

SECTION 4

WATER SUPPLY SYSTEM (W)

- 4-1. GENERAL** - All potable water pipe, fittings, valves, fire hydrants, blow-offs and other appurtenances shall be installed in accordance with the approved improvement plans, these Construction Standards, the American Water Works Association (AWWA), the latest edition of Caltrans Standard Specifications and Standard Plans, as recommended by the manufacturer and as specified by the City Engineer. These Construction Standards and the manufacturer's guidelines shall be present at the construction site at all times.
- 4-2. CONNECTION TO EXISTING FACILITIES** - Connection to existing City water facilities may be made with approval of the Public Works Department and in conformance with the following:
- A. System Tap** - The Public Works Department shall make all systems tap up to 2" in diameter, as required on the plans unless otherwise approved by the City Engineer. The Contractor shall pay for such work on a time and materials reimbursement basis. The Contractor shall be responsible for the following tasks associated with the tap as determined by the Public Works Department:
1. Coordinating the work requested with the Public Works Inspector. This shall include discussions on provisions for materials and equipment required to complete the work.
 2. Providing traffic control per the City's Public Works Department requirements.
 3. Excavating the work area, as agreed upon by the Public Works Inspector.
 4. Providing sheeting, shoring, and bracing as required.
 5. Provide lighting as required if the tap is to be performed at night.
 6. Backfilling, compacting, and pavement restoration of the excavation(s) upon tap completion.
- B. System Tie-In** - The Contractor shall tie-in the new system to an existing stub under the following conditions:
1. With specific approval of the Public Works Inspector.
 2. Care shall be taken to provide a clean, sanitary tie-in site.
 3. Dewatering of both the new and existing water mains shall take place in a way as to prevent contamination by trench water.
 4. All material used in the tie-in shall be clean and swabbed with chlorine to the satisfaction of the Public Works Inspector.
 5. All tie-ins shall take place in the presence of the Public Works Inspector.
 6. Tie-ins may take place only after the newly constructed water system has successfully passed all required testing procedures as established in these Construction Standards and as determined by the Public Works Inspector.

7. Under no circumstances shall anyone other than a representative of the Public Works Department open or close valves in a City-operated system.
- 4-3. CONSTRUCTION STAKING** - The water main shall be staked prior to excavation. Staking shall provide the station and the offset to the water main, as well as the cut to the nearest one-tenth foot (0.1'). Stakes shall be provided at a minimum of every fifty (50) feet in tangent sections, every twenty-five (25) feet in curved sections, and every ten (10) feet in approved vertical curve sections.
- 4-4. CONCRETE CRADLES, ARCHES & ENCASEMENTS** - Concrete cradles, arches and encasements shall conform to the "Shallow Water Mains" and "Special Concrete Encasement" details and the following:
- A. Placement** - The pipe shall be placed in proper position on temporary cradles or arches consisting of concrete block or bricks. When necessary, the pipe shall be rigidly anchored or weighted to prevent flotation when the concrete is placed.
 - B. Installation** - Cradles and arches shall be constructed with an ability to adjust the pipe to proper grade in order to avoid vertical joint pull. Cradles and arches shall be placed at the one-third and half-way points along each pipe segment where specified. Concrete placed beneath the pipe shall be sufficiently workable to fill the voids without excessive vibration. The concrete shall be allowed to cure and remain undisturbed for a minimum of 24 hours prior to backfill and compaction of the trench. Water shall not be permitted to enter, seep or run onto the concrete while curing.
- 4-5. TRENCHING AND BACKFILL** - Construction of water pipes and appurtenances shall be performed to the lines and grades shown on the approved project plans, as specified in the "Streets" section of these Construction Standards and in conformance with the following requirements:
- A. Excavations** - Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans, with vertical sides to the pipe crown as specified on the "Utility Trench Bedding, Backfill and Paving" detail. Excavations shall conform to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property.
 - B. Bell Holes** - Bell holes shall be excavated per manufacturer's recommendations. The minimum depth of bedding material shall be provided under the bell. Care shall be taken to ensure that the bell hole is no larger than necessary to accomplish proper joint assembly.
 - C. Pipe Support** - Pipes shall be placed on a firm bed of imported granular material conforming to the "Utility Trench Bedding, Backfill and Paving" detail. Bedding shall provide uniform and continuous support along the barrel of the pipe. The minimum depth of bedding material shall be provided under the bell. Blocking of the pipe is not permitted. Loose material shall be removed from the trench bottom and replaced with imported material.
 - D. Trench Backfill and Compaction** - Initial backfill material shall be placed immediately after pipe joints have been completed, inspected and passed by the Public Works Inspector. The material shall be carefully placed, consolidated around the pipe zone and shall be brought up evenly on both sides. Sufficient care shall be taken to prevent movement or damage to the pipe during shovel slicing. Shovel slicing shall be witnessed by the Public Works Inspector prior to shading the pipe.

Trench backfill shall be placed and compacted in accordance with the "Streets" section of these Construction Standards. Slurry or concrete caps shall only be used if deemed necessary by the City Engineer. Compaction equipment shall not make direct contact with the pipe.

4-6. PIPE INSTALLATION - Water pipe shall be installed in accordance with the following provisions:

- A. Storage of Pipe** - The Contractor shall keep the pipe interior free from foreign materials and in a clean and sanitary condition until acceptance by the City. At times when pipe-laying is not in progress, the open pipe end shall be sealed with a tight cap or plug to prevent foreign matter from entering the pipe. Provisions shall apply to the noon-hour as well as overnight.
- B. Pipe Placement** - Care shall be taken when lowering pipe into the trench to protect the pipe from damage. Chains are not permitted. The pipe shall be laid carefully to the lines and grades shown without grade breaks, unless designed with such, or to minimum depths shown on the approved plans. If field conditions exist such that the pipe may not be laid to the specified grade, the approved plans will require revisions prior to proceeding with construction.
- C. Joints** - Pipe sections shall be closely jointed to form a smooth flowline. Care shall be taken in placing the pipe and making field joints.
- D. Manufacturer's Recommendations** - All installations shall follow manufacturer's recommendations unless otherwise noted on the approved plans. The manufacturer's installation guide shall be on the job site at all times.
- E. Mechanical Restraint** - Pipes shall be mechanically restrained to the length specified in the approved plans, using materials specified herein. **Thrust Blocks** - Thrust blocks shall only be used where specifically shown on the plan/profile sheets and as required by AWWA standards. All fittings and appurtenances shall maintain a minimum of 18 feet of restrained pipe into the fitting from all directions.
- F. Tracing Wire** - A continuous 10 gauge solid insulated tracing wire shall be attached to mains, service lines and appurtenances per the Construction Standard Details and the following:
 - 1. Tracing wire shall be continuous between mainline valve boxes and fire hydrants. It shall be attached to the top of the pipe with 10-mil vinyl tape every 5 feet.
 - 2. Tracing wires through valve boxes shall be placed outside of riser, but inside the box.
 - 3. Tracing wire in manholes and vaults shall be attached inside the facility within one foot of the rim.
 - 4. Wire splices shall be located above ground, when possible, and inside of valve boxes and completed per the Standard Details and as follows:
 - a. Twist the wire together with a minimum of 5 twists.
 - b. Install a copper split bolt connector on the splice.
 - c. Solder all connections.
 - d. Cover the splice with mastic tape and wrap with vinyl tape.
- G. Marking Tape** - A 4.0 to 5.0 mil, 3 to 4 inch wide, blue plastic non-detectable water pipe marking tape, marked "Caution Buried Water Line Below" or equivalent shall be placed in all main line trenches, 12 to 24 inches from the surface.

- H. Marking Pipe in Unpaved Areas** - Mains in unpaved areas shall be marked every 150 lineal feet with a blue composite utility marker having a decal stating: "Caution Water Pipeline." Appurtenances (valves, ARV's, test stations, etc.) and angle points shall also be marked. Mains in landscaped areas shall be delineated with a brass marker set in an 8-inch concrete cylinder 4 inches above finished grade. The brass marker shall state "City of Grass Valley Water Main."
- I. Protection of Underground Metal** - All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 8-mils minimum thickness polyethylene encasement, per AWWA standards, with ends taped off with vinyl pipe wrap tape.
- J. Polyvinyl Chloride (PVC) Pressure Pipe Installation** - PVC shall be installed in accordance with the AWWA Manual M23 and the manufacturer's recommendations, except as otherwise provided herein:
1. PVC Pipe shall have been manufactured within the 18-month period prior to installation.
 2. Pipe and gaskets shall be kept clean and protected against sunlight and heat damage.
 3. Pipe showing signs of physical damage or excessive ultraviolet exposure will be rejected and shall be immediately removed from the job site.
 4. The pipe shall be installed with the manufacturing label showing on the top.
 5. The reference mark or stab line on the spigot end must be flush with the bell end and visible for inspection.
 6. The beveled end of the pipe shall be cut off before placement into a mechanical joint.
 7. Minimum length of pipe for installation shall be five (5) feet.
- K. Ductile Iron Pipe (DIP)** - DIP shall be installed in accordance with the standards for "Installation of Ductile Iron Water Mains and Their Appurtenances" (ANSI/AWWA C-600) and the manufacturer's recommendations, and as provided herein:
1. DIP shall be polyethylene-encased in accordance with these Construction Standards and the standard for "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5).
 2. At the direction of the Public Works Inspector, the Contractor shall repair damages to the polyethylene encasement as described within ANSI/AWWA C-105/A21.5 or shall replace all damaged polyethylene film sections.
 3. Metallic lines shall be exothermically welded and electrically continuous on DIP runs exceeding 100 feet or as approved by the City Engineer. Exothermic welds shall be installed per the Construction Standard Detail for "Exothermic Weld", and as follows:
 - a. Weld only against bare metal on both the bell and spigot ends of pipe.
 - b. Care must be taken not to remove excess metal when removing the pipe coating.

- c. After a solid weld is made, coat the bare metal with an acceptable bituminous coating material and cover with a plastic protective cap or approved equal.
 - d. DO NOT weld onto valves.
4. Corrosion test stations shall be installed on metallic lines at intervals not to exceed 1,000 lineal feet or as specified on the approved plans.
 5. DIP cuts shall be coated with an approved bituminous material.
 6. Minimum length of pipe for installation shall be two (2) feet.
- L. Ductile Iron Pipe Fittings** - In addition to requirements set by these standards, fittings shall be constructed per the following requirements. Mechanical joint fitting bolt threads and nut shall be coated with an approved bituminous material. Flanged bolt heads and threads shall be coated with an approved material.
- M. Transitions Between DIP and PVC** - Transitions between DIP and PVC shall be made as follows:
1. A PVC pipe spigot may be inserted into a DIP bell by cutting off the PVC bevel on the spigot, and leaving no more than a ½-inch taper. A Public Works Inspector shall be present to witness this process.
 2. Transitions may be made by the use of a DIP repair sleeve.
- N. Boring of Water Lines** - Borings for installation of water lines shall be made as follows:
1. The equipment, method and sequence of operation and conductor pipe grades shall be approved by the Public Works Inspector. A minimum of 48 hours notice shall be given prior to the start of work.
 2. Excavation for the boring operation shall be the minimum necessary to satisfactorily complete the work. Bracing, sheeting, and shoring shall be adequate to protect workers and any adjacent structure or roadbed.
 3. When, in the opinion of the Public Works Inspector, the nature of the soil indicates the likelihood of ground loss, the Contractor shall take steps to prevent boring holes that are substantially oversized.
 4. Utilizing the City's drainage system for residual discharge from boring operations is prohibited. This discharge is a violation of the City's Stormwater Ordinance and the Clean Water Act. Discharge fluid shall be recovered, contained and discharged at an appropriate location, or if the situation allows, fluid may be discharged into an open area with the pre-written approval of the property owner and approval from the Regional Water Quality Control Board, provided it does not impact sensitive areas such as wetlands, creeks, or other natural water conveyances.
- All street boring shall include adequate measures to mitigate sediment laden water discharge. An acceptable measure is pumping the discharge fluid into a tanker and hauling it away. Other measures suggested by the Contractor will be considered by the City.
- O. Vertical Elevation Change** - Mains designed with a vertical elevation change using angle fittings shall use ductile iron pipe with an approved restraint system between the two angle fittings.

P. Bridges and Casings - Pipe within bridges and casings shall be fully restrained and fully extended prior to closure.

4-7. SERVICE INSTALLATION - Water services shall be installed in accordance with manufacturer's recommendations, the Standard Details and the following provisions.

A. Continuity of Installation - Services shall be continuous from the main line to the service box.

B. Separation of Taps, Service Saddles and Fittings - Taps, service saddles and fittings attached to mains shall be separated from each other by a minimum of 24 inches.

C. Wrapping Service Saddles - Service saddles shall be wrapped and sealed in 8-mil minimum thickness polyethylene and backfilled with sand. Use pipe wrap tape to secure and seal the polyethylene wrap.

D. Service Manifolds - Service manifolds shall be constructed per the following criteria:

1. Where a service line is extended a distance greater than 40 feet, a construction jumper shall be installed per the Construction Standard Detail for "Backflow Manifold Schematic". The new service line and manifold shall be tested in accordance with these Construction Standards.

Where a service line is extended a distance less than 40 feet, the extension shall be cleaned, swabbed with chlorine and flushed in the presence of the Public Works Inspector. The new service line and manifold shall be pressure tested in accordance with these Construction Standards.

In both cases, the installation shall be fully restrained by an approved restraint system, starting at the main and as required by the approved Improvement plans.

2. No water shall be drawn through a service prior to installation of the water meter and testing of the backflow assembly.

E. Temporary Backflow Assemblies - A backflow assembly shall be required for construction and sales trailers having a landscape irrigation system or a septic holding tank.

F. Permanent Backflow Assemblies - Backflow assemblies shall be installed per Standard Detail. A Hotbox or freeze bag may be used for above ground installations.

G. Marking Residential Water Services - The curb in front of residential water services shall be stamped with a "W."

H. Caps on Service Saddles - Service saddles shall be installed with zinc caps on all bolts, per these Construction Standards.

4-8 ABANDONMENT OF SERVICES AND MAINS - All water services requiring abandonment shall be disconnected from the main line at the corporation stop and plugged unless otherwise approved by the Public Works Department. Mainline stubs shall have the valve removed and replaced with a blind flange or as approved by the Public Works Inspector. The abandoned piping shall be removed or left in place as approved by the Public Works Inspector.

4-9 APPURTENANCES INSTALLATION - All appurtenances, including fire protection, blow-offs, sample stations, air release valves and fire hydrants shall be installed in accordance with manufacturer's recommendations, these Construction Standards and the following provisions:

- A. Encasement** - All valves, fittings, DIP, copper and underground brass shall be wrapped and sealed in an 10-mil minimum thickness polyethylene encasement. Use pipe wrap tape to secure and seal to the polyethylene encasement. Damaged or scratched surfaces on epoxy coated valves and appurtenances may be repaired with an epoxy kit per manufacturer's recommendations and to the satisfaction of the Public Works Inspector prior to wrapping. Otherwise, the damaged valve shall be replaced with a new valve.
- B. Gate Valves and Extensions** - Gate valves shall be centered in a one-piece riser stock. An operator nut extension shall be installed on valves where the operating nut exceeds 40 inches in depth from final grade. Valve extensions shall be continuous and within 24 inches of finished grade.
- C. Coating Buried Nuts and Bolts** - Buried nuts and bolts shall have "Sap" caps or shall be coated with a bituminous material. This includes exposed bolts found on a manufactured appurtenance (i.e., valve bonnets, etc.). "T" bolt heads do not require coating.
- D. Fire Hydrant Markers** - Fire hydrants shall be marked with a blue recessed reflector placed 1 foot off of street centerline on the fire hydrant side of the street. Fire hydrants located at intersections shall be marked on both streets.
- E. Paint for Fire Hydrants** - Fire hydrant barrels shall be painted with Sherwin Williams Polane SP Polyurethane Mueller Yellow (Part Number 172-6918). Private hydrants shall be painted chrome. The tops and nozzle caps shall be painted by the City with the following capacity indicating scheme, per NFPA standard color code:
 - 1. **Class AA** - Flow capacity of 1,500 gpm or greater = OSHA Safety Light Blue
 - 2. **Class A** - Flow capacity of 1,000 gpm to 1499 gpm = OSHA Safety Green
 - 3. **Class A** - Flow capacity of 500 gpm to 999 gpm = OSHA Safety Orange
 - 4. **Class A** - Flow capacity less than 500 gpm = OSHA Safety Red
- F. Blow-Off Assemblies for Dead-End Lines** - Dead-end lines, low points and pressure zone boundaries, permanent and temporary, shall have a blow-off constructed per the "2" Blowoff Hydrant Assembly" Standard Detail and marked with a Carsonite marker
- G. Insulating kits** - Insulating kits shall be installed at transitions between dissimilar metal pipe per the Construction Details and as required by the Public Works Department.

4-10 TESTING PROCEDURES - Testing of the water system may proceed only after joint utility crossings are completed, the sewer mains and services have passed pressure test and TV inspection and subgrade elevations have been met. Road bases to be lime-treated shall be pressure tested before and after the lime treatment process. Testing prior to subgrade placement may be subject to additional pressure tests at the discretion of the Public Works Inspector. The new system shall be filled with potable water through an approved backflow device.

A. Pressure Test:

- 1. The Public Works Inspector will be present during the duration of the test.

2. Contractor shall verify with the Public Works Inspector that all system valves are open prior to testing. Air shall be completely expelled from the pipe, valves and hydrants.
 3. Pressure testing shall be conducted for a minimum of two hours at 150 pounds per square inch or at one-and-one-half times the operating pressure for water mains and 200 pounds per square inch for fire hydrant and fire protection assemblies, whichever is higher, as measured from the system high point. The test gauge shall be liquid-filled and capable of testing up to 300 psi.
 4. Loss of pressure shall not exceed 5psi during the two hour test period.
- B. Chlorine Disinfection** - Chlorine disinfection shall comply with the American Water Works Association Standard for Disinfection Water Mains (C651-92) and as specified below:
1. Disinfection inspections shall begin only after passing the pressure test.
 2. Prior to chlorination, pre-flush water mains and services. Pre-flushing is not permitted if using the Tablet Method for chlorination.
 3. Chlorine shall be drawn through all mains, hydrant runs and services. The Public Works Inspector shall verify that a minimum chlorine residual of 50 parts per million (ppm) has been achieved.
 4. After a 24-hour holding period, the Public Works Inspector will verify that a minimum chlorine content of 25 ppm remains in the system.
 5. Upon approval by the Public Works Inspector, the water system shall be flushed to remove concentrated chlorine. Flushing shall be continued until the remaining water has a chlorine residual below 1 ppm and a turbidity equal to or less than 1 NTU. Chlorinated water shall be neutralized to 0.1 ppm chlorine residual or less prior to discharge. Discharge location and neutralization methods shall be documented in the SWPPP and coordinated with, and approved by, the Public Works Inspector.
 6. Chlorinated water resulting from flushing newly installed water lines may be discharged into the City's sewer system only with the specific permission of the City Engineer.

Prior to discharging into the sewer system, the Contractor shall sign a form authorizing the Public Works Department to bill for the amount of water discharged into the system. At the end of each flushing exercise, and prior to tying into the City water system, the Public Works Inspector(s) shall prepare a bill for water usage based on the meter reading. This bill must be paid before the project is signed off by the City Engineer.

The Public Works Department shall determine the volume of discharge. Chlorinated water shall not be disposed of into environmentally-sensitive areas (i.e., under oak trees, vernal pools, man-made or natural streams, drainage systems, etc.) during any time of the year.

All discharges into the sewer system shall be governed by the following conditions:

- a. Water used for the purpose of flushing shall be metered.
- b. Discharge into the sewer system shall be done in such a manner as to avoid surcharging the sewer system.
- c. No discharge into the sewer system shall be permitted on rainy days.

- d. No discharge shall be permitted upstream of a small lift station.
 - e. An approved air gap shall be maintained at all times. Air gap distances shall be calculated as 2.5 times the pipe diameter. In no case shall the air gap be less than 12 inches.
- C. Water Quality Testing** - Water quality samples shall be taken per the following procedure:
- 1. Once flushing has lowered the chlorine residual below 1 ppm and the turbidity is equal to or less than 1 NTU, the water system shall observe a minimum 24 hour detention time. Water may not be drawn during this time period.
 - 2. After the 24-hour holding period has elapsed, water quality samples shall be collected for testing. If the sample lot does not meet the minimum chlorine residual and turbidity criteria, additional flushing and added 24-hour holding period shall be required. The procedure shall be repeated until the criteria are met.
 - 3. If the minimum criteria are met a final Presence/Absence test for coliform shall be performed prior to connection to the City water system. The flushing and chlorinating procedure shall be repeated until no coliform are detected.
- D. Tying Into The City System** - A tie-in procedure shall be submitted and approved by the Public Works Department prior to the proposed work. The Contractor shall allow up to seven days for review of the procedures by the Public Works Department. The water system shall be tied into the City system within ten (10) working days upon completing and passing all the testing procedures. Tie-ins shall be conducted as specified in Section 4-2 of these Construction Standards. After the tie-in has been made, the Contractor shall flush the segment tied-in to the approval of the Public Works Inspector.
- 1. If the new water system cannot be tied into the City system within ten (10) working days, the new system shall maintain a chlorine residual of 0.5 to 1.0 ppm or be subject to water quality testing and re-chlorination. This shall be discussed with the Public Works Inspector.
 - 2. On-site private systems may connect onto the City System upon passing all testing procedures, backflow tests, and meters have been paid for and installed. A tie-in procedure shall be required per this section.
- E. Continuity Testing** - The Public Works Department will test continuity of the tracing wire with City standard locating equipment upon request for testing by the Contractor. Discontinuity in the tracing wire shall be repaired. It is recommended that the Contractor request continuity testing after subgrade is made, but before asphalt is placed. Final continuity testing will take place after asphalt is placed and all valve boxes are raised. Costs for said inspection shall be borne by the Contractor. Preliminary inspections may be performed by outside Contractors, but shall not be accepted by the Public Works Department as an official record.
- F. Corrosion Protection System Testing** - At the completion of the pipe installation and prior to curb and gutter, the Corrosion Engineer shall conduct a test of the corrosion monitoring system in the presence of the Public Works Inspector. A report showing the test results shall be submitted to the Public Works Department for review and approval. The report shall include test station locations as called out on the approved plans, appurtenance tested, test result, and recommendations for future monitoring and maintenance.

4-11 REPAIRING INSTALLED IMPROVEMENTS - All PVC and DIP water mains shall be repaired per the following procedures:

- A. Damaged or Failed Pipe Sections** - Damaged or failed pipe sections shall be removed and replaced with new pipe in the presence of the Public Works Inspector. Replacement can be accomplished by the use of City approved ductile iron mechanical joint repair sleeves. Pipe restraints will be required.
- B. Backfill** - After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified in the Utility Trench Bedding, Backfill and Paving detail. The repairs shall then be re-tested per these Construction Standards.
- C. Encasement Repair** - At the direction of the City, the Contractor shall repair damage to the polyethylene encasement as described within ANSI/AWWA C-105/A21.5 or shall replace all damaged polyethylene film sections.

4-12 PUNCHLIST PROCESS - When the Contractor is satisfied that all improvements are substantially complete, a punchlist of final outstanding items may be requested. With the assistance and presence of the Contractor, the punchlist shall be generated by the Public Works Inspector.

4-13 MATERIALS

A. Water Main - Unless noted on the approved plans, all water mains shall be sizes 6, 8, 10, 12-inch, and either Polyvinyl Chloride Pressure Pipe (PVC) or Ductile Iron Pipe (DIP).

- 1. PVC Pressure Pipe** - PVC Pressure Pipe shall be manufactured to a minimum Class 150 rating and shall conform to the "Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 6 inches through 12 inches, for Water" (AWWA C-900), and shall also include the following:
 - a.** PVC Pressure Pipe shall be blue in color and shall have been manufactured within 18 months of installation. The pipe shall be manufacturer date coded and the City provided the manufacturer's coding for translation. Sun damaged pipe may be rejected at the Public Works Inspector's discretion.
 - b.** Rubber rings shall conform to the "Standard Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe" (ASTM F-477).
 - c.** Approved PVC Pressure Pipe manufacturers include: Certain Teed Certa Lock, Diamond Plastics Corporation, J-M Manufacturing, Pacific Western Pipe, Vinyl Tech-White Knight, Pressure - Flex Pipe, or approved equals.
- 2. Ductile Iron Pipe** - DIP shall be manufactured to conform to the standards ANSI/AWWA C-150/21.50 thickness design of ductile iron pipe and to "Ductile Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water and Other Liquids" (ANSI/AWWA C-151/A21.51) and shall also include the following:
 - a.** DIP shall be cement-mortar lined in accordance with the standard for "Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C-104/A21.4).
 - b.** Approved DIP manufacturers include: Pacific States, Tyler, US Pipes, Griffin, or approved equals.

B. Services

1. Polyethylene Pressure Pipe - Service laterals shall be sizes 1, 2, 4, and 6-inch iron pipe size (IPS) polyethylene pipe conforming to ASTM D2239 and shall be rated for use at a pressure class of 200 psi.
2. Brass Material
 - a. Brass pipe - Brass pipe shall conform to ASTM B-43 standards. A listing of approved pipe include: Hallstead 3/4" through 2" Red Brass, Cambridge-Lee, Federal WW-351, Wolverine, or approved equal.
 - b. Brass fittings - Brass fittings shall conform to ANSI Standard B16.15, B16.24, B2.1, T-94-1 and be a minimum of Class 125. A listing of approved manufacturers include: Lee Brass, Merritt Brass, New England Union Co., or approved equal.
3. Corporation Stops
 - a. Corporation stops shall be male, iron pipe thread by iron pipe thread and full throat ball valve design. A corporation stop shall be installed at the water main for all service laterals smaller than 2 inches. Approved manufacturers of corporation stops include: Jones, Mueller, or Ford. Part reference numbers are as shown below:
 - i. Jones: Part #J-1943 (3/4-inch to 2 inches)
 - ii. Mueller: Part#B-2969-N (Compression 1 1/2-inch to 2 inches)
Part#B-20013-N (Compression 3/4-inch to 1 inch)
 - iii. Ford: Part #FB500-NL (3/4-inch to 2 inches)
4. 90° Curb Stops
 - a. All curb stops must have lock/padlock wings. Approved curb stop manufacturers include: Jones, Mueller, or Ford. Part reference numbers are shown below:
 - i. Jones: Part #E-1966W (3/4-inch to 1 inch)
Part #E-1974W (1½ inches to 2 inches)
 - ii. Mueller: Part #B-24265N (3/4-inch to 1 inch)
Part #B-24286N (1½ inches to 2 inches)
 - iii. Ford: Part #BA13-332W-NL (3/4-inch)
Part #BA13-444W-NL (1 inch)
Part #BFA13-666W-NL (1½ inches)
Part #BFA13-777-NL (2 inches)
5. Dielectric Tape - Approved manufacturers for dielectric tape include Polyken #932 Hi-Tack joint wrap tape or approved equivalent flexible dielectric tape.
6. Service Saddles

- a. PVC Pressure Pipe Service Saddles manufacturers include: Jones or Mueller. Part reference numbers are as indicated below:

i. Jones: 4-inch through 12-inch saddles with ¾-inch through 2-inch tap, Part #J-996

ii. Mueller:

<u>Saddle Size</u>	<u>Part #</u>
4-inch	H-13490
6-inch	H-13491
8-inch	H-13492
10-inch	H-13493
12-inch	H-13494

- b. DIP Service Saddles manufacturers include: Jones, Mueller, or approved equal. Part reference numbers are as indicated below:

i. Jones: 4-inch through 12-inch saddles with ¾-inch through 2-inch taps: Part #J-979

ii. Mueller: ¾-inch through 2-inch taps:

<u>Saddle Size</u>	<u>Part #</u>
4-inch	BR2B0474IP *
6-inch	BR2B0684IP *
8-inch	BR2B0899IP *
10-inch	BR2B1104IP *
12-inch	BR2B1314IP *
16-inch	BR2B1732IP *

C. Appurtenances

1. Air Release Valves - Air release valves shall be epoxy coated vacuum break type and include a drain valve. A listing of approved manufacturers includes: Crispin, Valmatic, or approved equal. Part reference numbers are as shown below:

<u>Crispin</u>	<u>Part #</u>	<u>Valmatic</u>	<u>Part #</u>
1"	UL10	1"	201C
2"	UL20	2"	202C
3"	UL31	3"	203C
4"	UL41	4"	204C
6"	UL61	6"	206C
8"	UL81	8"	208C

2. Backflow Assembly - Refer to the current "List of Approved Backflow Prevention Assemblies" from the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research. Where there is a conflict between these standards, the University of California Testing Laboratory approved list and Title 17 of the State of California Administrative Code, the more restrictive requirement shall apply.

3. Blocking for Boxes - Slump Block - 4"x4"x15-1/2", or approved equal.

4. Blow-Off Assemblies - Kupferle, Eclipse #78 (2-inch) or approved equal.

5. Cadwelds - A listing of approved materials includes:
 - a. #4 jumper cable, CP cable, 18" long with 1" bare end
 - b. #4 cadweld copper sleeve
 - c. #4 cadweld shot with thermite mastic weld cap-t-cap
6. Fittings -
 - a. PVC - All fittings to be used with PVC Pressure Pipe shall conform to AWWA C-900 and C-905 standards.
 - b. Ductile Iron Pipe - Unless otherwise specified or shown on the approved plans, all fittings to be used with DIP shall employ either mechanical joints or restrained joints conforming to the standard for "Ductile Iron Compact Fittings for Water and Other Liquids" (ANSI/AWWA C-153/A21.53). Approved fitting manufacturers include Tyler, Union, and US Pipe.
 - i. All ductile iron fittings shall be mortar lined in accordance with the standard for "Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C-104/A21.4).
 - ii. All fittings shall be wrapped and sealed in clear polyethylene encasement in accordance with these Construction Standards.
7. Gaskets - Gaskets shall conform to the following specifications:
 - a. Flange Gaskets - Flange gaskets shall be neoprene rubber, red rubber, US Pipe, Flange Tyte, or approved equal.
 - b. Insulating Flange Gaskets - Insulating flange gaskets shall be USSO Standard B.16.21 insulation flange kits, Type E Full Face Gasket with two-side insulation as manufactured by Calpico, or approved equal.
8. Hydrants - Hydrants shall be dry barrel type with bronze operating nut, hydrant seat and drain ring lining. Caps shall be cast iron. Approved hydrants include: Mueller #A-423 yellow or approved equal.
9. Meters - All meters shall be provided by the City of Grass Valley Public Works Department.
10. Meter Spud Couplers -
 - a.

<u>Ford</u>	<u>Part #</u>
3/4" x 2 1/2"	C38-23-2.5NL
1" x 2 1/2"	C38-44-2.625NL
1 1/2" x 2 1/2"	CF31-66NL
2" x 2 1/2"	CF31-77NL
 - b.

<u>Jones</u>	<u>Part #</u>
3/4" x 2 1/2"	JE130
1" x 2 5/8"	JE130

1 1/2" x 2"	JE129
c. <u>Mueller</u>	<u>Part #</u>
3/4 "	H-10890N
1"	H-10890N
1 1/2"	H-10129JN
2"	H-10129JN

11. Nuts and Bolts

- a.** Flange Bolts and Nuts - Flange bolts and nuts shall conform to a minimum ASTM #A307. Bolts less than 3/4 inches in diameter shall be a minimum Grade B (heavy hex). Bolts 3/4 inches and larger in diameter shall be a minimum Grade A (standard hex).
- b.** Meter Bolts - Meter bolts are to be stainless steel, Grade 316 with brass nuts
- c.** Tee Bolt - Steel bolts are to be 3/4" high strength, low alloy steel with a heavy nut, conforming to AWWA Standard C-111-90

12. Nylon Bushings - Nylon bushings shall be 76-76R, 2 1/2" NST x 2" Pipe.

13. Patching Material - Cop-Coat Carboline Company (Bitumastic No. 50, Coal Tar), Coppers Coat 50, or approved equal.

14. Pipe Wrap Tape - 10-mil vinyl tape manufactured by Calpico Inc. (Calpico VI-10) or approved equal.

15. Polyethylene Encasement - "Clear" non-colored polyethylene film shall be used. The polyethylene film shall have a minimum thickness of 8-mils. The thickness shall not be less than 10 percent of the nominal thickness. The polyethylene shall be in either tubular or in sheet form. Polyethylene film shall be manufactured from a Type 1, Class C raw polyethylene material conforming to "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5). Approved manufacturers include: Fee Spec's-LP378D Northtown, Fulton Enterprise Inc., Global Polymer Tech, Unisource, or approved equal.

16. Pressure Regulators - Watts (3/4" through 2", UB5-series), Wilkens (3/4" through 2"-600 series, 2.5" through 3"-500YSBR), or approved equal.

17. Restraints

- a.** PVC – Megalug 2000PV Series, Sigma One-Lok Series, or approved equal.
- b.** DIP - Field Lock Gaskets (3 inches through 12 inches diameter only), Mega Lug 1100 Series, Sigma One-Lok Series, or approved equal.

18. Riser Aligners - Davis & Associates Riser Aligners (8"), or approved equal.

19. Riser Stock For Main Line Valves - Riser stock shall be 8-inch diameter PVC C-900 or SDR 35 for all main line valves.

20. Sampling Stations - The Kupferle Foundry Company Eclipse #88 or approved equal.

- 21. Silicone - Silicone shall be clear, 100% silicone with a 25-year life.
- 22. Tracing Wire Connectors - Tracing wire connectors shall be copper split-bolt type connectors. A listing of approved products include: Perminate Seal-Wire Connectors- Part #97811, Christy's (S-X), or approved equal.
- 23. Tracing Wire Mastic Tape Seal - 3M Mastic Tape #2229 or approved equal.
- 24. Utility Boxes and Lids - All box lids are to be permanently marked with the appropriate label (i.e., Water, ARV, CPT, etc.). In commercial projects, meter lids shall be stenciled with the number address it serves. The numbers shall be painted using white enamel paint and 2-inch stenciling. Traffic rated boxes are required in all streets. When located in a traffic area, boxes shall be rated for H20 loading. A list of approved box manufacturers include: Christy (Oldcastle), BES, or approved equal. Part reference numbers for Christy boxes and Christy or Nicor Inc. lids are shown below:

	Non-Traffic	Traffic
Christy	Part #	Part#
¾" service	B16BOX FL16D Lid B16X12 Extension	B1324BOX B1324-51JH B1324X12 Extension
1" to 2" services	N30BOX FL30D Lid B30X12 Extension	B1324BOX B1324-51JH B1324X12 Extension
3" meter box	N36BOX FL36D Lid B36X12 Extension	B1730BOX B1730-51JH B1730X12 Extension
4" meter box	N40BOX B40D Lid N40X10 Extension	B2436BOX B2436-52JH B2436X12 Extension
Valve box	G05TBOX G05CT Lid G08X12 Extension	G05TBOX G05CT Lid G08X12 Extension

- 25. Valves
 - a. Butterfly Valves - Butterfly valves to be used on diameters ranging from 12" to 72", shall be Mueller Linesal III (Holiday free epoxy, interior lining and standard black asphalt varnish exterior) or approved equal. Certification shall be provided by the valve manufacturer stating the epoxy lining is holiday free. The epoxy coating shall be spark tested and approved for installation by the Public Works Inspector.
 - b. Gate Valves - Gate valves for 2" - 2 1/2" services shall be A2360 Thread or approved equal. Gate valves to be used on diameters ranging from 3" to 12" shall be grey cast iron or approved equal. All in-line gate valves shall have integral flat face flanges on both ends. A list of approved valves includes: Mueller-A-2360 RS Gate Valve, AFC 2500, US Pipe-Metro Seal 250, Clow 604, or approved equal.

- c. Provide additional o-rings for each purchased valve.
- 26. Poly Adaptors –**
- a.

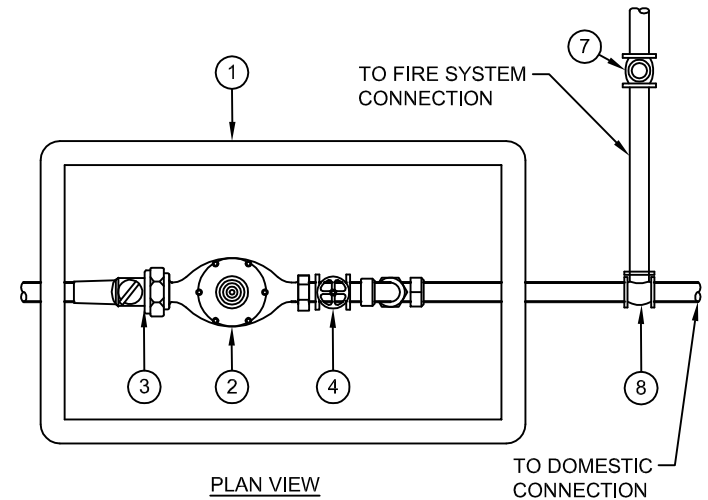
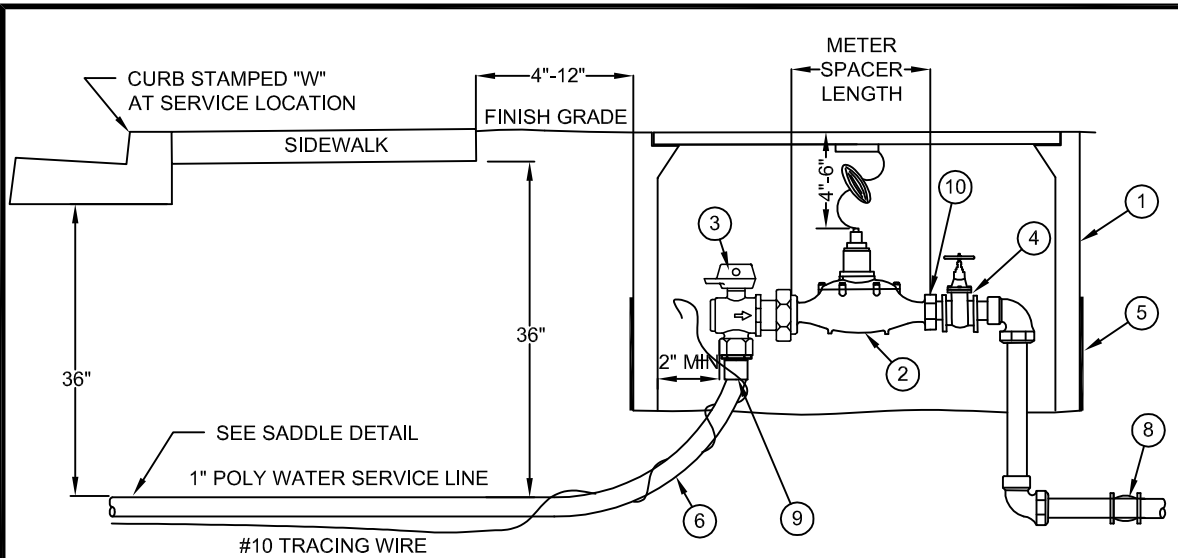
<u>Ford</u>	<u>Part #</u>
2" male	C86-77NL
2" female	C16-77NL

 - b.

<u>Jones</u>	<u>Part #</u>
2" male	JE-15429N
2" female	JE-15454N
2" MIP x IPS	JE-2640
2" female	JE-2608

 - c.

<u>Mueller</u>	<u>Part #</u>
1" MIP x IPS	H-15426
1" FIP x IPS	H-15456
- 27. Zinc Caps -** Zinc caps shall be Mars or approved equal. Mars part numbers are listed below:
- a. 7/16" to 1/2"-2.5 ounce weight
 - b. 5/8" to 1"- 6.0 ounce weight



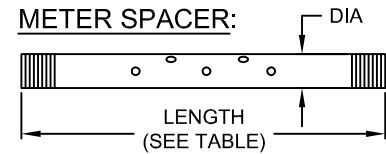
LEGEND:

- ① CHRISTY B16 BOX WITH FL16D LID FOR 3/4" METER / CHRISTY N30 BOX WITH FL30D LID FOR 1" METER (OR APPROVED EQUAL)
- ② WATER METER (CITY)
- ③ 90 ° BRASS CURB STOP (CITY)
- ④ GATE OR BALL VALVE (PRIVATE).
- ⑤ CEMENT BOARD END PLATE (TYP.)
- ⑥ RADIUS 24" MIN.
- ⑦ SINGLE BRASS CHECK VALVE (PRIVATE)
- ⑧ TEE (PRIVATE)
- ⑨ POLY ADAPTOR
- ⑩ METER SPUD ADAPTOR (NOT NECESSARY FOR 1" METER)

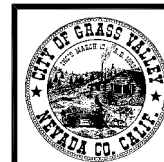
NOTES:

- 1. WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
- 2. ALL PIPE AND FITTINGS SHALL BE BRASS, WITH THE EXCEPTION OF THE SERVICE LINES.
- 3. BURIED BRASS PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
- 4. METER SPACER (SEE DETAIL) SCH 80 PVC NPT PIPE NIPPLE WITH 5 EA. X 1/4" DIA. HOLES THROUGH BOTH SIDES

METER SPACER:



METER SPACER TABLE		
METER SIZE	SPACER	
	DIA	LENGTH
3/4"	3/4"	7-1/2"
1"	1"	7-3/4"



PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

**3/4" & 1"
SERVICES**

APPROVED BY:

Jim McRae

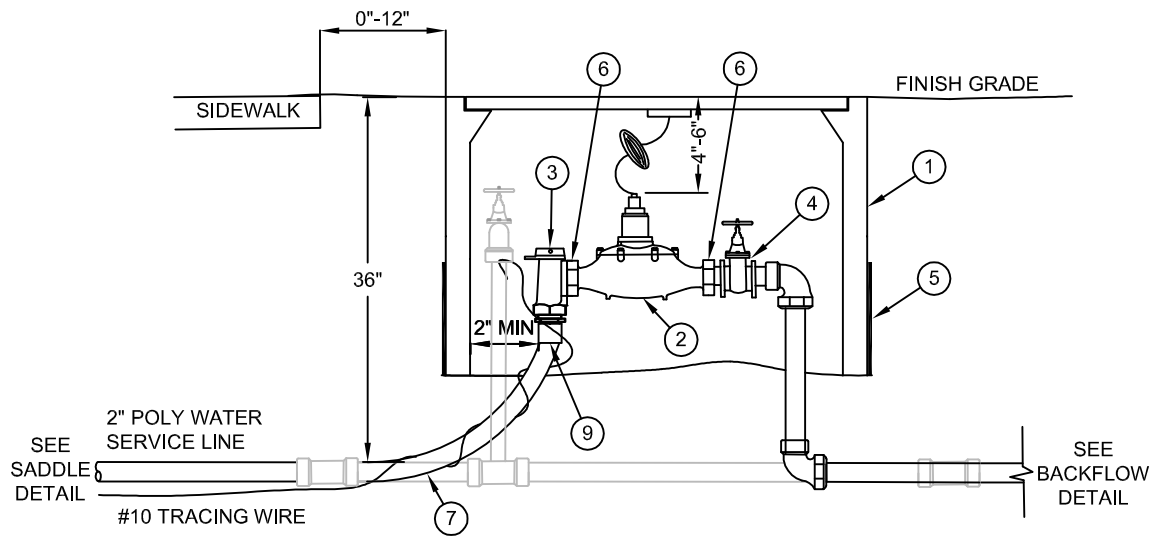
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:
NONE

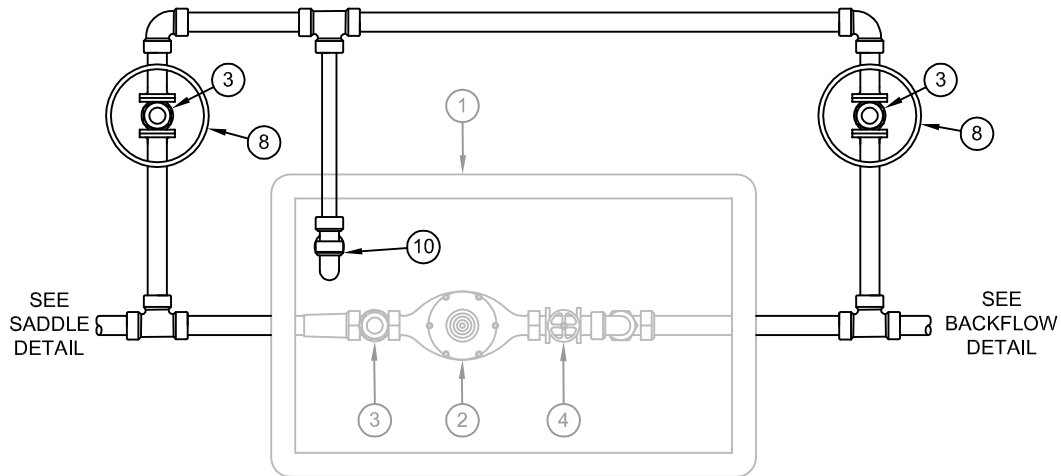
DRAWN BY:
EAD

DATE:
MAY 12, 2016

W-1



ELEVATION:




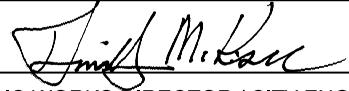
PLAN: BYPASS

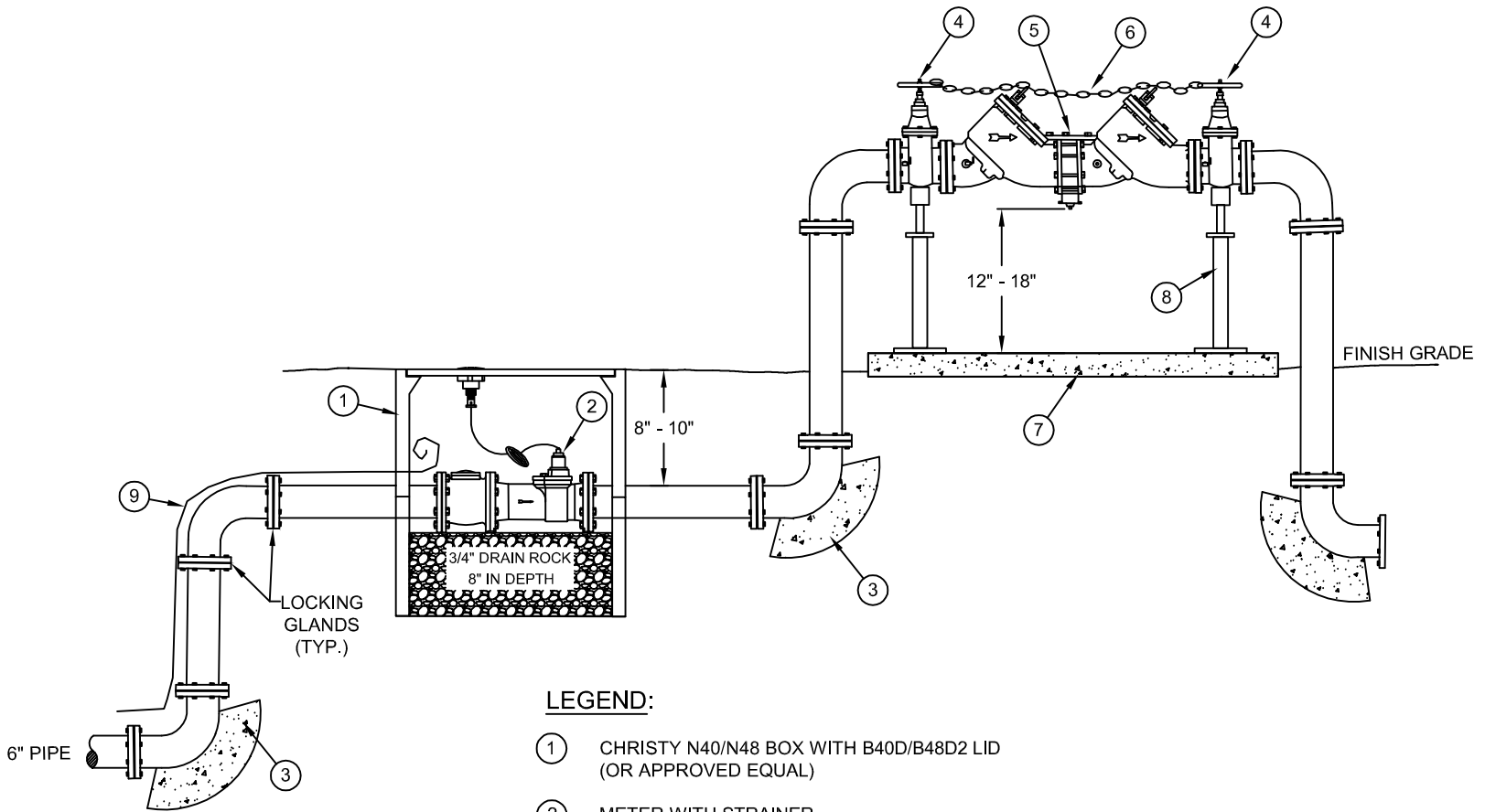
LEGEND:

- ① CHRISTY N30 BOX WITH FL30D LID FOR OTHER METERS (OR APPROVED EQUAL)
- ② WATER METER (CITY)
- ③ 90 ° BRASS CURB STOP (CITY)
- ④ GATE OR BALL VALVE ON CUSTOMER SIDE
- ⑤ CEMENT BOARD END PLATE (TYP.)
- ⑥ METER SPUD ADAPTOR
- ⑦ RADIUS 24" MIN
- ⑧ VALVE BOX PER W-9
- ⑨ POLY ADAPTOR
- ⑩ 3/4" NPT BRASS PIPE AND 3/4" NPT BRASS HOSE BIB AND CAP.

NOTES:

1. WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
2. ALL PIPE AND FITTINGS SHALL BE BRASS, WITH THE EXCEPTION OF THE SERVICE LINES.
3. BURIED BRASS PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
4. BYPASS FOR SERVICE LINE METERS ONLY NEEDED IF REQUESTED BY CITY.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	1-1/2" & 2" SERVICES		
APPROVED BY: 			
PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	W-2





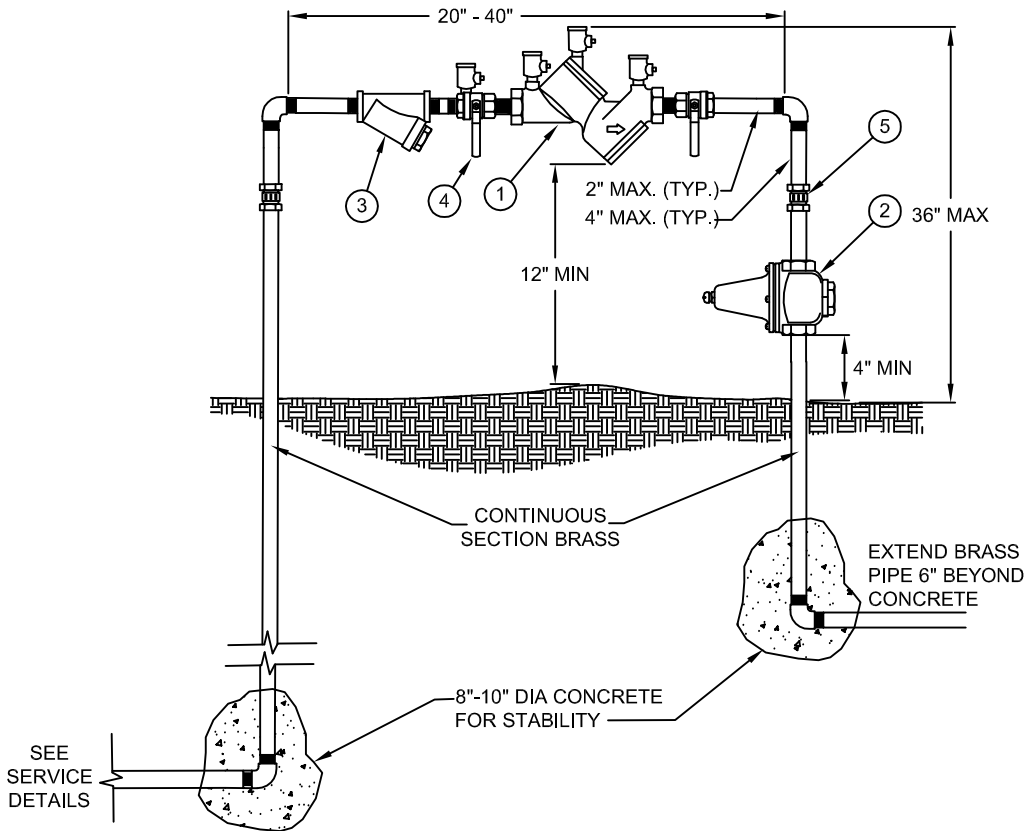
LEGEND:

- ① CHRISTY N40/N48 BOX WITH B40D/B48D2 LID (OR APPROVED EQUAL)
- ② METER WITH STRAINER
- ③ THRUST BLOCK (TYP.)
- ④ RESILIENT SEAT GATE VALVE
- ⑤ REDUCED PRESSURE BACKFLOW DEVICE
- ⑥ 1/4" NON-CASE HARDENED CHAIN WITH BREAKAWAY LOCK
- ⑦ 4" THICK REINFORCED CONCRETE SLAB
- ⑧ SUPPORT STANDS BOLTED INTO CONCRETE (TWO BOLTS MINIMUM)
- ⑨ #10 TRACING WIRE

NOTES:

1. FOR LATERAL SIZES 4", 6", 8" AND LARGER
2. NO WATER IS TO BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY A CERTIFIED BACKFLOW TESTER. CITY INSPECTOR MUST RECEIVE CERTIFICATION PRIOR TO TURN ON.
3. PIPE SHALL BE DUCTILE IRON OR C900 PVC.
4. PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL. POLYETHYLENE
5. USE CITY APPROVED RESTRAINED JOINTS OR FLANGED SPOOLS
6. WATER METER SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
7. THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG.
8. GATE VALVE REQUIRED PER DETAIL W-9.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	4" AND LARGER SERVICES		
APPROVED BY:			
 PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	W-3



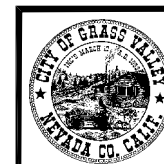
SEE
SERVICE
DETAILS

LEGEND:

- ① REDUCED PRESSURE BACKFLOW DEVICE
- ② BRASS PRESSURE REGULATOR, IF REQUIRED (NOT REQUIRED WHERE WORKING PRESSURE < 80PSI OR FOR IRRIGATION SERVICE)
- ③ BRASS STRAINER WITH BRASS PLUG
- ④ BALL VALVE (TYP.)
- ⑤ (2) UNIONS NOT CONNECTED TO PRESSURE REGULATOR

NOTES:

- 1. REDUCED PRESSURE BACKFLOW ASSEMBLY TO BE LOCATED AS CLOSE TO THE CITY WATER BOX AS POSSIBLE, 3' MAX.
- 2. NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY A CERTIFIED BACKLOW TESTER. CITY INSPECTOR MUST RECEIVE CERTIFICATION PRIOR TO TURN ON.
- 3. THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG.



PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

**RP BACKFLOW ASSEMBLY
2" AND SMALLER SERVICE**

APPROVED BY:

Jim McRae

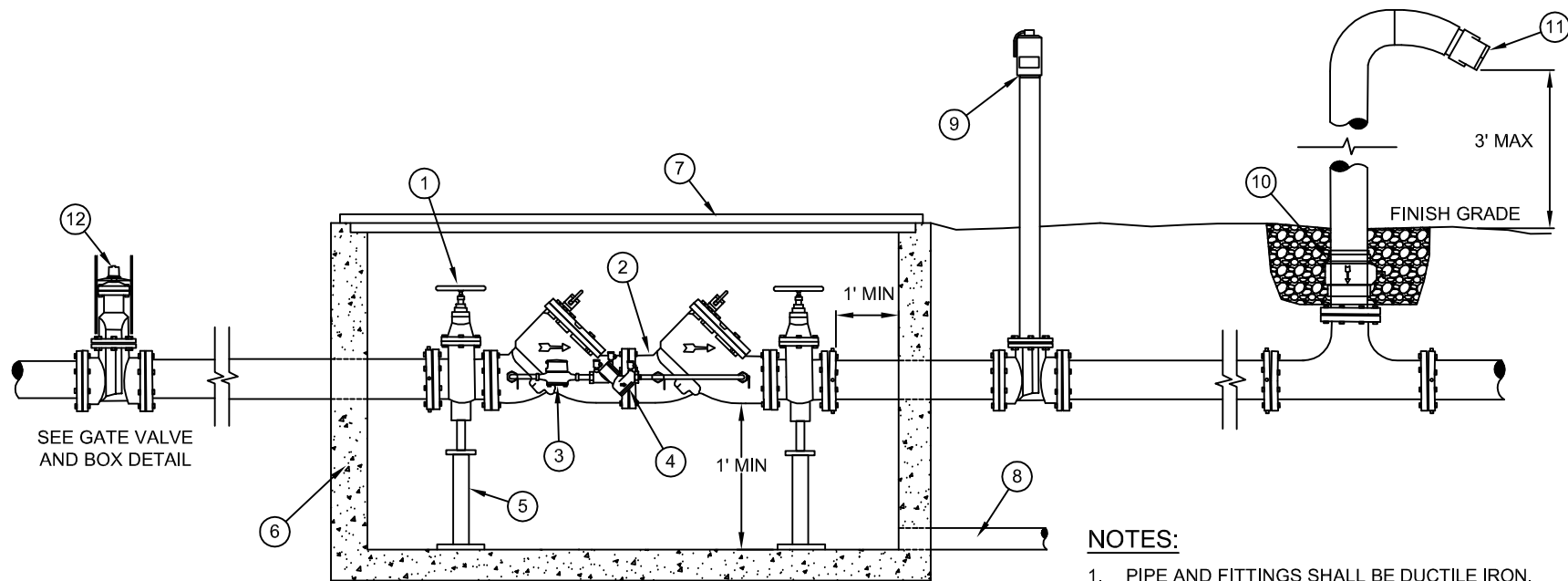
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:
NONE

DRAWN BY:
EAD

DATE:
MAY 12, 2016

W-4



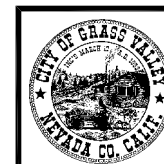
SEE GATE VALVE AND BOX DETAIL

LEGEND

- ① ISOLATION GATE VALVE WITH NON-RISING STEM AND WHEEL (FIRE PROTECTION ASSEMBLY ONLY)
- ② DOUBLE DETECTOR CHECK, AMES 3000 SERIES, AMES MAXIM SERIES M300, OR APPROVED EQUAL
- ③ WATER METER TO BE SUPPLIED BY CITY
- ④ METER CHECK VALVE
- ⑤ SUPPORTS 2-TYP. SHALL BE BOLTED DOWN WITH A MINIMUM OF TWO BOLTS EACH
- ⑥ CONCRETE VAULT OR BOX FOR FIRE PROTECTION ASSEMBLY: BROOKS OR JENSEN 4' X 6'-6" VAULT (OR APPROVED EQUAL). DOUBLE CHECK VALVE: CHRISTY N30 BOX WITH B-30 LID (OR APPROVED EQUAL)
- ⑦ VAULT LID FOR FIRE PROTECTION ASSEMBLY: GALVANIZED STEEL TWO PIECE TORSION ASSIST LID. VAULTS IN TRAFFIC AREAS REQUIRE H20 LID.
- ⑧ 4" SCH40 PVC PIPE DRAINED TO DAYLIGHT OR GRAVEL SUMP AS NECESSARY
- ⑨ POST INDICATOR VALVE.
- ⑩ CHECK VALVE WITH BALL DRIP.
- ⑪ SIAMESE 45 DEGREE FDC WITH UL FM APPROVED METAL BREAK-AWAY C.I. CAP.
- ⑫ GATE VALVE (FIRE PROTECTION ASSEMBLY ONLY)

NOTES:

- 1. PIPE AND FITTINGS SHALL BE DUCTILE IRON.
- 2. FITTINGS SHALL BE RESTRAINED MECHANICAL JOINTS.
- 3. BURIED NUTS AND BOLTS SHALL HAVE SAP CAPS.
- 4. BURIED PIPE AND FITTINGS SHALL BE WRAPPED AND SEALED WITH 10 MIL POLYETHYLENE AND VINYL TAPE.



PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

**FIRE PROTECT. ASSEMBLY
/DOUBLE CHECK VALVE**

APPROVED BY:

Jim McRae

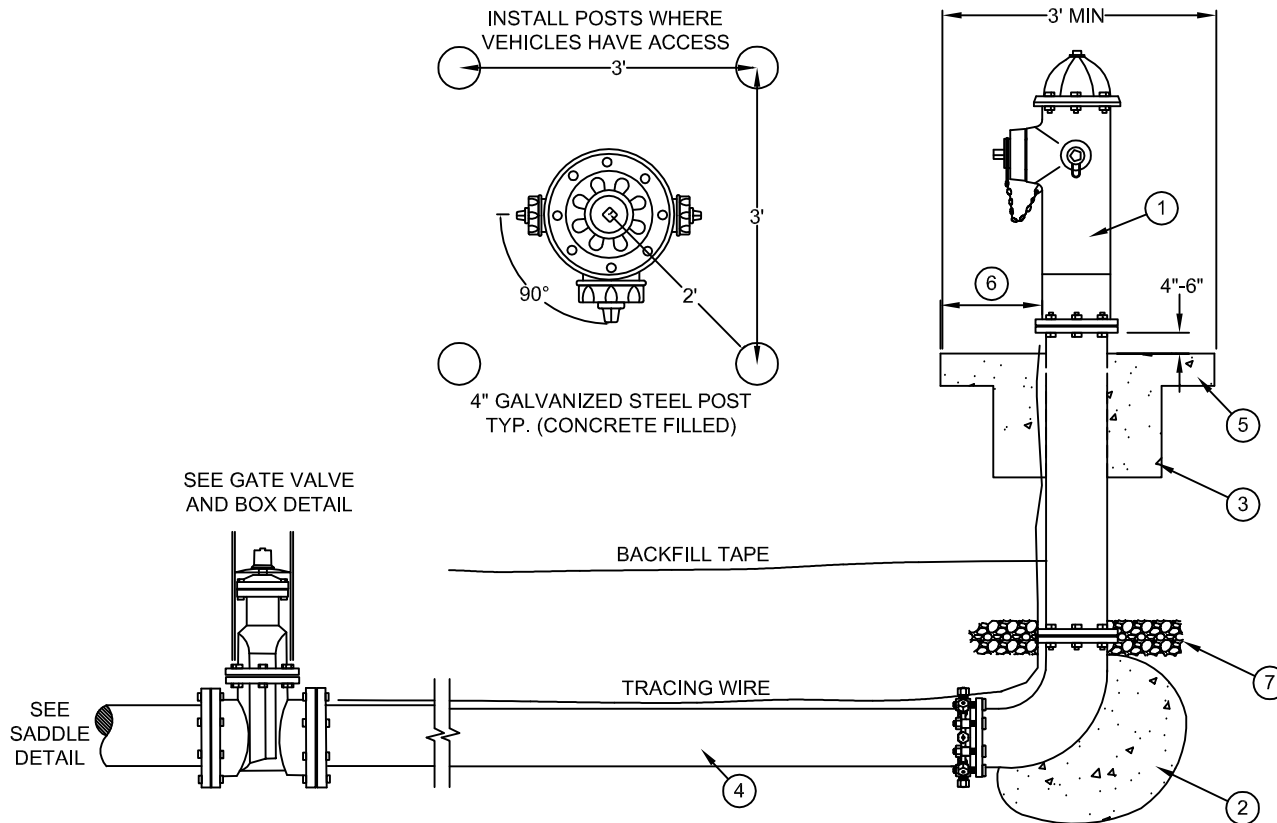
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:
NONE

DRAWN BY:
EAD

DATE:
MAY 12, 2016

W-5

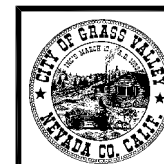


NOTES:

1. PIPE AND FITTINGS SHALL BE DUCTILE IRON.
2. FITTINGS SHALL BE RESTRAINED MECHANICAL JOINTS.
3. BURIED NUTS AND BOLTS SHALL HAVE SAP CAPS.
4. BURIED PIPE AND FITTINGS SHALL BE WRAPPED AND SEALED WITH 10 MIL POLYETHYLENE AND VINYL TAPE, EXCEPT AT DRAIN PLUG LOCATIONS.
5. MARK THE LOCATION OF THE HYDRANT WITH A BLUE REFLECTOR PLACED 1' OFF STREET CENTERLINE.
6. HYDRANTS LOCATED AT INTERSECTIONS SHALL BE MARKED ON BOTH STREETS.
7. A MINIMUM 3 FOOT CLEAR AREA SHALL BE MAINTAINED AROUND THE FIRE HYDRANT.
8. BOLLARDS REQUIRED WHERE THERE IS NO VERTICAL CURB. 6' POSTS TO BE SET TO A DEPTH OF 2' IN CONCRETE. BOLLARDS SHALL BE FILLED WITH CONCRETE AND PAINTED WITH TWO COATS OF YELLOW EXTERIOR ENAMEL PAINT.

LEGEND:

- ① MUELLER A423 FIRE HYDRANT PAINTED WITH TWO COATS OF MUELLER YELLOW PAINT. PRIVATE HYDRANTS SHALL BE PAINTED CHROME. TOPS AND NOZZLE CAPS TO BE PAINTED BY CITY.
- ② CONCRETE THRUST BLOCK AGAINST UNDISTURBED SOIL.
- ③ 12" X 12" X 12" CONCRETE COLLAR FOR STABILITY
- ④ DUCTILE IRON PIPE AND FITTINGS FOR ENTIRE LENGTH.
- ⑤ MINIMUM 3' X 3' CONCRETE SLAB (4" THICK) WITH 2' CLEARANCE AROUND OPERATING NUT. SIDEWALK MAY CONSTITUTE A PORTION OF THE SLAB.
- ⑥ HYDRANT MAY NOT PROTRUDE OVER SIDEWALK. HYDRANT 3' FROM BACK OF CURB IF DETACHED OR NO SIDEWALK.
- ⑦ 6" MIN OF 1/2" DRAIN ROCK SURROUNDING DRAIN PLUG.



PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

FIRE HYDRANT ASSEMBLY

APPROVED BY:

Jim McRae

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:
NONE

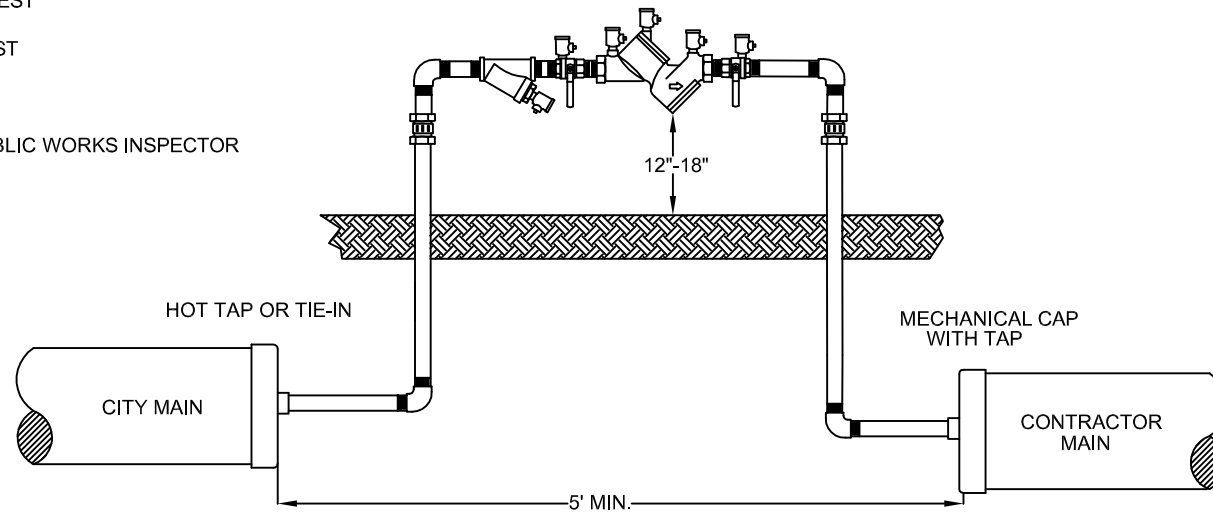
DRAWN BY:
EAD

DATE:
MAY 12, 2016

W-6


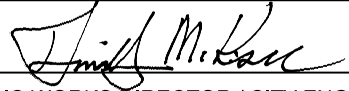
**PRIOR TO CONNECTION TO THE CITY MAIN,
THE FOLLOWING CONDITIONS SHALL BE MET:**

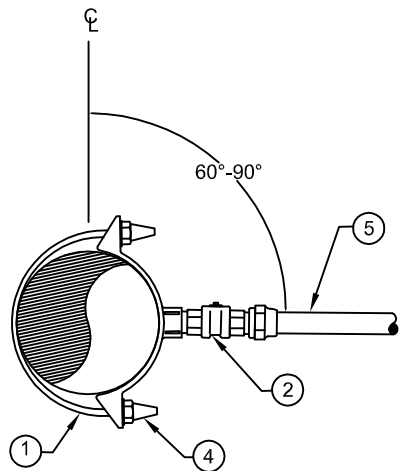
1. PASSED A PRESSURE TEST
2. PASSED A CHLORINE TEST
3. PASSED TURBIDITY TEST
4. PASSED A BACTII TEST
5. APPROVAL BY THE PUBLIC WORKS INSPECTOR



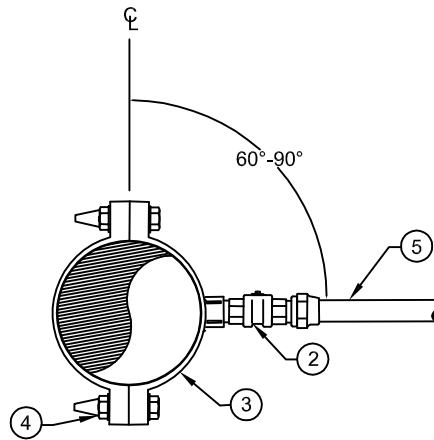
NOTES:

1. WATER SHALL ONLY BE DRAWN INTO THE CONTRACTORS MAIN THROUGH A CITY APPROVED RP TYPE BACKFLOW DEVICE WHICH HAS BEEN TESTED BY A CERTIFIED BACKFLOW TESTER. CITY INSPECTOR MUST HAVE THE CERTIFICATE PRIOR TO TURNING ON.
2. FINAL SYSTEM COMPONENTS NECESSARY FOR TIE-IN SHALL BE PRE-CHLORINATED AND PRE-FLUSHED IN THE PRESENCE OF AN PUBLIC WORKS INSPECTOR.

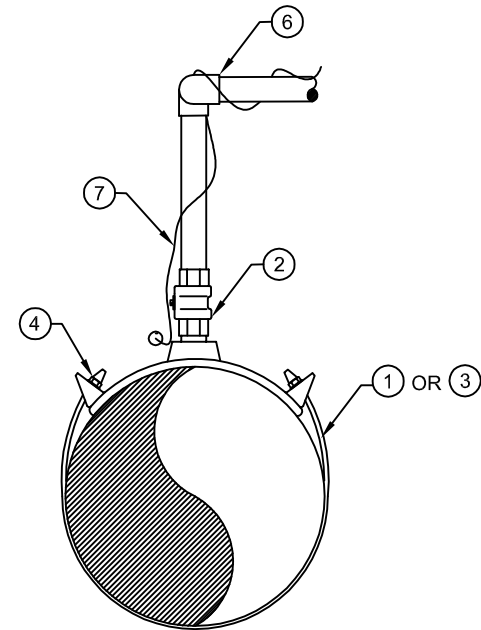
	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	CONSTRUCTION WATER DETAIL		
APPROVED BY: 			
PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	W-7



DOUBLE STRAP DUCTILE IRON
PIPE SADDLE



PVC PIPE SADDLE




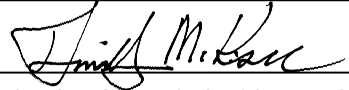
ARV SADDLE

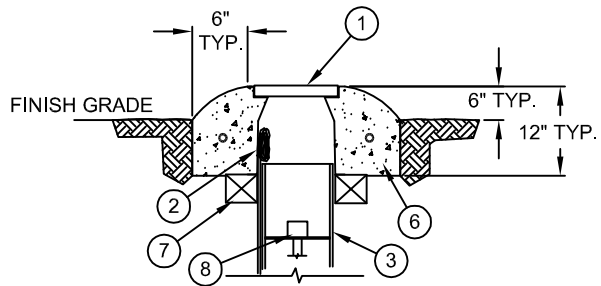
LEGEND:

- ① DOUBLE STRAP BRASS OR STAINLESS STEEL SADDLE FOR DUCTILE IRON MAIN
- ② INSULATING BALL STYLE CORPORATION STOP OR NON INSULATED CORPORATION STOP WITH NYLON BUSHING
- ③ BRASS OR STAINLESS STEEL SADDLE FOR PVC MAIN
- ④ ZINC CAPS ON ALL BOLTS (ONLY WITH NON-INSULATED CORPORATION STOP)
- ⑤ POLY SERVICE
- ⑥ SWING JOINT (2 - 90° BRASS FITTINGS)
- ⑦ #10 INSULATED TRACING WIRE

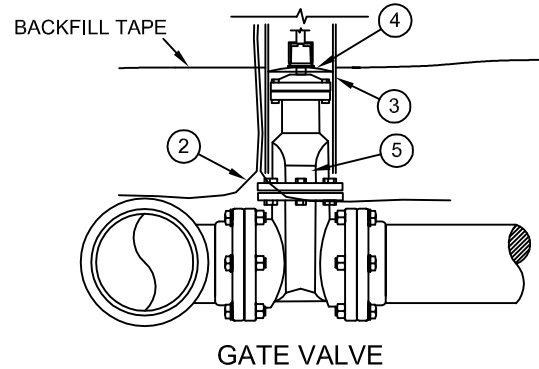
NOTES:

- 1. SADDLES SHALL BE WRAPPED IN 10 MIL POLYETHYLENE AND BACKFILLED WITH SAND.
- 2. TRACING WIRE SHALL BE REQUIRED ON ARV, HYDRANT RUNS, BLOW OFFS, SERVICES WITHOUT CONTINUOUS COPPER PIPE, AND OTHER MAJOR APPURTENANCES.

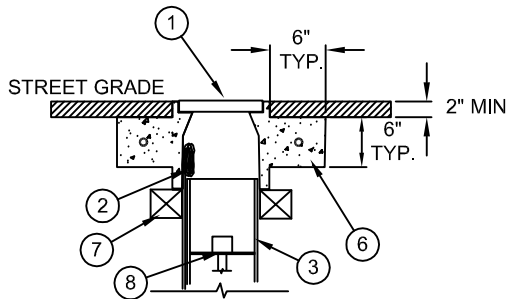
	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	SADDLE DETAIL		
APPROVED BY:			
 PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	W-8



UNDEVELOPED OR LANDSCAPED AREA



GATE VALVE





PAVED AREA

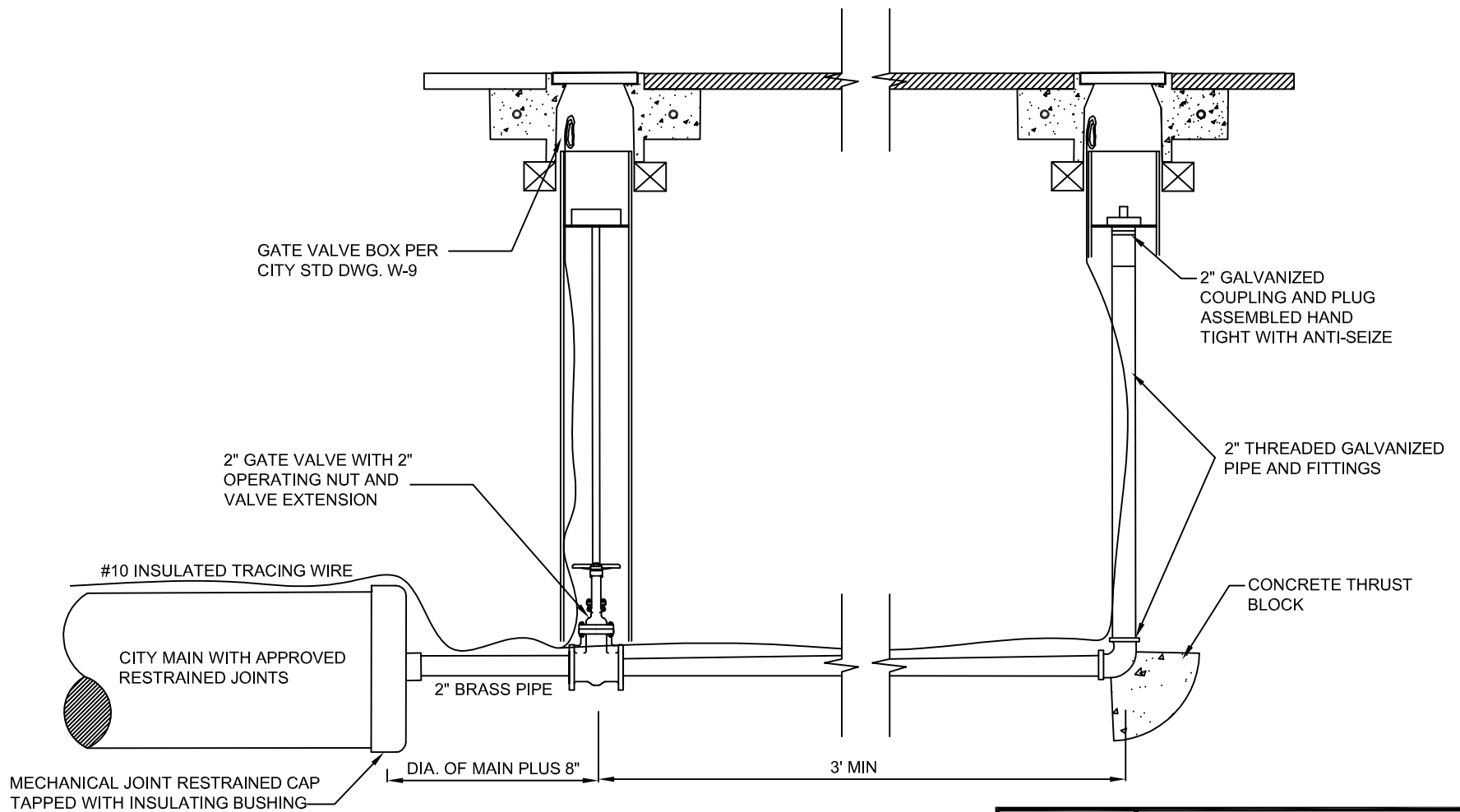
LEGEND

- ① CHRISTY G5 BOX (OR APPROVED EQUAL)
- ② #10 INSULATED TRACING WIRE
- ③ 8" PVC RISER STOCK
- ④ RISER ALIGNER
- ⑤ GATE VALVE
- ⑥ CONCRETE COLLAR W/ #4 REBAR HOOP
- ⑦ 4X4 SOLID CONCRETE BLOCKING UNDER BOX PERIMETER
- ⑧ VALVE EXTENSION PER THE CONSTRUCTION STANDARDS

NOTES:

1. TRACING WIRE THROUGH VALVE BOXES SHALL BE PLACED OUTSIDE OF RISER BUT INSIDE OF BOX.
2. TRACING WIRE SHALL BE SPLICED INSIDE THE VALVE BOX PER TRACING WIRE SPLICE DETAIL AND SHALL LOOP WITHIN THE VALVE BOX WITH 18" OF SLACK WIRE.
3. ALL GATE VALVES SHALL BE CENTERED IN A ONE PIECE RISER STOCK WITH THE USE OF A RISER ALIGNER.
4. OPERATOR NUTS DEEPER THAN 40 INCHES FROM FINISH GRADE SHALL REQUIRE A VALVE NUT EXTENSION, 2 FEET MINIMUM IN LENGTH.
5. VALVES AND FITTINGS SHALL BE WRAPPED AND SEALED IN 10 MIL POLYETHYLENE.
6. VALVE BOX IN PAVEMENT TO BE SET ¼ INCH BELOW FINISHED GRADE.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	GATE VALVE AND BOX		
APPROVED BY:			
 PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	W-9



GATE VALVE BOX PER CITY STD DWG. W-9

2" GATE VALVE WITH 2" OPERATING NUT AND VALVE EXTENSION

#10 INSULATED TRACING WIRE

CITY MAIN WITH APPROVED RESTRAINED JOINTS

2" BRASS PIPE

MECHANICAL JOINT RESTRAINED CAP TAPPED WITH INSULATING BUSHING

DIA. OF MAIN PLUS 8"

3' MIN

2" GALVANIZED COUPLING AND PLUG ASSEMBLED HAND TIGHT WITH ANTI-SEIZE

2" THREADED GALVANIZED PIPE AND FITTINGS

CONCRETE THRUST BLOCK

NOTES:

1. LOCATE BLOWOFF OUT OF STREET IN A PROTECTED AREA.
2. BLOWOFFS OUTSIDE OF PAVED AREAS SHALL BE A MINIMUM OF 6" ABOVE GRADE AND MARKED WITH A CARSONITE MARKER.



PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

2" BLOWOFF ASSEMBLY

APPROVED BY:

Jim McRae

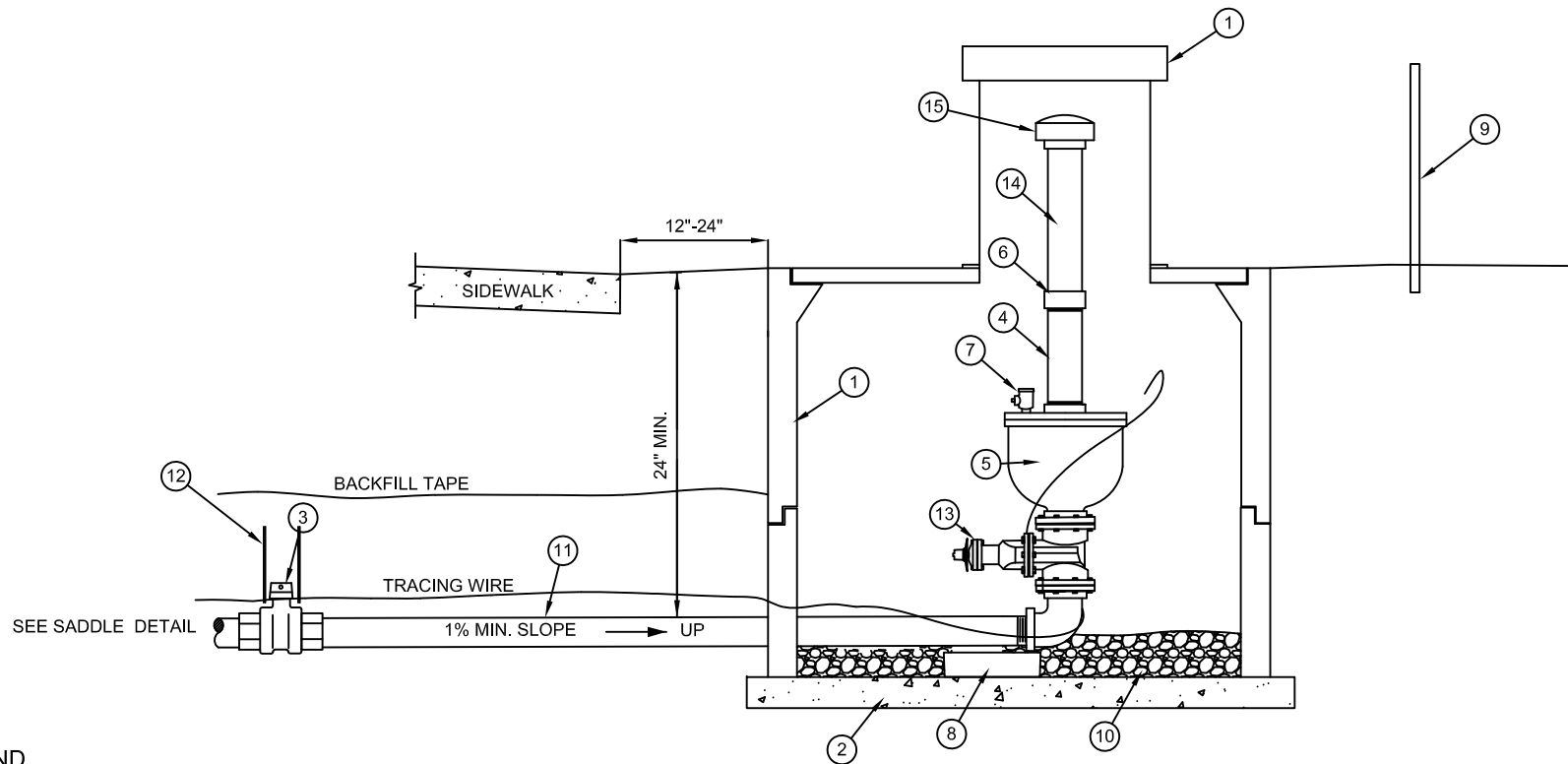
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:
NONE

DRAWN BY:
EAD

DATE:
MAY 12, 2016

W-10


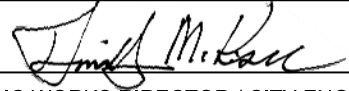


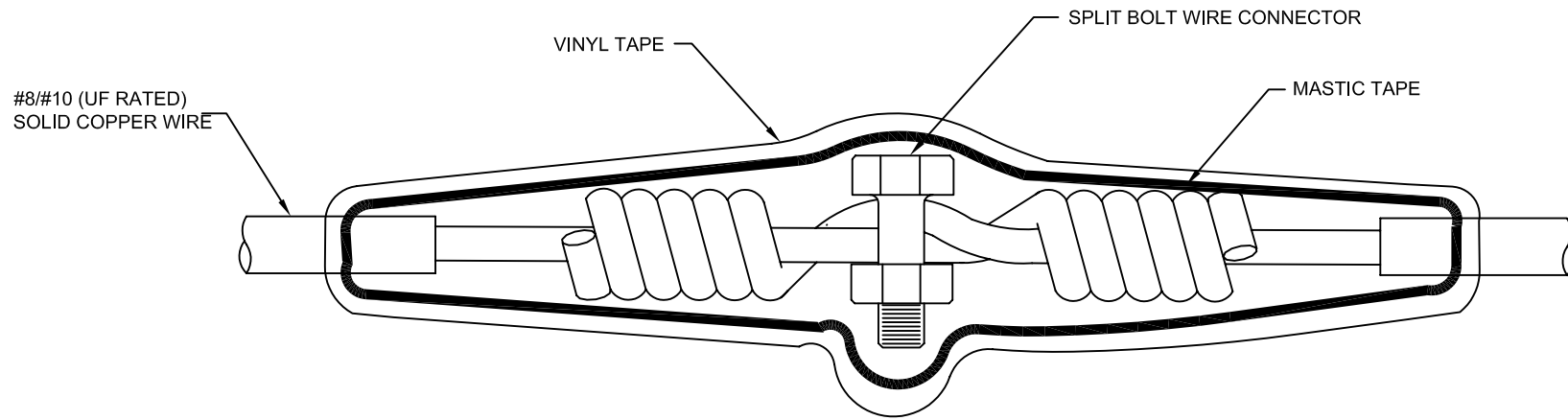
LEGEND

- 1. CHRISTY B36 UTILITY BOX W/ B30X12 EXTENSION AND PLACER WATERWORKS AE3618MC COVER AND ENCLOSURE (OR APPROVED EQUAL).
- 2. CONCRETE BLOCKING (4X4X15 1/2" SOLID SLUMP BLOCK) UNDER ENTIRE PERIMETER OF UTILITY BOX.
- 3. BRASS CORP STOP
- 4. BRASS NIPPLE (SIZED PER ARV OUTLET)
- 5. COMBINATION AIR / VACUUM VALVE WITH DRAIN VALVE
- 6. NPT PVC COUPLING
- 7. 1/4" TEST COCK
- 8. CONCRETE BLOCK FOR SUPPORT
- 9. IDENTIFIER PADDLE, AS REQUIRED BY THE CITY ENGINEER.
- 10. 3" DEEP DRAIN ROCK.
- 11. ALL FITTINGS AND PIPE TO BE BRASS
- 12. SEE GATE VALVE AND BOX DETAIL
- 13. GATE VALVE ACCESSIBLE WITHIN BOX
- 14. NPT SCH 80 PVC PIPE (SIZE PER ARV OUTLET)
- 15. NPT MUSHROOM VENT CAP W/SS SCREEN, BOTTOM VENTING (SIZED PER ARV OUTLET)

NOTES:



- 1. BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.
- 2. FITTINGS AND PIPE ABOVE GROUND SHALL BE GALVANIZED.
- 3. IF THE ARV MUST BE LOCATED IN A TRAFFIC AREA AND H/20 RATED BOX OF EQUIVALENT SIZE SHALL BE USED.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	1" AND 2" AIR RELEASE VALVE ASSEMBLY	
APPROVED BY: 		
PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: TMT	DATE: MARCH 4, 2014
		W-11

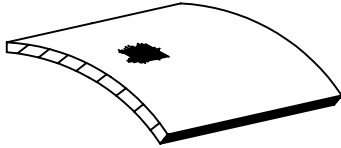


NOTES:

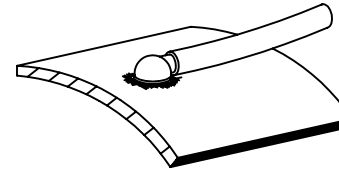
1. TWIST THE WIRE A MINIMUM OF (5) TIMES ON EACH END.
2. INSTALL SPLIT BOLT CONNECTOR.
3. SOLDER WIRE.
4. COVER THE ENTIRE SPLICE WITH MASTIC TAPE WRAP
5. WRAP MASTIC WITH VINYL TAPE.
6. WIRE SPLICES SHALL BE LOCATED WITHIN A VALVE BOX PER GATE VALVE AND BOX DETAIL.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION
	TRACING WIRE SPLICE
APPROVED BY: 	
PUBLIC WORKS DIRECTOR / CITY ENGINEER	
SCALE: NONE	DRAWN BY: BPJ
DATE: FEB 9, 2010	W-12

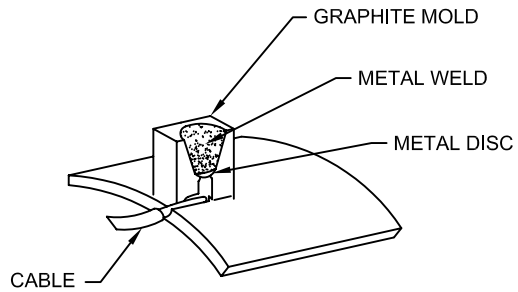
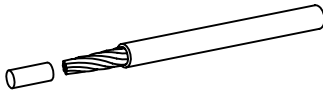
1) FILE TO BARE METAL & CLEAN OVER SURFACE



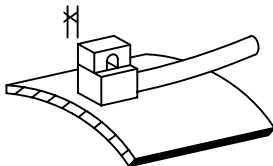
4) REMOVE SLAG FROM CONNECTION, COVER CONNECTION WITH COMPATIBLE COATING AND CAP OVER ALL EXPOSED METAL



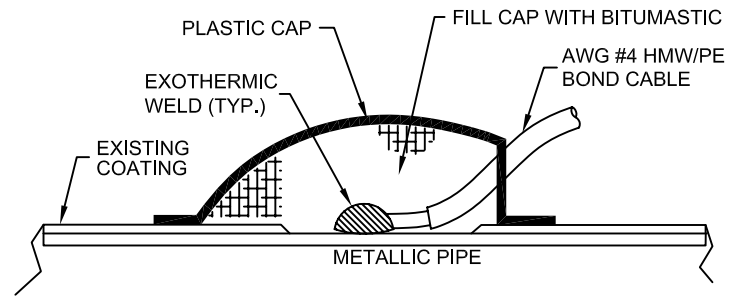
2) STRIP INSULATION FROM WIRE AND ATTACH SLEEVE



3) HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR, IGNITE WITH FLINT GUN



NOTE:
EACH JOINT SHALL HAVE TWO
SEPARATE WELD WIRES.



PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

EXOTHERMIC WELD

APPROVED BY:

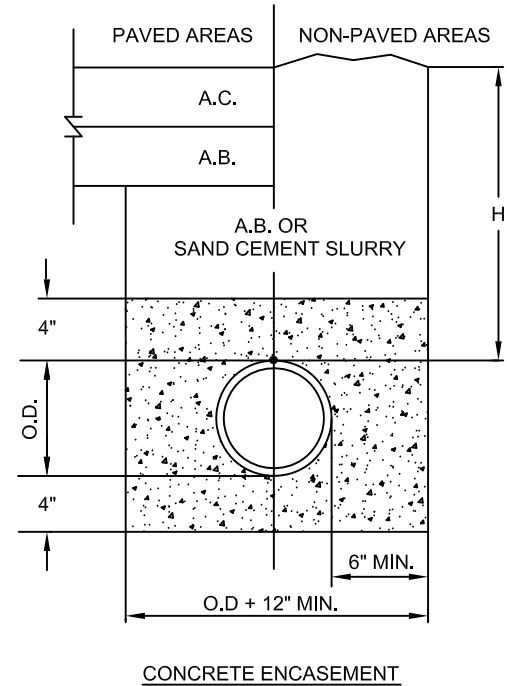
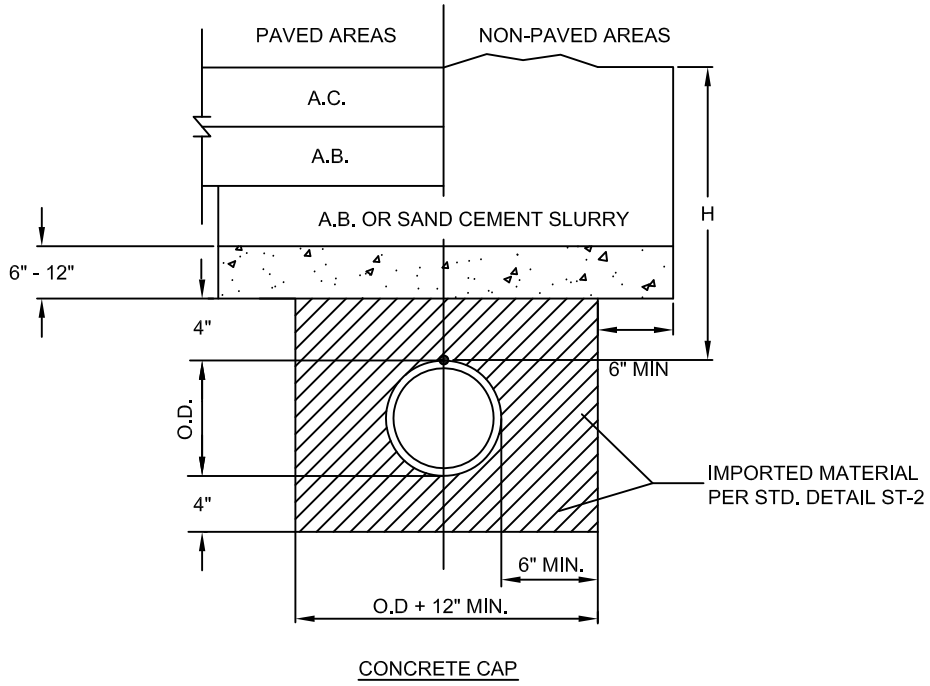
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:
NONE

DRAWN BY:
BPJ

DATE:
FEB 9, 2010

W-13


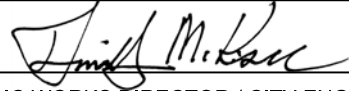


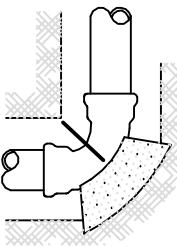
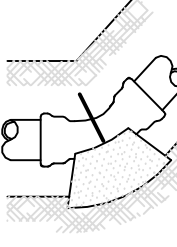
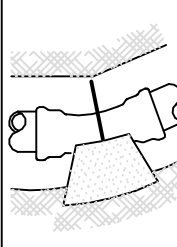
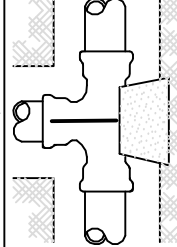
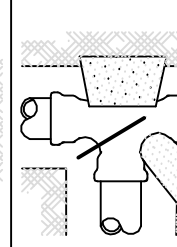
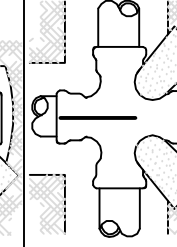
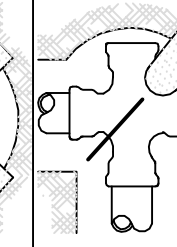
APPLICATION:

- WHERE $30" < H < 36"$, USE DIP ONLY
- WHERE $20" < H < 30"$
 - WITH SERVICES, USE DIP AND CONCRETE CAP
 - WITHOUT SERVICES, USE DIP AND CONCRETE ENCASE (WRAP DIP IN FOAM PRIOR TO ENCASEMENT)
- WHERE $H < 20"$, REDESIGN WATERLINE

NOTE:


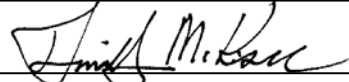
THIS DETAIL SHALL BE USED ON A CASE-BY-CASE BASIS WITH THE APPROVAL OF THE CITY ENGINEER. IN MOST CASES, THE 36" MINIMUM COVER SHALL PREVAIL.

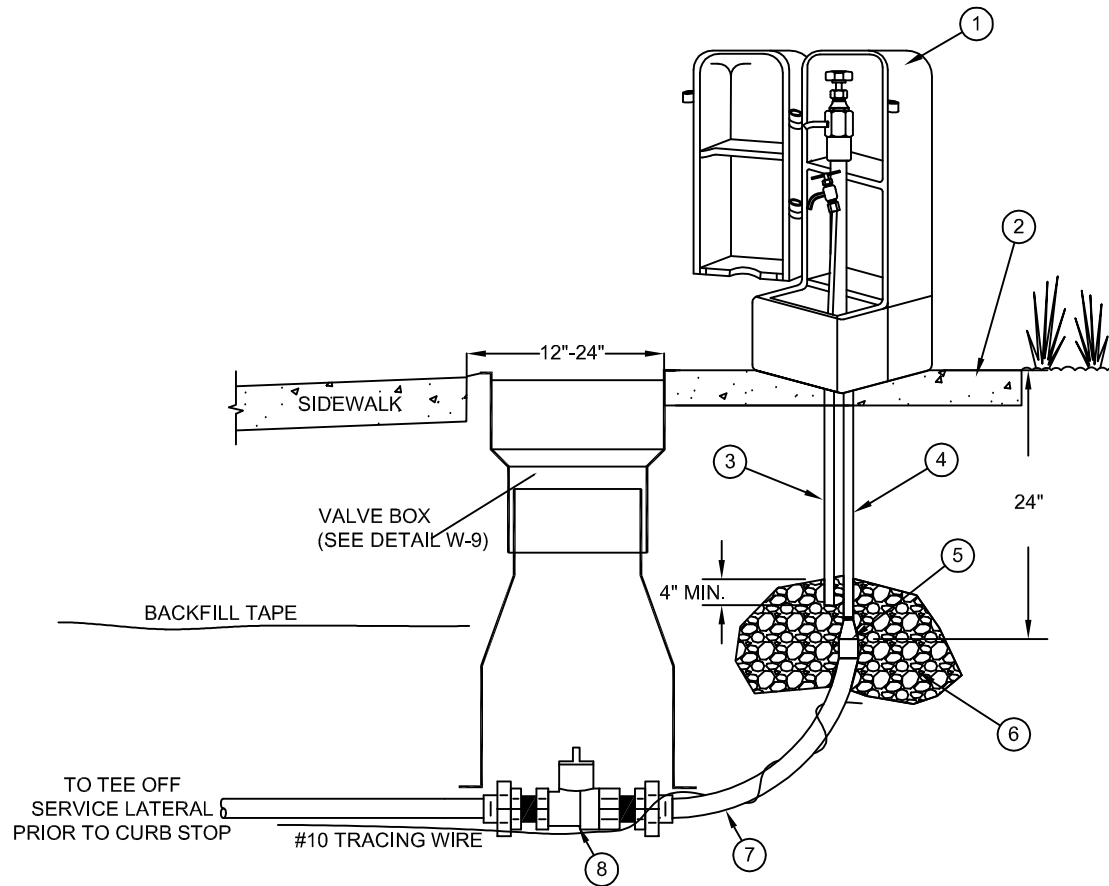
	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	SHALLOW WATER MAINS	
APPROVED BY: 		
PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: JP	DATE: DEC 14, 2010
		W-14

REQUIRED BEARING AREA – TOTAL SQUARE FEET								
TYPE OF FITTING	90° BEND	45° BEND	11 1/4" OR 22 1/2" BEND	TEE OR DEAD END	TEE W/PLUG	CROSS W/PLUG	CROSS W/PLUGS	
TYPICAL INSTALLATION								
SIZE OF PIPE	4"	2	1	1	2	2	2	2
	6"	4	2	1	3	4	4	4
	8"	7	4	2	5	7	7	7
	10"	12	6	3	8	12	12	12
	12"	16	10	5	12	16	16	16
	16"	28	15	8	21	28	28	28

NOTES:

1. THRUST BLOCKS TO BE CONSTRUCTED OF SIX SACK CONCRETE AND POURED AGAINST UNDISTURBED SOIL.
2. AREAS GIVEN ARE FOR CLASS 150 PIPE AT TEST PRESSURE OF 200 P.S.I. IN SOIL WITH 2,000 P.S.F. BEARING CAPACITY. INSTALLATIONS USING DIFFERENT PIPE, TEST PRESSURES AND/OR SOIL TYPES SHOULD ADJUST AREAS ACCORDINGLY.
3. JOINTS AND FACE OF PLUGS TO BE KEPT CLEAR OF CONCRETE.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	THRUST BLOCKS	
APPROVED BY: 		
PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: TMT	DATE: OCT 2, 2012
		W-15


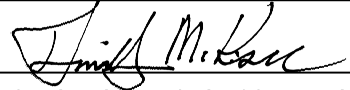


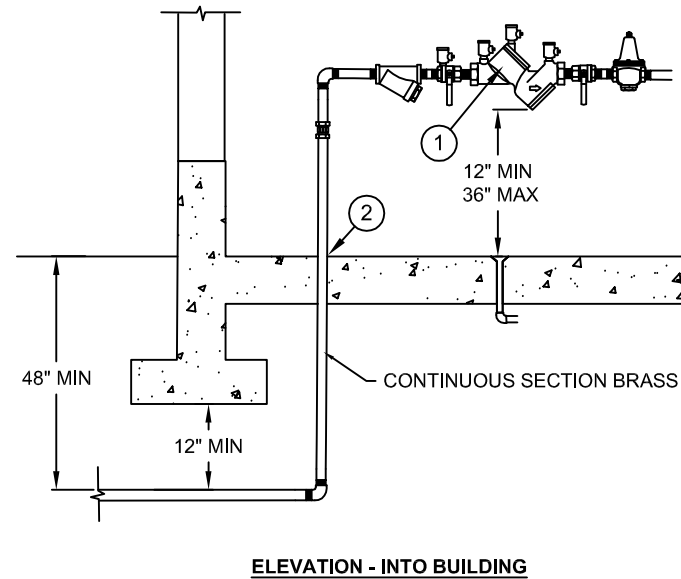
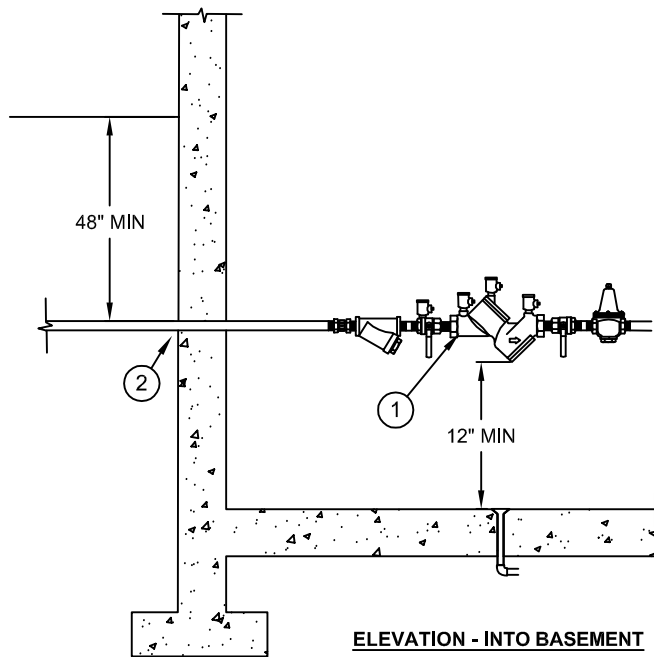
LEGEND:

- ① SAMPLING STATION
- ② 18" X 18" X 4" CONCRETE PAD
- ③ 1/2" PVC DRAIN
- ④ 1/2" STAINLESS STEEL PIPE
- ⑤ POLY ADAPTOR AND SS REDUCER
- ⑥ 1 CF 3/4" CRUSHED ROCK
- ⑦ 1" POLY WATER SERVICE LINE
- ⑧ 1" CORP STOP

NOTES:

1. SAMPLING STATIONS SHALL HAVE A SAMPLING BIBB WITH A $\frac{7}{16}$ " UNTHREADED BLOW OFF.
2. SECURE WITH STAINLESS STEEL ANCHOR BOLTS, SIZED PER SAMPLING STATION MANUFACTURER
3. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE ALUMINUM HOUSING WITH HINGED OPENING.
4. ALL WORKING PARTS SHALL BE OF STAINLESS STEEL AND SERVICEABLE FROM ABOVE GROUND.
5. A STAINLESS STEEL PET COCK WILL BE LOCATED BELOW THE SAMPLING BIBB.
6. MANUFACTURED BY KUPFERLE FOUNDRY. MAINGUARD MODEL #88-SS (OR EQUAL)

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	WATER QUALITY SAMPLING STATION	
APPROVED BY:  PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016
		W-16


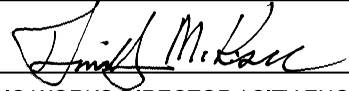


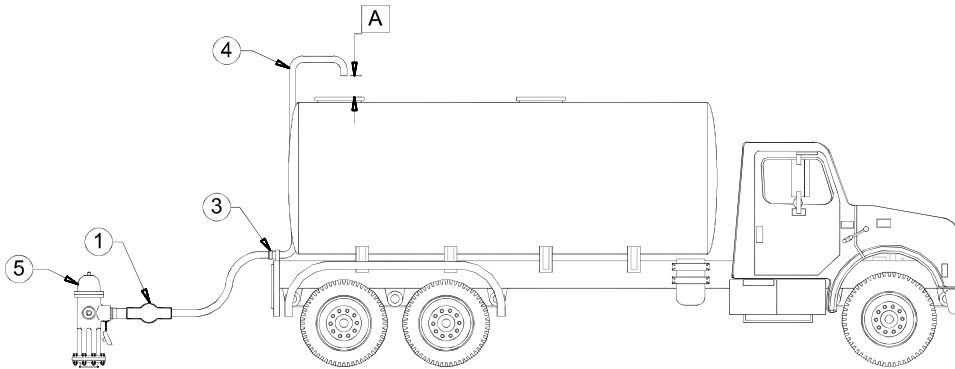
NOTES:

1. THIS DETAIL IS APPLICABLE TO 1" AND SMALLER COLD CLIMATE BACKFLOW PREVENTION DEVICES LOCATED WITHIN BUILDING OR STRUCTURES.
2. REQUIRES CITY ENGINEER APPROVAL WHEN A STANDARD REDUCED PRESSURE BACKFLOW DEVICE IS IMPRACTICAL.
3. ALL PIPE AND APPURTENANCES DOWNSTREAM OF METER BOX ARE THE RESPONSIBILITY OF THE CUSTOMER.
4. MUST BE NO CONNECTIONS BETWEEN THE METER AND THE BACKFLOW PREVENTION DEVICE.
5. DRAIN REQUIRED PER CHAPTER 8 OF THE 2007 UNIFORM PLUMBING CODE.
6. PROVIDE 12' OF CLEARANCE FROM ANY PART OF THE DEVICE.

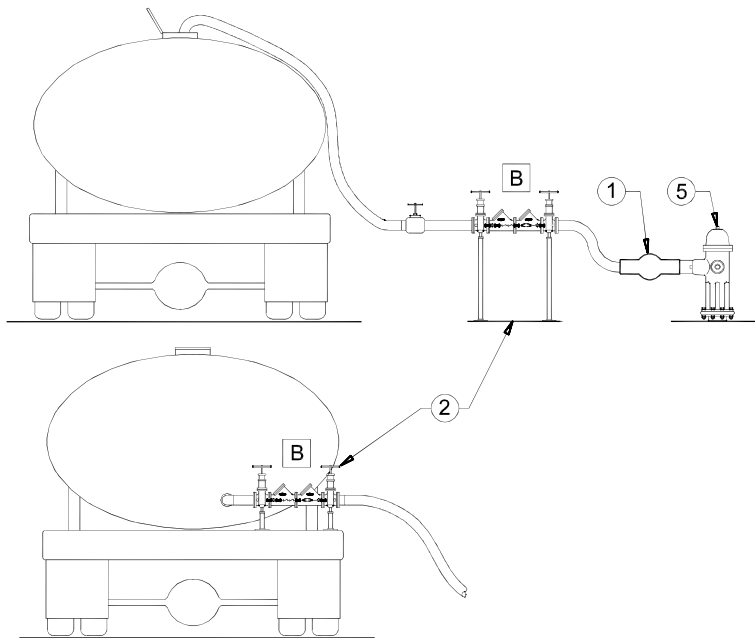
LEGEND:

- ① REDUCED PRESSURE BACKFLOW DEVICE PER DETAIL W-4.
- ② WALL/FLOOR PENETRATIONS

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION
	INDOOR R.P. BACKFLOW DEVICE
APPROVED BY:  PUBLIC WORKS DIRECTOR / CITY ENGINEER	
SCALE: NONE	DRAWN BY: EAD
DATE: MAY 12, 2016	W-17



CASE 1: AIR GAP EQUIPPED TANKER TRUCK




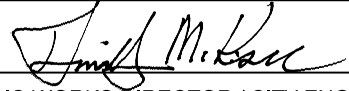
CASE 2: REDUCED PRESSURE BACKFLOW PREVENTION DEVICE USED

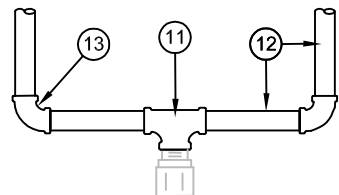
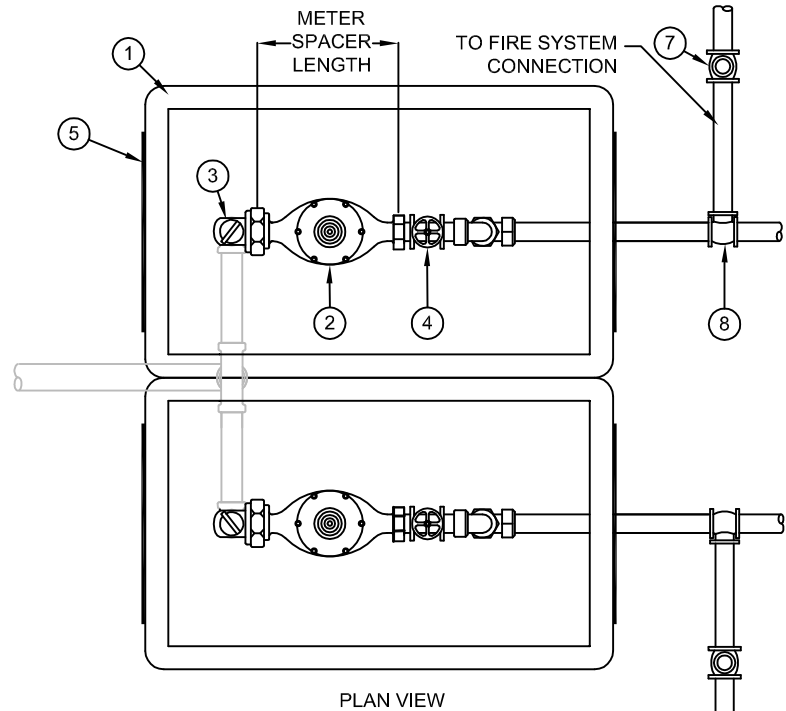
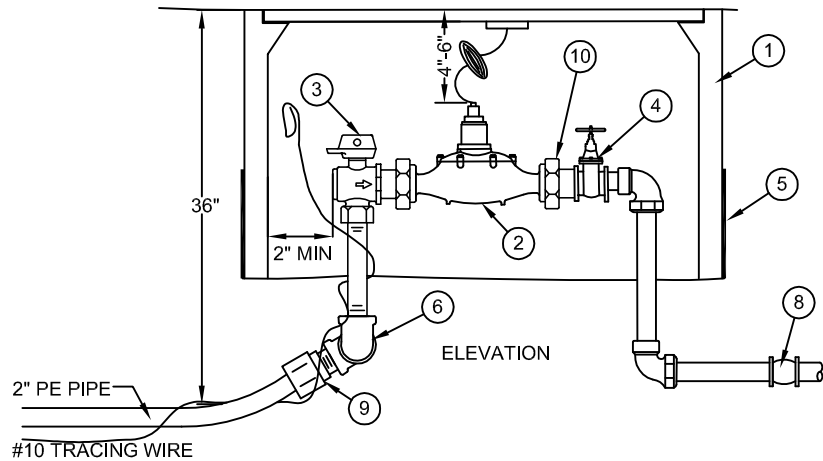
LEGEND:

- ① HYDRANT METER PROCURED FROM CITY
- ② TRUCK MOUNTED OR TEMPORARY REDUCED PRESSURE BACKFLOW PREVENTION DEVICE
- ③ HOSE CONNECTION
- ④ PIPE ATTACHED TO WATER TRUCK
- ⑤ CITY APPROVED SOURCE OF WATER

NOTES:

- A AIR GAP (AT LEAST 2X PIPE DIAMETER FROM FLOOD RIM OF TANK AND >12")
- B REDUCED-PRESSURE BACKFLOW PREVENTION DEVICE MUST BE TESTED AND CERTIFIED ACCURATE. SUBMIT CERTIFICATE TO CITY PRIOR TO USE.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	APPROVED METHODS FOR FILLING WATER TANKERS	
APPROVED BY:		
 PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016
		W-18

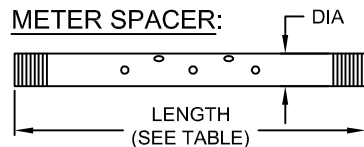


⑥ DOUBLE METER MANIFOLD

LEGEND:

- ① CHRISTY B16 BOX WITH FL16D LID FOR 3/4" METER / CHRISTY N30 BOX WITH FL30D LID FOR 1" METER (OR APPROVED EQUAL)
- ② WATER METER (CITY)
- ③ 90 ° BRASS CURB STOP (CITY)
- ④ GATE OR BALL VALVE (PRIVATE).
- ⑤ CEMENT BOARD END PLATE (TYP.)
- ⑥ DOUBLE METER BRASS MANIFOLD
- ⑦ SINGLE BRASS CHECK VALVE (PRIVATE)
- ⑧ TEE (PRIVATE)
- ⑨ POLY ADAPTOR
- ⑩ METER SPUD ADAPTOR (NOT NECESSARY FOR 1" METER)
- ⑪ BRASS TEE 1x1x2
- ⑫ BRASS SPOOL 1"
- ⑬ BRASS ELBOW 1"



METER SPACER:



METER SPACER TABLE		
METER SIZE	SPACER	
	DIA	LENGTH
3/4"	3/4"	7-1/2"
1"	1"	7-3/4"

NOTES:

1. WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
2. ALL PIPE AND FITTINGS SHALL BE BRASS, WITH THE EXCEPTION OF THE POLY SERVICE LINES.
3. BURIED BRASS PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
4. METER SPACER SCH 80 PVC NPT PIPE NIPPLE WITH 5 EA. X 1/4" DIA. HOLES THROUGH BOTH SIDES

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION	
	3/4" & 1" DOUBLE WATER SERVICE	
APPROVED BY: 		
PUBLIC WORKS DIRECTOR / CITY ENGINEER		
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016
		W-19