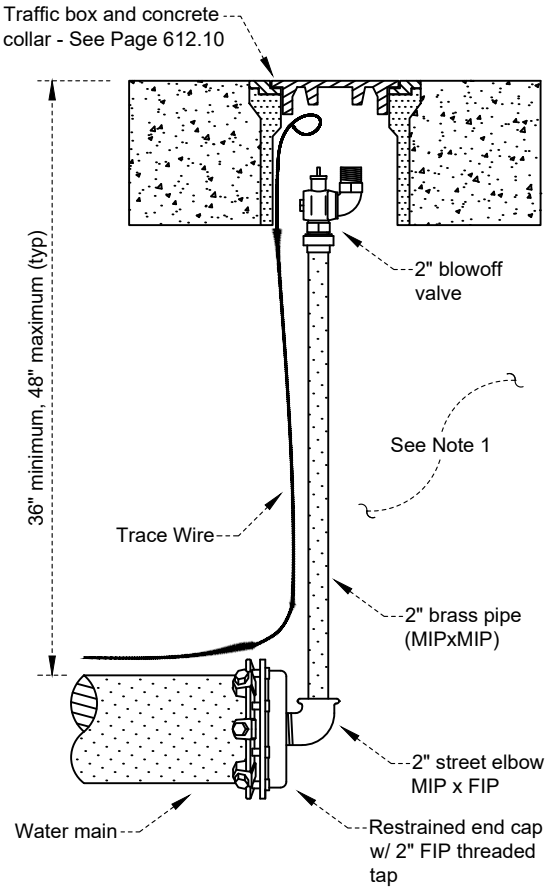
Date: 09/2023

Scale: None

Dwg No.: 441.00



MID-LINE INSTALLATION



END-OF-LINE INSTALLATION

NOTES:

1. Backfill material shall conform to Page 610.10.
2. Blowoffs shall be installed at the end of all dead end water mains, as well as at inline sag locations where sediment is likely to collect.
3. Blowoff valves and piping for 8" through 12" mains shall be 2". Blowoff sizing for larger mains shall be as approved by the City Engineer.
4. Blowoffs shall not discharge to a drain without an air gap separation.
5. Where blowoffs are installed via hot tap, a corporation stop shall be installed on the service saddle.
6. Blowoff valve outlets shall be capped after installation.
7. Trace wire shall conform to Page 608.00.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE
Public Works Department

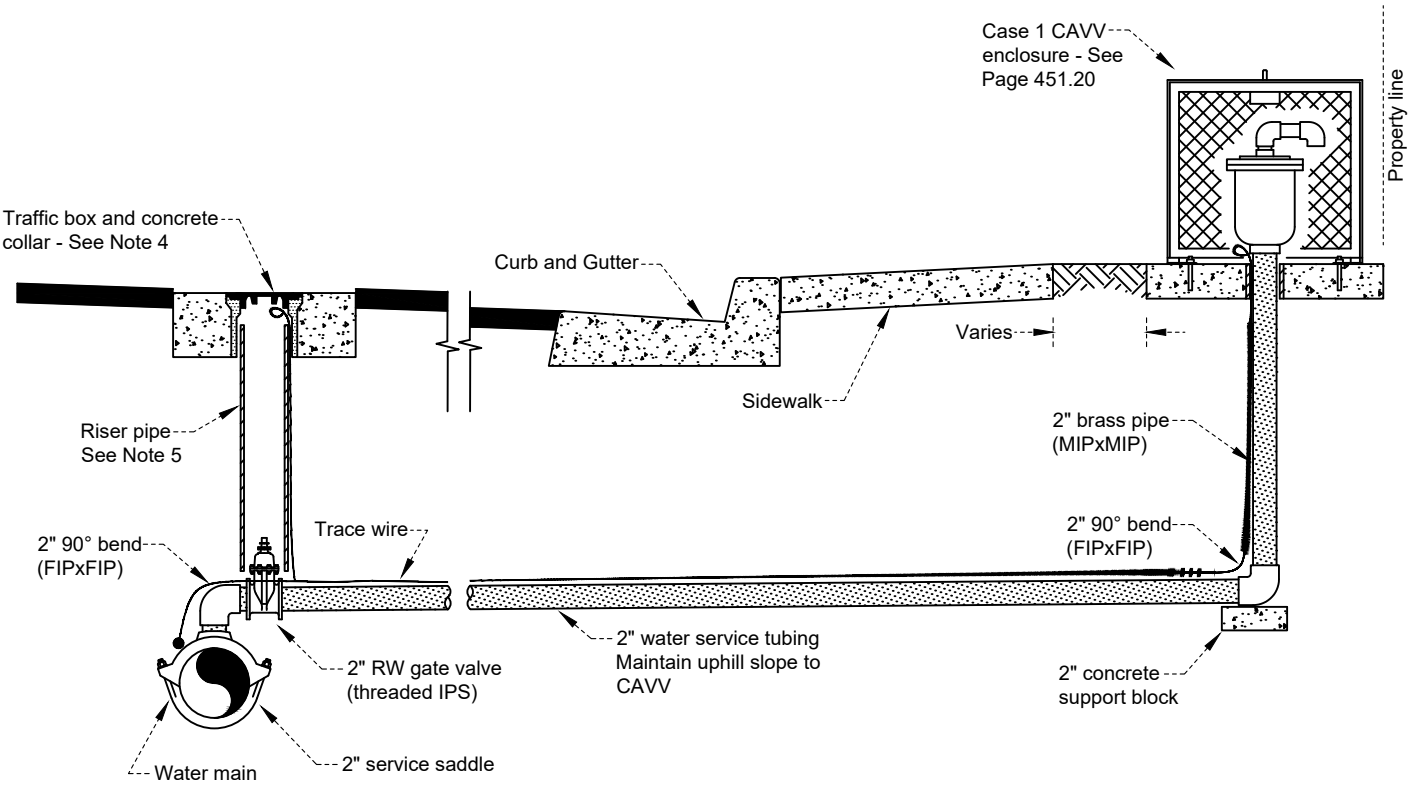
STANDARD DRAWING

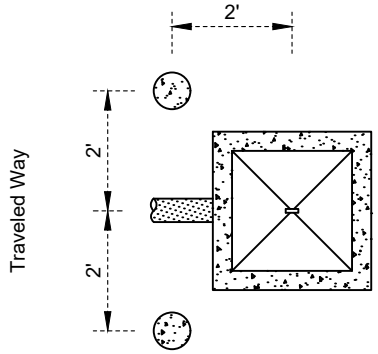
BLOWOFF INSTALLATION

Approved: 09-30-2023
City Engineer Date

Date: 09/2023
Scale: None

Dwg No.: 450.00





BOLLARD INSTALLATION DETAIL
See Note 3

NOTES:

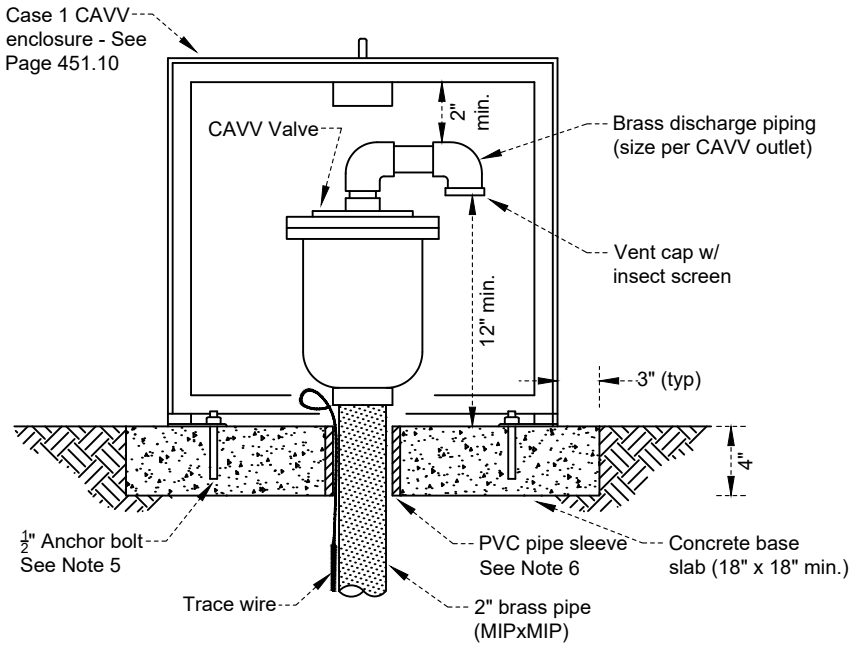
1. Backfill material shall conform to Page 610.10.
2. Piping shall be 2" brass unless otherwise noted.
3. Bollards shall be installed as shown when above ground CAVV enclosures are installed adjacent to the traveled way and no curb exists. Bollards shall conform to Page 670.00.
4. Traffic box and concrete collar installation shall conform with Page 612.10.
5. Riser pipe shall be 8" PVC SDR35. Trace wire shall be run on the OUTSIDE of the riser pipe.
6. CAVVs shall be installed at all pipeline high points, in change-in-grade locations where air pockets may accumulate in the water main, and at intervals of 1500' to 2000' on long pipe runs lacking a clearly defined high point. See Page 450.20 for above ground (Case 1) and underground (Case 2) CAVV installation details.
7. The minimum acceptable CAVV size shall be 2" as shown. CAVV sizing shall be engineered according to the manufacturer's specifications and approved by the City Engineer.
8. Trace wire shall conform to Page 608.00.

REVISION	BY	APPROVED	DATE

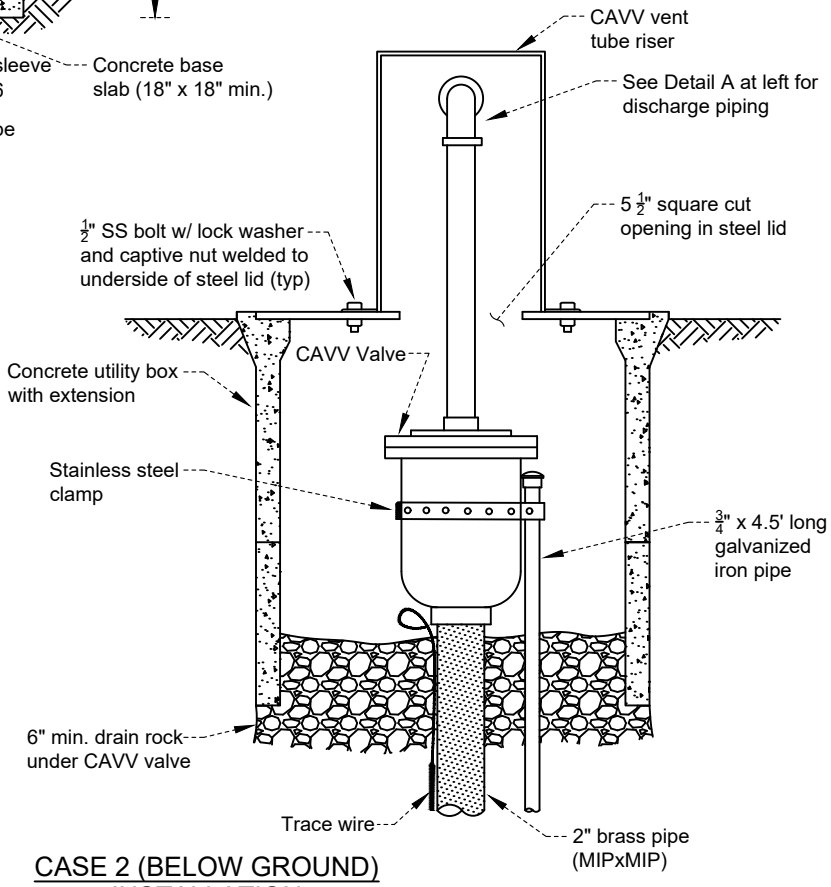
CITY OF SHASTA LAKE
Public Works Department
STANDARD DRAWING
COMBINATION AIR / VACUUM VALVE (CAVV)
TYPICAL SERVICE LINE

Approved: 09-30-2023
City Engineer Date

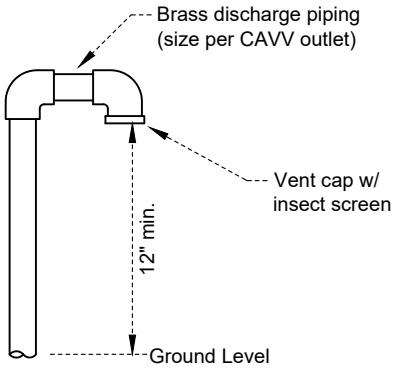
Date: 09/2023
Scale: None
Dwg No.: 451.10



CASE 1 (ABOVE GROUND) INSTALLATION



CASE 2 (BELOW GROUND) INSTALLATION



Detail A - Case 2
Discharge Piping

NOTES:

1. Backfill material shall conform to Page 610.10.
2. Concrete shall conform to Page 100.00.
3. Piping shall be 2" brass unless otherwise noted.
4. The minimum acceptable CAVV size shall be 2". CAVV sizing shall be engineered according to the manufacturer's specifications and approved by the City Engineer.
5. Enclosure anchor bolts shall be stainless steel (SS) and shall be embedded in the concrete base slab a minimum of 2" and a maximum of 3". Hold-down hardware shall include SS nuts, lock washers, and washers.
6. All piping passing through a concrete slab or base shall pass through a sleeve for the full thickness of the slab. The sleeve shall have an inside diameter 1/2" larger than the outside diameter of the carrier pipe and the carrier pipe shall be wrapped with foam pipe wrap or approved equal.

REVISION	BY	APPROVED	DATE

CITY OF SHASTA LAKE

Public Works Department

STANDARD DRAWING

COMBINATION AIR / VACUUM VALVE (CAVV)
TYPICAL INSTALLATION DETAIL

Approved: 09-30-2023

City Engineer Date

Date: 09/2023 | Dwg No.: 451.20

Scale: None