BOOK NO.

LAS VIRGENES MUNICIPAL WATER DISTRICT

CALABASAS, CALIFORNIA

STANDARD PLANS AND SPECIFICATIONS

FOR THE

CONSTRUCTION OF WATER MAINS AND FACILITIES

JUNE 1, 1997

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BEFORE USE

Note: Owner of this Standard Specification book is responsible for its continual updating. Notify Las Virgenes Municipal Water District at the start of a new project and updated material will be sent free of charge.

FOREWORD

The “Las Virgenes Municipal Water District Standard Plans & Specifications” establishes uniform methods and procedures for the design and construction of district facilities.

This manual is not a textbook or a substitute for engineering knowledge, experience or judgment. Neither does it impose any standard of conduct or duty to the public. Instead, the methods and procedures contained in this manual should be reviewed by the engineer using them to determine applicability to the project on which he is working. When methods and procedures are not applicable, the engineer should request guidance from the district.

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DEFINITIONS AND TERMS

Whenever the following terms, or pronouns used in their stead, occur in the Standard Specifications, the intent and meaning shall be interpreted as follows:

(a) District: LAS VIRGENES MUNICIPAL WATER DISTRICT, a municipal water district organized under the Municipal Water District Act of 1911, as amended, 4232 Las Virgenes Road, Calabasas, California.

(b) Engineer: The registered civil engineer responsible for the design, whose signature appears on the Plans.

(c) District's Representative: The person or engineering firm appointed by the Board of Directors of the district to represent the district with regard to the Agreement.

(d) Agreement: The executed form provided in the latest revision of the Las Virgenes Municipal Water District's Administrative Code, Section 11.2, or any proposal that certain works, when constructed to these standards, will be accepted by the district.

(e) Contractor or Subdivider: The person, firm, or corporation entering an Agreement with the district for the performance of work and the construction of facilities to be accepted by the district, or the agent appointed to act for said party in the performance of the work.

(f) Subcontractor: The person, firm, or corporation supplying labor, or labor and materials at the site of the work as a part of the Contractor's obligation under the Agreement.

(g) Plans: The official plans, profiles, typical cross-sections, working drawings, detail drawings and supplemental drawings, or exact reproductions thereof, approved by the Engineer, which show the locations, character, dimensions, and details of the work to be done.

(h) STANDARD DRAWINGS: Las Virgenes Municipal Water District Standard Drawings and Los Angeles

(I) Specifications: The directions, provisions, requirements, and standard drawings pertaining to the method and manner of performing the work, and to the qualities of materials to be furnished for acceptance by the district.

(j) Laboratory: The laboratory designated by the district's representative and/or district to test materials and work involved in the Contract.

TERMS

Wherever the terms “required”, “permitted”, “ordered”, “designated”, “directed”, “prescribed”, or terms of like import are used, it shall be understood that the requirements, permission, order, designation, prescription, or direction of the Owner’s Representative is intended. Similarly, the terms “acceptable”, “satisfactory”, “or equal”, or terms of like import shall mean acceptable to or satisfactory to the Owner’s Representative, unless otherwise expressly stated. The word “provide” shall be understood to mean furnish and install.

ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron & Steel Institute
ANSI	American National Standards Institute (formerly USASI, USAS, ASA)
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASA	American Standards Association (Now ANSI)
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CRSI	Concrete Reinforcing Steel Institute
IEEE	Institute of Electrical and Electronics Engineers
LVMWD	Las Virgenes Municipal Water District
NBFU	National Board of Fire Underwriters
NEMA	National Electrical Manufacturers
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
State Specifications	California Standard Specifications, State of California, Department of Transportation, Division of Highways
SSPC	Steel Structures Painting Council
UBC	Uniform Building Code, Pacific Coast Building Officials Conference of the International Conference of Building Officials
U/L or UL	Underwriters' Laboratories, Inc.
USASI or USAS	United States of American Standards Institute (Now ANSI)

REFERENCES

General Note: The listings below have been organized into major categories to facilitate their use.

General Codes or Specifications

- Standard Specifications for Public Works Construction 1988 Edition, by APWA/AGC, the “Green Book.”
- Road Encroachment Regulations, Los Angeles County Road Department.
- Standard Specifications - State of California Business and Transportation Agency, Department of Transportation Standard Specifications (Caltrans).
- State of California Department of Industrial Relations, Division of Industrial Safety, “Construction Safety Orders” (Shoring).
- Uniform Building Code as amended by Building & Safety Department, County of Los Angeles, California.
- Engineering Standard Manual Department of Water and Power, City of Los Angeles, California
- Procedural Guidelines and General Design Requirements, Irvine Ranch Water District, Orange, California.
- Water Design and Construction Standards, City of Thousand Oaks, California.
- City Standards, City of San Buenaventura, California.
- Ventura County Road Standards, Ventura, California.
- AWWA Manuals

  M6 Water Meters - Selection, Installation, Testing and Maintenance.

  M11 Steel Pipe - Design and Installation.

  M17 Installation, Operation and Maintenance of Fire Hydrants.

  M22 Sizing - Water Service Lines and Meters.

  M23 PVC Pipe.

Water System Materials and Construction (Excluding Subjects Listed Separately)

· ASTM Specifications.

A185 Specification for Welded Steel Wire Fabric for Concrete Reinforcement.

A307 Specification for bolts and nuts.

A615 Specification for deformed and plain billet-steel bars for concrete reinforcement (rebar).

A94 Specification for ready-mixed concrete.

C150 Specification for Portland cement.

D698 Tests for moisture-density relations of soils, using 5.516 rammer and 12-in. drop.

D1248 Specification for polyethylene plastics molding and extrusion materials (plastic film wrap).

· AWWA Standards

C110 American National Standard for gray iron and ductile iron fittings, 3-in. through 48-in., for water and other liquids.

C111 American National Standard for rubber gasket joints for ductile iron and gray iron pressure pipe and fittings.

C115 AWWA for cast iron and ductile iron flanges sizes 3" - 48".

C153 AWWA for compact mechanical joint ductile iron fittings size 3" - 24".

C153 AWWA for ductile iron compact push-on fittings size 4" - 12".

C207 AWWA Standard for steel pipe flanges for Water Works service - sizes 4-in. through 144-in.

C208 AWWA Standard for dimensions for steel water pipe fittings.

C500 AWWA Standard for gate valves - 3-in. through 48-in. NPS-for water and sewage systems.

C503 AWWA Standard for wet-barrel fire hydrants.

C504 AWWA Standard for rubber-seated butterfly valves.

C600 AWWA Standard for installation of gray and ductile cast iron water mains and appurtenances.

C601 AWWA Standard for disinfecting water mains.

Poly-Vinyl Chloride (PVC) Pipe

· AWWA Standards

C900 AWWA Standard for poly-vinyl chloride (PVC) pressure pipe, 4-in. through 12-in., for water.

C905 AWWA Standard for poly-vinyl chloride (PVC) pressure pipe, 14-in. through 36-in., for water.

Steel Pipe

· AWWA Standards

C200 AWWA Standard for steel water pipe 6-inches and larger. Note - steels to be ASTM A283 or A570.

C205 AWWA Standard for cement-mortar protective lining and coating for steel water pipe, 4-in. and larger, shop applied. Note - cement to meet ASTM C150.

C206 AWWA Standard for field welding of steel water pipe. Note - welding electrodes to meet ASTM A233 and welding procedures to meet AWS D10.9.

Ductile Iron Pipe

· AWWA Standards

C150 American National Standard for the thickness design of ductile iron pipe.

C151 American National Standard for ductile iron pipe, centrifugally cast in metal molds or other liquids.

C104 Cement mortar lining for ductile iron and gray iron pipe and fittings for water.

C105 Polyethylene encasement for gray and ductile cast iron piping for water and other liquids.

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MATERIALS

1.1 GENERAL REQUIREMENTS

This section discusses the materials involved in systems and associated construction activities.

The materials selected have been chosen for their strength, durability and ease of maintenance. It should be noted that in some instances the district requirements exceed those of the industry or regional standards. Where applicable, industry or regional standards, such as AWWA or other standards, have been referenced and it shall be the responsibility of the contractor to be familiar with those standards to insure compliance. Titles corresponding to the specific numbers are given in the reference section of the standards.

All equipment, materials and supplies to be incorporated in the work shall be new unless otherwise specified.

Contractor is to follow manufacturers recommendations for storage in order to prevent material damage. Failure to do so will be a cause for the district to reject such improperly stored materials.

In some instances, particular manufacturers and product names have been mentioned as being approved. Other products may also meet the requirements, but must be first approved in writing by the district before delivery is started and before such material is used in the work. One factor which may be considered by the district in any consideration of other products is the need for some degree of standardization. In the event that the contractor furnishes the material, process or article better than that specified, the difference in cost of such material, process or article so furnished shall be at no expense to the district. ■

1.2 TESTING AND FINAL ACCEPTABILITY OF MATERIAL

The district will require tests and certifications as deemed necessary to show that the specified materials have been employed. Notwithstanding prior factory or yard inspections, the district representative shall have the right to reject any damaged or defective materials found on the job which will affect the durability or performance of the installation and order its removal from the site.

No materials shall be installed until approved by the district. All installations which are to be backfilled shall be inspected and approved by the district's representative prior to backfilling and the contractor shall give 24 hour notice in advance of backfilling to the district's representative so that proper inspection may be provided.

All materials not conforming to the requirements of these specifications shall be considered as defective and all such materials, whether in place or not, shall be rejected. No rejected material, the defects of which have been subsequently corrected, shall be used until approved in writing by the district's representative.

The inspection of the work shall not relieve the contractor of any of his or her obligations to fulfill the specifications as prescribed. Defective work shall be made good, and unsuitable materials may be rejected notwithstanding the fact that such defective work and unsuitable materials have been previously overlooked by the district's representative and accepted.

All materials for use in the work shall be stored by the contractor in such a manner as to prevent damage from exposure to the elements, admixture of foreign materials or from any other cause. The district will not be responsible for damage or loss of materials by weather or other causes. ■

1.3 MAIN LINE PIPE MATERIALS

A. PVC Pipe

1. Pipe. PVC pipe shall conform to the quality and strength requirements of AWWA C900-89 and C900a-92 which covers PVC (polyvinyl chloride) pipe in sizes four to 12 inches and C905-88 for pipe sizes 14-36 inches.

   Each standard or random length of pipe shall be clearly marked with the following:

   - Nominal size and O.D. base, i.e., six-inch cast iron pipe size.
   - Material code "PVC 1120."
   - Dimensional ratio, i.e., DR 25 where the DR is equal to the outside diameter divided by the pipe thickness.
   - AWWA pressure class, i.e., PC 150.
   - AWWA designation "AWWA C900" or C905.
   - Manufacturer's trade name and production record code.
   - Seal (mark) of testing agency.

   The standard laying length shall be 20 feet (plus/minus) one inch in all classes and sizes. A maximum of 15 percent may be furnished in random lengths of not less than 10 feet each.

   In all cases, four-inch pipe shall be Class 200. No pipe shall be of a class less than Class 150.

   Class 150, 200 (C900 and C905) **minimum short piece of pipe length shall be two feet**.

   For tap sizes of :-inch to two inches, **service saddles are required.** Refer to Service Line Materials and Fittings sections of these Standards.

   "Heavy wall tap couplings" or "threaded brass insert couplings" are not accepted.

AWWA C900 and C905 pipe has the same outside diameter (O.D.) as that of ductile iron pipe (C.I.P.) in the sizes furnished.

One gasket shall be furnished with each length of elastomeric-gasket bell-end pipe and two gaskets shall be furnished with each coupling where couplings are used. **Transition rubber gaskets are not approved.**

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

Approved PVC pipe is:

- Johns Manville "Blue Brute Pipe"
- Pacific Western "PW"

Other manufacturers require prior approval.

2. Joint Mechanisms. The joints must meet DR requirements and shall be either of the following:

   - Integral wall - thickened bell end and (bell and spigot with rubber gasket.)
   - Integral sleeve reinforced bell end.
   - Elastomeric gasket couplings.

   PVC solvent cement joints, although allowed by AWWA C900 and C905, **are not approved**.

3. Couplings and Fittings. Where couplings are used, they shall meet the requirements of AWWA C900 and C905. Couplings shall be as furnished by the manufacturer and shall be marked with same information as the pipe. Couplings with no stops shall only be used at closures.

4. Cast iron fittings with grip tite ends shall be used for PVC pipe (refer to Main Line Fittings sections of these Standards.)

5. Locating wire. To allow for the location of non-metallic pipes, copper wire shall be provided. Wire shall be bare 12 gauge and shall be continuous between successive valve boxes (including air and vacuum and adjacent valve boxes associated with fire hydrants and blow off assemblies).

6. Hot Tapping - see Hot Tapping section.

7. Physical Test Requirements. Hydrostatic, burst and sustained pressure and crushing tests shall be conducted at the factory in accordance with AWWA C900-89, C900a-92 and C905-88. All testing shall be done by a recognized testing laboratory with such testing available for inspection by the engineer. If required, the manufacturer shall supply a letter of certification attesting to their pipe meeting these specifications.

   The hydrostatic proof test for every piece of pipe shall be as follows:

C900 Dimension Ratio (DR)	Pressure Rating (PR) psi (kPa)
DR = 18 or Class 150	600
DR = 14 or Class 200	800

C905 Dimension Ratio (DR)	Pressure Rating (PR) psi (kPa)
41	200
32.5	250
26	320
25	330
21	400
18	470

B. Steel Cylinder Pipe. All welding shall be done by qualified welders as specified in AWWA C-200, C-205, C-206, C-207, C-208 and the Standards of the American Welding Society.

(Certification per ASME Section 9 is mandatory.)

1. Steel pipe shall conform to the quality and strength requirements of AWWA C200 or as specified below. That standard pertains to electrically butt-welded straight-seam or spiral-seam pipe and to seamless pipe six inches in diameter or larger.

   The steel shall conform to one of the following:

Specification	Grade	Minimum Yield Point (psi)
ASTM A238	Grade C	30,000
	Grade D	33,000
ASTM A570	Grade 30	30,000
	Grade 36	36,000
	Grade 40	40,000
	Grade 45	45,000

   The stress in the steel pipe shall not exceed the higher of 15,000 psi or the stress computed using one-half the designated working pressure and the stress formula below except that the following minimum thicknesses shall be used:

Nominal Inside Diameter Inches	Minimum Thickness Inches
4" through 18"	0.1046
20" and 21"	0.1345
24" and 27"	0.1495

   The following formula shall be used to determine the stress in the steel cylinder:

$$s = \frac{PDi}{2g}$$

Where s = Stress, psi
P = Working Pressure, psi
Di = Maximum Inside Diameter of Steel Cylinder, inches
g = Wall Thickness of Steel Cylinder, inches

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

The nominal measurement for steel cylinders 12 inches and smaller shall conform to the following:

Nominal Inside Diameter	Steel Cylinder Outside Diameter
4"	4½"
6"	6-5/8"
8"	8-5/8"
10"	10¾"
12"	12¾"

For larger pipes, the steel cylinder outside diameter shall be computed using the following formula:

$D_o = D + 2 (t+g)$; where

D_o = Actual Steel Cylinder O.D., inches
D = Nominal Inside Diameter, inches
t = Thickness of Cement Mortar Lining, inches
g = Wall Thickness of Steel Cylinder, inches

Another factor for consideration in all steel lines is earth loads. AWWA Manual M-11 should be consulted in this regard.

The pipe shall be essentially round. The outside circumference shall not vary more than (plus/minus) 1.0 percent from the nominal outside circumference based upon the diameter specified (except for the ends which are discussed below.)

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

The pipe lengths, generally 40 feet long, shall be furnished with a tolerance of (plus/minus) two inches. Random lengths shall be furnished in lengths averaging 29 feet or more, with a minimum length of 20 feet.

Welded Seams in Steel Cylinders shall be fusion welded, longitudinal, spiral or girth. Longitudinal seams shall be limited to not more than one per plate section. Longitudinal seams must be staggered with longitudinal seams in adjoining plate section. Girth seams shall be limited to one per standard section 16 feet or less in length.

Additional girth seams in longer standard sections may be employed but not to exceed one per each additional full 10 feet beyond the first 20 feet. Seams in special sections may be increased as required.

2. Pipe Ends. Various end treatments can be supplied as discussed in AWWA C200 and briefly listed below:

- Ends for mechanical coupled field joints. These are either plain or grooved.

- Ends for lap joints for field welding. These shall have a bell end pressed or rolled without hammering. The surfaces shall be ground smooth. When assembled, joints must have a minimum 1½ -inch lap with approximately 1/32-inch clearance.

- Plain end pipe - these shall have a plain end right angle cut.

- Except for butt strap closures, butt welding and field fabricated fittings will not be permitted unless approved by the district.

- Deflection of more than three (3) degrees not allowed at joints.

- Ends fitted with butt straps for field welding. The butt straps may be made in halves. **Wedding bands shall not be used** unless approved by the district representative.

- Bell-and-spigot ends with rubber gaskets. These shall have bell ends which are made without hammering. Spigot ends shall be formed or fabricated to the required shape to retain the gasket. The gasket shall be designed and fitted as the sole element dependent upon to make the joint water tight. The gasket shall meet the requirements of AWWA C200.

- Plain ends fitted with flanges.

The allowable tolerance at pipe ends is discussed in AWWA C200.

3. Hydrostatic tests. Each pipe shall be tested by the manufacturer to a pressure not less than that determined by:

$$s = \frac{PDi}{2g}$$

where S = 0.75 times the minimum yield strength of the steel and the other items are as discussed earlier.

4. Cement Mortar Lining and Coating (CMLC). Unless otherwise approved or as revised below, all steel pipe shall be cement mortar lined and coated in accordance with AWWA C205 and ASTM C150 which covers shop applied lining and coating. Cement shall be Portland cement Type II for lining and coating.

   Cement mortar lining shall be uniform in thickness except at joints or other discontinuities. Ends of lining shall be left square and uniform and the lining holdback shall be as specified for the particular type of joint.

   It should be noted that the district requirements for thickness exceed those of the AWWA standard. Also, it should be noted that no wire fabric reinforcement is required for any lining of specials less than 24 inches in diameter.

CEMENT MORTAR LINING THICKNESS

Nominal Pipe Size Inches	Lining Thickness Inches	Tolerance Inches
6" - 12"	5/16	-1/16 + 1/8
14" - 16"	3/8	-1/16 + 1/8
18" - 36"	1/2	-1/16 + 1/8

5. Cement mortar coating shall be a reinforced coating over all outside surfaces of the pipe and specials. The coating shall be of a uniform

thickness except at joints or other discontinuities in the pipe. Ends of coatings shall be left square and uniform and the coating holdback shall be as specified for the particular type of joint.

After inspection of welded joints and electrically bonded connections, the outside joint recess shall be coated.

Flanges shall be coated with Sanchem (no-oxide) and protected with a polyethylene encasement installed per Painting section of these Standards and in accordance with AWWA C205.

The materials and construction methods for field joints shall be as discussed in Section 2 of these Standards.

CEMENT MORTAR COATING THICKNESS

Nominal Diameter Inches	Coating Thickness Inches	Tolerance Inches
4" - 6"	1/2	-0 + 1/8
8" - 10"	3/4	-0 + 1/8
12" and above	1	-0 + 1/8

6. Electrically Bonded Connections. These are required to form an electrically bonded connection between all steel pipe joints that are not welded.

7. Factory Tests and Inspection. The district representative shall at all times have the right to inspect the work and materials during the manufacturing process and to make or witness such tests as required in these specifications, or as deemed advisable. The contractor will then perform any and all additional work required to assure the pipeline is electrically continuous. In lieu of the preceding, the contractor shall upon request submit a certificate certifying that the materials meet the requirements of this specification. All testing will be done in recognized testing laboratories within the State of California approved by the district representative.

8. Fabricated Angles. These shall meet the requirements of AWWA C208-83. Except for butt strap closures, field fabricated fittings **will not be permitted unless approved by the district representative.**

9. Welded Joints. One of each section shall be swaged out to form a female or bell end which shall permit the male or spigot end to enter approximately 12 inches with a minimum clearance of 1/32-inch. The spigot end shall be "sized" to permit it to enter the bell end of the adjacent section and the weld bead shall be ground flush for the distance it is to enter the bell end.

10. Butt Strap Closures. The butt straps shall be the same thickness as the pipe wall but not less than six gauge, at least 10 inches wide with longitudinal seams, rolled to fit the outside cylinder diameter and shall be centered over the ends of the pipe sections they are to join. A 2 standard five-inch steel coupling shall be welded to the top section of the butt strap to permit access for mortar lining the inside of the joint. The coupling shall be closed with a five-inch solid steel plug welded to the coupling.

11. Welding electrodes shall comply with the requirements of the Standards of the American Welding Society.

    In all hand welding, the metal shall be deposited in successive layers and the minimum number of passes or beads in the completed weld shall be as follows:

Steel Cylinder Thickness Inches	Fillet Weld Minimum Number of Passes
Smaller than 3/16"	1
3/16" and 1/4"	2
5/16"	3
3/8"	3

    After the joints have been welded, the joint shall be coated in the same manner as specified for rubber ring joints.

12. Shop Drawings of all pipe and fittings shall be submitted to the district's representative for approval prior to fabrication of the pipe and fittings. Pipe lay sheets shall be included, consisting of drawings of lay, identification of joints, horizontal and vertical angles and appurtenances. Stationing and elevation shall be shown on all joints, angles and appurtenances. Elevation shall consist of top of pipe and finished surface at these points. Fabricated angles shall meet the

requirements of AWWA C208-83. Except for butt strap closures, field fabricated fittings **will not be permitted** unless approved by the district. Format for shop drawings and lay sheets may be obtained from the district representative. Such approval is an additional precaution against errors and is not to be construed as relieving the contractor of the full responsibility for the accuracy of the shop drawings.

13. Markings shall include a designation mark for each pipe or fitting furnished and field top shall also be indicated.

14. Hot Tapping - refer to Section 2.10 (Hot Tapping) of these Standards.

C. Ductile Iron Pipe

1. Pipe. The pipe shall conform to AWWA C151 for both quality and strength. Each pipe shall include the letters "DI" or word "DUCTILE" to indicate the pipe material. The standard nominal laying length shall be 18 or 20 feet. Random and short lengths shall be per AWWA C151.

2. Joints. These shall be of the rubber gasket push-on joint type conforming to the requirements of AWWA C111 unless otherwise specified. If required, the manufacturer shall supply a letter of certification attesting to their pipe meeting these specifications.

3. Fittings. Refer to Mainline Fittings section.

4. Service Taps. For tap sizes of :" to two inches, **service saddles are required. Tapping of the pipeline is not allowed.**

5. Lining and Coating. Unless otherwise approved, the internal surfaces shall be lined with a uniform thickness of cement mortar and then sealed with a bituminous coating in accordance with AWWA C104.

   The outside surface shall be protected with a polyethylene encasement installed per Painting section of these Standards and in accordance with AWWA C105. ■

1.4 MAIN LINE FITTINGS

A. Gray-Iron and Ductile Iron Fittings. Fittings shall be cement mortar lined or epoxy lined and shall meet the requirements of AWWA C110, C111, C104 and C200. All fittings shall be rated for 250 psi. This standard covers, but is not limited to, fittings with combinations of ends including mechanical joints, plain end, flange, push on joint. The fitting types are as follows:

90° bend, 45° bend, 22½° bend, 11¼° bend.

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

Lining and Coating. Unless otherwise approved, the internal surfaces shall be lined and manufactured to exceed the minimum requirements of American National Standard Institute ANSI A21.51 (AWWA C-151-71).

The outside surface shall be protected with a polyethylene encasement installed per Painting section of these Standards and in accordance with AWWA C105.

The only compact fittings approved are the Tyton C-153.

It should be understood that care must be exercised to not mix mechanical and flange joint ends since they will not mate.

B. Flanges. Per AWWA C206, C207 and C208, they shall be flat-faced and meet the requirements of AWWA C207 and should be AWWA standard steel hub flanges (these flanges meet ANSI B-16.5.) The flanges shall be marked with the size, name or trademark of manufacturer and with the AWWA class, i.e., "E".

The inherent problem with flanges is that they are rigid and do not provide flexibility. Three keys to their installation are (1) uniform tightening of the bolts; (2) do not mate steel raised face flanges with flat face cast iron flanges or vise versa and; (3) prevention of bending or torsional strains. Proper anchorage is important to meet the latter objective.

Flanges shall apply with the following specifications:

Working Pressure	Specification	Class
0 - 275 (1)	AWWA C207 and ANSI B-16.5	E (flat face)
0 - 300 (1)	AWWA C207 and ANSI B-16.5	F (flat face)

Higher class flanges are required when necessary to match valves.

C. Above Ground Bolts and Nuts: Bolts and studs for aboveground installations shall be cadmium plated and shall conform to ASTM A307, Grade B, "Steel Machine Bolts and Nuts and Tap Holes" when a ring gasket is used and shall conform to either ASTM A261 "Heat-Treated Carbon Steel Bolting Material" or ASTM A193 "Alloy-Steel Bolting Material for High Temperature Service" when a full-face gasket is used. Bolts and nuts shall be heavy hexagon series. Nuts shall conform to ASTM A194 "Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service" either in Grade 1, 2 or 2H. The fit shall be ANSI B1.1 "Unified Screw Threads" Class 2, except that Class 3 fit shall be used in holes tapped for studs. Threads may be made either cutting or cold forming. Between 3-inch and δ-inch shall project through the nut when drawn tight. Bolts for underground installations shall be Type 316 stainless steel. All buried bolts shall be completely coated with Sanchem (no-oxide) or appropriate equal, which must be applied in two coats to a minimum thickness of 15 millimeters per coat.

D. Gaskets shall be of the full face gasket type, 1/16-inch thick where both flanges are flat. Drop-in gasket type 1/16" may be used where a raised face flange is present.

1. Class "E" Flanges: Cloth-inserted rubber. Products: Manville No. 109, John Crane Co. Style 777 or equal. Gaskets shall be suitable for a pressure of 350 psi at a temperature of 180 degrees F.

2. Class "F" Flanges: Acrylic or aramid fiber bound with nitrile. Products: Garlock "Bluegard," Klinger "Klingersil C4400" or equal. Gaskets shall be suitable for a water pressure of 740 psi at a temperature of 100 degrees F. Gaskets shall comply with ANSI B16.20.

E. Flexible Couplings. These are designed to connect plain end pipes with a mechanical compression joint to provide a stress relieving, flexible, leak-proof joint. Their use **must be approved by the district representative prior to ordering/installing couplings.** They can be ordered in steel or cast iron pipe sizes (note: C900 and C905

PVC pipe has same outside diameter as cast iron.) The couplings shall either be Dresser Style 38 or Rockwell Series 431.

F. Grooved-End Couplings. Grooved-end couplings shall be of the two-piece style housing, Victaulic Style 77 or equal conforming to AWWA C606. Pipe shall be square cut grooved. Gasket shall be suitable for potable water. This type coupling shall not be used for burial service. Couplings shall be painted the same color as the pipe in accordance with Painting section of these Standards.

G. Transition Couplings. These are used to connect pipes of the same nominal size but different materials. AC, steel and PVC pipes can be connected to one another. **Mechanical joint fittings and transition rubber gaskets are not accepted unless approved the district representative.**

H. Flanged Coupling Adapters. These are used to connect plain end pipe to flanged valves, pumps, meters, etc. They eliminate the need for both a flanged spool and coupling. Generally, they are available in sizes through 12 inches. Approved are Dresser style 127 cast iron and Rockwell series 912 cast iron or 913 steel flanged coupling adapters.

I. Insulating Couplings. These are used to stop the flow of electric current across the joint by means of an insulating boot. Approved are Rockwell Series 416, 932 or 933 and Dresser Style 39 insulating couplings.

J. Special Steel Pipe Fittings and Fitting Dimensions. AWWA C-200, C208 and SS-P-385a covers special fittings, such as elbows, tees, crosses, reducers, etc., and should be consulted for a specific application. Compact fittings **are not approved**. The outside surface shall be protected with a polyethylene encasement furnished and installed per Painting section of these Standards and in accordance with AWWA C105.

Fitting dimensions shall conform to AWWA Specification C208, except that reducers shall consist of taper sections between six-inch minimum lengths of adjoining pipe. The taper shall be a minimum of 12 inches in length of each two-inch diameter change and the gauge shall be equal to that of the larger adjoining pipe. The diameter of the six-inch sections shall match the adjoining pipes and the gauge shall be sufficient to maintain a stress of not less than 15,000 psi at the designated working pressure and shall be not less than 10 gauge.

All special sections and fittings shall be fabricated in a shop by the manufacturer from district approved shop drawings under the inspection of a

district representative. Except for butt strap closures, field fabricated fittings **will not be permitted unless approved by the district representative**.

K. Mechanical Restraint Joints:

Restrained joint fittings shall be provided at all tees, crosses, reducers, bends, caps, plugs and valves such that the pipe is fully restrained in all directions.

These shall meet Uni-B-13 for PVC and be UL/FM approved through 12" for both ductile iron and PVC. The restraint mechanism shall consist of individually activated gripping surfaces to maximize restraint capability. Twist-off nuts, sized the same as the tee-head bolts, shall be used to insure proper activating of restraining devices. The gland shall be manufactured of ductile iron conforming to ASTM A536-80. The retainer-gland shall have a pressure rating equal to that of the pipe on which it is used through 14" with a minimum safety factor of 2:1. Gland shall be Megalug by EBAA Iron, Inc.

Push-on Restraint

When it is necessary to restrain push-on joints adjacent to restrained fittings, a harness restraint device shall be used. All harnesses shall have a pressure rating equal to that of the pipe on which it is used through 14". Harness assemblies including tie bolts shall be manufactured of ductile iron conforming to ASTM A536-80. Harness shall be manufactured by EBAA Iron, Inc. ■

1.5 MAIN LINE VALVES

A. Butterfly Valves. Butterfly valves per AWWA C504 shall be used for general waterline use when line pressure is less than 150 psi in 10-inch and larger lines or where required by the district.

Identification copper wire used for locating PVC pipe must be installed continuous between successive valve boxes.

1. General. Butterfly valves shall be tightly closing, rubber seated valves conforming to AWWA C504 except as herein modified. Valves shall be designed for tight shut-off with no water leaks when subjected to a maximum differential pressure across the disc of 150 psi.

   Valve shafts shall be 18-8 stainless steel, type 304 except where completely sealed from water in the valve. Valve disc fasteners shall be 18-8 stainless steel, type 304. Valve discs shall be of alloy-cast-iron, conforming to ASTM A-436, type 1. The valve disc shall rotate 90E from fully open to the fully closed position.

   Shaft seals shall be designed for use with standard split-V type packing or other approved seals and the interior passage shall not have any excessive obstructions or stops. Cartridge-type valve seats, or valve employing snap rings to retain the rubber seats, will not be acceptable. The rubber seat shall be mounted in the valve body.

   On valves 30 inches or larger Class 150, the valve port diameter shall not be reduced more than 12 inches of the nominal pipe diameter.

2. Interior Coating. The interior cast iron surfaces of valves, including the disc, shall be coated with 100 percent solids, catalytically setting epoxy which is manufactured for use in the interior of potable water systems and per Painting section of these Standards.

   Exterior Coating. Valve bodies and operator corrosion housings shall be protected with a polyethylene encasement and installed per Painting section of these Standards and AWWA C105.

3. Operators. All valve operators shall be fully gasketed, weatherproofed and factory packed with grease. Operators shall be of the size required for opening and closing the valve against its design water pressure and they shall have a torque rating not less than that shown in AWWA Specification C504.

The operator shall be capable of withstanding an input torque of 450 foot-pounds at extreme operator position without damage.

Buried operators shall be worm gear or screw type with counter-clockwise opening equipped with standard AWWA two-inch operating nuts. Operators shall be specifically designed and suitable for permanent buried service.

Operators for valves located above ground shall have disc-position indicators and hand-wheel or as specified.

4. Marking. The manufacturer shall show the manufacturer's name or mark, the year of manufacture valve size and the designation of working pressure.

5. Approved valves. Shall be from those listed at the end of this section.

6. Painting. All exposed metal surfaces of valves installed above ground or in vaults shall be painted per Painting section of these Standards and in accordance with AWWA C105.

7. Valves restraints shall be used when installing push-on valves below ground. When placing thrust blocks around a fitting, the concrete must be around the fitting and not the joint.

8. Valve Stacks and Covers. Refer to Standard Drawing.

B. Gate Valve/Wedge and Resilient-Seated Gate Valves

1. Per AWWA, this specification pertains to above ground valves, three-inch and smaller and buried valves eight-inches and smaller when line pressure is less than 200 psi or where required by the engineer. When line pressure exceeds 200 psi, the following valves must be used (high pressure wafer sphere butterfly valve or a plug valve) regardless of main size.

Valves shall be tightly closing, rubber seated valves conforming to AWWA C500 and C509 except as herein modified. Valves shall be designed for tight shut-off with no water leaks when subjected to a maximum differential pressure across the disc of 200 psi.

Valves shall meet the requirements of AWWA C500, C550 and C509 specifications and shall be of the same size as the main in which they are installed.

All valves shall be counter-clockwise opening, non-rising stem type.

Buried valves shall be equipped with two-inch square cast iron operating nuts.

Valves located above ground or in vaults shall have a hand-wheel or as specified.

Interior coating. The interior cast iron surfaces of valves shall be coated with 100 percent solids, catalytically setting epoxy which is manufactured for use in the interior of potable water systems and per Painting section of these Standards.

Exterior Coating. Valve bodies shall be protected with a polyethylene encasement and installed per Painting section of these Standards and AWWA C105.

Marking. The manufacturer shall show the manufacturers name or mark, the year of manufacture valve size and the designation of working pressure.

Approved valves. Shall be those listed at the end of this section.

Painting. All exposed metal surfaces of valves installed above ground or in vaults shall be painted per Painting section of these Standards and in accordance with AWWA C105.

Valve restraints shall be used when installing push-on valves below ground. When placing thrust blocks around a fitting, the concrete must be around the fitting and not the joint.

Valve Stacks and Covers. Refer to Standard Drawing.

2. Gate Valves, Three-Inch and Smaller, Not Buried. The body and all interior working parts, except stems, shall be constructed of ASTM B-62 (85-5-5-5) or ASTM B-61 bronze. The stem bronze shall not contain more than two percent (2%) aluminum nor more than seven percent (7%) zinc and shall meet these additional requirements: a minimum tensile strength of 60.000 psi, a minimum yield strength of 30,000 psi and a minimum of ten percent (10%) elongation in two inches.

3. Valves, Three-Inches Through Eight-Inches. Valve body and bonnet shall be manufactured of cast iron with solid bronze valve with an O-ring stuffing box. All internal working parts, except stems shall be

ASTM B-62-70 (85-5-5-5). The stem bronze shall not contain more than two percent (2%) aluminum nor more than seven percent (7%) zinc and shall have the additional strength requirements: a minimum tensile strength of 60,000 psi, a minimum yield strength of 30,000 psi and a minimum of ten percent (10%) elongation in two inches.

C. Plug Valves

1. General. Plug Valves shall be used for general waterline use when line pressure exceeds 150 psi in 10-inch and larger lines or where required by the developer/engineer. Valves shall meet the requirements of AWWA C500, C550 and C507 specifications and shall be of the same size as the main in which they are installed.

2. Interior Coating. The interior of the valve except the bronze and working parts shall be coated with 100 percent solids, catalytically setting epoxy which is manufactured for use in the interior of potable water systems and per Painting section of these Standards.

3. Exterior Coating. Valve bodies and operator corrosion housings shall be protected with a polyethylene encasement and installed per Painting section of these Standards and in accordance with AWWA C105.

4. Watertight Gear Housings as manufactured by Rockwell shall be furnished and installed on all plug valves.

   Valves located below ground shall be spur gear operated with watertight gear housings, lubricant pipe and road box.

   Gear housings shall be complete with the required length of pipe extension and road box set flush with the finished street.

   The extension shall be of such length that a minimum of five inches clearance is provided between the bottom of the road box lid and any portion of the valve stem extension. Exposed nuts and bolts for gear housings shall be stainless steel Type 316.

   Plug valves located above ground or in vaults shall be worm gear operated. Outside locations shall include watertight gear housings and hand-wheel or as specified.

   The exterior surfaces of ferrous watertight gear housings and pipe extensions shall be coated with factory applied coating.

5. Marking. The manufacturer shall show the manufacturer's name or mark, the year of manufacture, valve size and the designation of working pressure.

6. Approved valves shall be from those listed at the end of this section.

7. Painting. All exposed metal surfaces of valves installed above ground or in vaults shall be painted per Painting section of these Standards.

8. Valve restraints shall be used when installing push-on valves below ground. When placing thrust blocks around a fitting, the concrete must be around the fitting and not the joint.

9. Valve Stacks and Covers. Refer to Standard Drawing.

   All plug valves shall be flanged Rockwell (Permaturn) pressure lubricated semi-steel, Venturi pattern type for the sizes and pressure classes as indicated in the following table:

Plug Valve Size	Maximum Pressure Class	Rockwell Valve Fig.	
		Below Ground	Above Ground
6" through 12"	200	No. 1167	No. 1169
14" through 24"	175	No. 1167	No. 1169
6" through 24"	400	No. 1489 with Worm Gear	No. 1169 with Worm Gear

D. Tapping - Sleeves and Valves

1. Edge of sleeve must not be closer than 18 inches from a joint.

2. When tapping pipe, no tapping shall be done less than two (2) feet from a joint.

3. The outside surface of the tapping sleeve and valve shall be protected with a polyethylene encasement furnished and installed per Painting section of these Standards in accordance with AWWA C105.

4. Valve Stacks and Covers. Refer to Standard Drawing.

5. Hot taps on steel mains must use reinformcement collars when the diameter of the pipe is less than 2 of the main pipe diameter. When the branching pipe does exceed 2 of the pipe diameter, a full wrap saddle shall be used.

6. Hot taps of one-inch (1) through two-inch (2) on steel main must use a 3,000 pound steel coupling.

7. Approved tapping sleeves are as follows:

Main	Sleeve
AC pipe	Rockwell 622 with (CC-620) International 432 or 228
PVC pipe	Rockwell 629 with (CC-620)

8. Hot taps on steel mains must use reinforcement collars when the diameter of the pipe is less than 2 of the main pipe diameter. When the branching pipe does exceed 2 of the pipe diameter, a full wrap saddle shall be used.

The effective shoulder width AW≅ of collars or wrappers from the inside surface of the steel riser to the outside edge of the collar or wrapper measured on the surface of the cylinder shall be not less than one-third nor more than one-half the inside diameter of the steel riser. The thickness of the collar or wrapper shall be not less than AT≅ as determined by

$$T = \frac{Pw \times ID\ cyl. \times ID\ riser}{36{,}00 \times W}$$

where Pw is the design class in pounds per square inch and other dimensions are in inches.

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D. DATA FOR FIELD USE LVMWD APPROVED VALVES □

Valve Size	Pratt Groundhog Butterfly Valves 150 WP		Clow Resilient Wedge Gate Valves 200 WP		Mueller Gate Valves A-2380 200 WP		Mueller Gate Valves Resilient Seat 200 WP		Mueller Gate Valves A-2393-6 250 WP		Clow AWWA Gate Valves 200 WP	
	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns
2	--	--	10 7/8	4 3/4	10	5½	--	--	9	5½	10¼	5
2½	--	--	11 3/8	5 1/2	10¾	6 1/4	--	--	--	--	11 3/8"	6
3	--	--	12 3/8	10	12½	7½	--	--	8¾	7½	12¼	7
4	--	--	14¾	13½	15	14½	--	--	11	14½	14	15
6	6 1/8	32	19	19½	18	20½	16.31	14½	12	20½	18	21
8	6 1/8	32	22½	25½	2227		20.12	20½	13½	27	22	27
10	6 1/8	32	26½	31½	26½	33½	23¼	27	15	33½	25 3/8	33

Value Size	American Flow Control Series 500 200 WP Resilient Wedge Valve		American Flow Control Series 500 250 WP Resilient Wedge Valve		Rockwell FIG 1167 Venturi Plug Valves 200 WP		Clow List 16 Extra Heavy Pressure Gate Valves 250 WP		*Dezurak HP Butterfly Valves ANSI 150 285 WP		Rockwell FIG 1489 Venturi Plug Valves 400 WP	
	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns
2												
2½	11¾	9	--	--	--	--	11½	5	9.31	9	--	--
3	11¾	9	--	--	--	--	--	--	9.56	9	--	--
4	11¾	10	--	--	--	--	16¾	7	9.81	9	--	--
6	18 15/16	13	13.4	13	--	--	19¾	15	10.56	9	--	--
8	23 1/8	19	16 3/4	19	11.3	1 9/16	25½	21	12.60	9	11.8	12½
10	29½	26	20 1/8	26	12.7	1 9/16	31½	27	13.31	9	13.9	12½
	38	32	24.1	32	14.5	2 1/24	36½	33	15.13	15	15.0	12½

Value Size	*Dezurak HP Butterfly Valves ANSI 300 740 WP		Pratt Triton Butterfly Valves		Jamesbury Wafer Sphere Butterfly Valves 815 ANSI CL 150		Jamesbury Wafer Sphere Butterfly Valves 830 ANSI CL 300	
	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns	Distance (Inches)	Number Of Turns
2	9.31	9	--	--	--		--	
2½	9.81	9	--	--	--		--	
3	10.19	9	--	--	7¾		8 1/8	
4	11.56	9	--	--	8½		9	
6	12.81	9	7	27	10		10¾	
8	14.69	15	7 5/8	32	11 5/16		12	
10	16.57	15	7 5/8	32	13		14 7/8	

Vavles 10" and above with a press of:

1. <150 psi use Butterfly valve.
2. >150 psi use Plug or Wafer Sphere valve.

All data if from respective manufacturer□s catalogs.

Distance is from top of operating nut to valve center line.

*Dezurak distance is from top of gearbox to valve center line (DIM. A + B IN CATALOG)

WP = Working pressure as noted.

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1.6 EARTHWORK

Earthwork shall be as listed in the Standard Specifications for Public Works Construction Latest Edition, by APWA/AGC, the "Green Book unless otherwise noted."

Within the rights-of-way of the State Department of Transportation, the County Road Department and the respective cities within the district, earthwork shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

A. Pipe Zone. The pipe zone shall include the full width of trench from six inches below the bottom of the pipe or conduit to a horizontal level 12 inches above the top of the pipe per Standard Drawing PW-101.

B. Sheeting, Shoring and Bracing of Trenches. Trenches shall have sheeting, shoring, and bracing conforming to the latest Cal-OSHA requirements. Shoring plans must be prepared and stamped by a registered civil engineer.

C. Imported Sand--Pipe Zone and Pipe Bedding. Imported sand used in the pipe zone and for the pipe bedding shall consist of natural or manufactured granular material, or a combination thereof, free of deleterious amounts of organic material, mica, loam clay, rocks and other substances not suitable for the purpose intended. Imported sand shall be graded such that 100% passes 3/8" sieve and 0 - 10% passes No. 200 sieve. Sand shall have a sand equivalent of not less than 50 per ASTMD 2419.

D. Rock Fill for Foundation Stabilization. Rock refill shall be crushed or natural rock containing less than one percent asbestos by weight or volume.

E. Native Earth Backfill--Trench Zone. In the absence of stricter requirements, the material above the pipe zone may be native material that does not contain rocks larger than three inches and shall be so graded that at least 40 percent of the material passes a No. 4 sieve. The contractor at his option may use imported sand in the trench zone, provided there is no additional cost to the district.

F. Special Slurry Backfill. For pipelines which are laid in an already paved street, it may be required the backfill above the pipe zone with a one sack slurry mix in lieu of compacted soil backfill. The slurry mix shall have no less than one sack cement per cubic yard. ■

1.7 ASPHALT CONCRETE PAVING

General. Asphalt concrete paving shall conform to Class B-AR-4000 (for the Structural Section) and C2-AR-4000 (for the cap) as listed in the Standard Specifications for Public Works Construction Latest Edition, by APWA/AGC, the "Green Book unless otherwise noted."

Within the rights-of-way of the State Department of Transportation, the County Road Department of the respective cities within the district, asphalt concrete paving shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications. ■

1.8 CONCRETE AND MORTAR WORK

General

1. Description

Concrete work shall be in accordance with the Standard Specifications for Public Works Construction Latest Edition, by APWA/AGC, the "Green Book unless otherwise noted."

Within the rights-of-way of the State Department of Transportation, the County Road Department of the respective cities within the district, concrete and mortar work shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

2. Design Criteria

a. Concrete for thrust blocks, pipe and pump can encasement and other unreinforced concrete shall contain not less than five sacks of Portland cement per cubic yard and attain a strength not less than 2000 psi at 28 days.

b. Pipe Mortar Lining and Coating (ML&C). Unless otherwise approved or as revised below, all steel pipe shall be mortar lined and coated in accordance with AWWA C205, ASTM C150 which covers shop applied lining and coating, per main line pipe materials.

Ends of lining shall be left square and the lining holdback shall be as specified for the particular type of joint.

3. Concrete Admixtures

a. As specified elsewhere or shown on the drawings.

b. Do not use any accelerating water-reducing admixture or any other type of admixture that contains chlorides or other corrosive elements in any concrete without district representative approval.

c. To prevent segregation and improve workability, or to cause an increase in strength, a reduction in mixing water will be permitted when approved in writing by the district's representative. Only admixtures which reduce shrinkage by at least 10 percent and are not lignin will be permitted.

Admixtures will not be permitted in a concrete mixture placed contiguous to steel water line piping and appurtenances.

4. Reinforcing Steel

Where specified reinforcing bars shall be Deformed Billet-Steel Bars for Concrete Reinforcement, ASTM A615 unless otherwise noted.

5. Embedments

The contractor shall furnish all embedments required for proper installation of accessories or equipment specified elsewhere or shown on the drawings.

6. Forms

Forms for exposed interior and exterior concrete shall be plastic coated, edge sealed plywood. All sharp edges shall be chamfered with :-inch by :-inch triangular fillets.

7. Curing Compound

Curing compound shall conform to ASTM C309. ■

1.9 PAINTING

A. General. This section will only cover the paint materials. "Painting" as it relates to construction is discussed in Section 2.0. The painting materials shall comply with AWWA D102.

All buried metal (except bronze.) Exterior surface to receive two coats of Sanchem (no-oxide) 15 mil. each.

In addition to the Sanchem (no-oxide) coating, encapsulate all exterior surfaces including nuts and bolts with a 10 millimeter layer of plastic film wrap.

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

Exceptions to the above policy for interior coating require written approval in advance of delivery to the job site.

1. Steel, cast iron and other bitumen coated metals. Located above ground and/or in vaults shall be primed with Kooner=s Primer, and finish coats of Tenemec Services 10 modified or as approved for the particular installation.

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Coating Material Requirements for Potable Water Facilities

	Primer	Finish Coat
Line Valve Stack Cover	Kooner=s	Tnemec Services 10 modified (White)
Closed Valve Stack Cover (Zone Valve)	Kooner=s	Tnemec Services 10 modified (OSHA Safety Red)
Fire Hydrant Valves Stack Cover and Fire Hydrant Body	Kooner=s	Tnemec Services 10 modified (Medium Yellow)
Blow-Off Valve Stack Cover	Kooner=s	Tnemec Services 10 modified (Medium Yellow)
By-Pass Valve Stack Cover	Kooner=s	Tnemec Services 10 modified (Olive Green)
Detector Check Meter Piping and Valves	Kooner=s	Tnemec Services 10 modified (Olive Green)
Master Meter Piping and Valves	Kooner=s	Tnemec Services 10 modified (Olive Green)
Combination Air Release Can	Kooner=s	Behind Curb Tnemec Services 10 modified (Olive Green) Open Field Tnemec Services 10 modified (Medium Yellow)
Guard Post	Kooner=s	Behind Curb Tnemec Services 10 modified (Olive Green) Open Field Tnemec Services 10 modified (Medium Yellow)
Vaults		
Bottom and Top of Lid(s)	Kooner=s	Tnemec Services 10 modified(Olive Green)
Ladder	Kooner=s	Tnemec Services 10 modified (Medium Yellow)
Bolts and Studs		Sanchem (No-oxide)

B. Plastic Film Wrap. All bolts shall be completed coated with Sanchem (no-oxide) prior to wrapping all buried valves, bolted flanges, cast iron, steel, and miscellaneous metal. The polyethylene film shall be as produced from DuPont Alathon resin and shall meet the requirements of ASTM Designation D 1248 for Type 1, Class A, Grade E-1.

The polyethylene film shall be 10 millimeters in thickness. The length shall be sufficient to firmly attach the film to the pipe on either side of the valve, flange or fitting.

At the contractor's option, tubular material may be purchased and cut with one side to fold out to the required width.

Adhesive tape for securing the polyethylene wrap shall be 10 mil. Two (2) inch wide adhesive tape Polyken No. 900 (Polyethylene) or Scotchrap No. 50 (Polyvinyl). ■

1.10 SERVICE LINE MATERIALS AND FITTINGS

A. General. The materials covered in this section include the service saddle, service line pipe, corporation stop and angle meter stop inside the meter box. Where specific manufacturers' products are listed, it should be understood that other products which are equivalent may be used if approved in writing. This section is written as if the minimum service line size is one inch.

Water meter types and manufacturers will be selected by the district. A temporary jumper of PVC schedule 80 shall be installed by the contractor, pending installation of the meter by the district crews.

1. Copper Pipe. Copper pipe material shall be used for all service lines from one-inch through two-inches. The pipe shall be Type K soft copper tubing. Solder fittings shall be soldered with solder containing no lead; instead, it shall be a blend of copper, phosphorous, and silver. Service lines are to receive backfill of imported sand within the pipe zone in accordance with Standard Drawing PW-101.

2. Service Saddles. These shall be of the double strap type made of bronze with bronze nuts. The thread shall be female iron pipe thread. They shall be James Jones J-979 for AC and J-969 for PVC only and Ford 202B for ACP only.

3. Corporation Stops. These shall be bronze.

Service Line	Meter Size	Corp Stop Inlet	Corp Stop Outlet	Manufacturer	Type
1"	3/4" and 1"	MIP Thread	Flared Copper	Ford	FB-700
				James Jones	J-1929
				Mueller	H-15025
1½"	1½"	MIP Thread	FIP Thread	McDonald	4704B
				James Jones	J-1931
				Ford	FB-500
2"	2"	MIP Thread	FIP Thread	McDonald	3131B
				Ford	FB-1700
				James Jones	J-1931
				McDonald	3131B

4. Angle Meter Stops. These shall be bronze. Refer to the table below.

Service Line	Meter Size	Angle Meter Stop	Inlet Side	Outlet Side	Manufacturer	Type
1"	3/4" x 1"	1"	Flared Copper	Swivel Meter Coupling	J. Jones	J-1525
					Ford	KV23-444W
					Mueller	A-14255
					McDonald	4642B
1"	1"	1"	Flared Copper	Swivel Meter Coupling	J. Jones	J-1525
					Ford	KV23-444W
					Mueller	H-14255
					McDonald	4642B
1½"	1½"	1½"	Female Iron Thread	Flanged	Ford	FV13-666W
					Mueller	14286
					McDonald	4604B
2"	2"	2"	Female Iron Thread	Flanged	Ford	FV13-377W
					Mueller	14286
					McDonald	4604B

5. Meter Spacers. These shall be PVC Schedule 80 pipe. Refer to the table below.

Meter Size	PSI	Length of Spacer
3/4"	150	1¼" X 9"
1"	150	1¼" X 10 ¾"
1 ½"	150	1½" X 13"
2"	150	2" X 17"
¾"	250	1¼" X 17"
1"	250	1¼" X 21 ¾"
1 ½"	250	1½" X 47"
2"	250	2" X 50"

6. Customer Hand Valves. These shall be bronze ball valves with a customer handle. The outlets are always female iron pipe threads. Refer to the table below.

Meter Size	Inlet	Outlet	Manufacturer	Type
3/4"	1" Meter Coupling	1¼"	James Jones	J-1908
			Ford	B13-454/ HB34-S
			McDonald	6101M
1"	1" Meter Coupling	1¼"	James Jones	J-1908
			Ford	B13-454/ HB34-S
			McDonald	6101M
1½"	Flanged	1½"	Ford	BF13-676W/ HB-67S
			McDonald	6101MW
2"	Flanged	2"	Ford	BF13-787W/ HB67S
			McDonald	6101MW

7. Meter Boxes. For 3/4", 1", 12" and 2" meters shall be according to the following:

Meter Size	Model Number
3/4" or 1"	Armocast Polymer Boxes and Drop in Lid – P6000485AX12DQ J&R Polymer Boxes - #4 ½
5/8", ¾" or 1" Regulated	Armocast Polymer P6001534AX12DZ J&R No. 6B Drop in Lid
1½" or 2"	Armocast Polymer P6001534AX12DZ J&R No. 6B Drop in Lid
1½" or 2" Regulated	Armocast Polymer P6001534AX12DZ J&R No. 6B Drop in Lid (2 Boxes Required)

Meter boxes shall be set as shown in Standard Drawings.

Location of service to be permanently marked on the top of the curb with a chiseled, two-inch high "W."

The district crews will install the meter. A temporary jumper of PVC Schedule 80 pipe shall be installed by the contractor pending the installation of the meter.

8. Detector Check Valves. See PW-109

B. Fire hydrants. Shall be wet barrel type meeting AWWA C503 and have a six-inch flanged inlet with one 22 and one four-inch valved outlets with National Standard fire hose threads.

Fire hydrants at or near street intersections shall be located inside the intersection valving and located at the curb return. Fire hydrants located between intersections must be located on property lines. For typical installation refer to Standard Drawing PW-126.

Other hydrant requirements are:

1. The outlets shall be protected with plastic type caps attached to the hydrant head with a chain.

2. Hydrant flanges shall contain eight equally spaced bolt holes for static pressures under 200 psi and 12 equally spaced bolt holes for static pressures greater than 200 psi.

3. All hydrants shall be permanently marked with the manufacturer's name and the year of manufacture.

4. Hydrant lateral shall be either PVC or steel pipe. Refer to Standard Drawing.

5. Hydrant valve shall be a six-inch valve flange x push on ends for PVC pipe.

6. Painting shall be painted per Painting section of these Standards and in accordance with AWWA C105.

7. Spool shall be used between the bury/ell and fire hydrant. Spools generally are available in 30", 36", 42" and 48" lengths. An approved product is "Tyler."

8. Hydrant burys for PVC pipe shall be a six-inch inside diameter and made of cast iron conforming to ASTM A-126. The burys shall be one piece with the top having a flange drilled with holes to receive the extension spool or hydrant. The bottom shall have a 90E bend end for meeting the horizontal pipe. In the event the hydrant lateral is PVC then the bury end shall be a push on joint fitting. Burys are generally available in 30", 36", 42" and 48" lengths. An approved product is "Tyler Hydrant Burys." Steel pipe spool shall be of schedule 40 CMLC/CMC.

9. Bolts. Alloy steel break-off (shear) bolts shall be used to attach the fire hydrant to the extension spool. Buried bolts and nuts shall be stainless steel type 316.

10. Mains to Fire Hydrants. Separate lines used only for fire hydrants shall be a minimum of six inches in diameter. Actual size to be determined by the district representative.

11. Approved Fire Hydrant Assemblies.

STATIC PRESSURE LESS THAN 200 PSI	
Jones	J-3710
Clow	2050
Long Beach Iron Works	LB-125

STATIC PRESSURE GREATER THAN 200 PSI	
Jones	J-3708
Clow	2010
Long Beach Iron Works	LB-110

C. Combination Air Release Assemblies. The combination air release assembly has the features of an air release valve and an air and vacuum valve. Both units shall be housed in a cast iron body and all internal parts such as the float, bushings, level pins, seat and baffle shall be either stainless steel or brass as furnished by the manufacturer. All assemblies shall be rated at 300 psi maximum operating pressure.

Air and vacuum valves are to be connected to the high point of the main lines. Air and vacuum valves at or near street intersections must be located inside the intersection valving where practical and located at the beginning or end of curb return. Air and vacuum valves located between intersections must be located on property lines.

For typical installation refer to combination air release assembly Standard Drawings

Approved Air and Vacuum assemblies are as follows:

CRISPIN	
Size	Valve No.
1”	UL10
2”	UL 20
3”	UL 31
4”	UL 41

APCO	
Size	Valve No.
1”	143C
2”	145C
3”	147C
4”	149C

D. Blow-off Assemblies. Blow-offs shall be wet barrel type meeting AWWA C503 and have a four-inch flanged inlet. Blow-offs shall have one 22-inch

valved outlet with National Standard fire hose threads. For typical installation refer to Standard Drawings.

Other specific requirements are:

1. The outlet shall be protected with a plastic cap attached to the hydrant head with a chain.

2. All angle fire hydrant valves shall be permanently marked with the manufacturer's name and the year of manufacture.

3. Mains to Blow-offs. Separate lines used only for blow-offs shall be a minimum of four inches in diameter. Actual size to be determined by the district representative.

4. Blow-off Valve. Shall be a four-inch valve flange as required. ■■

SECTION 2.0

CONSTRUCTION

2.1 GENERAL REQUIREMENTS

This section describes the use of materials and workmanship to be employed in construction of the water system. The developer/engineer shall prepare such general and special specifications as are necessary to define the nature and location of the work, contractual arrangements, payment for work and any other matters concerning the owner or his contractor; these items are not discussed within the standards presented here.

In accordance with the provisions of California Business and Professions Code Section 7059, the district requires that (a) Contractor be licensed in the State of California (b) possess the following classification: Class A or C-34 license.

A. Use of This Section. The construction section is intended to highlight the features of construction which are deemed to be most significant. In any construction activity, the recommendations of the manufacturer of a product, especially where more stringent, should apply. Construction to be per district's Standard Plans and Specifications.

There are a number of construction activities which pertain to all pipe types and these will be presented first. Specialized activities unique to a particular pipe type will be covered separately.

Specific references which are incorporated into this section include:

- AWWA C206 "Field Welding of Steel Pipes."
- AWWA C900 "Polyvinyl Chloride (PVC) Pressure Pipe, four inches through 12 inches."
- AWWA C905 "Polyvinyl Chloride (PVC) Pressure Pipe, 14 inches through 36 inches."
- AWWA Manual M11 "Steel Pipe - Design and Installation."
- AWWA Manual M23 "PVC Pipe - Design and Installation."
- AWWA Manual M17 "Installation, Operation and Maintenance of Fire Hydrants."

Finally, Section 1 of these Standards contains material descriptions. The developer/contractor should use that section along with this section and the respective Standard Drawings as a reference.

B. Protection/Operation of Existing Water System. A primary concern of the district is the protection and operation of the existing water system. No developer or contractor will be allowed to operate any existing water valves or to cause a shutdown of any portion of the district's water system without prior approval from district.

Following approval from the district, in general, any operation of valves in a planned shutdown will be done by the district. Any planned shutdown shall be discussed at the preconstruction meeting and at least three (3) weeks in advance of a planned shutdown. Shutdowns will only be allowed if no other reasonable alternative exists, such as the use of a hot-tap connection in lieu of a cut-in tee. When shutdowns are required in a part of the district system, the district will evaluate whether the shutdown should be done during the day or during the night. Contractor economics shall be weighed less heavily in the decision than the interruption and inconvenience to existing customers. Any shutdown shall involve a thorough notification plan for existing customers as well as the provision of bottled water, water tanks, etc. where appropriate at no expense to the district.

C. Quality of Materials. Materials and equipment to be incorporated into the work shall be new and unused unless otherwise approved. In case a reference is not clear as to which of several available grades is desired, the highest quality material shall be used.

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

The contractor's attention is called to the time required for obtaining certain materials and equipment to be furnished. It shall be the responsibility of the contractor to promptly place orders for items of extended delivery times.

D. Construction Water. All water used for construction shall be metered. Reclaimed water shall be used when available for compaction.

The contractor shall sign up at the district's headquarters office for one or more construction meters. After receipt of a deposit amount, the district will install the meter at the fire hydrant selected by the contractor. Upon request, the district will move the hydrant meter to another location. The contractor is not to move the construction meter(s). Charges for construction water are covered by district's Administrative Code. The contractor is put on notice that unpaid invoices will result in removal of the construction meter.

E. Substitutions. Where articles or materials are specified by brand or trade name, alternate materials or articles equal to those specified may be approved provided the request for approval is in writing accompanied by

supporting data and received in ample time to permit investigations without delaying the work. Unless substitutions have received prior approval, no deviation from the Standards will be allowed.

F. Quality of Workmanship. All work will be done by persons experienced in the specific work, under competent supervision and in a first class manner to the district's complete satisfaction.

G. Supervision and Superintendence. The contractor shall designate and keep on the work a competent superintendent, who shall not be replaced without written notice to the district's representative, at all times during its progress. The superintendent will be the contractor's representative at the site and shall have authority to act on behalf of the contractor. All communications given to the superintendent shall be as binding as if given to the contractor. During periods when the work is suspended, the contractor shall make appropriate arrangements for any emergency work which may be required.

Whenever the superintendent is not present on any particular part of the work, the Owner's representative may desire to inform the foreman or other worker in charge of the particular part of the work to whom the given information is relevant. Information so given shall be as binding as if given to the superintendent.

H. Defective Work. Any defective materials or workmanship which shall become evident within one year after acceptance of completed work shall be replaced or repaired without cost to the district. The district has the right to bring legal action to correct the deficiencies as well as to withhold exoneration of performance bonds.

I. District Inspection, Field Acceptance and Guarantee Period. Whether expressly indicated on the drawings or not, all contractors shall call the Underground Service Alert prior to any excavation. Failure to do so shall not relieve the contractor of any liability associated with disturbance/breakage of existing utilities. The district will inspect all pipe installation including appurtenant structures, trench backfill within the pipe zone. It will be the contractor's responsibility to provide a five (5) working day notice to the district representative prior to the start of any work. Such notification will allow for scheduling a preconstruction meeting between interested parties. Failure to provide proper notification may delay the starting date since the district representative may not be able to inspect the work and cannot accept any work for which inspection has not been arranged.

The district's representative shall at all times have access to the work during construction to inspect the progress, workmanship and materials used in the work.

Whenever the contractor varies the normal period during which work or any portion of it is carried on each day, he shall give timely notice to the district's representative so that the representative may, if he wishes, be present to

observe the work in progress. If the contractor fails to give such timely notice, any work done in the absence of the district's representative will be subject to rejection.

The contractor shall give timely notice to the district's representative in advance of backfilling or otherwise covering any part of the work so that the district's representative may, if he wishes, observe such part of the work before it is concealed.

The observation, if any, by the district's representative of the work shall not relieve the contractor of any of his obligations and it must be emphasized that the primary responsibility for compliance with all district requirements and standards rests with the developer and/or contractor.

Defective work shall be made good, and materials and equipment furnished and work performed which is not in accordance with the contract documents may be rejected notwithstanding the fact that such materials, equipment and work have been previously observed by the district's representative or that payment therefore has been included in an estimate for payment.

Field acceptance is made by the inspector and will not coincide with the date of the district Board of Director's acceptance of the work. However, the one-year guarantee period for all work shall begin as of district Board of Director's acceptance. As previously mentioned in this section, any defective work discovered during this period shall be repaired or replaced. A new one-year period will begin for that corrected work.

J. Public Relations. The contractor shall conduct its affairs in a manner which will lessen the disturbance to residents in the vicinity of the work. In this regard, formal working period shall be 7:30 A.M. to 5:00 P.M., Monday through Thursday and Friday from 8:00 A.M. to 4:30 P.M., excluding holidays. (For updated schedule of holidays contact the district's inspector.) Inspections requested by or made necessary as a result of the actions of the contractor outside the normal working period or on Saturdays, Sundays or holidays must be scheduled and approved by the district. All costs for the required inspections outside the normal working period shall be the responsibility of the contractor with payment agreed to by the contractor in advance of the inspection at the rate established by the district.

The contractor shall provide a minimum 48-hour written advance notice to the district's inspector for all work anticipated outside the normal working period with payment agreed to by the contractor in advance.

These Standards utilize the term "due notice." The term "due notice" is hereby defined to be 24 hours.

K. Sanitation. The contractor shall provide and maintain enclosed toilets for the use of employees engaged in the work. These accommodations shall be maintained in a neat and sanitary condition.

L. Cleanup and Dust Control. Throughout all phases of construction, including suspension of work, and until final acceptance of the project, the contractor shall keep the work site clean and free from rubbish and debris. The contractor shall also abate dust nuisance by cleaning, sweeping and sprinkling with water, or other means as necessary. The use of water resulting in mud on public streets or district grounds will not be permitted as a substitute for sweeping or other methods. Their supply and application shall be at no expense to the district.

Materials and equipment shall be removed from the site as soon as they are no longer necessary; and upon completion of the work and before final inspection, the entire work site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory, clean and neat appearance.

Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

M. Observation of Work by Public Agencies. The contractor shall be responsible for procuring, scheduling and coordinating all observations/inspections by Public Agencies as required by their respective permits and governing codes. The district's representative shall be notified in writing, 48 hours in advance, of such scheduled inspection, and shall have the opportunity to be present during the inspection.

N. Safety. In accordance with generally accepted construction practices, the contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons and property during performance of the work, and the contractor shall fully comply with all state, federal and other laws, rules regulations and orders relating to safety of the public and workers.

The right of the engineer/architect or the owners representative to conduct construction review or observation of the contractors performance will not include review or observation of the adequacy of the contractors safety measures in, on or near the construction site.

O. Traffic Control Devices and Signs. Where construction will be within the rights-of-way of the State Department of Transportation, the County Road Department and the respective cities within the district, construction shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

Construction signing, striping, barricades and other traffic control devices used for handling traffic and public convenience shall conform to the latest edition of the State of California, Department of Transportation, "Manual of Traffic Controls for Construction and Maintenance Work Zones" at no expense to the district.

Signs shall be illuminated or reflectorized when they are used during hours of darkness. Provide cones, pylons, barricades or posts used in the diversion of traffic with flashers or other illumination if in place during hours of darkness at no expense to the district.

Maintain a 24-hour emergency service to remove, install, relocate and maintain warning devices and furnish to the authority having jurisdiction names and telephone numbers of three persons responsible for this emergency service. In the event these persons do not promptly respond or the authority having jurisdiction deems it necessary to call out other forces to accomplish emergency service, the contractor will be held responsible for the cost of such emergency service. ■

2.2 PERMITS

The following may be required of the contract:

A. Encroachment. Where construction will be within the rights-of way of the State Department of Transportation, the County Road Department and the respective cities within the district, encroachment shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

B. Explosives. Where the contractor anticipates the use of explosives in conjunction with the water construction, within the rights-of-way of the State Department of Transportation, the County Road Department and the respective cities within the district, the use of explosives shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

C. Easements. Contractor shall comply with any terms, conditions, limitations or other provision contained in any permit issued to the district.

D. Approvals. All approvals must be obtained from local agencies prior to mobilizing/beginning of work, e.g.: approved traffic control permit. ■

2.3 UTILITIES AND EXISTING FACILITIES

A. Utilities and Existing Facilities. Whether expressly indicated on the drawings or not, all contractors shall call the Underground Service Alert prior to any construction of pipelines. Failure to do so shall not relieve the contractor of any liability associated with disturbance/breakage of existing utilities.

In case it shall be necessary to remove and or relocate any such utilities, facilities or any portions thereof, the contractor shall notify the district and authorized agent of the owner of the utility and/or facility so affected. The contractor shall not interfere with said utility and/or facility structures until disposition of the obstruction to the work has been determined and/or notice to relocate or remove has been given by the district or authorized agent of the owner of the utility and/or facility so affected.

Any existing utility or facility, shown or not shown on the drawings, inadvertently damaged during excavation shall be repaired by the contractor at no expense to the district.

The fact that any underground utility and/or facility is not shown on plans shall not relieve the contractor's responsibility to comply with these standards. It shall be the contractor's responsibility to ascertain, prior to commencing work, the existence of any underground utilities or facilities which may be subject to damage by reason of his operations.

B. Separation Requirements for Water and Wastewater Lines.

Criteria for the Separation of Mains/Sanitary Sewers

- Basic Separation Standards (4 Basic Standards)
- Exception to Basic Separation Standards

Department of Health Services
State of California

Construction criteria for wastewater lines or water mains where the "basic separation standards" as discussed in Section 2.4C, cannot be attained are shown on Standard Drawing PW-102, Pages 1 and 2. There are basically two situations encountered:

Case 1 - New wastewater line installation with new or existing water main.

Case 2 - New water main installation with existing wastewater line.

Case 1: New Wastewater Main Being Installed. For illustration, see PW-102.

ZONE SPECIAL CONSTRUCTION REQUIREMENTS

A. Wastewater lines parallel to water mains shall not be permitted in this zone without approval from the responsible health agency and water supplier.

B. A wastewater line placed parallel to a water main shall be constructed of:

1. Extra strength vitrified clay pipe with compression joints.

2. Class 200, Type II, asbestos-cement pipe with rubber gasket joints.

3. Plastic wastewater pipe with rubber ring joints (per ASTM D3034) or equivalent.

4. Cast or ductile iron pipe with compression joints.

5. Reinforced concrete pressure pipe with compression joints (per AWWA C302-74.)

C. A wastewater line crossing a water main shall be constructed of:

1. Ductile iron pipe with hot dip bituminous coating and mechanical joints.

2. A continuous section or Class 200 (DR14 per AWWA C900) plastic pipe or equivalent centered over the pipe being crossed.

3. A continuous section of reinforced concrete pressure pipe (per AWWA C302-74) centered over the pipe being crossed.

4. Any wastewater pipe within a continuous sleeve.

D. A wastewater line crossing a water main shall be constructed of:

1. A continuous section of ductile iron pipe with hot dip bituminous coating.

2. A continuous section of Class 200 (or 14 per AWWA C900) plastic pipe or equivalent centered on the pipe being crossed.

3. A continuous section of reinforced concrete pressure pipe (per AWWA C302-74) centered on the pipe being crossed.

4. Any wastewater pipe within a continuous sleeve.

5. Any wastewater pipe separated by a 10' X 10' - 4" thick reinforced concrete slab.

Case 2: New Water Main Being Installed. For illustration, see PW-102.

ZONE SPECIAL CONSTRUCTION REQUIREMENTS

A. No water mains parallel to wastewater lines shall be constructed without approval from the responsible health agency.

B. If the wastewater line paralleling the water main does not meet the Case 1, Zone B requirements, the water main shall be constructed of:

1. Ductile iron pipe with hot bituminous coating.

2. Dipped and wrapped 3" thick welded steel pipe.

3. Class 200, Type II, asbestos-cement pressure pipe.

4. Class 200 pressure rated plastic water pipe (DR14 per AWWA C900) or equivalent.

5. Reinforced concrete pressure pipe, steel cylinder type (per AWWA C300-74, or C301-79 or C303-70.)

C. If the wastewater line crossing the water main does not meet the Case 1, Zone C requirements, the water main shall have no joints in Zone C and shall be constructed of:

1. Ductile iron pipe with hot dip bituminous coating.

2. Dipped and wrapped 3" thick welded steel pipe.

3. Class 200 pressure rated plastic water pipe (DR14 per AWWA C900 or equivalent.)

4. Reinforced concrete pressure pipe, steel cylinder pipe (per AWWA C300-74 or C301-79 or C303-70.)

D. If the wastewater line crossing the water main does not meet the requirements for Case 1, Zone D, the water main shall have no joints within four feet from either side of the wastewater line, and shall be constructed of:

1. Ductile iron pipe hot dip bituminous coating.

2. Dipped and wrapped ¼" thick welded steel pipe.

3. Class 200 pressure rated plastic water pipe (DR14 per AWWA C900) or equivalent.

4. Reinforced concrete pressure pipe, steel cylinder type (per AWWA C300-74 or C301-79 or C303-70.)

DEFINITIONS:

1. Health Agency - The Department of Health Services, State of California. For water systems supplying fewer than 200 service connections, the local health officer shall act for the Department of Health Services.

2. Low Head Water Main - Any water main which has a pressure of five psi or less at any time at any point in the main.

3. Compression Joint - A push-on joint that seals by means of the compression of rubber ring or gasket between the pipe and a bell or coupling.

4. Mechanical Joints - Bolted joints.

5. Rated Working Pressure or Pressure Class - A pipe classification system based upon the internal working pressure of the fluid in the pipe, type of pipe material and the thickness of the pipe wall.

6. Fused Joint - The joining of sections of pipe using thermal or chemical bonding.

7. Sleeve - A protective tube of steel with a wall thickness of NOT LESS THAN 3" into which a pipe is inserted.

8. Groundwater - Subsurface water found in the saturation zone.

9. House Lateral - A wastewater line connecting the building drain and the main wastewater line.

10. Dimension is from outside of water main to outside of wastewater line or manhole. ■

2.4 EARTHWORK/CLEARING AND GRUBBING

A. General. Earthwork shall include all necessary clearing, grubbing, grading, excavation, backfilling, compaction and cleaning up debris.

Included is controlling water, bracing excavations, stabilizing subgrade, protecting existing structures and facilities and such supplementary operations as are necessary to properly complete the entire work indicated or specified.

Within water pipeline easements or rights-of-way, trees, shrubs, fences and all other improvements that have to be removed to permit construction and which are intended for replacement shall be replaced in kind or size or with approved substitutes unless permission to exclude such replacement is obtained from the owner/agency or granted by the district.

1. Safety Precautions. All excavations shall be performed, protected and supported as required for safety and in the manner set forth in accordance to the latest rules, orders and regulations prescribed by the State of California Department of Industrial Relations, Division of Industrial Safety "Construction Safety Orders."

   Shoring plans must be prepared and stamped by a registered Civil Engineer, whose license is currently in effect.

2. Obstructions. The contractor's attention is directed to the possible existence of pipe and other underground improvements which may or may not be shown on the Plans. The contractor shall preserve and protect any such improvements whether shown on the Plans or not. Where it is necessary to remove and replace or to relocate such improvements in order to prosecute the work, they shall be removed, maintained and permanently replaced by the contractor.

3. Oak Tree Ordinance. The developer and contractor must be aware of local oak tree ordinance which govern the protection, trimming and removal of oak trees, as well as the limits of construction around the oak trees. In general, any work under or within the protected zone of an oak tree may be subject to special requirements.

4. Grading and Stockpiling. The contractor shall control grading in a manner to prevent water running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can flow uninterrupted in existing gutters, other surface drains or temporary drains. Material for backfill or for protection of excavation in public roads from surface drainage shall be neatly placed and kept shaped so as to cause the least possible interference with public travel. Free access must be provided to all fire hydrants, water valves, meters and private drives.

5. Imported Backfill Material. Whenever the excavated material is not suitable for backfill the contractor shall furnish suitable imported backfill material.

6. Working Area. Except for specified off-site construction, all earthwork shall be confined strictly within site property lines.

7. Compaction Tests. Compaction tests will be made at no cost to the district by an approved laboratory in accordance with ASTM D1557 or better. The number of tests and their location and depth shall be determined by the district's representative. The contractor shall make all necessary excavations for compaction tests as directed by the district's representative and shall refill and recompact these excavations to the densities as specified herein.

8. Relative Compaction. Specified herein shall be a percentage of the maximum density at optimum moisture content as determined by AASHTO Test No. T180-57 Modified. Unless otherwise specified, the relative compaction for earthwork in open fields shall be 90%. In populated areas and in public and private roads and driveways the relative compaction shall be minimum 90%.

9. Dewatering. The contractor shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavation or other parts of the work.

   To ensure a firm, unyielding excavation and preservation of the final line and grade of the bottom of excavation, dewatering shall be continuous until such times as water can be allowed to rise.

   The contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property. No water shall be drained into work built or under construction without prior consent of the district's representative. Water shall be disposed in such a manner as not to be a menace to the public health.

10. Correction of Faulty Grades. Where excavation is inadvertently carried below subgrade and/or foundation elevations, it shall be rectified by backfilling with approved sand, compacted to structural standards and/or one sack slurry as directed by the district's representative, all at the expense of the contractor.

11. Clearing & Grubbing. All vegetation, such as roots, brush, heavy sods, heavy growth of grass and all decayed vegetable matter, rubbish and other unsuitable material within the area of the work shall be stripped or otherwise removed prior to starting excavation and backfill.

12. Soil Sterilant.

General. The contractor shall treat the finished subgrade of specified areas with an approved soil sterilant.

Areas Requiring Soil Sterilant. All paved embankments, walkways, drainage structures, parking and road areas.

Material and Application. The sterilant shall be applied in accordance with the manufacturer's directions and local environmental regulations.

13. Final Clean-up. After backfill has been completed, the site shall be dressed smooth and left in a neat and presentable condition, free of all cleared vegetation, rubbish and other construction wastes.

14. Seeding. The contractor is required to scarify and seed the ground at locations along the pipeline where the native vegetation has been destroyed by construction operations and at other areas where seeding is determined to be necessary by the district's representative. The areas shall be seeded with a district approved mixture. ■

2.5 EXCAVATION AND TRENCHING

A. Safety Precautions: All excavations shall be performed, protected and supported as required for safety and in the manner set forth in accordance to the latest rules, orders and regulations prescribed by the State of California Department of Industrial Relations, Division of Industrial Safety "Construction Safety Orders."

Shoring plans must be prepared and stamped by a registered Civil Engineer, whose license is currently in effect.

B. Alignment and Grades. Trench depth shall be adequate to accommodate the pipe and its foundation at the profile shown on the Plans. In the absence of such profile grade, the top of pipe grade shall be located three (3) feet below the existing street grade or existing ground for potable, 42" for reclaimed water. The measurement of the depth shall be at the trench centerline.

When the natural ground above the pipeline trench has been over excavated and/or the pipeline is to be placed in new excavation, excavation material shall be placed and compacted to an elevation of not less than three feet above the top of pipe prior to trench excavation.

C. Foundation in Poor Soil. Where rock excavation is required, the rock shall be excavated to a minimum over depth of six (6) inches below the trench depths indicated on the drawings or specified. Over depths in the rock excavation and unauthorized overdepths shall be backfilled with the same material as the bedding zone. Whenever wet or otherwise unstable soil incapable of properly supporting the pipe as determined by the district's inspector is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with an appropriate material between a course sand and a crushed rock to provided a stable foundation.

The necessity of replacing unsuitable material at depths of more than two (2) feet below bottom of pipe grade will be determined by the district's representative. If the necessity for such additional removal and replacement has been occasioned by an act or failure to act on the part of the contractor, it shall be rectified by backfilling with approved sand, compacted to structural standards and/or one sack slurry as directed by the district's representative.

D. Trench Width. The width of the trench within the pipe zone shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed the amount detailed in the Standard Drawing PW-101. In general, the following shall be adhered to:

Nominal Diameter	Trench Width	
	Minimum	Maximum
6" - 12"	O.D. + 6"	O.D. + 9"
14" - 30"	O.D. + 9"	O.D. + 12"

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

E. Pipe Subgrade. The trench bottom shall have a flat or semi-circular cross section. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of each joint except for required "bell holes" at joints.

Foundations in poor soil where rock and soft spongy and deleterious material exists shall be removed. ■

2.6 PIPE BEDDING AND LAYING FOR PVC, DI AND STEEL PIPE

A. General. This portion of the work includes the furnishing of all materials and their proper assembly to result in a first class waterline installation true to line and grade and free from leaks, cracks and obstructions.

Do not lay pipe without giving the district's representative due notice to inspect the bedding.

All pipe 24 inches or greater in diameter shall be braced and stulled to prevent damage during shipment. Any damaged pipe or fittings delivered and unloaded at trench side shall be removed by the contractor from the work site.

With steel Mortar Lining and Coating (CMLC) and DI Pipe, the off loading of the pipe as well as placement in the trench shall be handled with straps. Chains or bare cinch or choker type cables shall not be used. The slings shall be sufficient width to prevent damage to the lining or coating. On 20-foot length of pipe or longer, two straps must be used.

The contractor is warned that the approved water pipeline design is based upon a proper combination of pipe strength and pipe support. No acceptance will be given unless the work of trenching, bedding, laying, backfilling and compaction is conscientiously done in accordance with the procedures outlined in these Standards.

Grades shall be transferred from surveyors reference set points based on approved construction plan and grade. Each length of pipe shall be laid on bedding as specified and shall have full bearing for its entire length between bell holes excavated in said bedding material to allow for unobstructed assembly of all joints. No wedging or blocking with wood or soil to support the pipe will be permitted. Under no circumstances will a contractor be allowed to dump backfill materials on top of a pipe which is not continuously supported in its final grade position.

Pipe shall not be laid when the district’s inspector determines that the condition of the trench is unsuitable. As the work progresses, the interior of the waterline shall be cleared of all dirt and superfluous materials of every description. Trenches shall be kept free from water until sufficient backfill has been applied to keep the pipe in place. At times when work is not in progress, open ends of pipe and fittings shall be securely closed to the satisfaction of the district inspector so that no trench water, earth or other substance will enter the pipe or fittings. Pipe or fittings damaged during assembly shall be removed and replaced.

B. Pipe Laying for PVC Pipe C900 and C905.

Because it is a plastic product, the pipe should be covered with an opaque material if it is to be stored outside for a prolonged period of time (45 days.)

Gasket lubricants shall be non-toxic and water soluble specially prepared for use in potable water systems.

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

Field beveling of pipe ends after cutting can be done with special beveling tools or with such items as rasps.

The minimum short length of pipe shall be two feet and must meet the requirements of DR18 and DR14. The use of short pieces must be approved by the district representative.

Trench Grade Sheets. Prior to laying pipe, trench grade sheets must be submitted to the district's representative with identification of horizontal and vertical angles and appurtenances. Stationing and elevation shall be at 25-foot intervals and on all angles and appurtenances. Elevation shall consist of top of pipe and finished surface at these points.

Lowering of Pipe into Trench. Pipe shall not be lowered into the trench until the pipe bedding has been brought to grade.

When pipe laying is not in progress, the open ends of installed pipe shall be closed.

The pipe joint shall not be deflected either vertically or horizontally beyond the limits recommended by the manufacturer.
PIPE LAYOUT FOR CURVED ALIGNMENT

C900 Pipe Diameter	Minimum Curve Radius
4 inch	100 feet
6 inch	150 feet
8 inch	200 feet
10 inch	250 feet
12 inch	300 feet

C905 Pipe Diameter	Minimum Curve Radius
14-36 inch	764 feet

Special design required for short curve radius.

Pipe deflection by the use of staking or any mechanical means is not permitted under any circumstances.

To allow for the location of non-metallic pipes, copper wire shall be provided in the pipe zone directly on top of the pipe centerline. Copper wire shall be bare 12 gauge and shall be periodically wrapped or taped to the water pipe at intervals of five (5) feet apart along the barrel by means of short strips of adhesive tape, Polyken No. 900 (polyethylene) or Scotchrap No. 50 (polyvinyl.) Wire shall be continuous between successive valve boxes (including air and vacuum and adjacent valve boxes associated with fire hydrants and blow off assemblies.)

The contractor will perform all required tests to assure the continuity of the copper wire.

C. Pipe Laying For Steel Pipe

Shop Drawings. Shop drawings of all pipe and fittings shall be submitted to the district's representative for approval prior to fabrication of the pipe and fittings. Pipe lay sheets shall be included, consisting of drawings of lay, identification of joints, horizontal and vertical angles and appurtenances. Stationing and elevation shall be shown on all joints, angles and appurtenances. Elevation shall consist of top of pipe and finished surface at these points. Fabricated angles shall meet the requirements of AWWA C208-83. Except for butt strap closures, field fabricated fittings **will not be permitted** unless approved by the district. Format for shop drawings and lay sheets may be obtained from the district representative. Such approval is an additional precaution against errors and is not to be construed as relieving the contractor of the full responsibility for the accuracy of the shop drawings.

Trench Grade Sheets. Prior to laying pipe, trench grade sheets must be submitted to the district's representative with identification of horizontal and vertical angles and appurtenances. Stationing and elevation shall be shown on all joints, angles and appurtenances. Elevation shall consist of top of pipe and finished surface at these points.

Plastic Film Wrap. To protect the pipe from corrosion, cement mortar lined and coated pipe and fittings buried underground shall be protected with a polyethylene encasement wrap per Painting section of these Standards.

The wrapping shall be applied to the pipe in the field in the following manner:

- Using a sling, pick up pipe with a crane at the side of the trench and raise about three feet off the ground. The polyethylene tube, cut approximately two feet longer than the length of the pipe, shall be

slipped over the spigot end of the pipe and bunched up, accordion fashion, between the end of the pipe and the sling.

- Lower the pipe into the trench. Seat the spigot into the bell of the adjacent installed pipe, and lower the pipe to the trench bottom.

- Remove the sling from the center of the pipe and hook into the bell cavity. Raise the bell three to four inches and slip the tube of polyethylene film along the full length of the pipe barrel. Enough of the film should be left bunched up, accordion fashion, at each end of the pipe to overlap the adjoining pipe about one foot.

- To make the overlapped joint wrap, the film shall be pulled over the bell of the pipe, folded around the adjacent spigot and wrapped with about three circumferential turns of the plastic adhesive tape in order to seal the tube of film to the pipe. The tube on the adjacent pipe shall then be pulled over the first wrap on the pipe bell and sealed in place behind the bell, using about three circumferential turns of the polyethylene adhesive tape.

- The resulting loose wrap on the barrel of the pipe shall be pulled snugly around the barrel of the pipe, the excess material folded over the top and the fold held in place by means of short strips of the adhesive tape at intervals three feet apart along the pipe barrel.

Rubber Ring Joints. Joining the pipe is similar to that for PVC and DI pipe with exceptions noted under field joints and electrically bonded connections. Flanged Joints. All flanges, bolts and nuts must be covered with Sanchem (no-oxide) and the outside surface shall be protected with a polyethylene encasement furnished and installed per Painting section of these Standards.

Flexible Coupling Joints. Joints shall be completed in the trench after the pipe has been laid to the alignment and grade shown on the plans. Each pipe, for a distance of six (6) to eight (8) inches back from the end, shall be thoroughly cleaned to remove oil, dirt, loose scale, rust and other foreign matter. Flanges, gaskets and sleeves shall then be assembled on the pipe ends in accordance with the manufacturer's recommendations. Coupling sleeves shall be accurately centered over the pipe ends and one pipe and shall touch the coupling sleeve centering stop if the coupling sleeve is so equipped. Bolts and nuts must be covered with Sanchem (no-oxide) and the outside surface shall be protected with a polyethylene encasement furnished and installed per Painting section of these Standards.

Lowering of pipe and accessories into trench. Pipe shall not be lowered into the trench until the pipe bed has been brought to grade. The sealing surfaces of all materials shall be kept clean during installation.

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

The pipe joint shall not be deflected either vertically or horizontally beyond the limits recommended by the manufacturer.

Mortar Lining of the Interior Joints. When the section has been laid in place, the joint shall be finished by pulling a rubber ball or the equivalent through the joint to finish it off smooth with the inside surface of the lining (swabbing.)

The contractor must obtain a confined space permit prior to mortar lining the interior joints when the pipe is 24-inches or larger.

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

Welded Joints. Field welding of joints shall be in accordance with AWWA C206.

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

All welding shall be done by experienced welders qualified in accordance with the standards of the American Welding Society and be certified per ASME Section 9. Welding electrodes shall comply with the requirements of ASTM Specification A233. Welding procedures shall meet qualifications of AWS Standard D10.9 "Qualification of Welding Procedures and Welders for Piping and Tubing."

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

Steel Cylinder Thickness Inches	Fillet Weld Minimum Number of Passes
Smaller than 3/16"	1
3/16" and ¼"	2
5/16"	3
3/8"	3

In all welding, undercutting of the base metal adjoining the weld is a defect and shall be repaired. Overlapping or burning back the inside or outside corner during the application of a fillet weld will not be permitted. The finished fillet weld must be free of grooves, deep valleys or ridges and contain no abrupt changes in section at the toe.

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

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

Butt Strap Closure Joints. Butt strap closure joints shall be completed in the trench after the pipe has been laid to the alignment and grade shown on the plans.

They shall be field welded to the outside of the pipe along both edges by full circumferential fillet welds. The interior of butt strap joints shall be grouted with cement mortar as specified for mortar lining of interior joints.

A 1/2 standard five-inch pipe coupling shall be welded to the top section of the butt strap to permit access for mortar lining the inside of the joint. The coupling shall be closed with a five-inch solid steel plug welded to the coupling.

The exterior of butt strap joints shall be wrapped with mesh wire and completely covered with mortar equal to the thickness of the existing coating.

Except for butt strap closures field fabricated fittings and butt joints **will not be permitted**, unless approved by the district representative.

Mortar Coating of Exterior. Grout composed of one part Type II cement to not more than two parts sand thoroughly mixed with water to the consistency of thick cream. Sand gradation shall conform to the requirements of ASTM C33 except that 100 percent shall pass the No. 16 sieve. The joints shall be coated with cement-mortar, retained by suitable bands or diapers so as to bridge the joint and retain the grout without leakage. The diaper shall be made of heavy duty sail cloth of sufficiently close weave to prevent cement loss from the mortar. The diapers shall be Mar-Mac fabric diapers or approved equal. The fabric shall be hemmed on each edge and shall contain a metal strap within each hem sufficiently longer than the circumference of the pipe to allow a secure attachment of the diaper to the pipe. The diaper width will depend on pipe size and design and shall be the width

recommended by the manufacturer. The grout space, prior to filling, shall be flushed with water so that the surface of the joint to be in contact with the grout will be thoroughly moistened when the grout is poured. The joint shall be filled with grout by pouring from one side only, and shall be rodded with a wire or other flexible rod or vibrated so that the grout completely fills the joint recess by moving down one side of the pipe, around the bottom of the pipe, and up the opposite side. Pouring and rodding the grout shall be continued to allow completion of the filling of the entire joint recess in one operation. Care shall be taken to leave no unfilled space. The exposed portion of the grout at the top of the pipe shall be coated with a sealing compound or covered with burlap or moist earth.

Electrically Bonded Connections. Jumper bond connections shall be welded on all underground connections where sections of steel pipe are joined by means of rubber rings.

Materials and shape shall be as designated per bond joint installation in Standard Drawings.

The contractor will make electrical and mechanical tests to determine that each joint between sections of pipe is satisfactorily bonded. The contractor will then perform all additional work required to assure the pipeline is electrically continuous.

D. Pipe Laying for Ductile Iron Pipe. Where approved for use, ductile iron pipe shall be laid in accordance with manufacturer instructions and in general compliance with the applicable procedures as listed for PVC and steel pipe. Where specified, the district may request a specification for such installation practices.

Tapping of the pipeline for services is not allowed.

The outside surface shall be protected with a polyethylene encasement furnished and installed per Painting section of these Standards. ▉

2.7 BACKFILL AND COMPACTION FOR PVC, DI AND STEEL PIPE

A. General. Backfill and compaction will be as listed in the Standard Specification for Public Works Construction Latest Edition, by APWA/AGC, the "Green Book unless otherwise noted."

Within the rights-of-way of the State Department of Transportation, the County Road Department of the respective cities within the district, backfill and compaction shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of the Specifications.

There are several distinct zones to be considered in the backfilling procedure (refer to Standard Drawing PW-101.)

- In all cases, the filling of trenches shall be subject to approval by the district representative and/or City or County Public Works Inspector who shall have full authority to order compaction tests to demonstrate the actual backfill density.

B. Backfilling Pipe Zone. Sand as specified in Earthwork section of these Standards must be used and shall be placed in the pipe zone with particular attention to getting material to the underside of the pipe and fittings to provide a firm support along the full length of the pipe. Care shall be exercised in backfilling to prevent damage to the pipe or coating, as applicable.

C. Jetting Method in the Pipe Zone. Jetting with water to consolidate the sand in the pipe zone is acceptable when foundation soil provides adequate drainage and jetting is approved by district representative.

Acceptability of backfill in the pipe zone will be determined primarily by visual inspection and probing by the district inspector to determine that no voids exist in the backfill. The backfill within the pipe zone shall be per Standard Drawing 101.

D. Backfilling Above Pipe Zone. Testing for pipe and joint leakage will be done after consolidation of the backfill to the top of the base zone and after service lines have been installed to the property lines.

Contractor shall assume the responsibility of removal and replacement of backfill necessary for correction of defective conditions revealed by testing at no expense to the district.

In traffic areas within public rights-of-way where pavement is to be replaced, the City or County requirements may call for a cement sand slurry mixture to be used for trench backfill at no expense to the district.

Standard Drawing PW-101 presents the district's trench requirements within the paved right-of-way.

E. Compaction Tests. All required excavations and tests will be performed at no expense to the district.

Tests shall be performed in accordance to ASTM D1557 by an approved geology laboratory.

The contractor shall make all necessary excavations for compaction tests. The number of tests and their location and depth shall be determined by the district's representative and/or a representative of those agencies where construction is within their rights-of-way.

Compaction test results shall be submitted in writing to the district inspector prior to testing for pipe and joint leakage. ■

2.8 THRUST BLOCKS AND ANCHOR BLOCKS

A. General. **Do not place concrete without giving the district's inspector 24 hours notice.**

B. Concrete Thrust, Anchor Blocks shall be placed as required and shall consist of Portland cement concrete containing not less than five sacks of cement per cubic yard and shall conform to the applicable provisions of the Standard Specifications for Portland Cement Concrete. Concrete thrust and anchor blocks shall be placed between the undisturbed ground and the fittings to be anchored. The concrete shall be placed so that the pipe joints and fittings will be accessible for repair. All concrete supports shall be allowed to cure for at least five days prior to filling the supported pipe with water or per special design provisions.

Quantity of concrete and the area of bearings on the pipe and undisturbed soil shall be as shown on the Plans and per Standard Drawing. ■

2.9 RESURFACING AND RESTORATION

General. Resurfacing and restoration will be as listed in the Standard Specifications for Public Works Construction Latest Edition by APWA/AGC, the "Green Book unless otherwise noted."

Within the rights-of-way of the State Department of Transportation, the County Road Department of the respective cities within the district, resurfacing and restoration shall be in accordance with requirements and provisions of the permits issued by those agencies. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of the Specifications.

Substructures removed or damaged on public or private property shall be restored or replaced unless such structures are designated on plans "to be abandoned." Such structures include but are not limited to trees, bushes, plantings, ground cover, mail boxes, fences and sprinkler systems.

Any temporary paving, barricades or special provisions required by public agencies shall be furnished at no expense to the district. ■

2.10 HOT TAPPING

General.

- **Hot tapping shall only be done in the presence of the district representative.** The tapping mechanism shall be as recommended by the tapping manufacturer.

- Hot taps on steel mains must use reinforcement collars when the diameter of the pipe is less than 2 of the main pipe diameter. When the branching pipe does exceed 2 of the pipe diameter, a full wrap saddle shall be used.

- Hot taps of one-inch (1) through two-inch (2) must use a reinforcement collar and a 3,000# steel coupling.

Hot Tapping Contractors

1. Presently there are no district contractor requirements to perform hot tapping (of non-district owned and operated water system) provided the contractor adheres to approved district tapping standards.

2. No tapping shall be performed on steel cylinder pipe where the horizontal or spiral weld of the pipe will be in contact with any part of the nozzle or collar per Standard Drawing.

3. Approved hot tapping contractors for district owned water systems are:

   Koppl Company, Inc.
   International Flow Technologies, Inc. ▉

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

2.11 SERVICE CONNECTIONS AND SERVICE LINES

General. As shown on Standard Drawings, service connections to the main where copper tubing is used for the service line shall be made at 15” above horizontal (springline.)

Water service laterals at intersections shall be located outside of the intersection valving whenever possible.

Service lines shall be one continuous length "snaked" within the trench to allow for expansion or contraction.

1. Service Taps: In no case shall a service tap be made in a main closer than two (2) feet from a joint or fitting. Service taps shall not be less than three (3) feet apart on PVC main, and no less than 18" apart on steel pipe mains. Service taps shall be located opposite the meter locations so that the service laterals will be perpendicular to the water main and street centerline. Service tap locations varying more than five feet from the perpendicular must be approved by the district's representative prior to installation. Unless other wise noted on the Plans, service taps shall be located so that the water service lateral is parallel to and 10 feet from the sewer lateral serving the same property.

2. Dielectric Connections shall be provided where dissimilar metals are joined and shall conform to Standard Drawing.

3. Earthwork shall conform to Standard Drawing PW-101. ■

2.12 INSTALLATION OF VALVES AND FITTINGS

General. Valves and fittings shall be installed at the locations and grades shown on the Plans. The following items comprise a partial check list.

- All line valves at intersections shall be located as close as possible to the beginning of curb return and/or end of curb return.
- Water distribution main shall have valves spaced no greater than 1,000 feet apart.
- At water main intersections, each branch shall be valved. Where relatively short blocks separate water main intersections, one of the two valves between the water main intersections may be eliminated.
- All valves and appurtenances at depths greater than eight (8) feet require special design and district approval.
- Valve restraints shall be used when installing push-on valves below ground per Standard Drawing. When placing thrust blocks around a fitting, the concrete must be around the fitting and not the joint. □

2.13 INSTALLATION OF FIRE HYDRANT ASSEMBLIES

General. Fire hydrant assemblies are to be installed in accordance with the general instructions contained in AWWA C600 and AWWA Manual No. M17 and Standard Drawing.

- The setback from the curb face must be per Standard Drawing, whether the fire hydrant is on public street or within a private street.

- Fire hydrants at or near street intersections shall be located inside the intersection valving and located at the beginning of curb return or end of curb return. Fire hydrants located between intersections must be located on property lines.

- The fire hydrant shall be positioned so that the bolts between the extension piece and the hydrant are accessible, as shown on Standard Drawing.

- Painting shall be per Painting section of these Standards with all metal surfaces above ground being painted. ■

2.14 INSTALLATION OF METER BOXES

A. General. Specific installation details are shown on Standard Drawings below.

Standard Drawing No.	Size
PW-103 and PW-104	3/4" and 1" meter
PW-105 and PW-106	1½" and 2" meter

The district will select the meter type and install the meter after proper arrangements have been made.

B. Meter Boxes. These shall be set as shown in Standard Drawings.

Spacers (or jumpers) are to be placed within the meter box until the district installs the meter.

Care must be taken to avoid placing a strain on the spacer through misalignment of the house or service line. ■

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

2.15 PAINTING

General.

- Paints shall be delivered to the jobsite in original cans or packages bearing the brand name and the manufacturers name.

- Paints specified shall be used unless specific written approval is obtained in advance to use other products.

- Manufacturer's recommended time between coats will be used as a guide as to when the next coat of paint may be applied.

- The contractor shall notify the district inspector after surface preparation and after the application of each successive coat of paint.

- Surfaces to be painted shall first be thoroughly cleaned to remove dirt, loose scale, rust, oil, grease and/or other foreign matter immediately prior to painting.

- After cleaning, metal surfaces shall receive two primer coats of a minimum film thickness of 15 millimeters each or equivalent conditioning or seal coats and two finish coats of two-millimeter thickness each.

- If the metal is bronze, first etch with Kooner's passavator and coat with Kooner's primer. The procedure is to first degrease metal surfaces with Kooner's thinner. Then use Kooner's primer before two finish coats of Tenemec Services 10 modified are applied as approved for the particular installation. □

2.16 ABANDONMENT

General. The contractor shall remove and dispose of/or abandon in place existing pipelines, structures or appurtenances as shown on the plans.

Abandonment of all water mains and appurtenances shall be approved by the district prior to any such work.

Water lines to be abandoned shall be pumped full with a two-sack sand slurry mix. Each end shall be encased with a minimum of six inches of concrete per Concrete and Mortar Work section. Said concrete shall thoroughly cover all exposed metal.

Structures and appurtenances associated with lines to be abandoned shall be removed by the contractor.

All materials and appurtenances determined by the district representative to be salvageable are district property and shall be delivered by the contractor/developer to the district warehouse at no cost to the district. ■

2.17 HYDROSTATIC TESTING OF WATER MAINS

All completed waterlines, as well as the service lines and appurtenant structures, will be tested by and at the expense of the contractor in the district's representative's presence prior to field acceptance of the work. The contractor must correct all defects in workmanship or materials which become evident by inspection or testing at any time during the work. Testing will be done after the complete installation and compaction of all underground utilities, except as modified below.

A. General Requirements. Pipe and all appurtenances shall be subjected to a four-hour hydrostatic pressure test. This test shall consist of applying to the pipeline a pressure of 50 psi in excess of the designated working class of pipe. Pressure tests shall not be performed until backfill and compaction is completed to subgrade per the Standard Specification on Earthwork. Re-tests shall be conducted following "disturbances" of the pipe zone pipeline or appurtenances at the discretion of the district representative.

The maximum length of pipe to be included in any one test shall be no more than 2,500 feet or the distance between valves, whichever is greater. The contractor shall provide suitable test bulkheads, blocking and fittings to permit such sectionalizing.

B. Preparation. The test shall be applied at an approved outlet. The contractor shall provide and later securely plug such fittings. The line shall be flushed, filled and maintained at operating pressure for a period of at least 72 hours prior to testing to satisfy any system water absorption. Seventy two hour soak period not required for PVC pipe. While filling and immediately prior to testing, all air shall be expelled from the pipeline.

In selected cases, the fire department may require a check of the fire flow or pressure following construction. In such instances, the developer/contractor shall assist the fire department, as appropriate.

C. Procedure. After the 72 hour soak period the pressure in the pipeline shall be pumped up to the specified test pressure. When the test pressure has been reached, the pumping shall be discontinued until the pressure in the line has dropped 10 psi, at which time the pressure shall again be pumped up to the specified test pressure. This procedure shall be repeated until four hours have elapsed from the time the specified test pressure was first applied. At the end of this period, the pressure shall be pumped up to the test pressure for the last time.

D. Leakage. Shall be considered as the total amount of water pumped into the pipeline during the four hour period, including the amount required in reaching the test pressure for the final time.

If leakage exceeds the allowable leakage, the leak points shall be located and stopped, and all defective pipe, fittings, valves and other accessories discovered shall be removed and replaced.

Allowable leakage shall be computed as below:

Where: $$L = \frac{CND/P}{1850}$$

L = Maximum allowable leakage in gallons per hour for the section of pipeline being treated.

N = Number of joints in length tested.

D = Diameter of pipe in inches.

P = Test pressure in psi.

C = 0.25 for PVC pipe with rubber gasket joints.

C = 0.50 for cast iron pipe with rubber gasket joints.

C = 0.125 for flanged joints.

C = 0 for welded steel pipe with welded joints.

When the pipeline being tested contains more then one type of joint or pipe type allowable, leakage shall be computed for each, then summed for a total allowable leakage. The district representative will provide the contractor a temporary water meter to measure leakage.

E. Role of Flushing. All mains shall be flushed with potable water after completion of construction and prior to disinfection. The primary purpose of this function is to remove the sediments and miscellaneous products of construction.

MINIMUM FLUSHING FLOW	
Pipe Size	Flow Rate to Produce 2.5 fps
6"	220 gpm
8"	390 gpm
10"	610 gpm
12"	880 gpm
14"	1,200 gpm
16"	1,565 gpm
18"	1,980 gpm

Before conducting hydrostatic tests, flush pipes with water to remove dirt and debris. Maintain a flushing velocity of at least 2.5 fps for water testing. Flush pipes for time period as given by the formula

$$T = \frac{2L}{2.5}$$

in which:

T = flushing time (seconds)
L = pipe length (feet).

For pipelines 24 inches or larger in diameter, acceptable alternatives to flushing are use of high-pressure water jet, sweeping, or scrubbing. Water, sediment, dirt, and foreign material accumulated during this cleaning operation shall be discharged, vacuumed, or otherwise removed from the pipe. ■

2.18 DISINFECTING WATER MAINS

A. General. Disinfection is the last step necessary before connection to the existing water mains. After pressure testing and prior to acceptance of the work, the entire pipeline including all valves, fittings, hydrants, service laterals and other accessories shall be disinfected in accordance with the current AWWA Specification C-651 which provides detail specifications for:

Limiting contaminating materials from entering the water mains during construction or repair.

Removing by flushing contaminating materials that may have entered the water main during construction or repair.

Disinfecting any residual contamination that may remain after cleaning.

Determining the bacteriologic quality of fresh water in the water main after disinfecting the main.

B. Procedure. All mains shall be flushed with potable water after completion of construction and prior to disinfection. Drainage facilities shall be constructed such that the water lines cannot be contaminated through the flushing outlet. After flushing, a licensed chlorination contractor shall disinfect the line. Chlorine solution shall not exceed 100 ppm and chlorine residual shall be a minimum of 25 ppm in all parts of the line and appurtenances attached thereto.

The placing of HTH capsules or powder in pipe sections during the laying process SHALL NOT be considered adequate sterilization. The contractor shall keep adequate chlorine residual testing and indicating apparatus available on the site during the entire sterilization period.

C. Final Flushing. If residual is less than 25 ppm after 24 hours have elapsed, disinfection shall be repeated.

After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. The flushing fittings shall be plugged with devices intended for this purpose at the pressure class of the pipe. Where water main is coated, plugs and outlets shall be similarly

coated. Do not discharge chlorinated water with chlorine content greater than 0.2 - 0.5 mg/l to natural water course or storm drain. De-chlorinate water and discharge only in a manner permitted by Regional Water Quality Control Board.

D. Bacteriologic Samples. One sample of water for the specified bacteriologic test shall be taken by the district representative from each end of the sterilized main (located downstream of the point of introduction of chlorine disinfectant.) For mains over 2,500 feet in length, additional samples shall be taken at intermediate points in such a manner that at least one sample is taken for each 2,500 feet of main.

E. Repetition of Procedure. If the disinfection fails, then the procedure shall be repeated.

F. Procedure After Cutting into or Repairing Mains. Two procedures are recommended as follows:

1. Swabbing with hypochlorite where all pipe and fittings are swabbed on the interior with five percent hypochlorite solution before they are installed. This should be followed by flushing, preferably from both directions.

2. Slug method whereby a section of line is isolated and then fed a slug dosage of chlorine up to 500 mg/l for a minimum of 2 hour. Then the line is flushed. ■■

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

SECTION 3.0

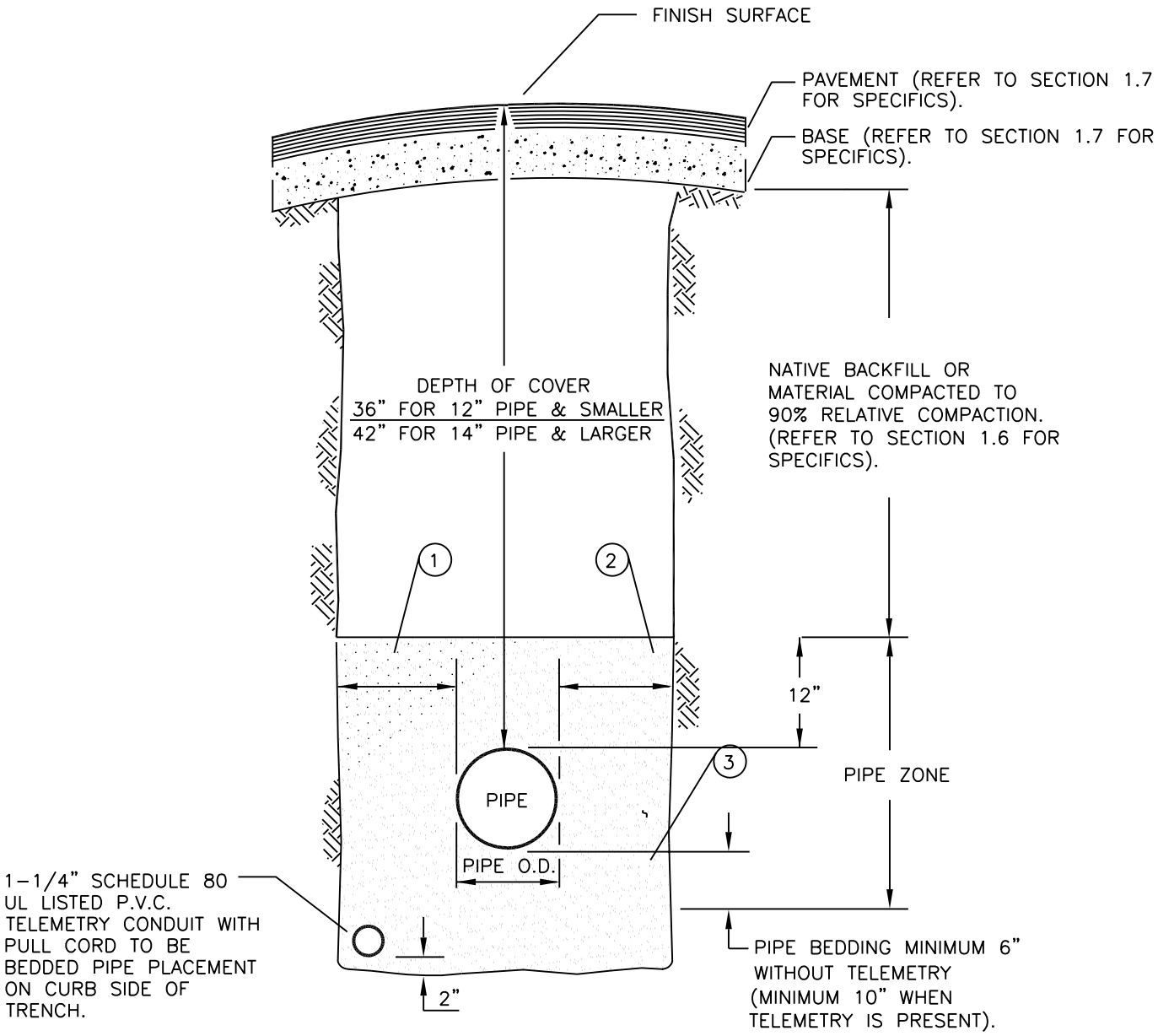
TABLE OF STANDARD DRAWINGS

Standard Drawing No. PW 101	Trench Terminology and Standard Dimensions
Standard Drawing No. PW 102 (2 sheets)	Separation Requirements for Water and Wastewater lines
Standard Drawing No. PW 103	Three quarter-inch (¾) or one-inch (1) Water Meter Service installation (maximum working pressure 150 psi)
Standard Drawing No. PW 104	Three quarter-inch (¾) or one-inch (1) Water Meter Service Installation (maximum working pressure 151 - 250 psi)
Standard Drawing No. PW 105	One and one-half inch (1½) or two-inch (2) Water Meter Service Installation (maximum working pressure 150 psi)
Standard Drawing No. PW 105A	Two-inch (2) water meter service installation with Detector Check option (maximum working pressure 150 psi)
Standard Drawing No. PW 106	One and one-half inch (1½) or two-inch (2) Water Meter Service Installation (maximum working pressure 151 - 250 psi)
Standard Drawing No. PW 107	Three-inch (3) to eight-inch (8) water service installation (above ground) (maximum pressure 150 psi)
Standard Drawing No. PW 108	Pressure Regulation Station
Standard Drawing No. PW 109 (two sheets)	Two and one-half inch (2½) to ten-inch (1) Detector Check installation (above ground)
Standard Drawing No. PW 109A (two sheets)	One and one-half inch (1½) or two-inch (2) Detector Check
Standard Drawing No. PW 110	Fire Hydrant Installation

Standard Drawing No. PW 111	Master Meter Installation
Standard Drawing No. PW 112	Master Meter Piping Removal
Standard Drawing No. PW 113	One-inch (1) Water Sampling Station
Standard Drawing No. PW 114	Temporary Riser and Hose Bib
Standard Drawing No. PW 115	Two-inch (2) Air and Vacuum Valve for six-inch (6) through eighteen-inch (18) Mains
Standard Drawing No. PW 116	Four-inch (4) Class 200 or 400 Blow-Off installation
Standard Drawing No. PW 117	Valve Restraint Installation
Standard Drawing No. PW 118	Valve Box and Cover Identification
Standard Drawing No. PW 119	Valve Stem Extension
Standard Drawing No. PW 120	Dielectric Connection to Steel Main
Standard Drawing No. PW 121	Bond Joint Installation (steel pipe)
Standard Drawing No. PW 122	Cathodic Protection Test Leads and Wire Splice Details
Standard Drawing No. PW 123	Cathodic Protection Test Point Station for Non-Traffic Conditions
Standard Drawing No. PW 124	Cathodic Protection Test Point Station for Traffic Conditions
Standard Drawing No. PW 125	Sacrificial Anode Installation at Leak Repair Site for Non-Traffic Conditions
Standard Drawing No. PW 126	Sacrificial Anode Installation at Leak Repair Site for Traffic Conditions
Standard Drawing No. PW 127	Location of Above Ground Utilities (fire hydrants and meters)
Standard Drawing No. PW 128	Location of Above Ground Utilities (air and vacuum valves)

Standard Drawing No. PW 129	Concrete or Block Retaining Wall
Standard Drawing No. PW 130	Guard and Marker Post Detail
Standard Drawing No. PW 131 (2 sheets)	Flange Outlet and End Assemblies Detail
Standard Drawing No. PW 132	Butt Strap Closure Detail
Standard Drawing No. PW 133 (2 sheets)	Thrust Block Details
Standard Drawing No. PW 134	Anchor Block Details (16-inch Pipe Maximum)
Standard Drawing No. PW 135	Special Anchor Block Detail
Standard Drawing No. PW 136	Redwood Baffles and Concrete Collars
Standard Drawing No. PW 137	Joint Restraint and Anchor Box Assembly for Mechanical Coupling (sizes six-inch through 12-inch)
Standard Drawing No. PW 138	Pipe Protection Fence Installation
Standard Drawing No. PW 139	Pipe Protection Slab and Concrete Encasement Detail
Standard Drawing No. PW 140	Mechanical Joint Tapping Sleeve

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE



(1) For pipe 12"ø and smaller, trench width at side of pipe shall be 6" to 9" (typical both sides).

(2) For pipe 14" to 30"ø, trench width at side of pipe shall be 9" to 12" (typical both sides).

(3) Sand material per specifications compacted to 90% relative compaction (refer to Section 1.6 specifics).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

TRENCH TERMINOLOGY AND STANDARD DIMENSIONS

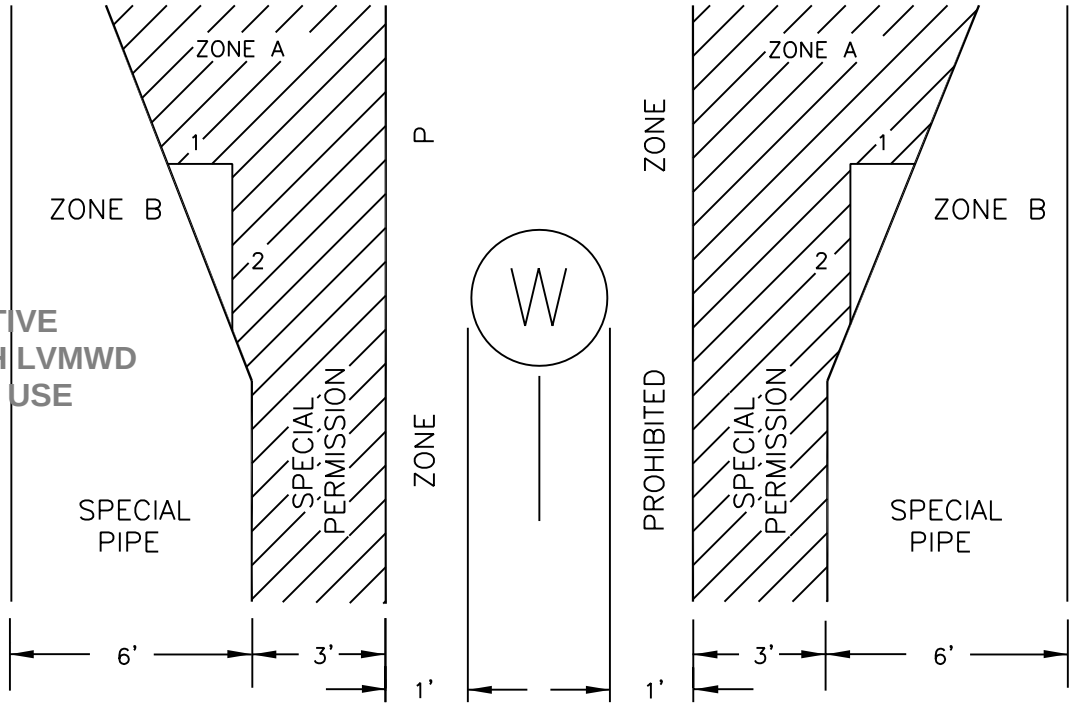
REVISIONS			
NO.	BY	DATE	APRVD.

/S/ BRIAN WHITAKER
PRINCIPAL ENGINEER

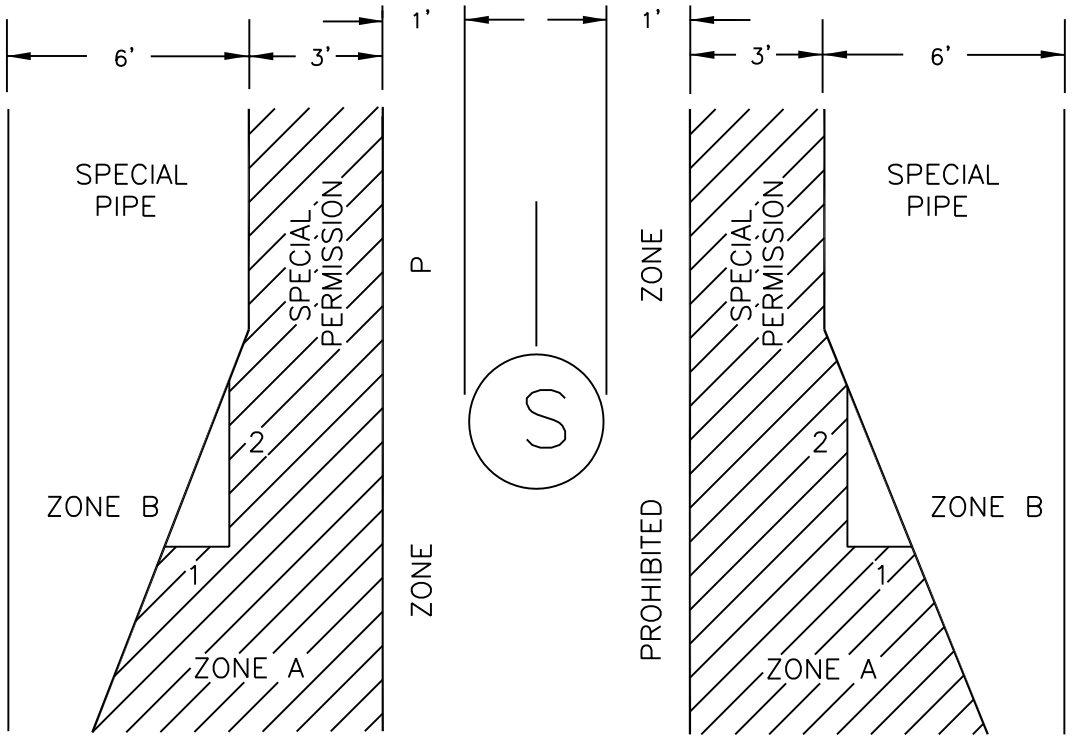
06-13/2001
DATE

PW-101

PARALLEL CONSTRUCTION



CASE 1: NEW WASTEWATER (SEWER) MAIN. REFER TO SECTION 2.3 FOR SPECIFICS.



CASE 2: NEW WATER MAIN. REFER TO SECTION 2.3 FOR SPECIFICS

SEPARATION REQUIREMENTS FOR WATER AND WASTEWATER LINES

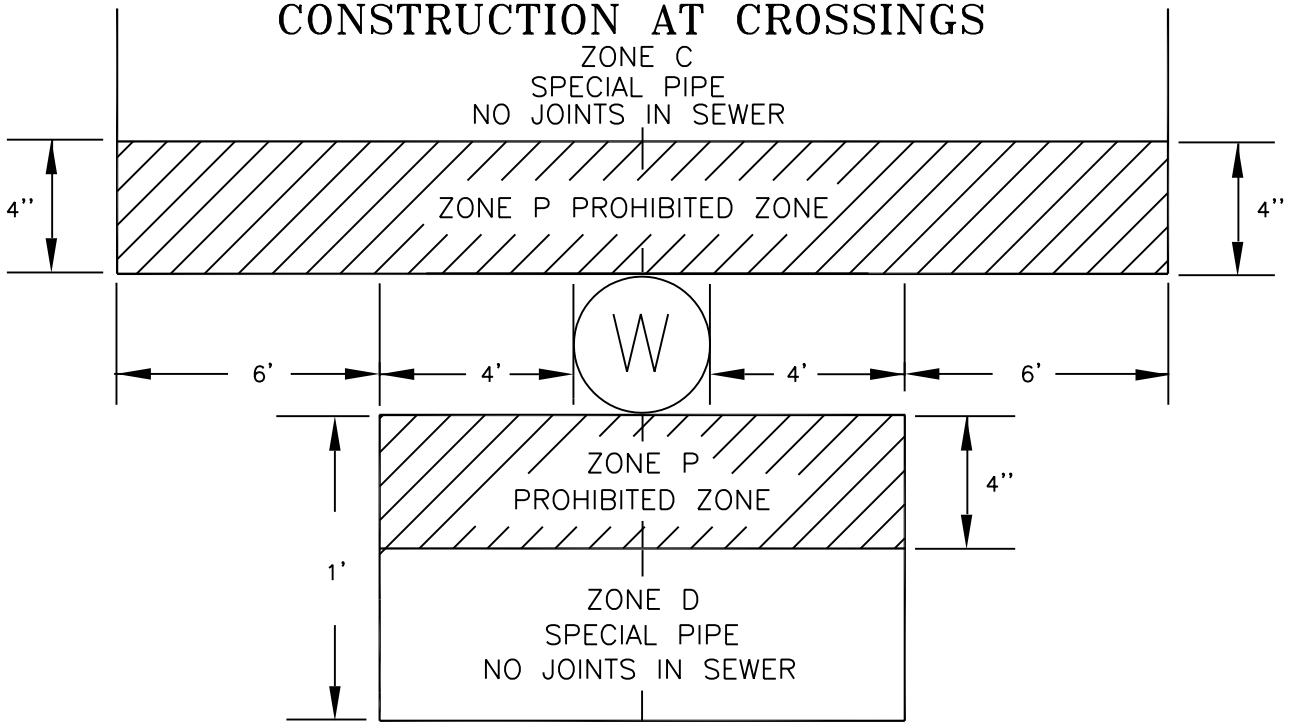
REVISIONS			
NO.	BY	DATE	APRVD.

/S/ BRIAN WHITAKER
PRINCIPAL ENGINEER

06-13/2001
DATE

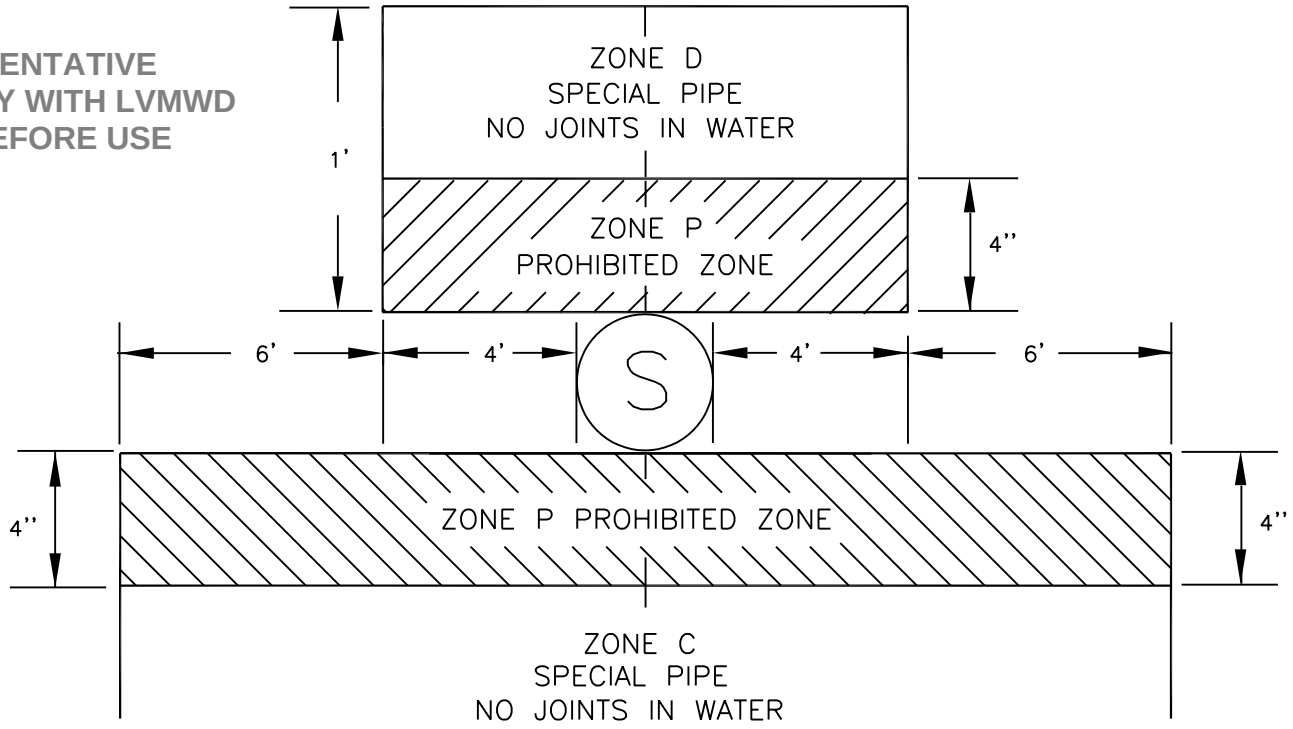
PW-102

CONSTRUCTION AT CROSSINGS



CASE 1: NEW WASTEWATER (SEWER) MAIN. REFER TO SECTION 2.3 FOR SPECIFICS.

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE



CASE 2: NEW WATER MAIN. REFER TO SECTION 2.3 FOR SPECIFICS.

SEPARATION REQUIREMENTS FOR WATER AND WASTEWATER LINES

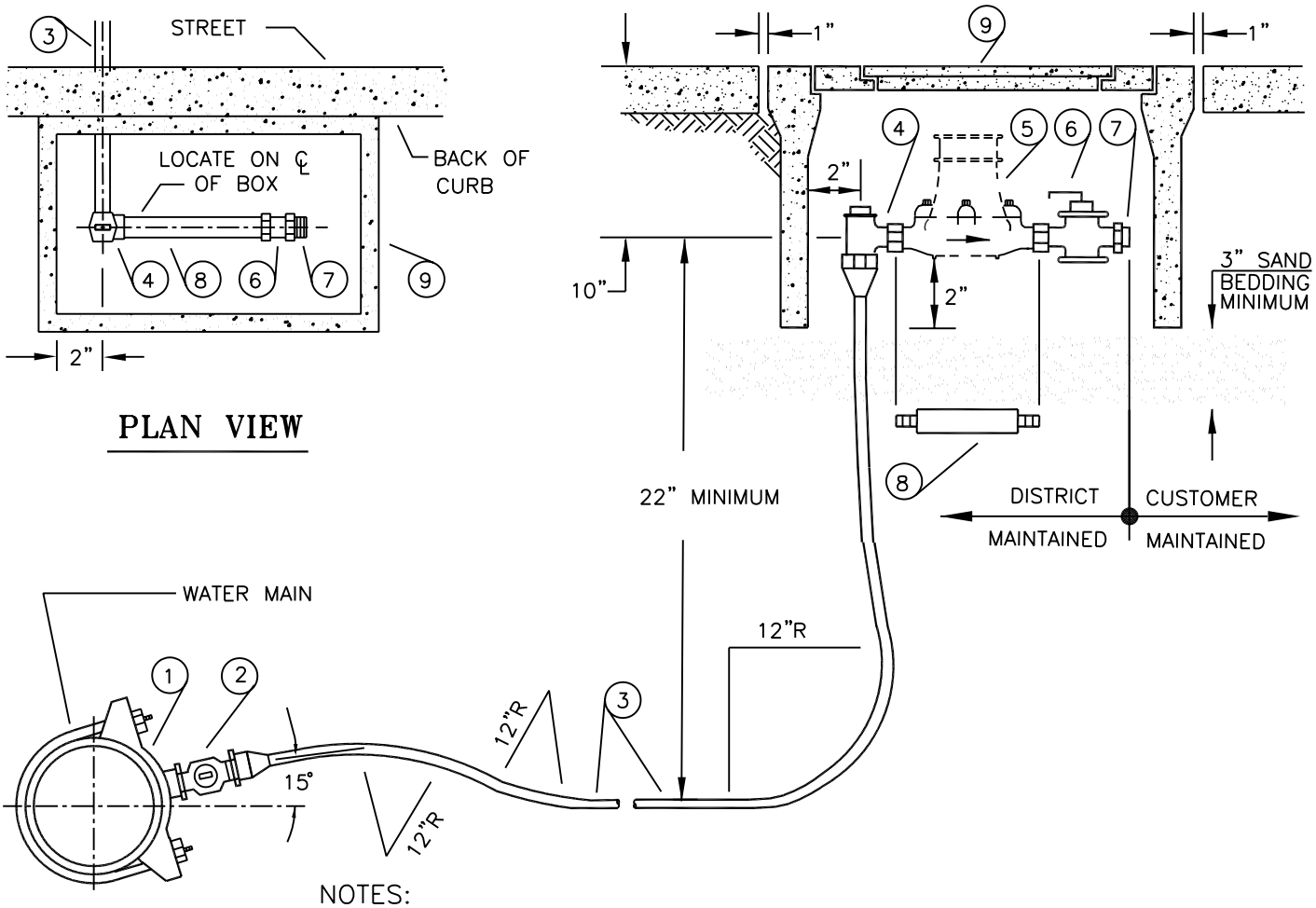
REVISIONS			
NO.	BY	DATE	APRVD.

/S/ BRIAN WHITAKER
PRINCIPAL ENGINEER

06-13/2001
DATE

PW-102

2 OF 2



NOTES:

1. Refer to Section 1.10 for materials specifications.
2. No intermediate joints permitted without approval of LVMWD. Service lines to receive backfill of imported sand within pipe zone (refer to Standard Drawing PW-101 for specifics).
3. Spacer length: 3/4" meter 1-1/4" x 9"
   1" meter 1-1/4" x 10-3/4"

(1) Service Saddle (refer to Standard Drawing PW-120 for connection to steel main).
(2) Corporation Stop (install with key on side and open position, unless otherwise directed).
(3) Copper Tubing Pipe (see Note No. 2).
(4) Angle Meter Stop Valve
(5) Meter (installed by LVMWD).
(6) Customer Handle Valve
(7) Nylon Bushing
(8)
(9) Meter Box (refer to Section 1.10-4 and Standard Drawing PW-127 for specifics). ⚠1

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

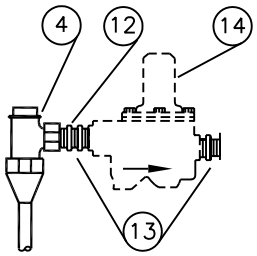
3/4" OR 1" WATER METER SERVICE INSTALLATION (MAXIMUM WORKING PRESSURE 150 psi)

REVISIONS			
NO.	BY	DATE	APRVD.
⚠1	OB	10-1-03	J.V.

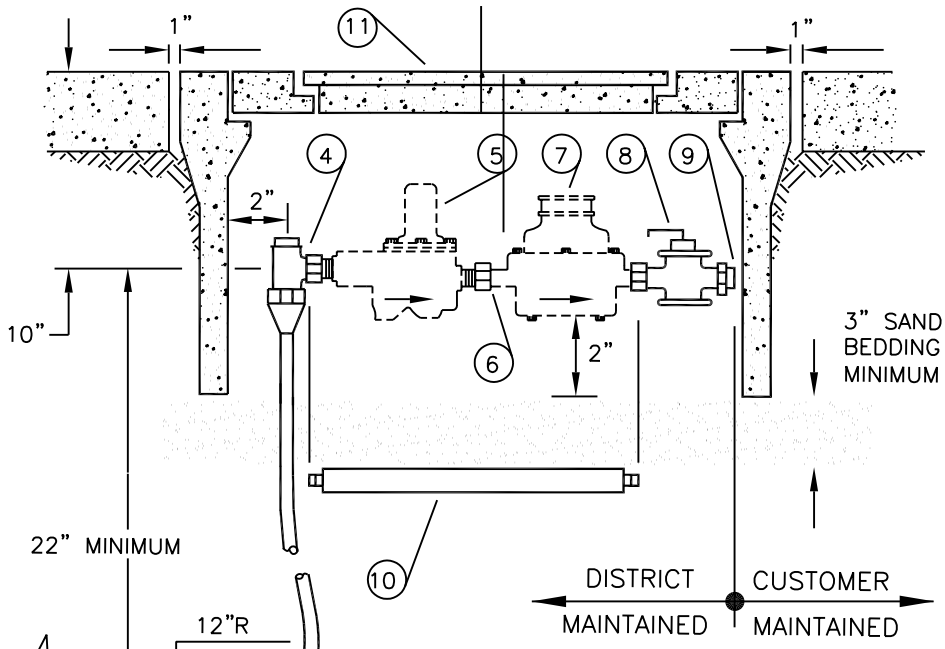
/S/ BRIAN WHITAKER
PRINCIPAL ENGINEER

06-13/2001
DATE

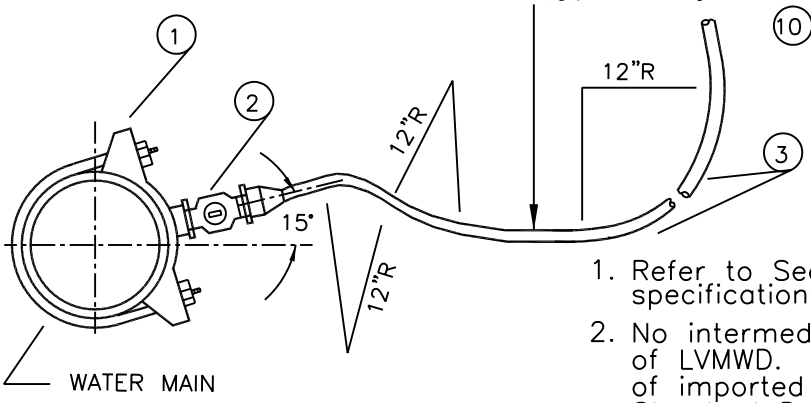
PW-103



1" METER SERVICE



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE



NOTES:

1. Refer to Section 1.10 for materials specifications.
2. No intermediate joints permitted without approval of LVMWD. Service lines to receive backfill of imported sand within pipe zone (refer to Standard Drawing PW-101 for specifics).
3. Spacer length: 3/4" meter 1-1/4" x 17"
   1" meter 1-1/4" x 21-3/4"

(1) Service Saddle (refer to Standard Drawing PW-120 for connection to steel main).
(2) Corporation Stop (install with key on side and open position, unless otherwise directed).
(3) Service Tubing (see Note No. 2).
(4) Angle Meter Stop Valve
(5) Pressure Regulating Valve for 3/4" Meter (will be installed by LVMWD).
(6) Meter Coupling (will be installed by LVMWD).
(7) Meter (will be installed by LVMWD).
(8) Customer Handle Valve
(9) Nylon Bushing
(10) Meter Spacer (PVC Schedule 80 will be installed by contractor; see Note No. 3).
(11) Meter Box (refer to Section 1.10-4 and Standard Drawing PW-127 for specifics). ⚠1
(12) Meter Adapter (will be installed by LVMWD).
(13) Bushing (will be installed by LVMWD).
(14) Pressure Regulating Valve for 1" Meter (will be installed by LVMWD).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

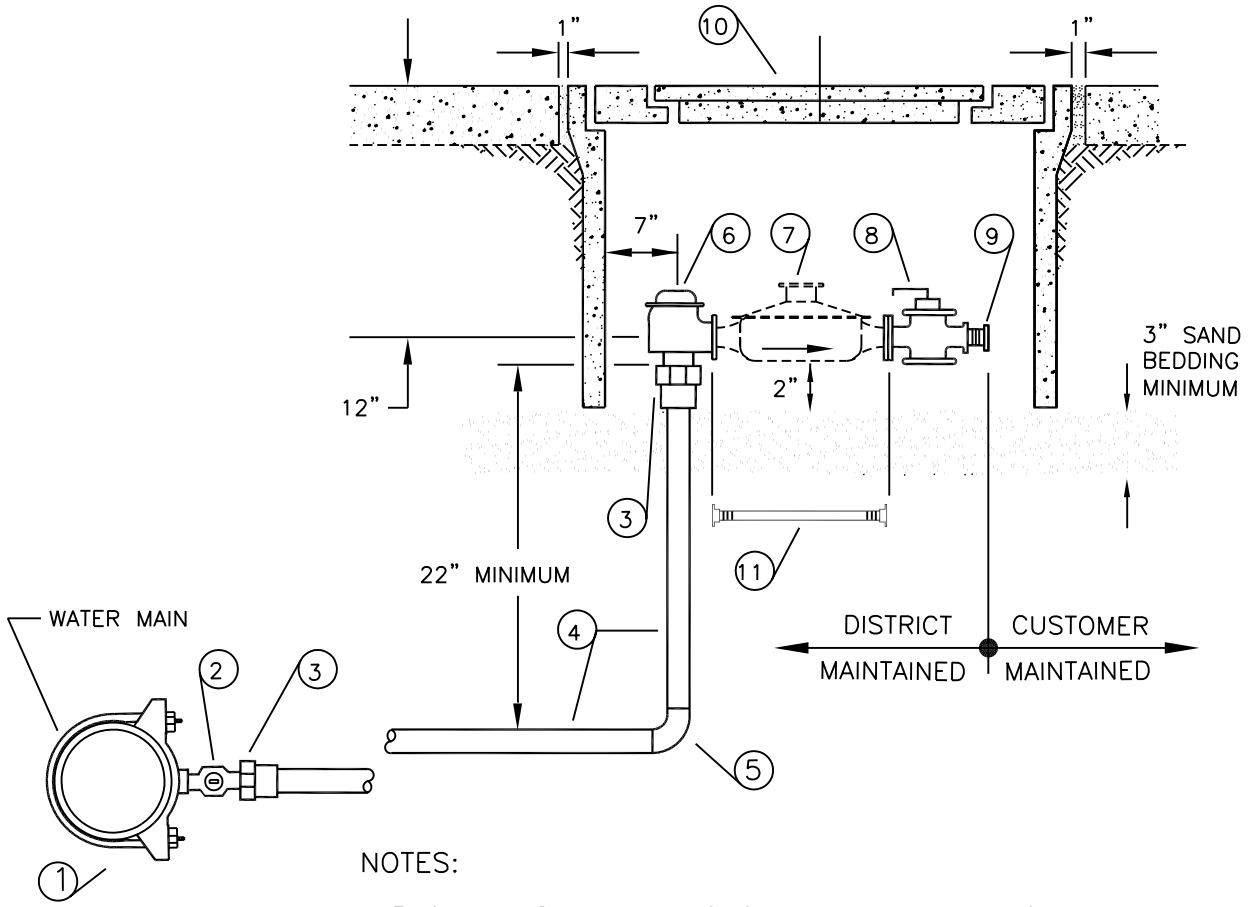
3/4" AND 1" WATER METER SERVICES INSTALLATION (MAXIMUM WORKING PRESSURE 151 - 250 psi)

REVISIONS			
NO.	BY	DATE	APRVD.
⚠1	OB	10-1-03	J.V.

/S/ BRIAN WHITAKER
PRINCIPAL ENGINEER

06-13/2001
DATE

PW-104



NOTES:

1. Refer to Section 1.10 for materials specifications.
2. No intermediate joints permitted without approval of LVMWD. Service lines to receive backfill of imported sand within pipe zone (refer to Standard Drawing PW–101 for specifics).
3. Spacer length: 1–1/2" meter 1–1/2" x 13"
   2" meter 2" x 17"

(1) Service Saddle (refer to Standard Drawing PW–120 for connection to steel main).
(2) Corporation Stop (install with key on side and open position, unless otherwise directed).
(3) Adapter
(4) Service Tubing (see Note No. 2).
(5) 90° Ell
(6) Angle Meter Stop Valve
(7) Meter (will be installed by LVMWD).
(8) Customer Handle Valve
(9) Nylon Bushing
(10) Meter Box (refer to Section 1.10–4 and Standard Drawing PW–127 for specifics). ⚠1
(11) Meter Spacer (PVC Schedule 80 will be installed by contractor; see Note No. 3).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

1-1/2" OR 2" WATER METER SERVICE INSTALLATION (MAXIMUM WORKING PRESSURE 150 psi)

REVISIONS			
NO.	BY	DATE	APRVD.
⚠1	OB	10–1–03	J.V.

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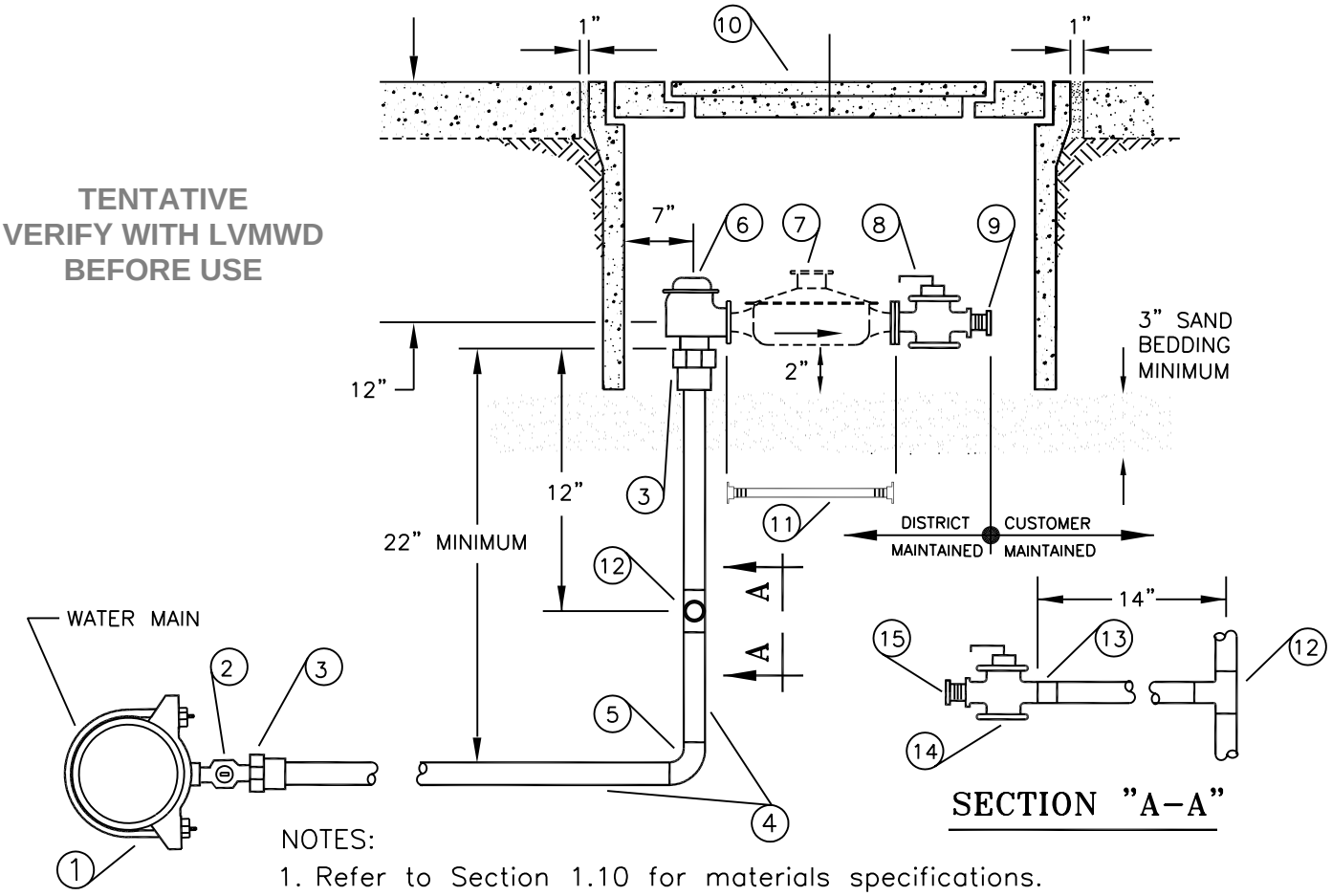
PRINCIPAL ENGINEER — DATE

PW-105

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE



SECTION "A–A"

NOTES:

1. Refer to Section 1.10 for materials specifications.
2. No intermediate joints permitted without approval of LVMWD. Service lines to receive backfill of imported sand within pipe zone (refer to Standard Drawing PW–101 for specifics).
3. Spacer length: 2" meter 2" x 17"
4. Install Detector Check per Standard Drawing PW–109A.

(1) Service Saddle (refer to Standard Drawing PW–120 for connection to steel main).
(2) Corporation Stop (install with key on side and open position, unless otherwise directed).
(3) Adapter
(4) Service Tubing (see Note No. 2).
(5) 90° Ell
(6) Angle Meter Stop Valve
(7) Meter (will be installed by LVMWD).
(8) Customer Handle Valve
(9) Nylon Bushing
(10) Meter Box (refer to Section 1.10–4 and Standard Drawing PW–127 for specifics). ⚠
(11) Meter Spacer (PVC Schedule 80 will be installed by contractor; see Note No. 3).
(12) Copper Tee (2" x 2" x 2")
(13) Copper MIP (2")
(14) Jones J–1900 2" FIP x FIP Tee Head with Lockwing
(15) 2" Brass Plug (see Note No. 4)

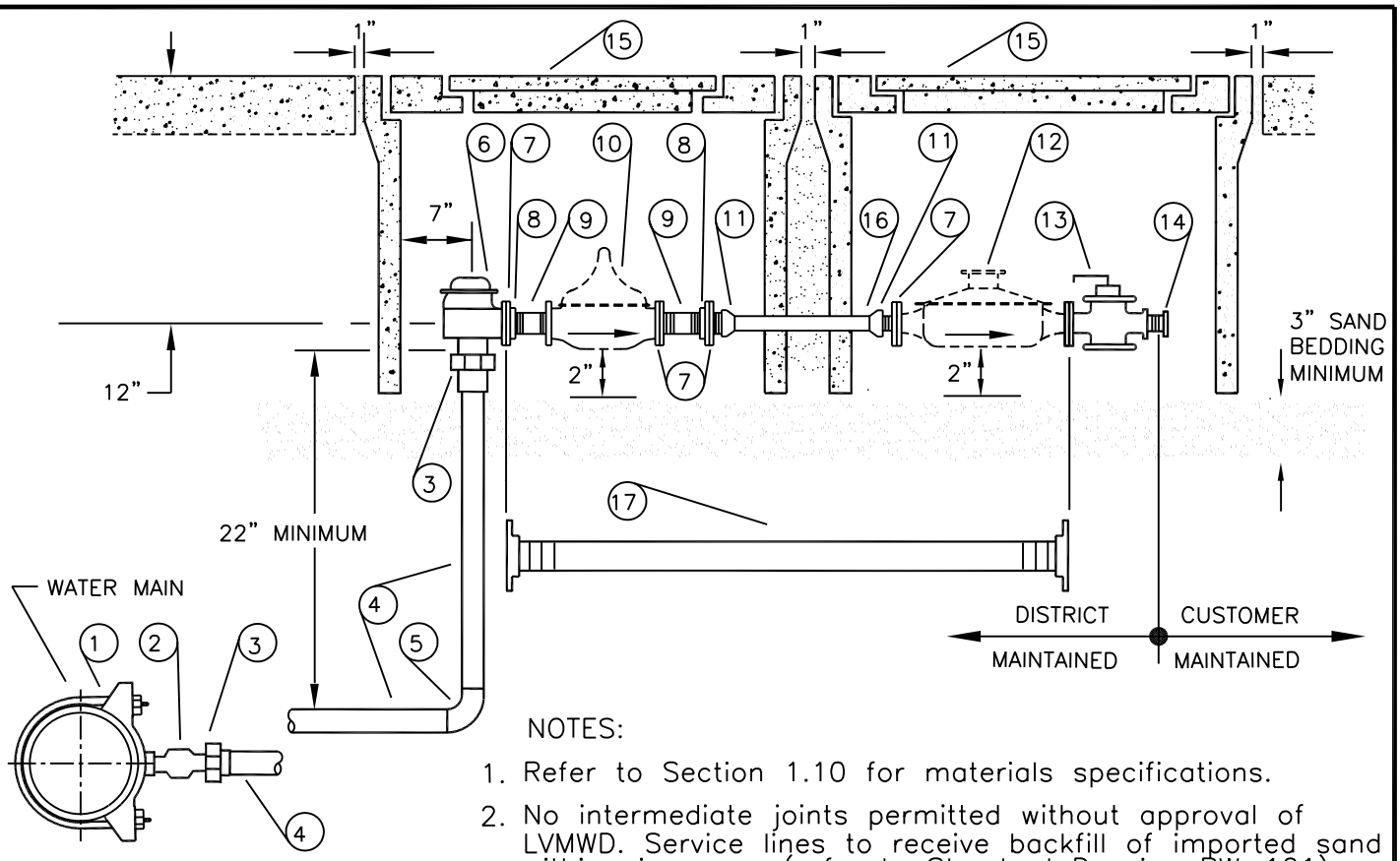
2" WATER METER SERVICE INSTALLATION WITH DETECTOR CHECK OPTION (MAXIMUM WORKING PRESSURE 150 psi)

REVISIONS			
NO.	BY	DATE	APRVD.
⚠	OB	10–1–03	J.V.

ORIGINAL SIGNED BY DAVID R. LIPPMAN
PRINCIPAL ENGINEER

05/08/03
DATE

PW-105A



NOTES:

1. Refer to Section 1.10 for materials specifications.
2. No intermediate joints permitted without approval of LVMWD. Service lines to receive backfill of imported sand within pipe zone (refer to Standard Drawing PW-101).
3. Spacer length: 1-1/2" meter 1-1/2" x 47"
   2" meter 2" x 50"

(1) Service Saddle (refer to Standard Drawing PW-120 for connection to steel main).
(2) Corporation Stop (install with key on side and open position, unless otherwise directed).
(3) Adapter
(4) Service Tubing (see Note No. 2).
(5) 90° Ell
(6) Angle Meter Stop Valve
(7) Meter Flange (will be installed by LVMWD).
(8) Bushing (will be installed by LVMWD).
(9) Nipple (will be installed by LVMWD).
(10) Pressure Regulator (will be installed by LVMWD).
(11) Adapter (will be installed by LVMWD).
(12) Meter (will be installed by LVMWD).
(13) Customer Handle Valve
(14) Nylon Bushing
(15) Meter Box (refer to Section 1.10-4 and Standard Drawing PW-127 for specifics). ⚠1
(16) Service Tubing
(17) Meter Spacer (PVC Schedule 80 will be installed by contractor; see Note No. 3).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

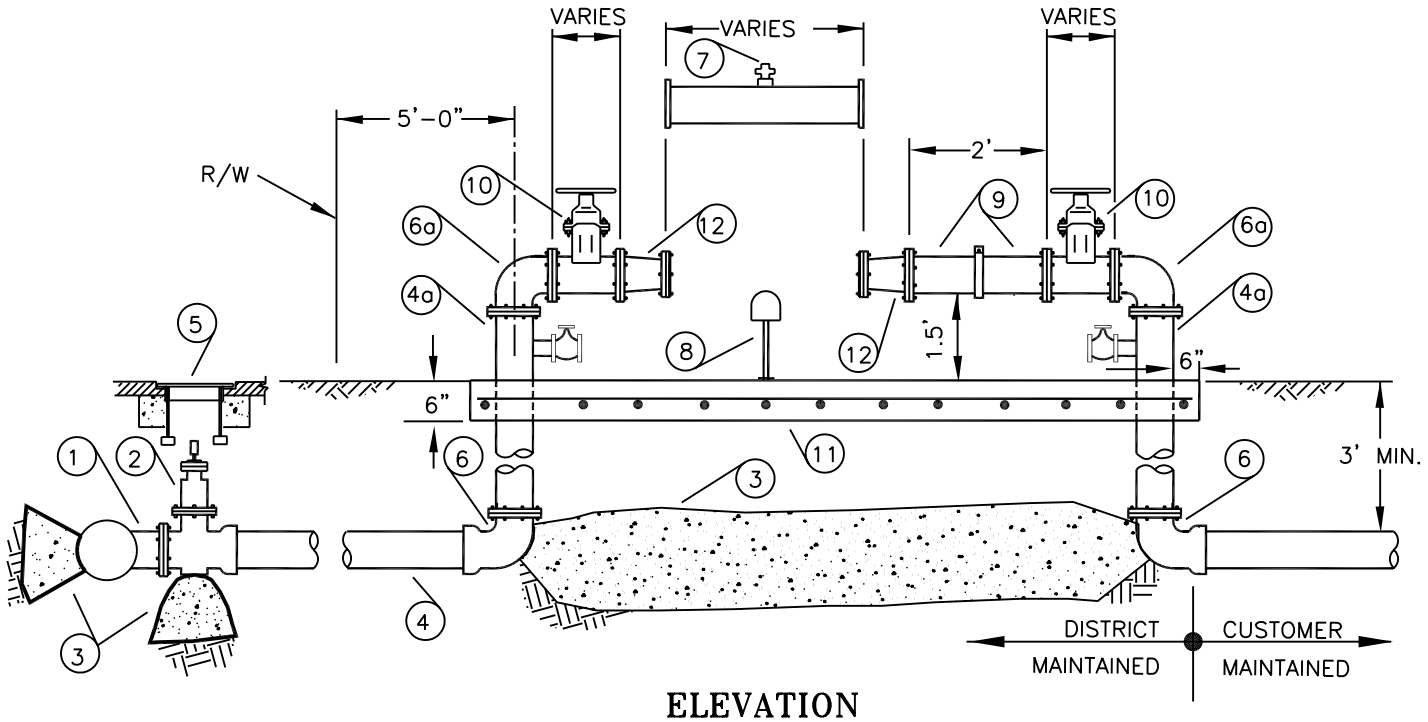
1-1/2" OR 2" WATER METER SERVICE INSTALLATION (MAXIMUM WORKING PRESSURE 151 - 250 psi)

REVISIONS			
NO.	BY	DATE	APRVD.
⚠1	OB	10-1-03	J.V.

ORIGINAL SIGNED BY BRIAN WHITAKER
PRINCIPAL ENGINEER

08/13/-01
DATE

PW-106



ELEVATION

NOTES:

1. Refer to Painting Section for specifics.
2. Spacer to be installed by contractor. Verify spacer dimension with LVMWD representative prior to fabrication.
3. Omit reducers if meter size is 4".

(1) Flanged Outlet (install tee or refer to Standard Drawings PW-131 and PW-140 for specifics).
(2) Valve Flg. x Gt. or Flg x Flg above 200psi (refer to Section 1.5 for specifics).
(3) Thrust Block (refer to Standard Drawing PW-133 for specifics).
(4) Pipe PVC C-900 Cl. 200 or 10ga CM/CL above 200psi.
(4a) Pipe 10ga Steel CM/CL with 2" 3000# half coupling and 2" maleable iron G.V.
(5) Valve Box and Cover (refer to Standard Drawing PW-118 for specifics).
(6) 90° Ell (Cl). Flg. x Gt. or Flg. x Flg. above 200psi.
(6a) 90° Ell (Cl or Steel CML) Flg. x Flg.
(7) 10 ga. CML temporary Steel Spacer with 3/4" steel coupling 3000# (see Note Nos. 1 & 2).
(8) Meter Support (Grinell No. 264)
(9) Pipe (Schedule 40 Steel CML pipe-flange x groove with Victaulic Coupling Style 77. See Note No. 1).
(10) Gate valve with Hand Wheels.
(11) Support Pad (with #4 rebar 8" on center)
(12) 4" x 3" Reducers (Cl, Dl or Steel CML. See Note No. 3).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

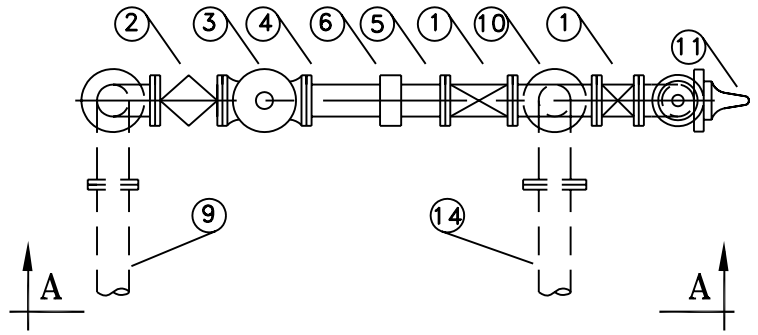
3" to 8" WATER METER SERVICE INSTALLATION (ABOVE GROUND) (MAXIMUM WORKING PRESSURE 150 psi)

REVISIONS			
NO.	BY	DATE	APRVD.

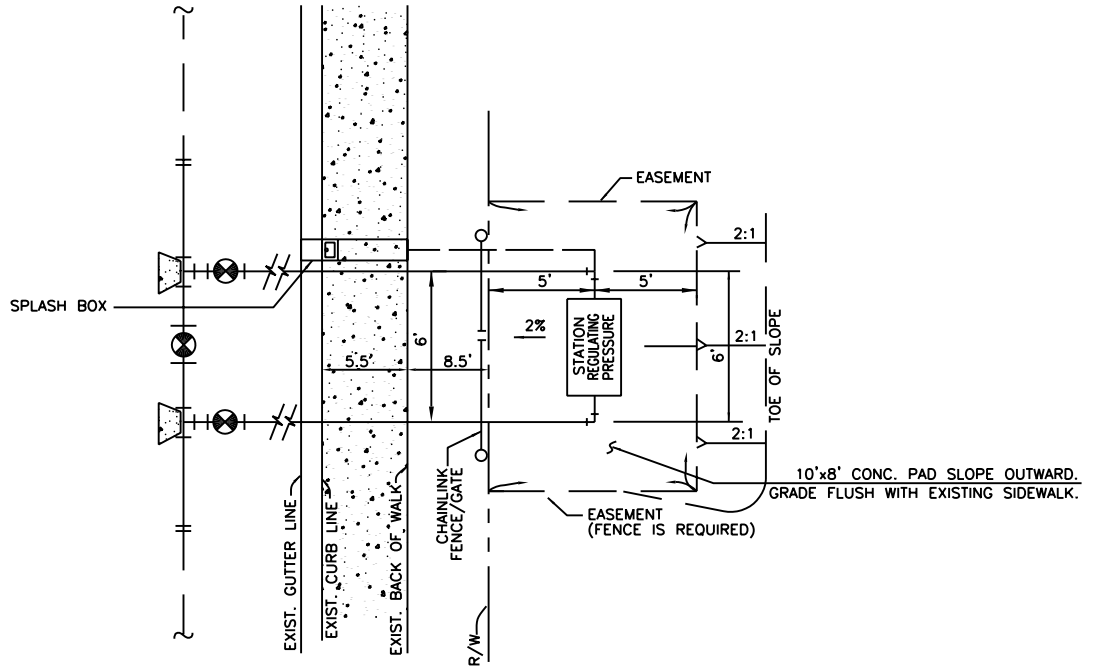
ORIGINAL SIGNED BY BRIAN WHITAKER
PRINCIPAL ENGINEER

08/13/-01
DATE

PW-107



PLAN VIEW
N.T.S.

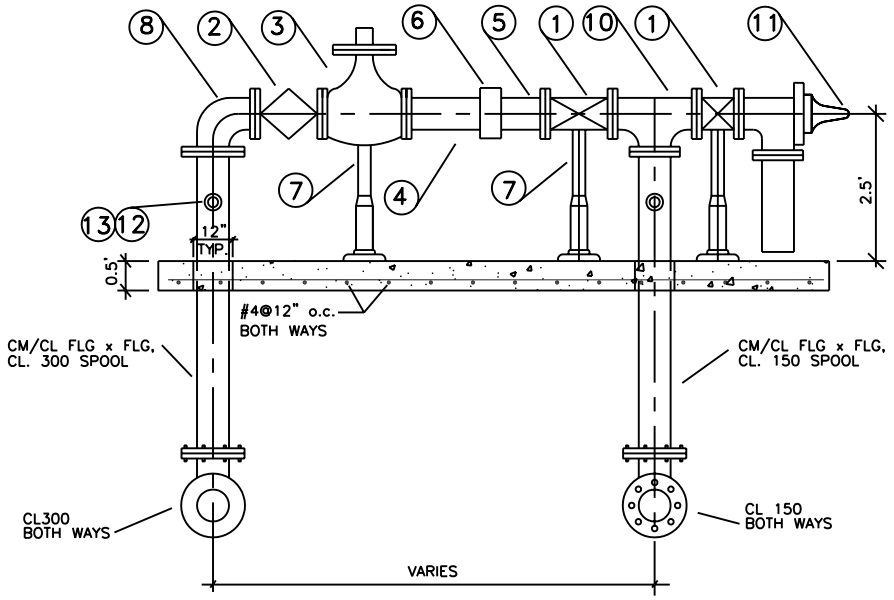


PRESSURE REGULATING STATION PLAN (1)
N.T.S.

PRESSURE REGULATING ASSEMBLY

1. GATE VALVE PER L.V.M.W.D. STD. SPECS. (150 p.s.i.) (FLAT FACE, HAND WHEEL).
2. PLUG VALVE, ROCKWELL FLG. 305 (400 p.s.i.) (WITH HAND WHEEL).
3. PRESSURE REDUCING VALVE, 90G-01 ABSKCX (S.S. TRIM), (WITH BRONZE DISC RETAINER AND DIAPHRAGM WASHER, 250 p.s.i.).
4. SCHEDULE 40 STEEL PIPE (CML) WITH FLANGE TO MATCH VALVE ON ONE END AND MILLED FOR VICTAULIC COUPLING STYLE 77 ON OTHER END.
5. SCHEDULE 40 STEEL PIPE (CML) WITH FLANGE TO MATCH VALVE ON ONE END AND MILLED FOR VICTAULIC COUPLING STYLE 77 ON OTHER END. THIS PIECE CAN BE WELDED IN FIELD AND FIELD COATED.
6. VICTAULIC STANDARD COUPLINGS, STYLE 77.
7. ADJUSTABLE PIPE SUPPORT; GRINNEL No. 264.
8. 90° ELBOW FLG'D CML/CMC, OR CAST IRON 250 CL.
9. CMC/CML 12 GA STEEL PIPE.
10. FLANGED STEEL TEE OR C.I. CL. 250.
11. PRESSURE RELIEF VALVE CLA-VAL No. 50A-01 ABKCX (S.S. TRIM ANGLE VALVE) WITH BRONZE DISC RETAINER AND DIAPHRAGM WASHER.
12. 2" WELD-ON COUPLING (HALF COUPLINGS, HEAVY DUTY). VARIES WITH DIFFERENT SIZE OF BY-PASS.
13. 2 - 2" STEEL PLUGS. VARIES WITH DIFFERENT SIZE OF BY-PASS.
14. PVC PIPE.

NOTE: P.R. STATION/SIZING/STAGING IS THE SUBJECT TO DISTRICT REVIEW. MULTIPLE STAGE DESIGN TO BE COORDINATED WITH THE DISTRICT.



SECTION "A - A"
N.T.S.

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

DIMENSION	GENERIC PART NAME	PART DESCRIPTION	PRESSURE RATING [psi]	LENGTH OF THE PARTS (INCHES)				
				4"	6"	8"	10"	12"
A	90° Elbow	Centerline of pipe (high pressure side) to edge of flange	250	6.50	8.00	9.00	11.00	12.00
B	Plug Valve	Rockwell Fig. 1489 or equal (worm gear operated)	800		13.00	14.25	16.75	17.50
C	Pressure Reducing Valve	Cla-val Model 90G-01 or equal	400	15.62	21.00	26.38	31.12	35.50
D	Gate Valve	Resilient Seat, per LVMWD Specs.	200	9.00	10.50	11.50	13.00	14.00
E	Tee	Outside Edge of Flange to Center line Half of Main Run dimension	250	6.50	8.00	9.00	11.00	12.00
F		Theoretical length of spool (shipped plain end, cut to fit)	250	23.88	23.50	25.87	25.13	29.00
Total Length (inches)				61.500	84.00	96.00	108.00	120.00
Total Length (feet)				5.125	7.000	8.000	9.000	10.000

SINGLE STAGE PRESSURE REGULATION STATION

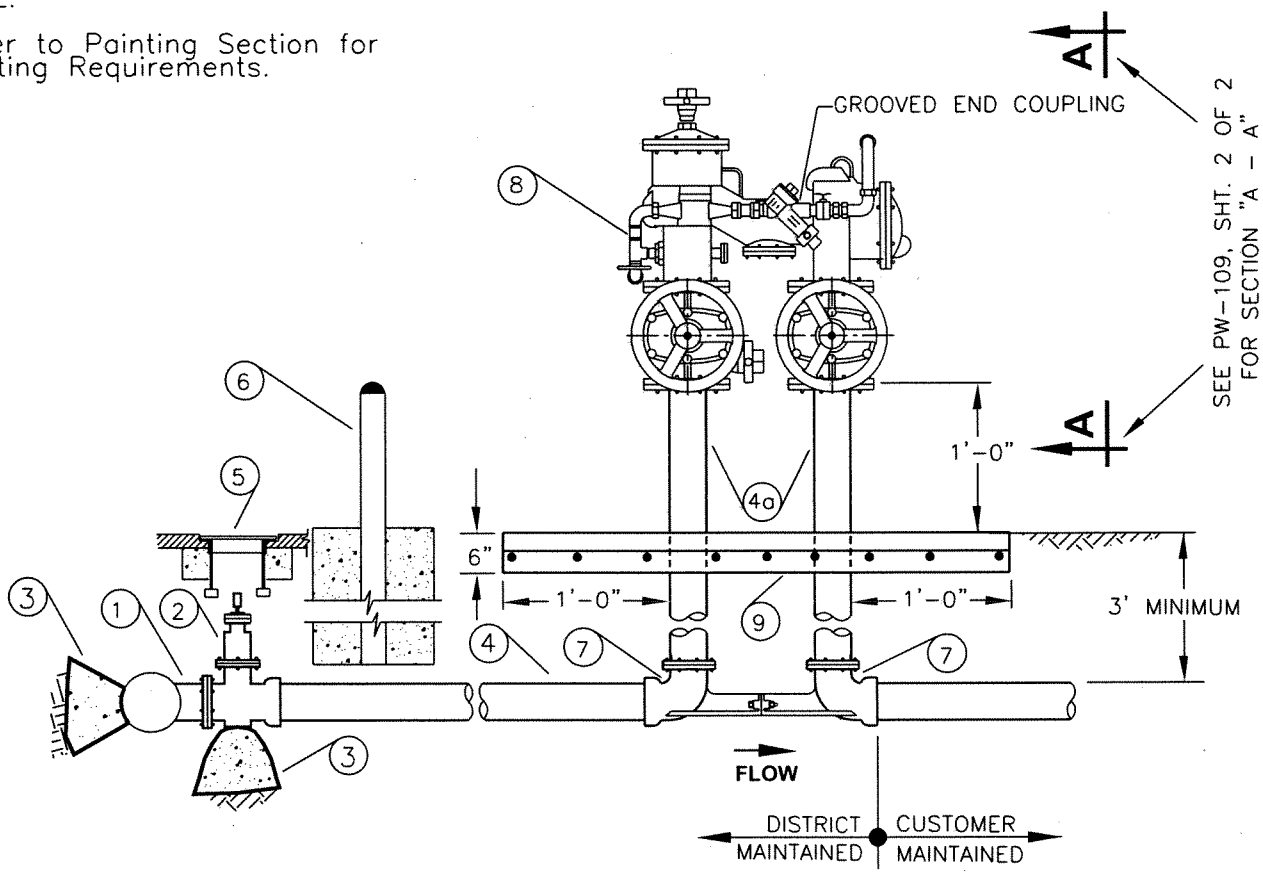
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-108

NOTE:

1. Refer to Painting Section for Coating Requirements.



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

ELEVATION

(1) Flanged Outlet (install tee or refer to Standard Drawings PW-131 and PW-140 for specifics).

(2) Valve Flg. x Gt. or Flg. x Flg. above 200 psi (refer to Section 1.5 for specifics). (4" minimum)

(3) Thrust Block (refer to Standard Drawing PW-133 for specifics).

(4) Pipe PVC C-900, D.I. - AWWA C151 (use 10ga Steel CMC/CML for 200psi and higher; piping to be 4" minimum).

(4a) Pipe C.I. or 10ga Steel CMC/CML.

(5) Valve Box and Cover (refer to Standard Drawing PW-118 for specifics).

(6) Guard Post (refer to Standard Drawing PW-130 for specifics).

(7) FEBCO Valve Setter Model 611 Flange x Flange

(8) FEBCO Backflow Prevention Model 876V Double Check Valve Detector

(9) Support Pad (with #4 rebar 8" on center)

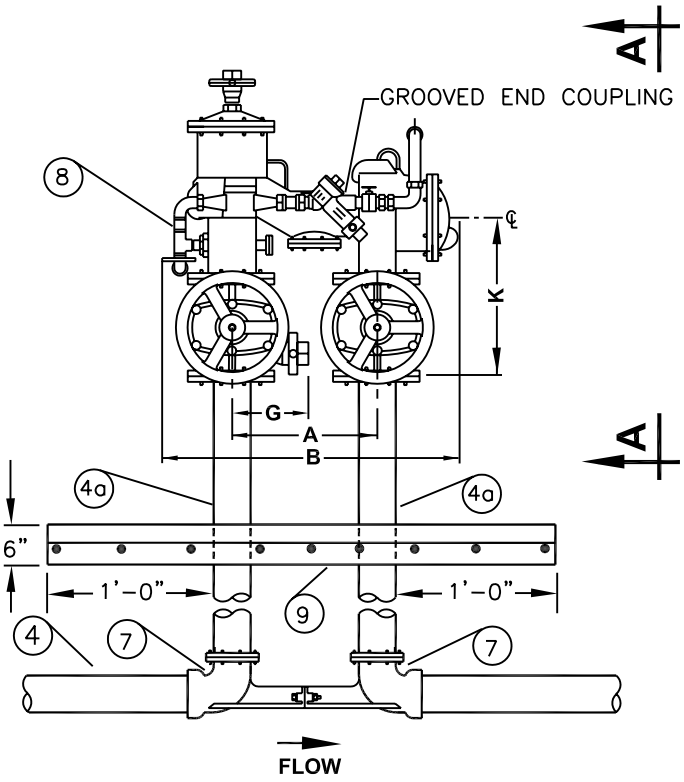
4" to 10" DETECTOR CHECK INSTALLATION (ABOVE GROUND)

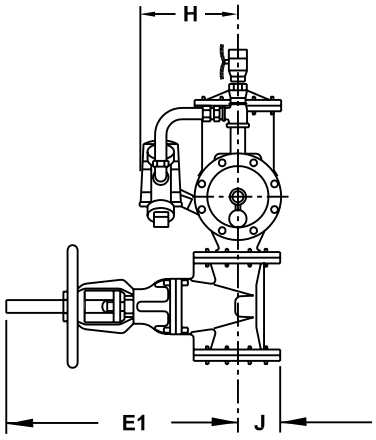
REVISIONS			
NO.	BY	DATE	APRVD.
1	O.B.	08-06/2001	B.W.
2	O.B.	12-07/2004	

/S/ BRIAN WHITAKER
PRINCIPAL ENGINEER

06-04/2001
DATE

PW-109
1 OF 2





SECTION "A -A"

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

DIMENSIONS

DATA PER MANUFACTURE CATALOG
CONFIRM WITH MANUFACTURE FOR FINAL DIMENSIONS FOR INSTALLATION

Size (Inches)	A (Inches)	B (Inches)	C (Inches)	E1 OS&Y Open (Inches)	F (Inches)	G (Inches)	H (Inches)	J (Inches)	K (Inches)	M (Inches)	Net. OS&Y (Lbs)
4	14	27-7/8	26-3/4	23-1/4	17-3/4	7	13	4-1/2	15-1/2	31	330
6	16	32-1/4	32-1/4	30-1/8	21-5/8	8	13	5-1/2	18-5/8	37-1/4	520
8	18-1/2	37-1/2	36-3/8	37-3/4	24-3/4	9-1/4	14-1/2	6-3/4	20-3/4	41-1/2	860
10	21	42-1/2	40-3/4	48	27-1/2	10	15	8	24	48	1460

4" to 10" DETECTOR CHECK INSTALLATION (ABOVE GROUND)

REVISIONS			
NO.	BY	DATE	APRVD.
1	O.B.	12-07/2004	

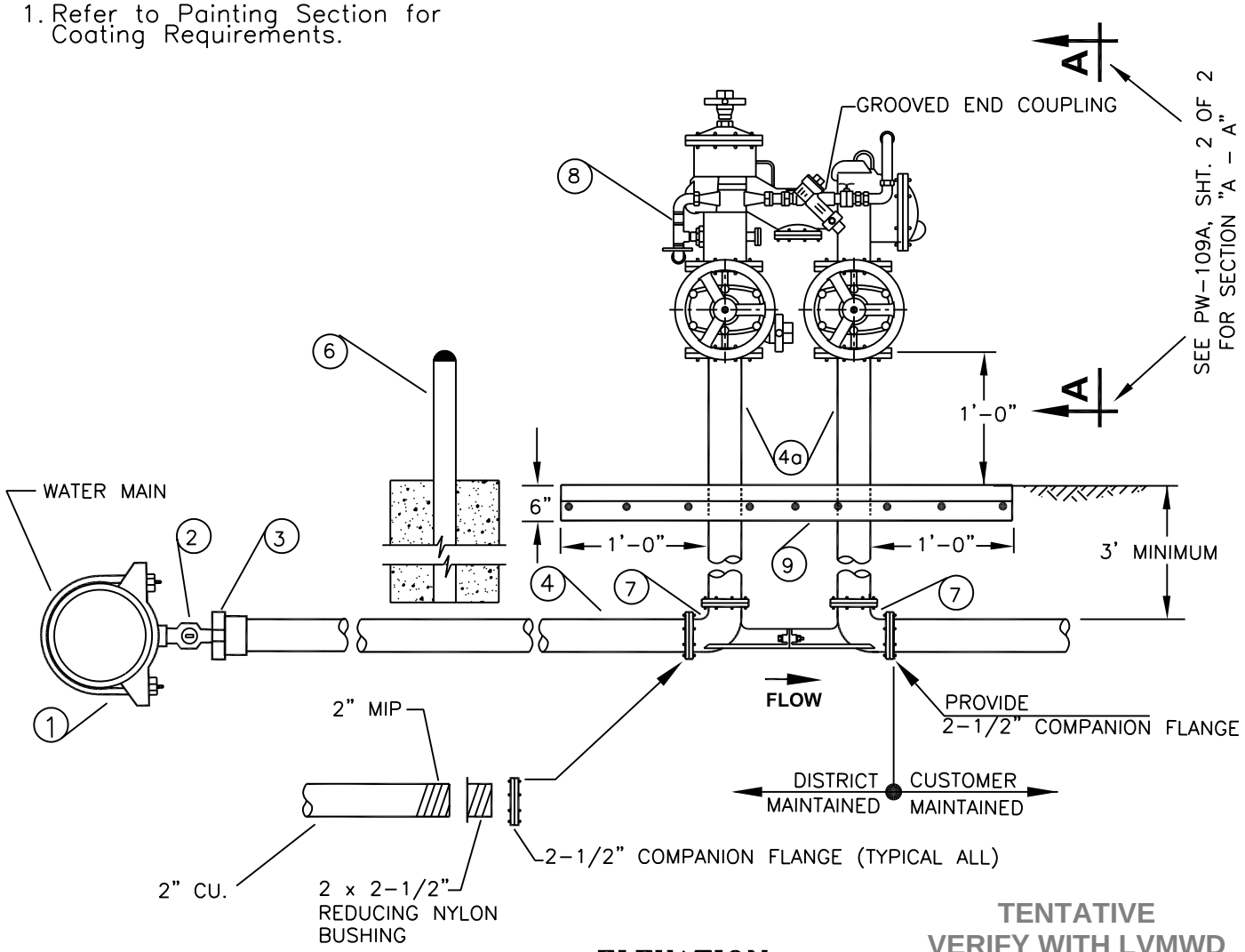
/S/ BRIAN WHITAKER
PRINCIPAL ENGINEER

06-05/2001
DATE

PW-109

NOTE:

1. Refer to Painting Section for Coating Requirements.



ELEVATION

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

(1) Service Saddle (refer to Standard Drawing PW-120 for connection to steel main).
(2) 2" Corporation Stop (install with key on side and open position, unless otherwise directed).
(3) Adapter
(4) 2" Copper Tubing Type K
(4a) Pipe 2-1/2" Type L Copper w/MIP's and Brass Companion Flange.
(6) Guard Post (refer to Standard Drawing PW-130 for specifics) if needed.
(7) FEBCO Valve Setter Model 611 Flange x Flange.
(8) FEBCO Backflow Prevention Model 876V Double Check Valve Detector
(9) Concrete Support Pad (with 6" x 6" Wire Mesh).

2-1/2" DETECTOR CHECK

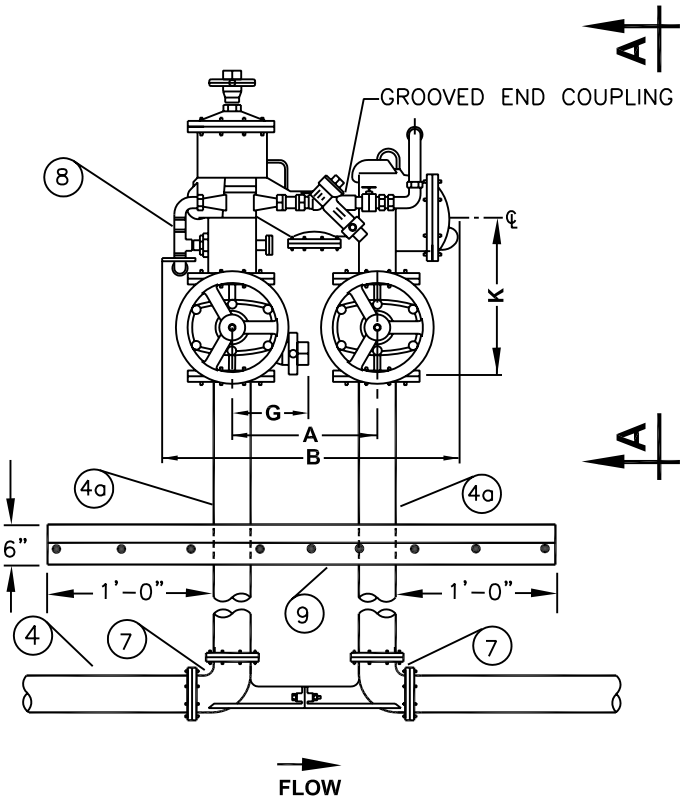
REVISIONS			
NO.	BY	DATE	APRVD.
1	O.B.	12-07/2004	

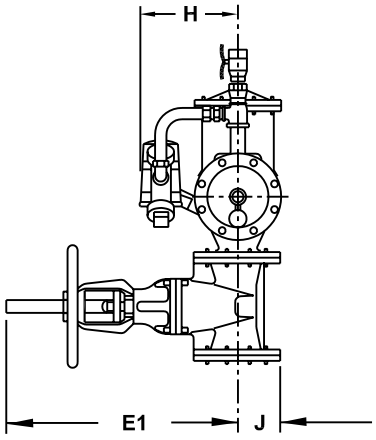
/S/ DAVID R. LIPPMAN
DIRECTOR OF FACILITIES AND OPERATIONS

01-26/05
DATE

PW-109A

1 OF 2





SECTION "A -A"

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

DIMENSIONS

DATA PER MANUFACTURE CATALOG
CONFIRM WITH MANUFACTURE FOR FINAL DIMENSIONS FOR INSTALLATION

Size (Inches)	A (Inches)	B (Inches)	C (Inches)	E1 OS&Y Open (Inches)	F (Inches)	G (Inches)	H (Inches)	J (Inches)	K (Inches)	M (Inches)	Net. OS&Y (Lbs)
2-1/2	12-1/2	25-3/4	24-1/4	16-3/8	16-5/8	6-1/4	11-1/2	3-1/2	15-5/8	27-1/4	230

2-1/2" DETECTOR CHECK INSTALLATION (ABOVE GROUND)

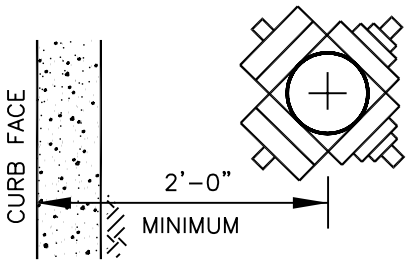
REVISIONS			
NO.	BY	DATE	APRVD.
1	O.B.	12-07/2004	

/S/DAVID R. LIPPMAN
DIRECTOR OF FACILITIES AND OPERATIONS

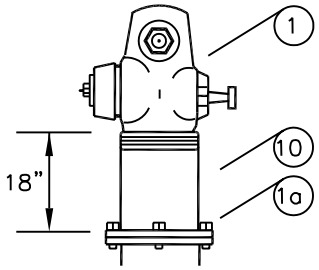
01-26/05
DATE

PW-109A

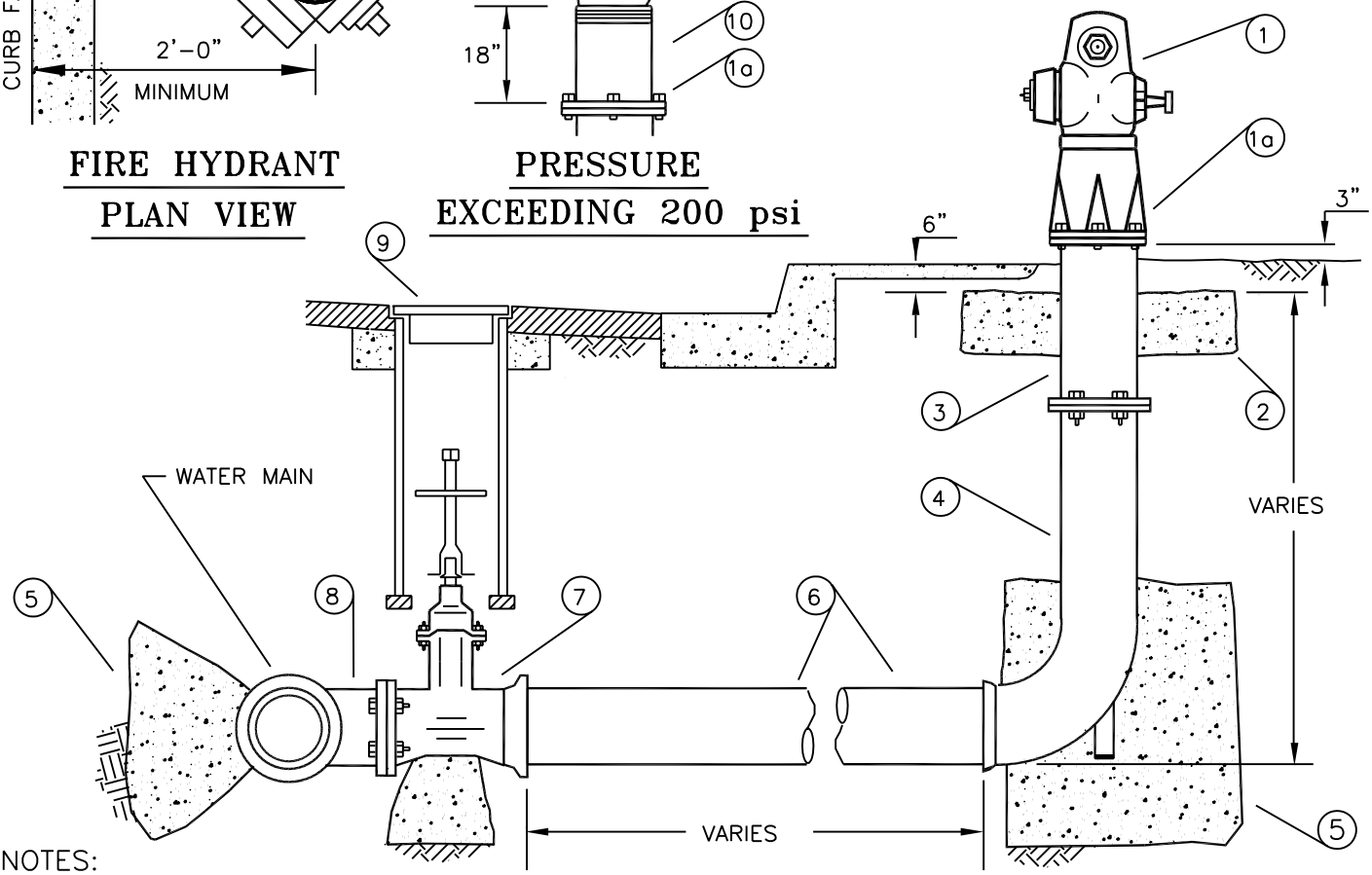
2 OF 2



FIRE HYDRANT
PLAN VIEW



PRESSURE
EXCEEDING 200 psi



NOTES:

1. For static pressures below 200 psi, PVC pipe with CI, DI or steel CML/CMC fittings shall be used.
2. For static pressures exceeding 200 psi, 10 ga. steel pipe and fittings CML/CMC shall be used.
3. Refer to Painting Section for specifics.

(1) Fire Hydrant Assembly (refer to Section 1.10 and Standard Drawing PW-127 for location specifics).
(1a) Shear Bolts and Companion Flange
(2) Concrete Support Block (6" x 24" x24")
(3) Hydrant Extension
(4) Fire Hydrant Bury
(5) Thrust Block (refer to Standard Drawing PW-133 for specifics).
(6) Pipe (see Note Nos. 1 and 2).
(7) Valve (refer to Section 1.5 and Standard Drawing PW-117 for specifics).
(8) Flange Outlet (see Note Nos. 1 and 2, and Standard Drawings PW-131 and PW-140 for specifics).
(9) Valve Box and Cover (refer to Standard Drawing PW-118 for specifics).
(10) Steel Spool, flange x thread

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

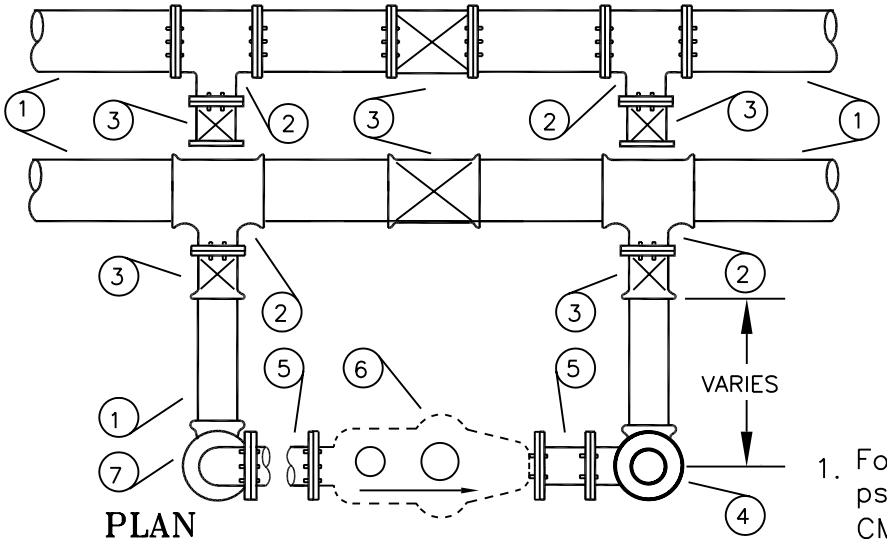
FIRE HYDRANT INSTALLATION

REVISIONS			
NO.	BY	DATE	APRVD.

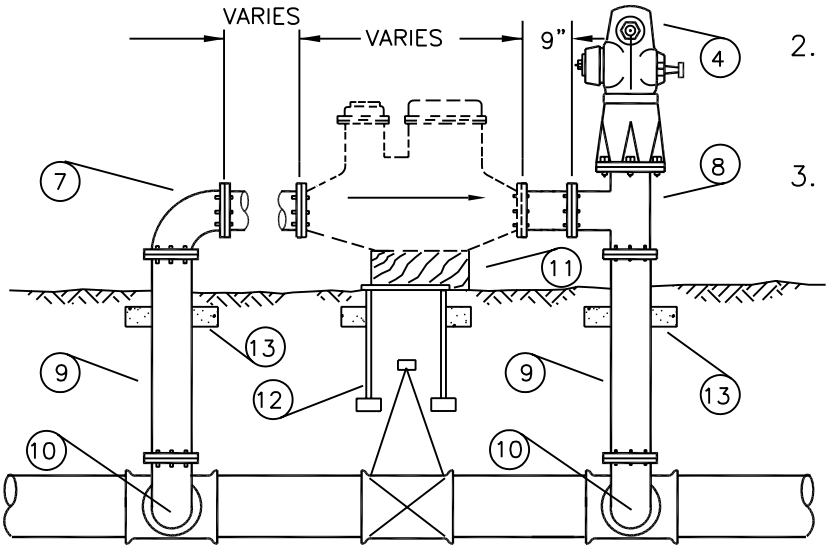
DIRECTOR OF FACILITIES AND OPERATIONS

DATE

PW-110



PLAN



ELEVATION

STEEL PIPE

PVC PIPE

NOTES:

1. For static pressures below 200 psi, PVC pipe with CI, DI or steel CML/CMC fittings shall be used.
2. For static pressures exceeding 200 psi, 10 ga. steel pipe and fittings CML/CMC shall be used.
3. Refer to Painting Section for specifics.

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

(1) Pipe (see Note Nos. 1 and 2).
(2) Tee (see Note Nos. 1 and 2, and Standard Drawings PW–131 and PW–140 for specifics).
(3) Valve (refer to Section 1.5 specifics).
(4) Fire Hydrant Assembly (refer to Section 1.10, Standard Drawing PW–127 for specifics).
(5) Pipe (10ga steel pipe CML/CMC, ship flanges loose, allow extra length for cut and fit).
(6) Master Meter (contractor to install spacer only, LVMWD will install meter).
(7) 90° Ell
(8) Tee
(9) Extension varies
(10) 90° Elbow varies to Master Meter size
(11) Temporary Redwood Block
(12) Valve Box and Cover (refer to Standard Drawing PW–118 for specifics).
(13) Support Block (6" x 24" x 24").

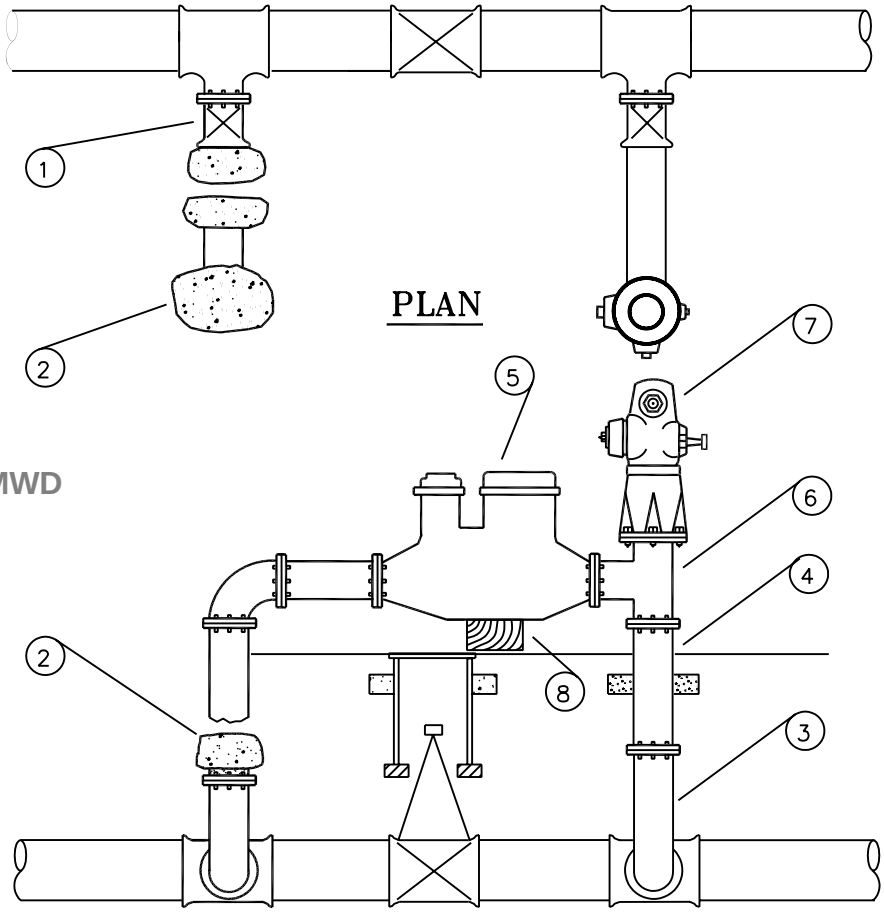
MASTER METER PIPING INSTALLATION

REVISIONS			
NO.	BY	DATE	APRVD.

DIRECTOR OF FACILITIES AND OPERATIONS

DATE

PW-111



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Close valve down and up stream of meter. Remove valve stack & cap of valve to be abandoned. If valve is flange x flange, install blind flange. Clean and re-coat valve body per Painting Section.
2. Plug valve and open end of pipe to be abandoned with concrete.
3. Contractor to re-install Fire Hydrant assembly (per Standard Drawing PW-110 for specifics).
4. Cut Pipe 12" below finish surface and fill pipe with concrete slurry.

(1) Valve (see Note No. 1).
(2) Plug (see Note Nos. 2 and 4).
(3) 90° Ell
(4) Hydrant Extension
(5) Master Meter (to be removed by LVMWD).
(6) Tee to be removed
(7) Fire Hydrant Assembly (see Note No.3).
(8) Temporary Redwood Block

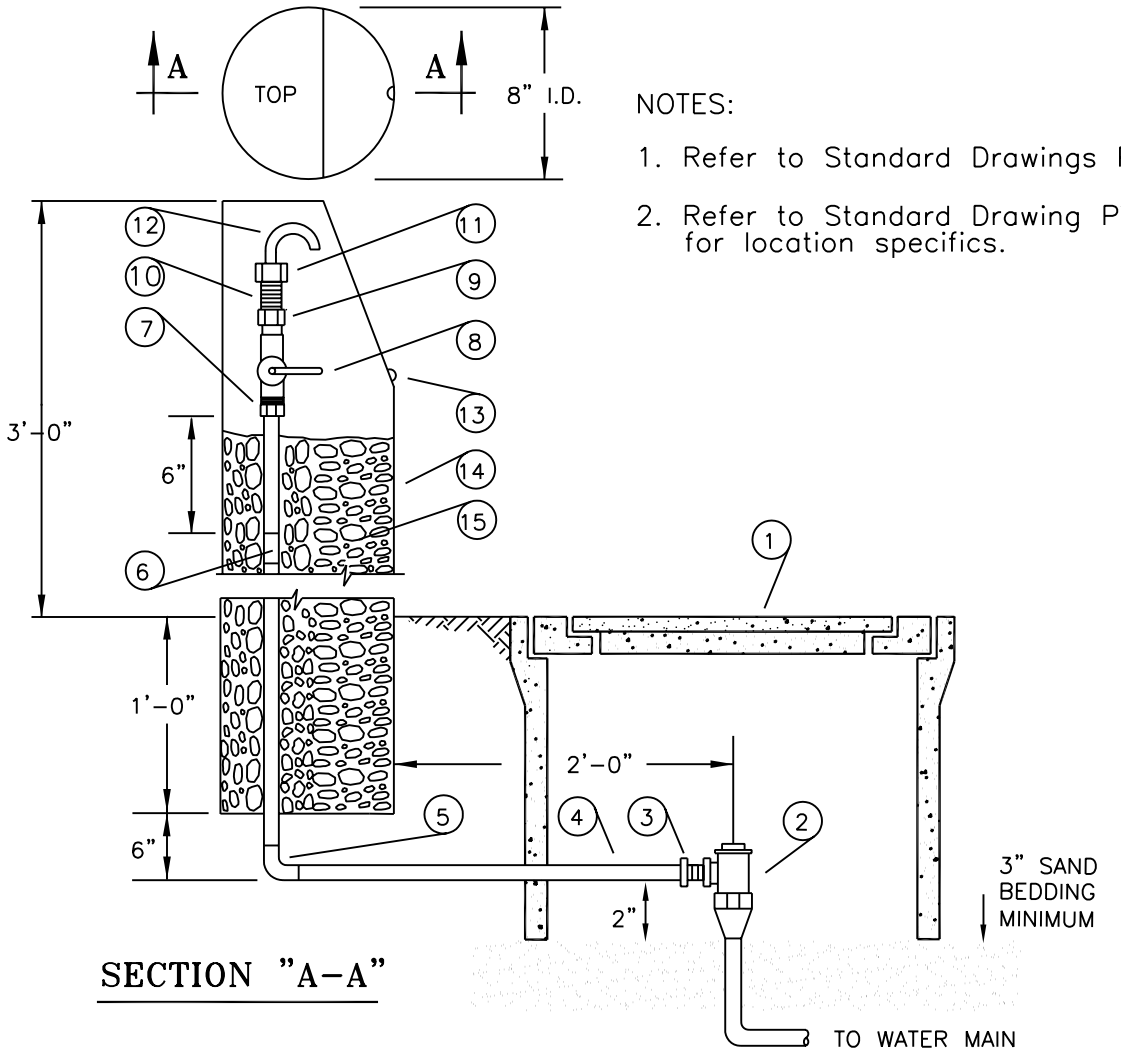
MASTER METER PIPING REMOVAL

REVISIONS			
NO.	BY	DATE	APRVD.

DIRECTOR OF FACILITIES AND OPERATIONS

DATE

PW-112



SECTION "A-A"

NOTES:

1. Refer to Standard Drawings PW-103
2. Refer to Standard Drawing PW-127 for location specifics.

1. Meter Box (refer to Section 1.10-4 and Standard Drawing PW-127 for specifics). ⚠1
2. Angle Meter Stop Valve (see Note No. 1).
3. Adapter (1" x 1")
4. Copper Tubing (see Note No. 1).
5. 90° Ell
6. Reducer (1" x 1/2")
7. Adapter (1/2")
8. Valve (1/2")
9. Bushing (1/2")
10. Nipple (3/8")
11. Flare Nipple (3/8")
12. CopperTubing (3/8" x 6")
13. Lock (Standard Key)
14. Sample Station Housing (Koraleen Enterprises; See Note No. 2).
15. Rock (3/4")

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

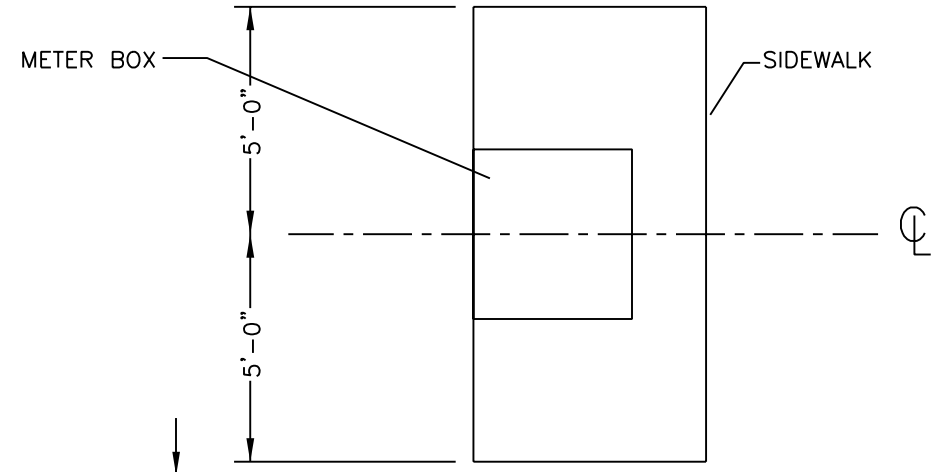
1" WATER SAMPLING STATION

REVISIONS			
NO.	BY	DATE	APRVD.
⚠1	OB	10-1-03	J.V.

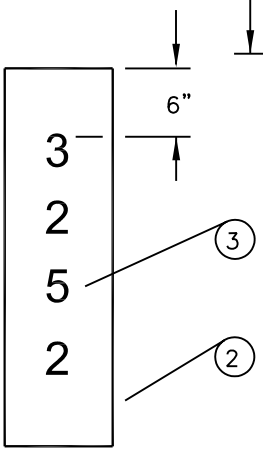
DIRECTOR OF FACILITIES AND OPERATIONS

DATE

PW-113

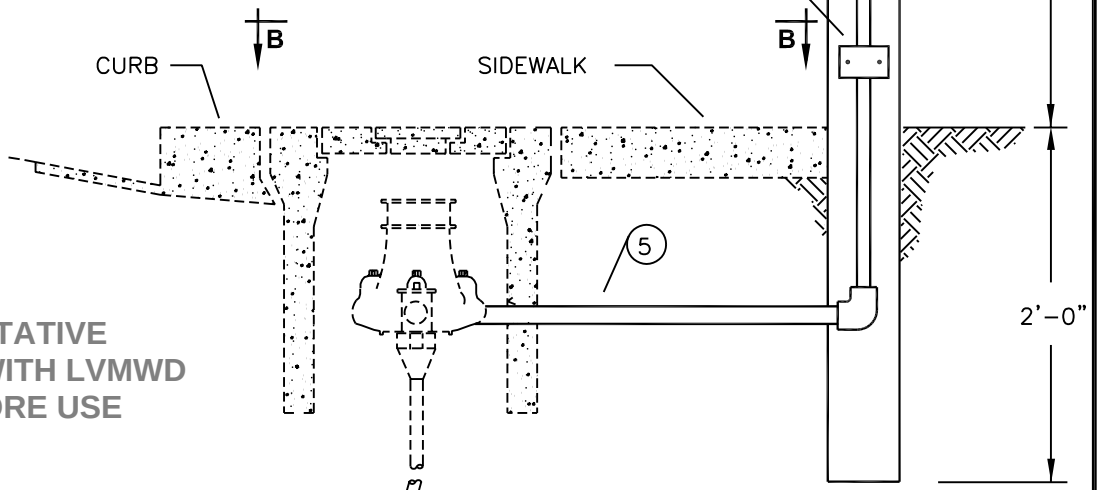


PLAN VIEW "B - B"

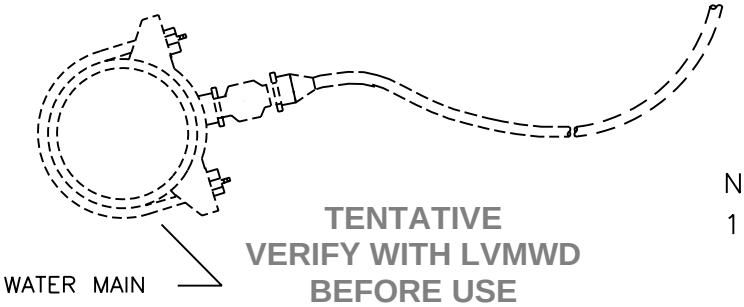


DETAIL "A"

SEE DETAIL "A"



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. For connection to meter, refer to Standard Drawings PW-103 through PW-106 for specifics.

(1) Hose Bib with anti-siphon on outlet

(2) Redwood Post (4"x 4" x 6').

(3) Lot Number/Address 2" high metal number (see detail "A" above).

(4) Pipe strap

(5) Customer Service Line

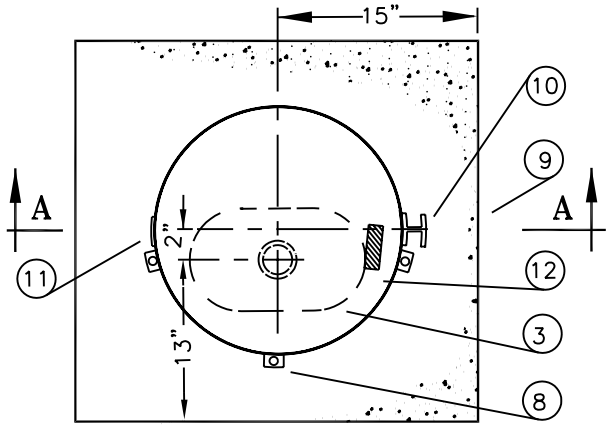
TEMPORARY RISER AND HOSE BIB

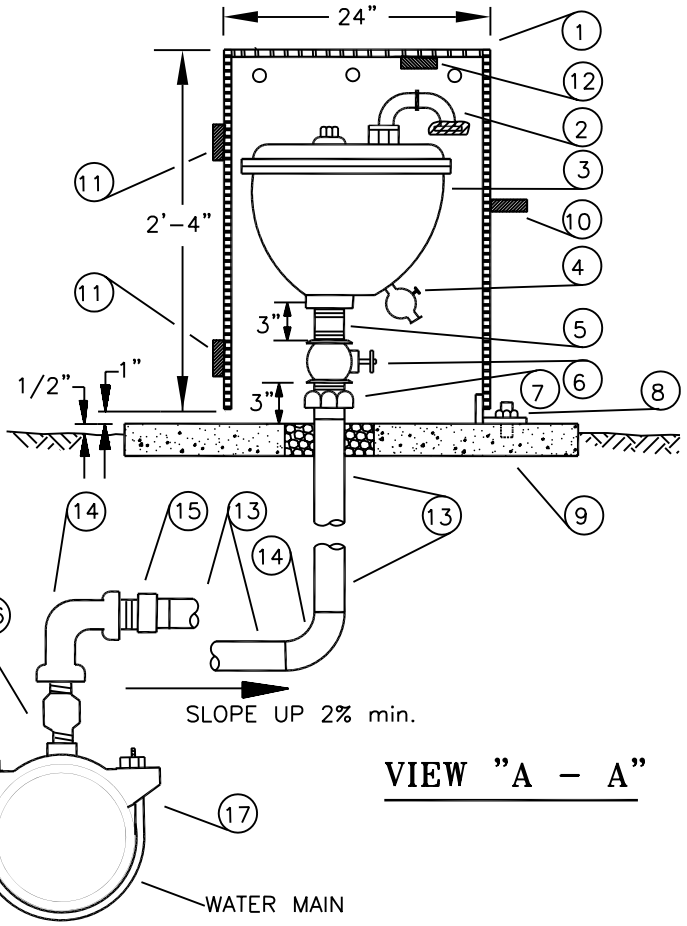
REVISIONS			
NO.	BY	DATE	APRVD.

DIRECTOR OF FACILITIES AND OPERATIONS

DATE

PW-114





VIEW "A - A"

NOTES:

1. (6)-1"ø holes equally spaced. Galvanize all steel parts after fabrication. Refer to Painting Section for specifics.
2. 6" x 30" x 30" with a 6"ø hole filled with 3/4" crushed rock.
3. 1-1/2" x 1-1/2" x 1/4" thick x 2" long angle steel, with 3/8" hole. Center 1" from top of can on side opposite hinges & weld (1) to each pipe half can.
4. No intermediate joints permitted without approval of LVMWD. Service lines to receive backfill of imported sand within pipe zone (refer to Standard Drawing PW-101).

(1) 24"ø-1/4" Steel Plate (refer to Standard Drawing PW-128 for location specifics; see Note No. 1).
(2) 90° Street Ell with Screen (2-required)
(3) Combination Air Release & Vacuum Valve (refer to Section 1.10 for specifics).
(4) Test Drain Valve (1-1/2" x 3/4")
(5) Close Nipple
(6) Valve (nonrising Jones J-372)
(7) Adapter
(8) Anchor Bolts & Angle Strip (3/8" cinch anchor bolts, 3-required).
(9) Concrete Pad (see Note No. 2).
(10) Padlock Bracket (2-required; see Note 3).
(11) Heavy Duty Hinges (4-1/2" x 4-1/2" Stanley heavy duty)
(12) Support Strip (6" x 1" x 1-1/4" steel strip)
(13) Service Tubing (refer to Section 1.10 and Note No. 4).
(14) 90° Ell
(15) Adapter
(16) Corporation Stop (refer to Section 1.10 for specifics).
(17) Service Saddle (refer to Section 1.10 and Standard Drawing PW-120 for connection to steel main).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

2" AIR AND VACUUM VALVE FOR 6" - 18" MAINS

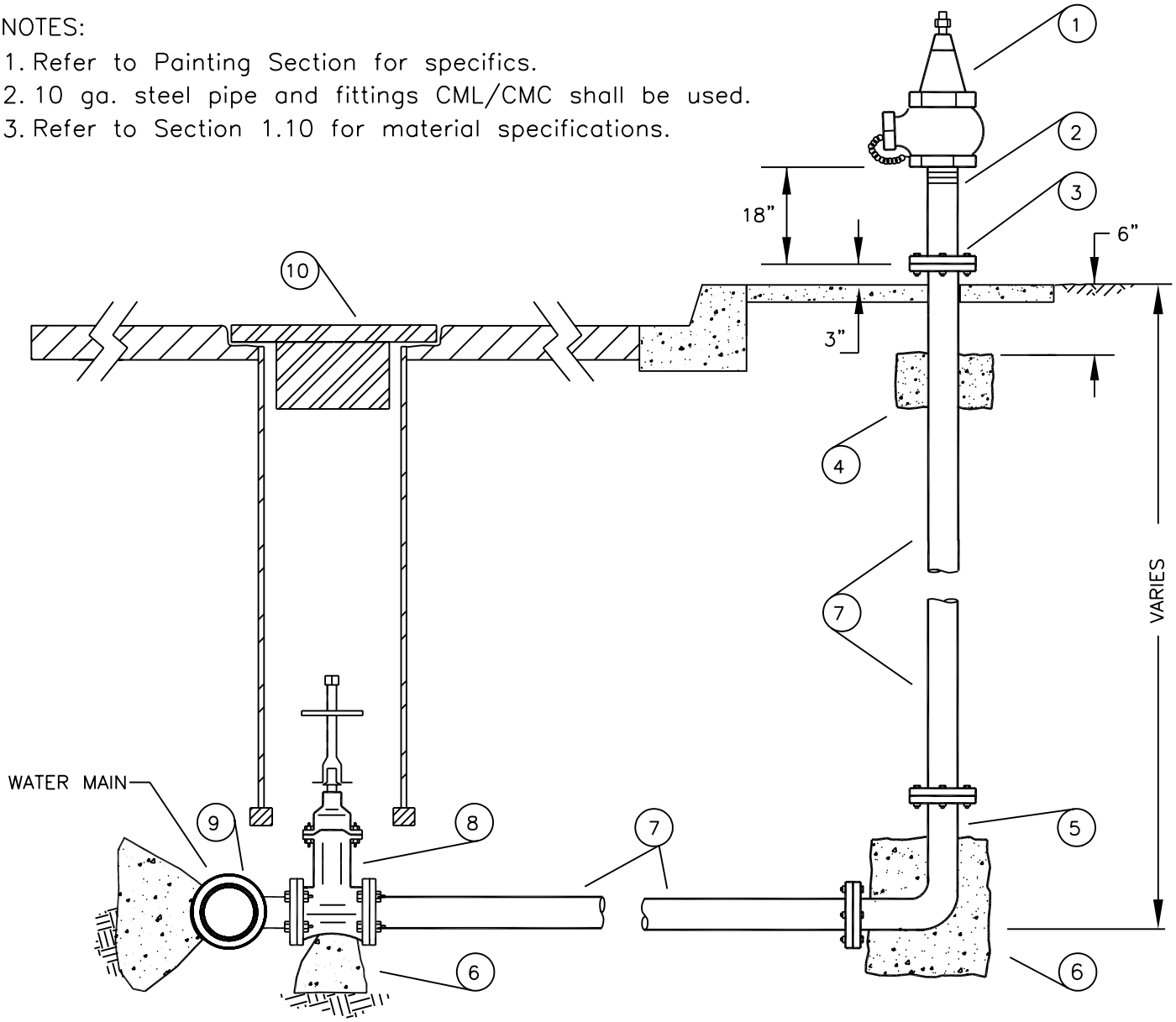
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-115

NOTES:

1. Refer to Painting Section for specifics.
2. 10 ga. steel pipe and fittings CML/CMC shall be used.
3. Refer to Section 1.10 for material specifications.



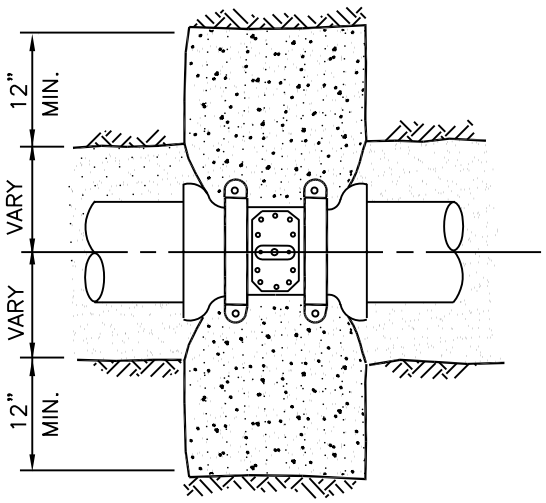
1. 4" Angle Fire Hydrant Valve J-344HP (see Note No. 1; refer to Standard Dawing PW-127 for location specifics).
2. 4" Nipple (Steel CML) or Spool Flg x Thread.
3. Shear Bolts and Companion Flange
4. Concrete Support Block (6" x 24" x 24")
5. 90° Ell
6. Thrust Block (refer to Standard Drawing PW-133 for specifics).
7. Pipe (see Note No. 2).
8. 4" Valve (refer to Section 1.5 for specifics).
9. Flange Outlet (install tee or refer to Standard Drawings PW-131 and PW-140 for specifics).
10. Valve Box and Cover (refer to Standard Drawing PW-118 for specifics).

4" CLASS 200 OR 400 BLOW-OFF INSTALLATION

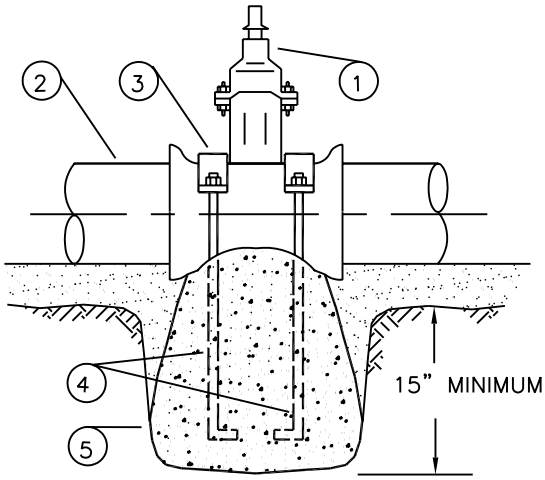
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-116



PLAN



ELEVATION

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. This Drawing to be used with Push on and Resilient Wedge Valves only.
2. Butterfly valves require special valve restraint design.
3. Straps to be 3/8" x 2" with 5/8" anchor bolts. Bolts to extend depth of block. Coat exposed metal with Sanchem (no-oxide). Refer to Section 1.9 for specifics.

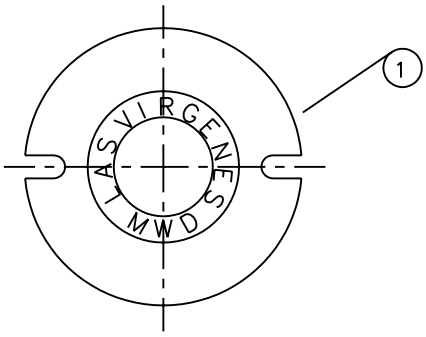
(1) Valve (refer to Section 1.5, Standard Drawings PW-118 and PW-133 for specifics).
(2) Main
(3) Straps (see Note No. 2).
(4) Bolt (see Note No. 3).
(5) Concrete

VALVE RESTRAINT INSTALLATION

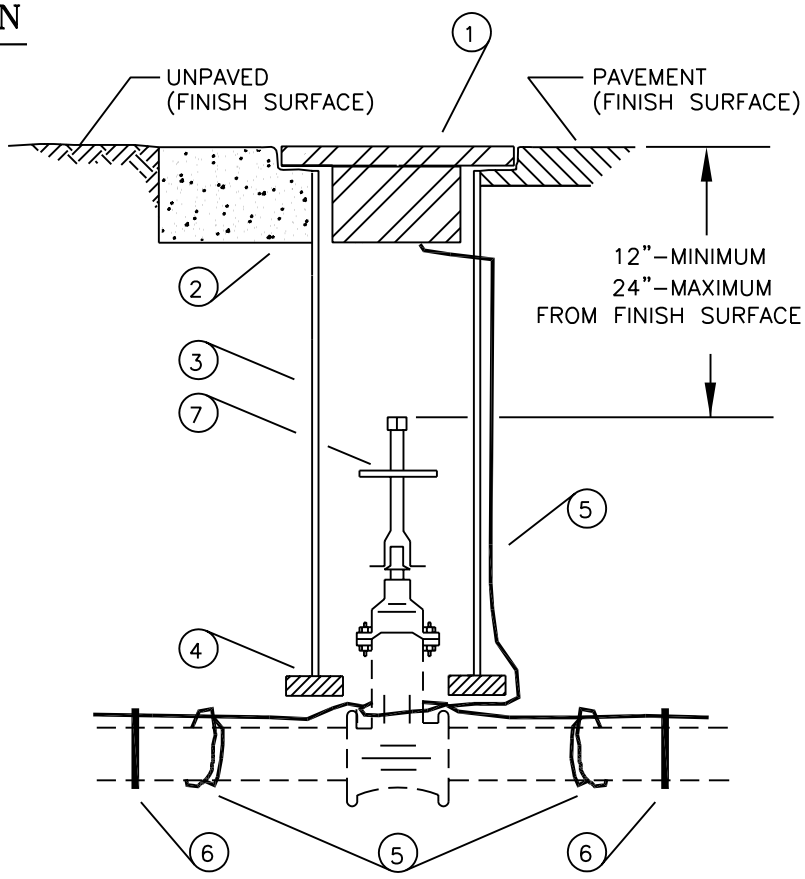
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-117



TYPICAL IDENTIFICATION



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Refer to Painting Section for specifics.

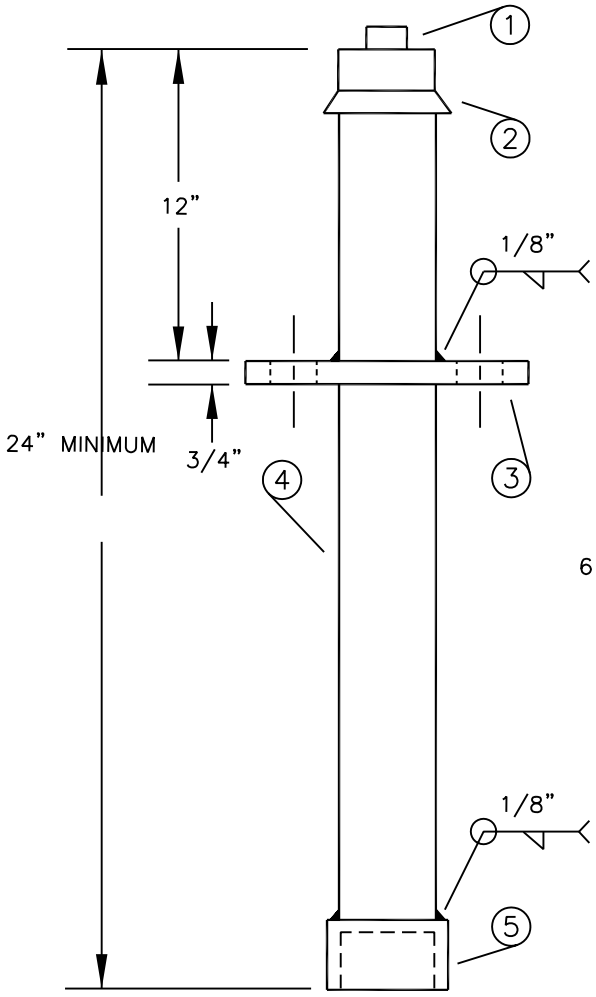
(1) Valve Box Cover (Alhambra Foundary No. A–29608; see Note No. 1).
(2) Concrete Ring (20"ø, 6" high).
(3) PVC Pipe (8" O.D.).
(4) Clay Brick (2" x 4" x 8").
(5) Copper Wire (bare 12 ga.). Refer to Section 1.3 for specifics.
(6) Adhesive Tape (10 mil. 2" wide Polyken No. 900 polyethylene).
(7) Valve Extension (refer to Standard Drawing PW–119 for specifics).

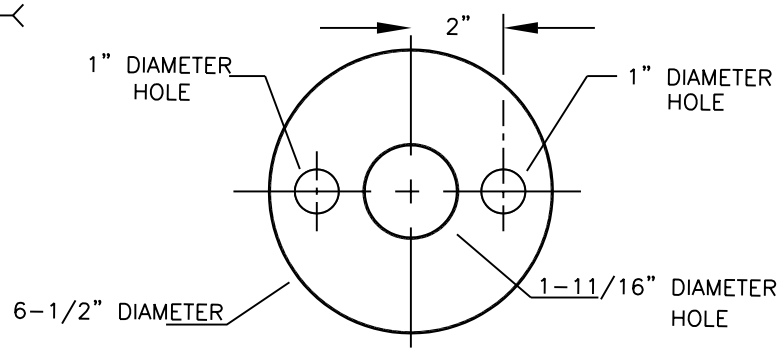
VALVE BOX AND COVER IDENTIFICATION

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-118





SPACER PLATE PLAN

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

EXTENSION STEM

NOTES:

1. Provide valve stem extension when depth to operating nut exceed 48" (fabricate extension to field measurement).
2. No valve stem extension shall be less than 2' in length. Terminate extension 12" to 24" from finished grade.
3. Provide additional spacer plate when distance to bottom socket exceeds 5'.
4. Coat metal with Sanchem (no-oxide).

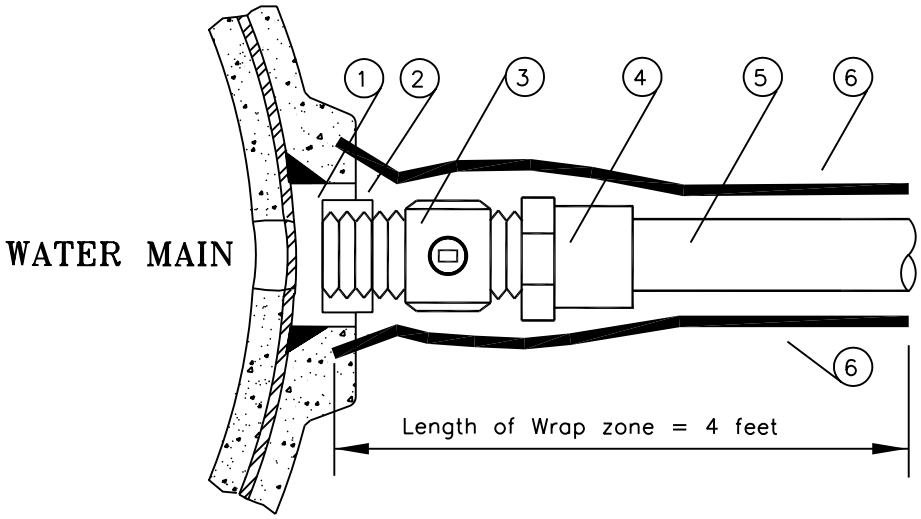
(1) Cap Screw
(2) Operating Nut (2" square)
(3) Spacer Plate (See Note No. 3).
(4) Extension Stem (1-1/4" solid, round or square stock; pinned couplers are unacceptable).
(5) Socket (2" square operating nut)

VALVE STEM EXTENSION

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-119



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Refer to Section 1.10 for material specifications.

2. Dielectric connections shall be required on all air and vacuum valve assemblies, manual air release assemblies and water service assemblies where copper or brass pipe connections are made to steel mains.

3. Typical wrap – use double wrap of 10 mil. 2" wide Polyken No. 900 adhesive tape. Wrap corporation stop or valve in open position, unless otherwise directed.

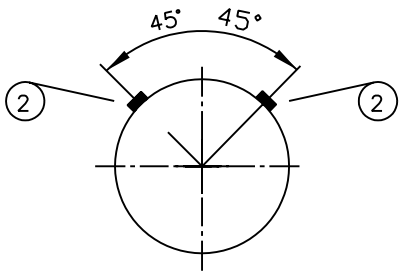
(1) Coupling (extra heavy carbon steel 3000 lbs. rating).
(2) Insulating Bushing (Nylon, see Note No. 2).
(3) Corporation Stop (see Note Nos. 1 and 2).
(4) Adapter (when required, see Note No. 1).
(5) Service Tubing (see Note No. 3).
(6) Adhesive Tape (see Note No. 3).

DIELECTRIC CONNECTION TO STEEL MAIN

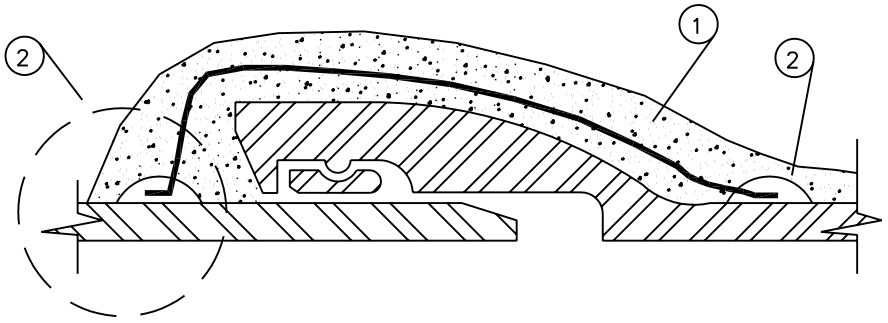
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

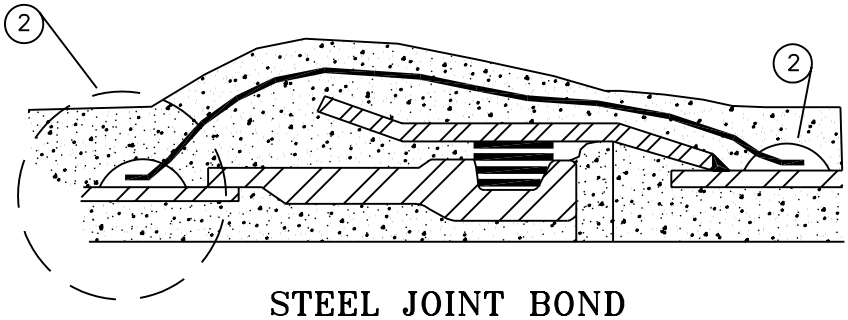
PW-120



PLACEMENT DIAGRAM

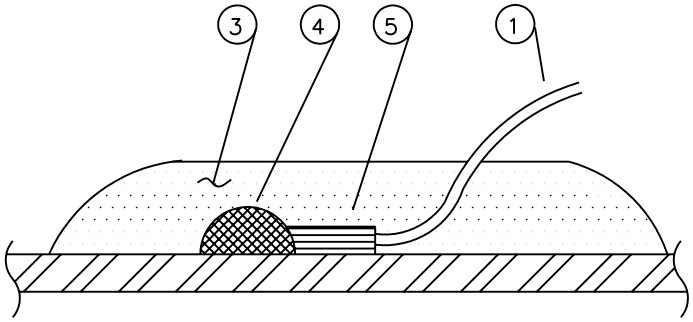


DUCTILE IRON JOINT BOND



STEEL JOINT BOND

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE



BOND WIRE CONNECTION DETAIL

NOTES:

1. Pipe surface around weld must be cleaned to provide a sound, clean dry metal surface. Recoat all exposed metal.

2.

Pipe Size (inches)	Wire Size (AWG No.)
4–10	#6
12–16	#4
20–24	#2
30–42	#1

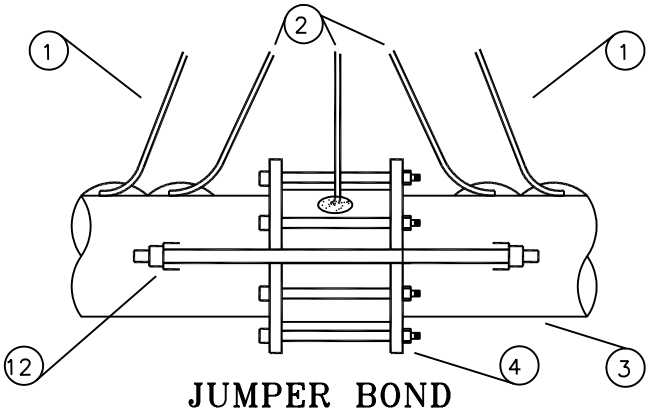
(1) Wire (see Note No. 2).
(2) Bond Wire Connection (2 typical)
(3) Epoxy Putty, Sika # 32
(4) Exothermic Weld
(5) Copper Sleeve

BOND JOINT INSTALLATION (STEEL PIPE)

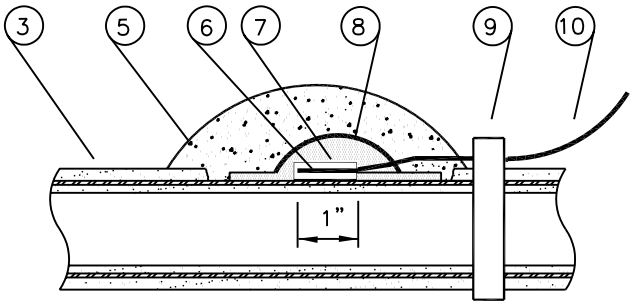
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

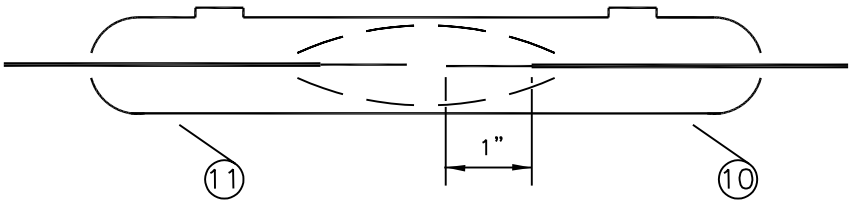
PW-121



JUMPER BOND



PIPE CONNECTION DETAIL



WIRE SPLICE DETAIL

NOTES:

1. Pipe surface around weld must be cleaned to provide a sound, clean dry metal surface. Recoat all exposed metal.
2. No. 10 ga. wire red stranded THW requires an adapter sleeve (cad weld part No. B 1331k).
3. Cad weld should be coated with "3M" electrical coating & sealed with Royston Handy Cap before the cement coating is replaced on the pipe.
4. Scotch 3M 82–A1 power cable splice kit.
5. No. 4 ga. cable black stranded THW; requires a 1" adapter sleeve (cad weld part No. B 1331k).

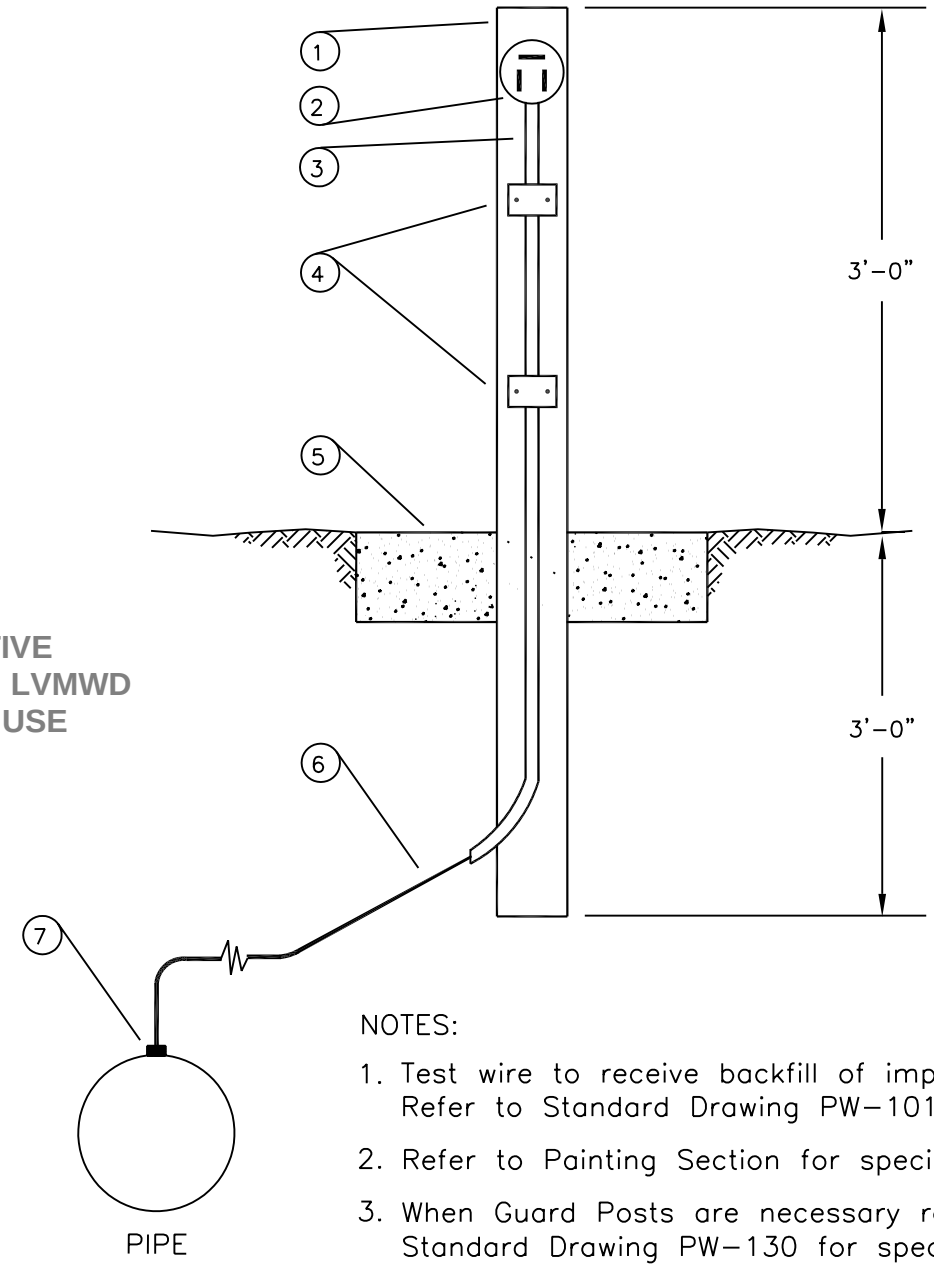
(1) Wire 10ga. (see Note No. 2).
(2) Cable 4ga. (see Note No. 5).
(3) Pipe
(4) Insulator Pipe Coupling
(5) Cement Coating (see Note No. 3).
(6) Cad Weld (see Note No. 3).
(7) Copper Sleeve (See Note No. 2).
(8) Royston Handy Cap (see Note No. 3).
(9) Adhesive Tape (10 mil. 2" wide Polyken No. 900).
(10) Test Wire (see Note No. 2).
(11) Cable Splice Kit (see Note No. 4).
(12) Pipe Joint Restraint (refer to Standard Drawing PW–137 for specifics).

CATHODIC PROTECTION TEST LEADS AND WIRE SPLICE DETAILS

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-122



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Test wire to receive backfill of imported sand. Refer to Standard Drawing PW-101 for specifics.
2. Refer to Painting Section for specifics.
3. When Guard Posts are necessary refer to Standard Drawing PW-130 for specifics.

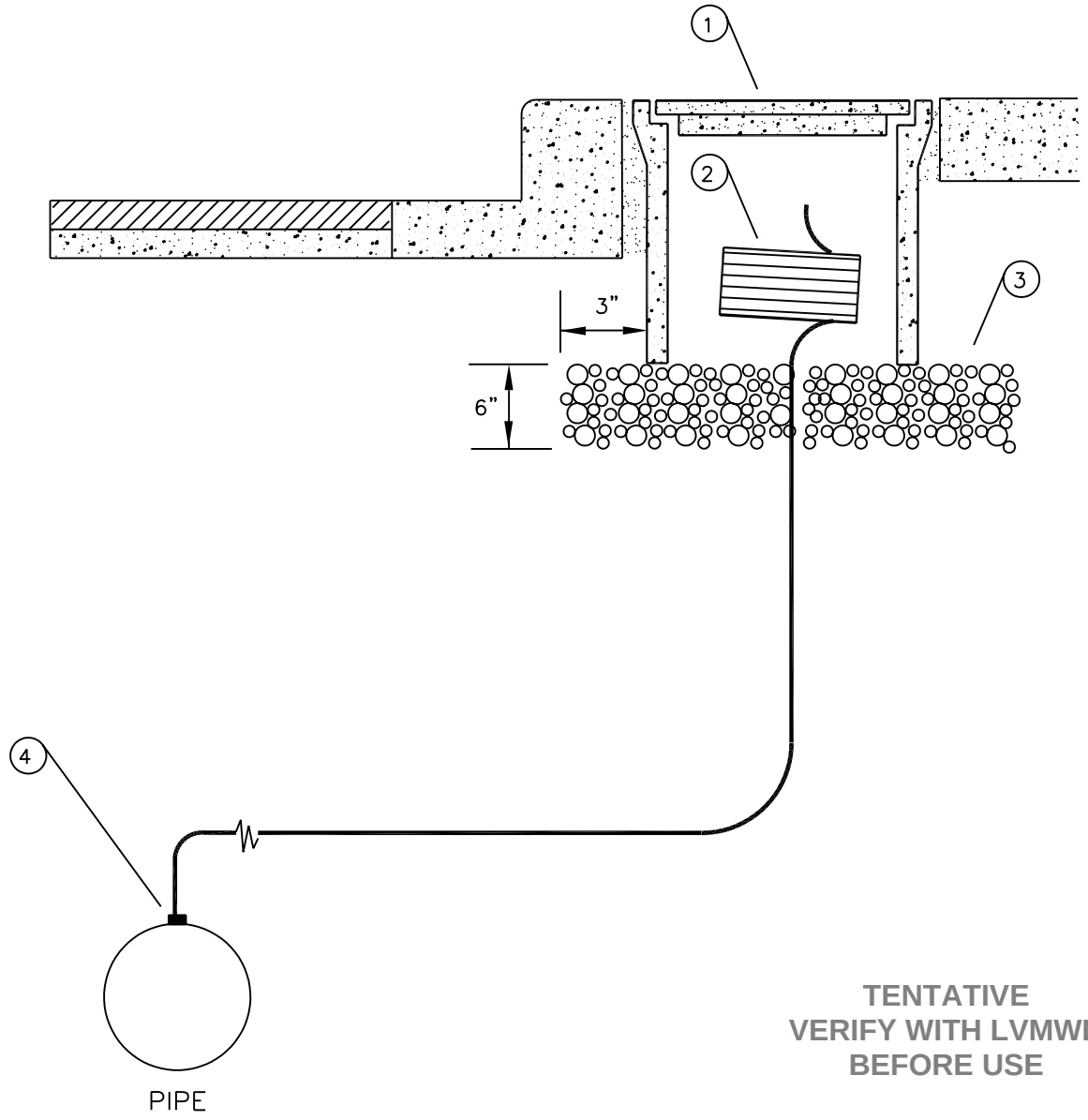
(1) Redwood Post (4" x 4" x 6', see Note Nos. 2 & 3).
(2) Explosion Proof Outlet Box (4")
(3) Conduit (3/4" galvanized)
(4) U - Clamp (2 required; see Note No. 2).
(5) Concrete Pad (24" x 24" x 6")
(6) Test Wire (see Note No. 1 and refer to Standard Drawings PW-121 and PW-122 for specifics).
(7) Connection (refer to Standard Drawing PW-122 for specifics).

CATHODIC PROTECTION TEST POINT STATION FOR NON-TRAFIC CONDITIONS

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-123



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Provide minimum 2' extra wire inside the box.
2. Backfill per Standard Drawing PW–101.

(1) Test Box (Brooks No. 36–HFL; refer to Standard Drawing PW–127 for specifics).
(2) Test Wire (refer to Standard Drawing P–122 for specifics).
(3) 3/4" Crushed Rock
(4) Connection (refer to Standard Drawings PW–121 and PW–122 for specifics).

CATHODIC PROTECTION TEST POINT STATION FOR TRAFIC CONDITIONS

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

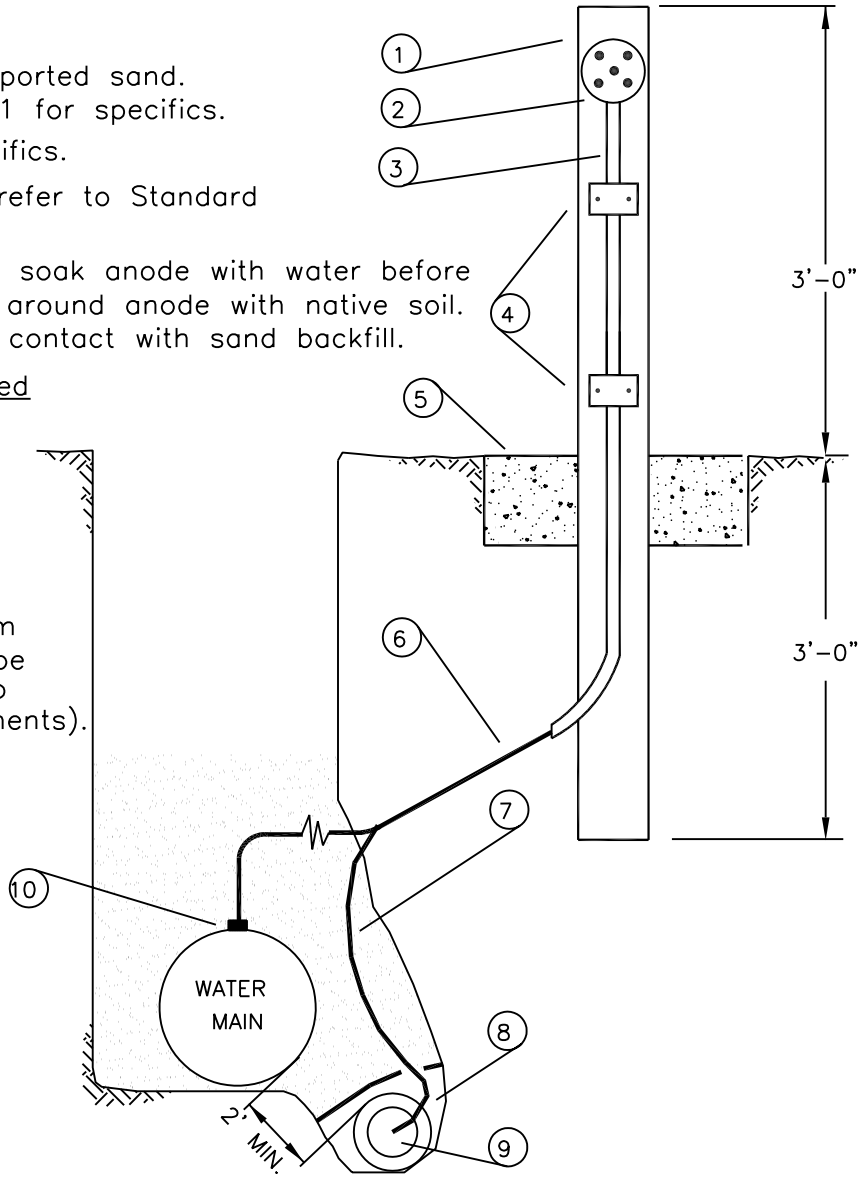
PW-124

NOTES:

1. Test wire to receive backfill of imported sand. Refer to Standard Drawing PW–101 for specifics.
2. Refer to Painting Section for specifics.
3. When Guard Posts are necessary refer to Standard Drawing PW–130 for specifics.
4. Remove external shipping bag and soak anode with water before back filling. Backfill 12" minimum around anode with native soil. Do not allow anode to come into contact with sand backfill.
5.

Pipe size	Anodes required
12" and under	2
14" – 20"	4
21" and larger	4 to 6

Minimum spacing requirements, as noted on the sketch, should be observed in preference to minimum number of anodes. (Anodes may be placed vertical, when necessary, to achieve minimum spacing requirements).



1. Redwood Post (4" x 4" x 6', see Note Nos. 2 & 3).
2. Explosion Proof Outlet Box (4")
3. Conduit (3/4" galvanized)
4. U – Clamp (2 required; see Note No. 2).
5. Concrete Pad (24" x 24" x 6")
6. Test Wire (see Note No. 1 and refer to Standard Drawings PW–121 and PW–122 for specifics).
7. #10 Anode Lead
8. Backfill (see Note No. 4).
9. 32 lb. packaged magnesium Anode (Galvomag) (see Note No.5).
10. Connection (refer to Standard Drawings PW–121 and PW–122 for specifics).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

SACRIFICIAL ANODE INSTALLATION AT LEAK REPAIR SITE FOR NON-TRAFIC CONDITIONS

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-125

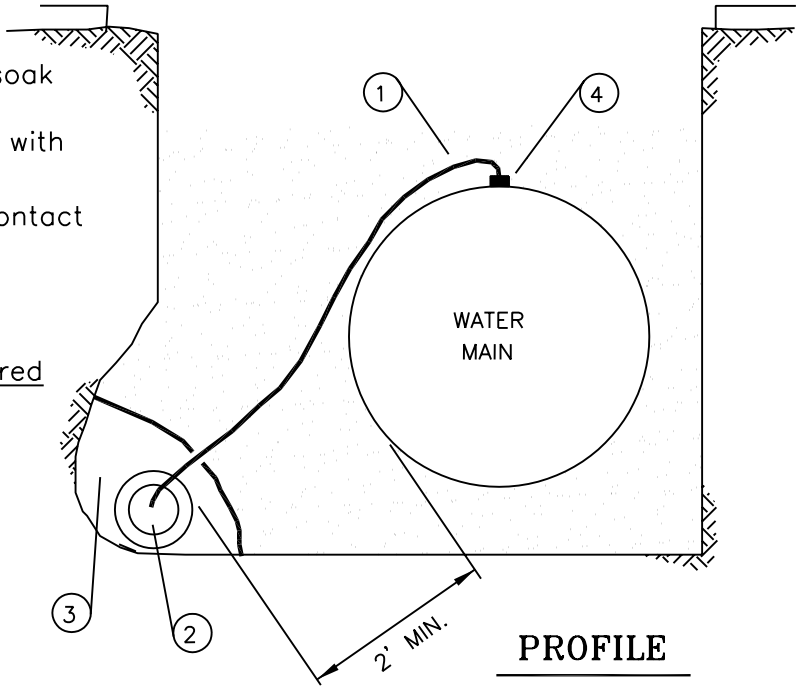
NOTES:

1. Remove external shipping bag and soak anode with water before back filling. Backfill 12" minimum around anode with with native soil.
   Do not allow anode to come into contact with sand backfill.

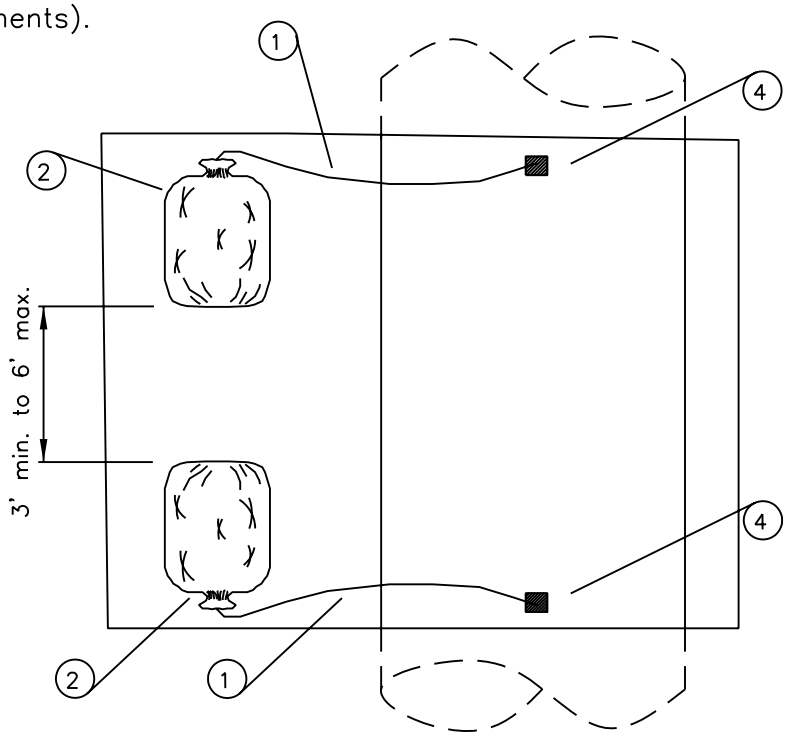
2.

Pipe size	Anodes required
12" and under	2
14" – 20"	4
21" and larger	4 to 6

Minimum spacing requirements, as noted on the sketch, should be observed in preference to minimum number of anodes. (Anodes may be placed vertical, when necessary, to achieve minimum spacing requirements).



PROFILE



PLAN

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

(1) #10 Anode Lead
(2) 32 lb. packaged Magnesium Anode (Galmonag) (see Note No. 2).
(3) Backfill (see Note No. 1)
(4) Refer to Standard Drawing PW–121 for joint bond specifics.

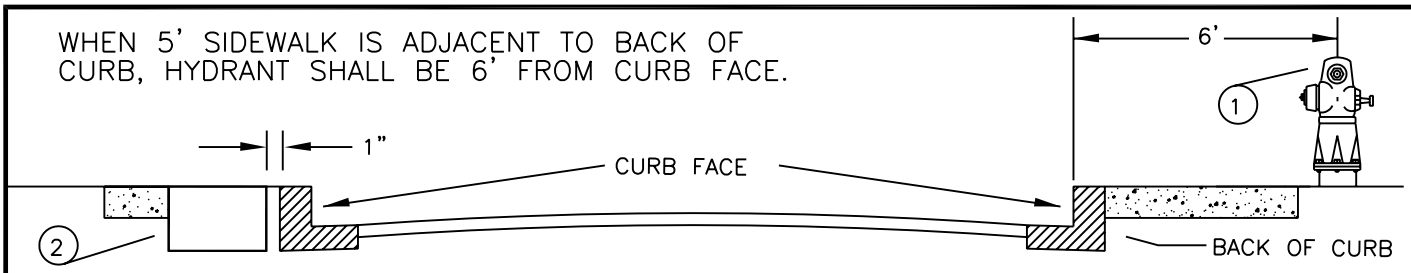
SACRIFICIAL ANODE INSTALLATION AT LEAK REPAIR SITE FOR TRAFFIC CONDITIONS

REVISIONS			
NO.	BY	DATE	APRVD.

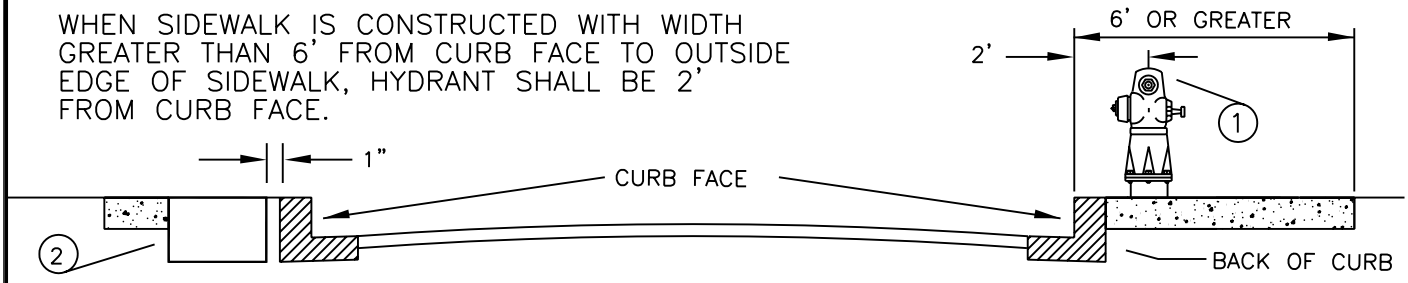
PRINCIPAL ENGINEER _____ DATE _____

PW-126

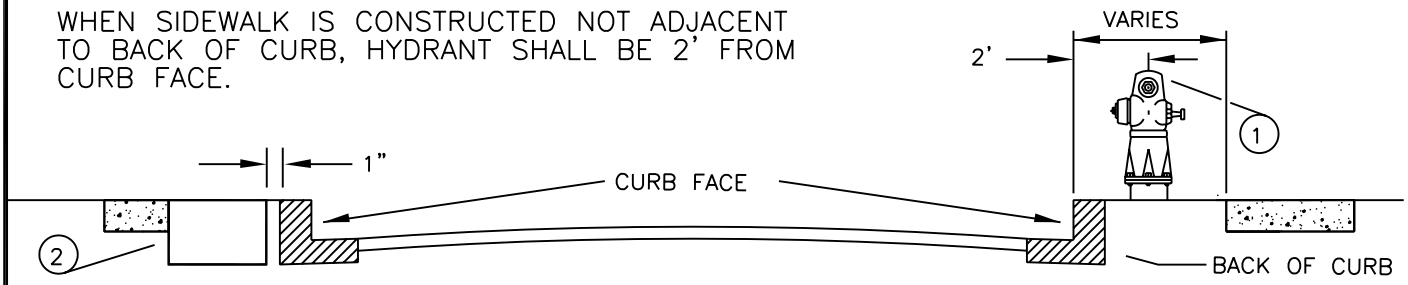
WHEN 5' SIDEWALK IS ADJACENT TO BACK OF CURB, HYDRANT SHALL BE 6' FROM CURB FACE.



WHEN SIDEWALK IS CONSTRUCTED WITH WIDTH GREATER THAN 6' FROM CURB FACE TO OUTSIDE EDGE OF SIDEWALK, HYDRANT SHALL BE 2' FROM CURB FACE.

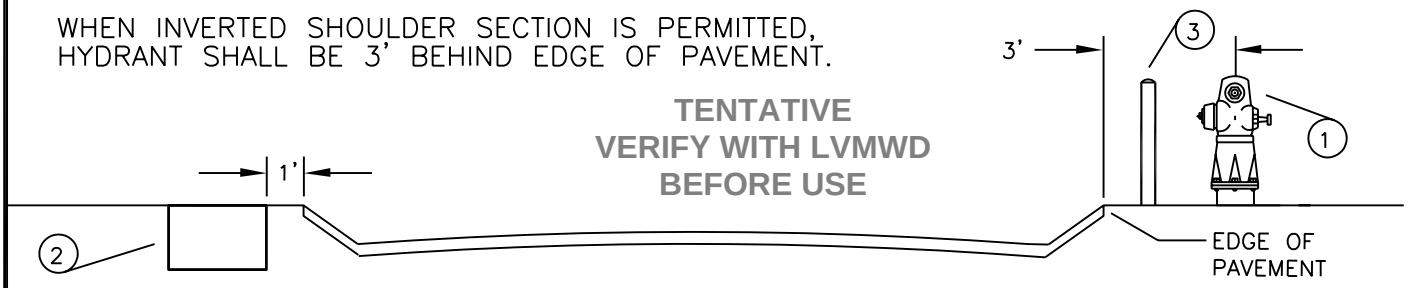


WHEN SIDEWALK IS CONSTRUCTED NOT ADJACENT TO BACK OF CURB, HYDRANT SHALL BE 2' FROM CURB FACE.



WHEN INVERTED SHOULDER SECTION IS PERMITTED, HYDRANT SHALL BE 3' BEHIND EDGE OF PAVEMENT.

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE



NOTES:

1. Fire hydrants at or near street intersections must be located inside the intersection valving & located at the Beginning of Curb return or End of Curb return. Fire hydrants between intersections must be located on property lines. Refer to Standard Drawings PW–129 & PW–130.
2. Meter boxes to be set longitudinal axis parallel to & 1" from behind curb. Location of service to be permanently marked on the top of the curb with a "W". The owner shall be responsible for the location & condition of all services until such time as LVMWD has accepted the water system. Meter boxes to be set with longitudinal axis parallel to & 1' back of pavement edge, and 1" higher than finish grade with steel lid.
3. Guard posts are required except at back of curb locations. Refer to Standard Drawing PW–130.

(1) Fire Hydrant, Blow–off and Water Sampling Station
(2) Meter Box
(3) Guard Post, Cathodic Protection Test Point Station

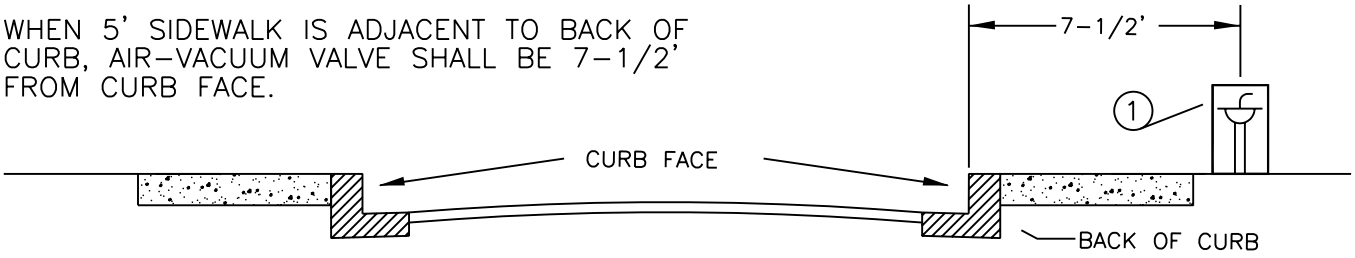
LOCATION OF ABOVE GROUND UTILITIES (FIRE HYDRANTS AND METERS)

REVISIONS			
NO.	BY	DATE	APRVD.

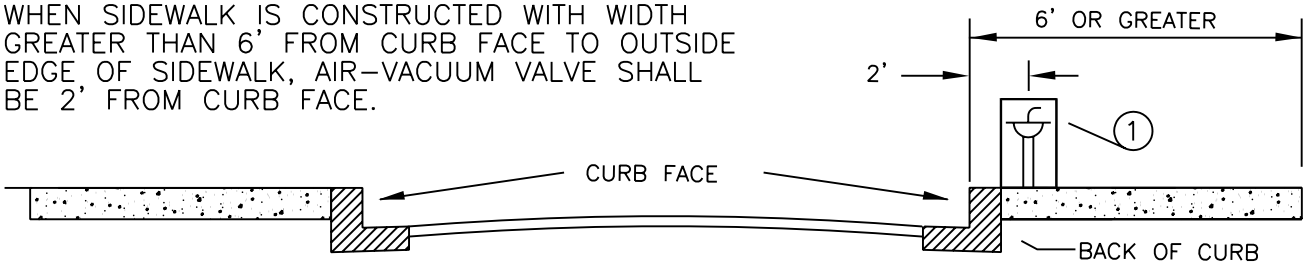
PRINCIPAL ENGINEER _____ DATE _____

PW-127

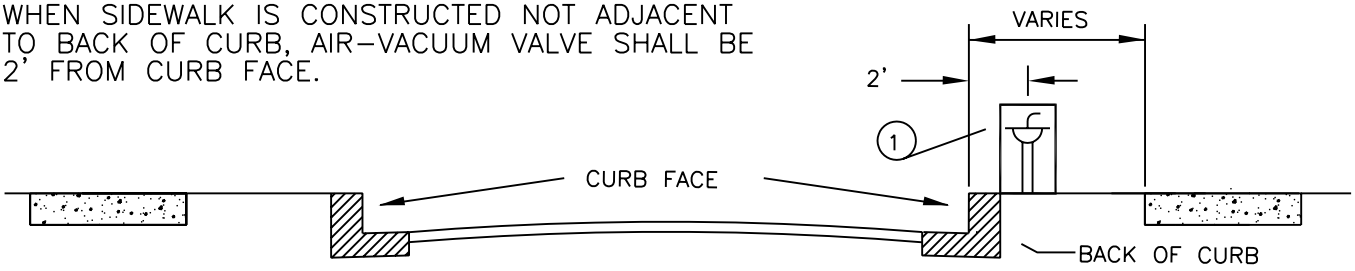
WHEN 5' SIDEWALK IS ADJACENT TO BACK OF CURB, AIR–VACUUM VALVE SHALL BE 7–1/2' FROM CURB FACE.



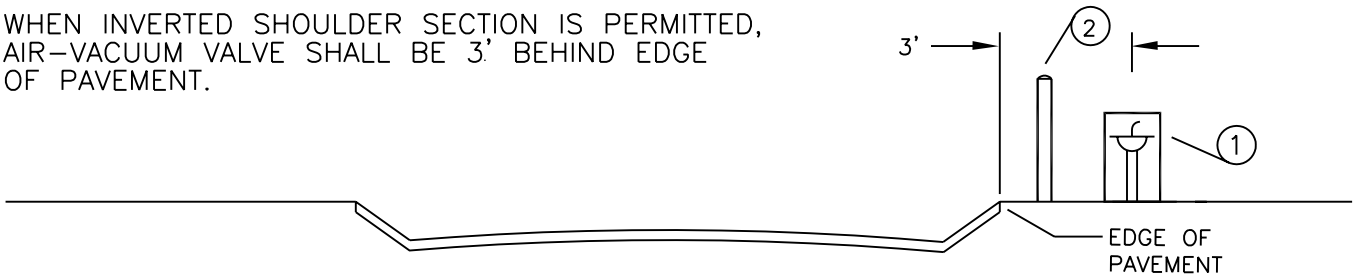
WHEN SIDEWALK IS CONSTRUCTED WITH WIDTH GREATER THAN 6' FROM CURB FACE TO OUTSIDE EDGE OF SIDEWALK, AIR–VACUUM VALVE SHALL BE 2' FROM CURB FACE.



WHEN SIDEWALK IS CONSTRUCTED NOT ADJACENT TO BACK OF CURB, AIR–VACUUM VALVE SHALL BE 2' FROM CURB FACE.



WHEN INVERTED SHOULDER SECTION IS PERMITTED, AIR–VACUUM VALVE SHALL BE 3' BEHIND EDGE OF PAVEMENT.



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Air–vacuum valves at or near street intersections shall be located inside the intersection valving and located at the Beginning of Curb return and End of Curb return. Air–vacuum valves between intersections shall be located on property lines. Refer to Standard Drawings PW–129 & PW–130.
2. Guard posts are required except at back of curb locations. Refer to Standard Drawing PW–130.

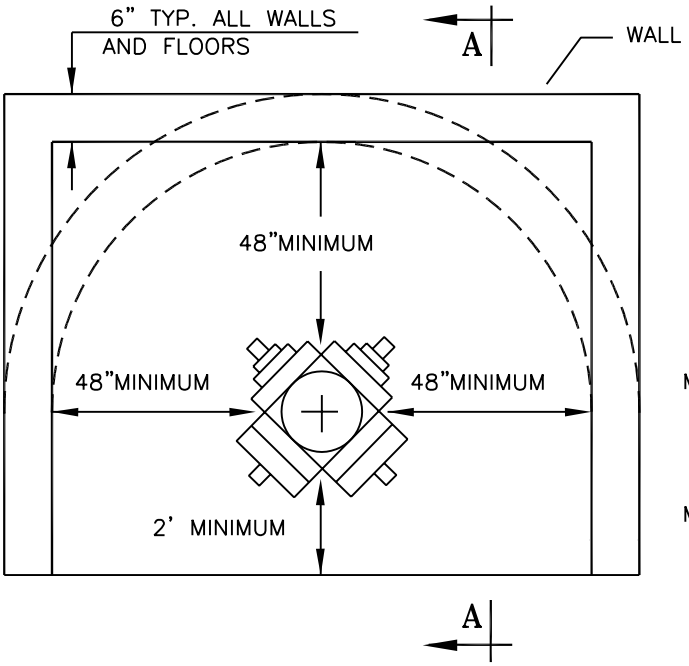
(1) Air–Vacuum Valve
(2) Guard Post

LOCATION OF ABOVE GROUND UTILITIES (AIR AND VACUUM VALVES)

REVISIONS			
NO.	BY	DATE	APRVD.

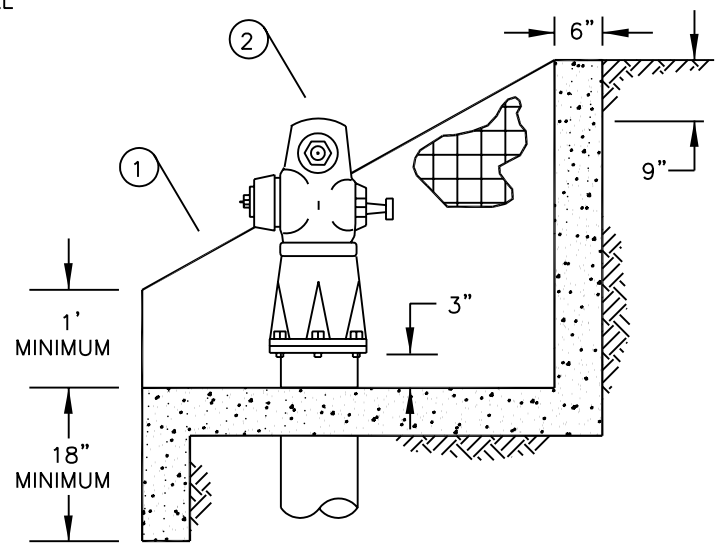
PRINCIPAL ENGINEER _____ DATE _____

PW-128

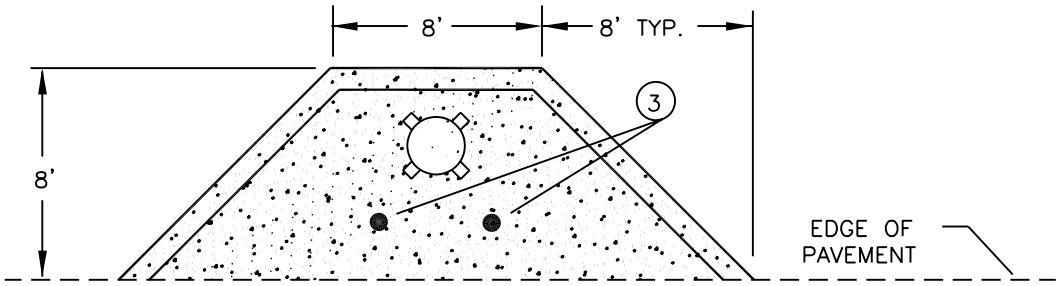


PLAN

(TO BE USED WHERE GROUND SLOPE EXCEEDS 30% OR AS REQUIRED)



SECTION "A–A"



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

PLAN

(TO BE USED IN STREET SHOULDER WHEN GROUND SLOPE EXCEEDS 30% OR AS REQUIRED)

NOTES:

1. All walls require building permit. Concrete block may be substituted for wall sections if approved by Building Department.
2. Wall may require use of special color and texture of materials.
3. Horseshoe shape may be substituted in place of square walls.

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

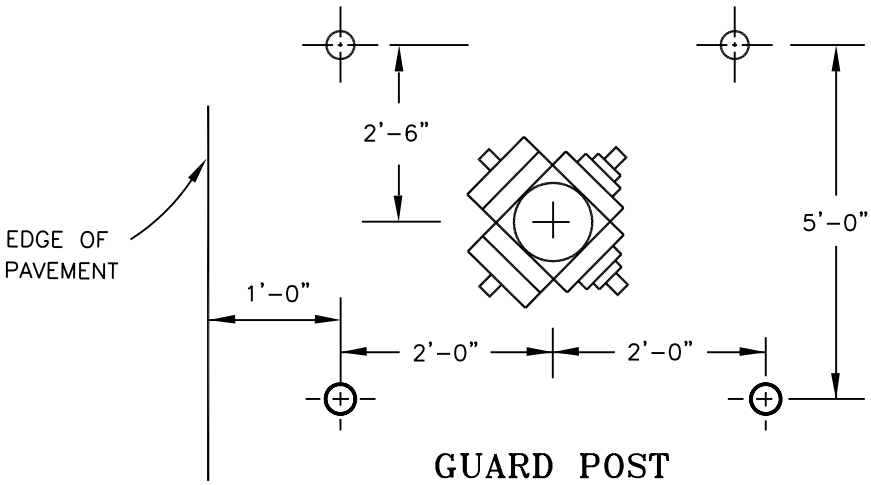
(1) Retaining Wall
(2) Above Ground Water Appurtenances
(3) Guard Post (refer to Standard Drawings PW–127 and PW–130 for specifics).

CONCRETE OR BLOCK RETAINING WALL

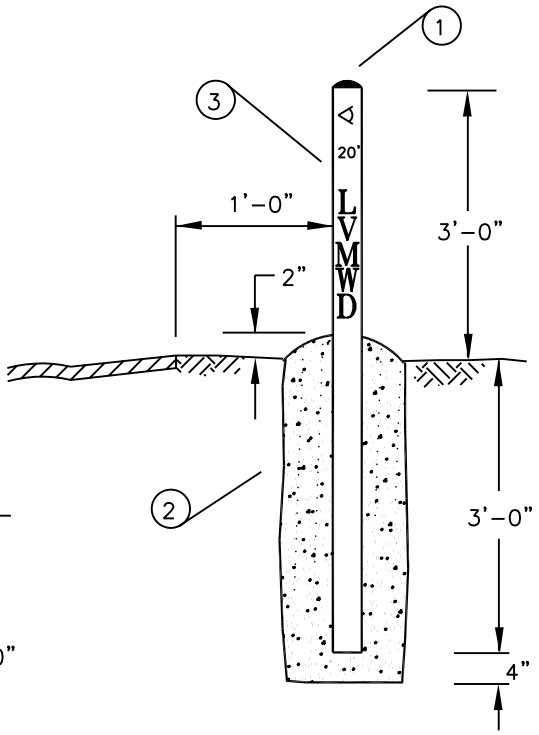
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

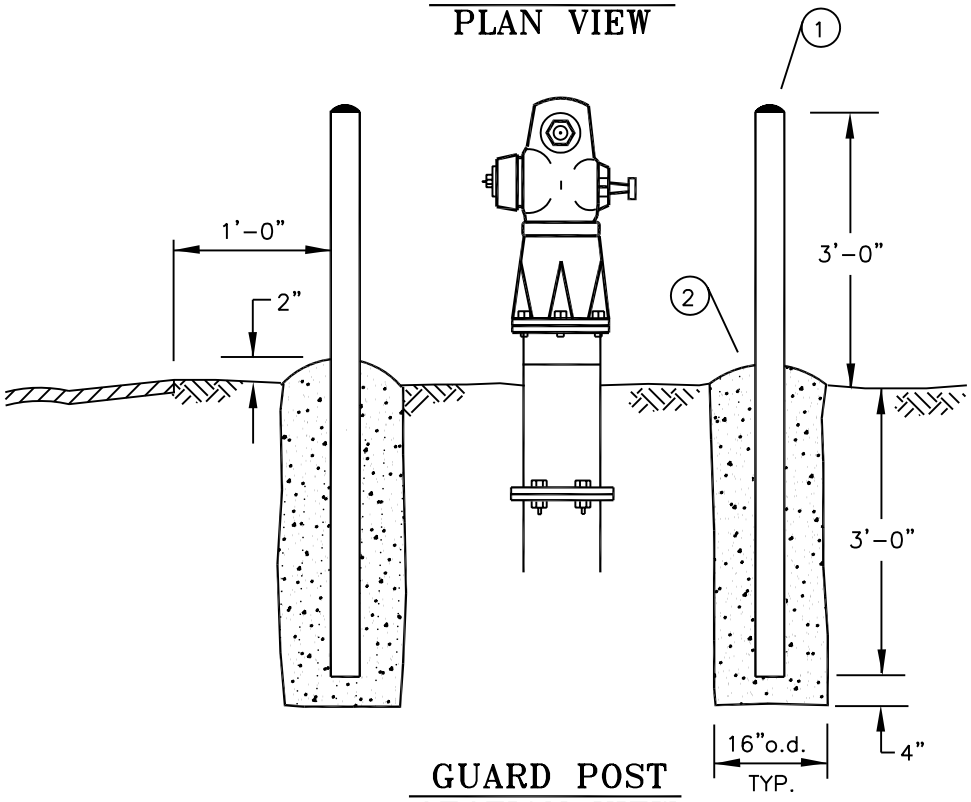
PW-129



GUARD POST
PLAN VIEW



MARKER POST



GUARD POST
SECTION VIEW

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Fill with concrete and crown concrete at top to shed water.
2. Refer to Painting Section for specifics.
3. Stencil in black letters 2" high: ("LVMWD", angle if any, and distance from post to valve or utility).

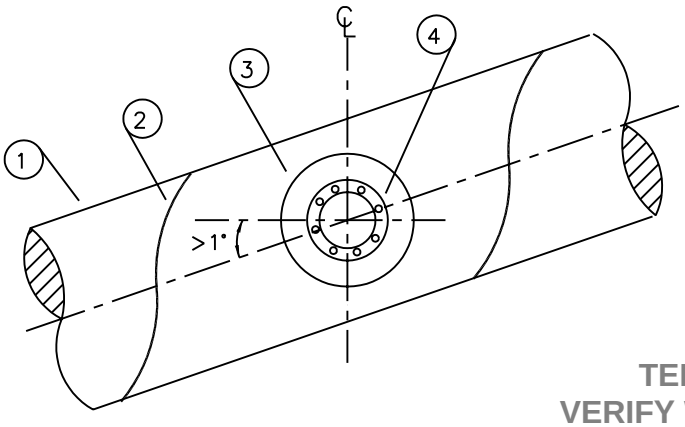
(1) Pipe (4"ø schedule 40 steel; see Note No. 1).
(2) Concrete Base (see Note No. 1).
(3) Post Marking (see Note Nos. 2 and 3).

GUARD AND MARKER POST DETAIL

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

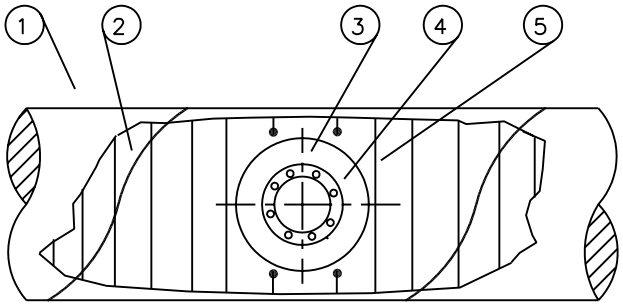
PW-130



FLANGE OUTLET

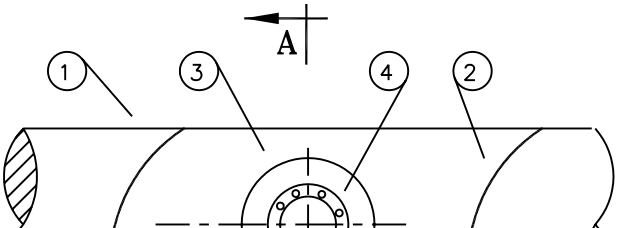
LONGITUDINAL ELEVATION

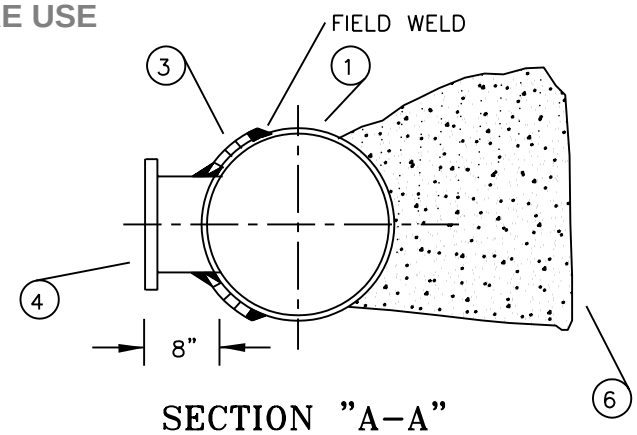
STEEL PIPE PER AWWA C200



FLANGE OUTLET DETAIL

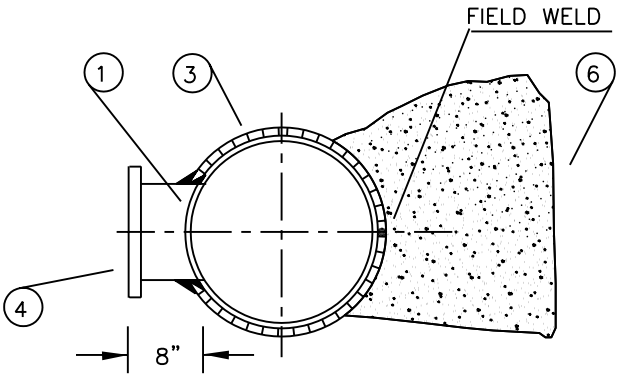
STEEL PIPE PER AWWA C303





SECTION "A–A"

USING REINFORCEMENT COLLAR



SECTION "A–A"

USING FULL WRAP SADDLE

NOTES:

1. Where slope of water main exceeds 1%, install flanges with bolt holes straddling the vertical centerline as shown.

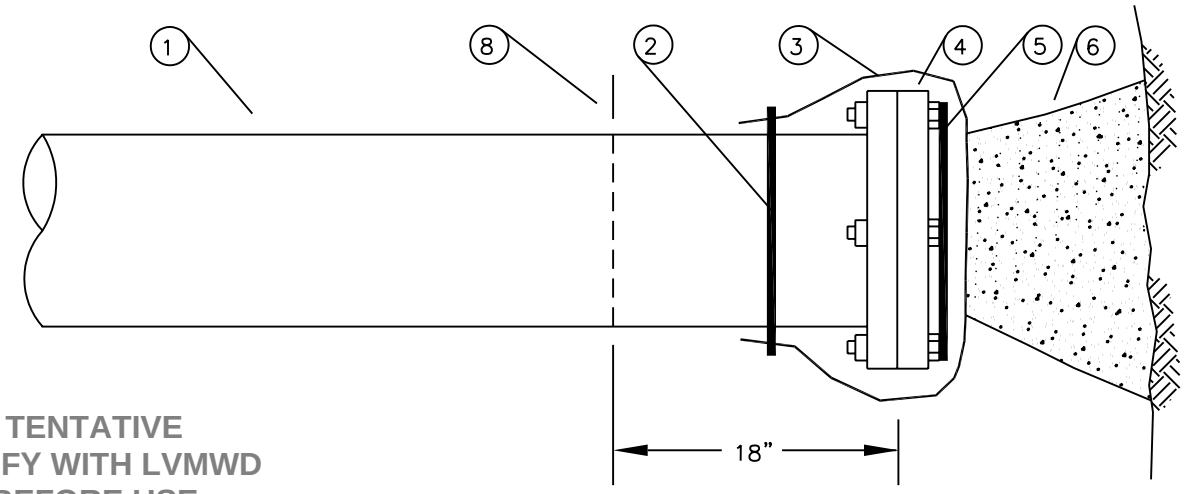
(1) Steel Pipe
(2) Longitudinal or helical Seam (no welding or cutting of seam).
(3) Collar
(4) Steel Nozzle CML/CMC and Flange (pipe cut to fit, see Note No.1).
(5) Circumferential Reinforcement wire (must be spot welded to pipe prior to cutting).
(6) Thrust Block (refer to Standard Drawing PW–133 for specifics).

FLANGE OUTLET AND END ASSEMBLY DETAILS

REVISIONS			
NO.	BY	DATE	APRVD.

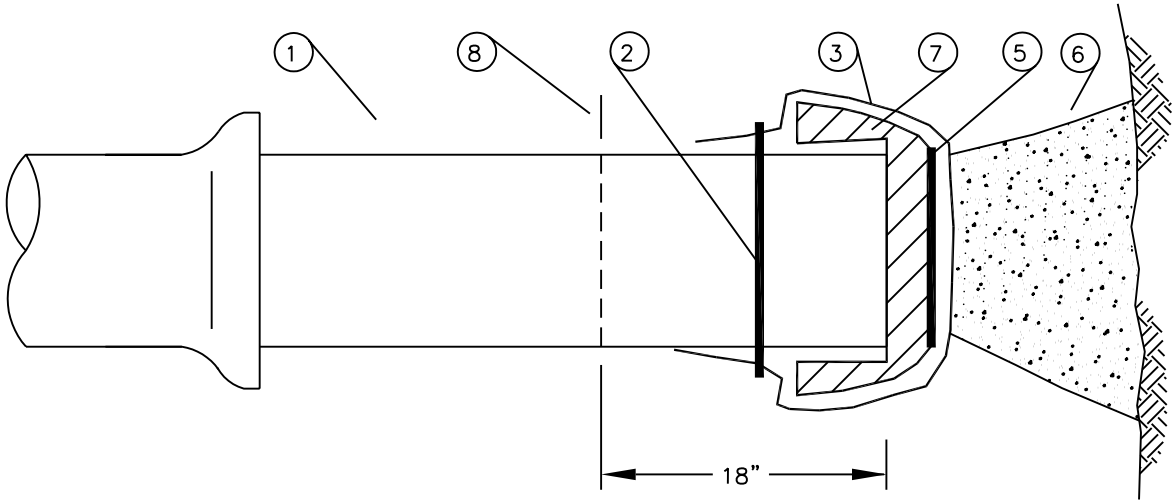
PRINCIPAL ENGINEER _____ DATE _____

PW-131



TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

STEEL PIPE END ASSEMBLY



PVC AND DUCTILE IRON PIPE END ASSEMBLY

1. Pipe
2. Adhesive Tape (10 mil. 2" wide Polyken No.900)
3. Plastic Wrap
4. Flange
5. Felt Paper (No.15 building felt)
6. Thrust Block (refer to Standard Drawing PW–133 for specifics).
7. Cap
8. Point of connection of Air Release Assemblies.

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

FLANGE OUTLET AND END ASSEMBLY DETAILS

REVISIONS			
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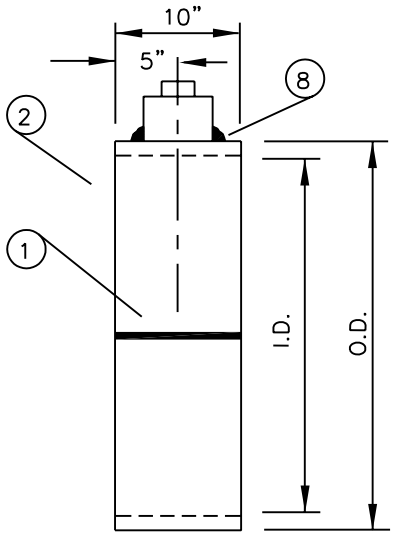
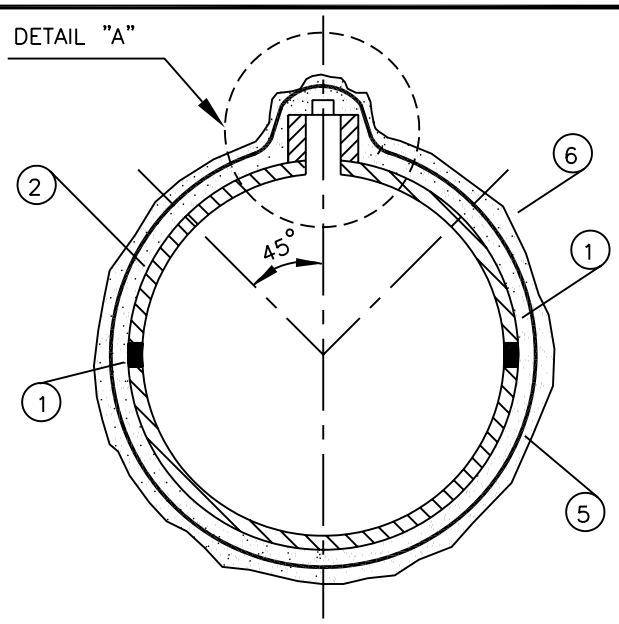
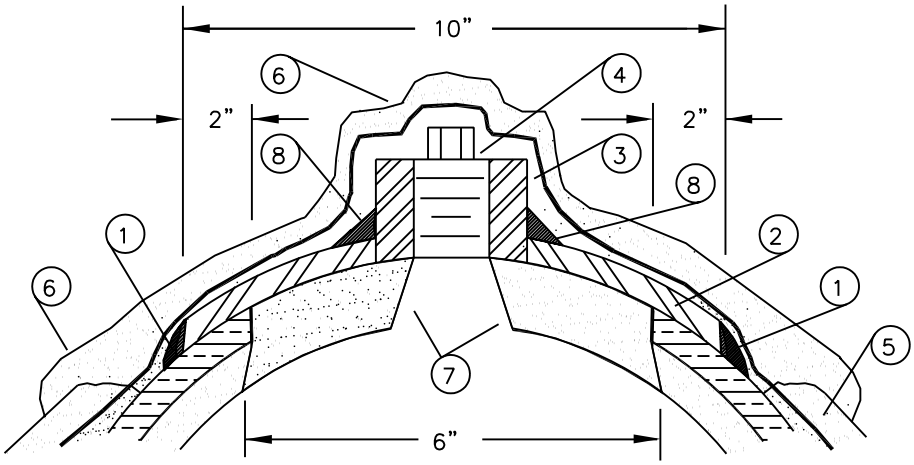
DATE

PW-131
2 OF 2







DETAIL "A"

NOTES:

1. Butt strap to be shipped in halves & welded in the field. Plate thickness shall be equal to adjoining steel pipe or minimum 6 ga. mild steel. When pipe I.D. exceeds 12", provide two handholes at 45° from vertical.

2. Pipe surface around welds must be cleaned to provide a dry metal surface. Recoat all exposed metal with mortar.

(1) Weld (field weld with three passes).
(2) Butt Strap
(3) Pipe Coupling (1/2 Std. 5" 3000 lb.)
(4) Plug (solid steel plug) weld to seal.
(5) Wire
(6) Coating
(7) Lining field point
(8) Weld in shop

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

BUTT STRAP CLOSURE DETAIL

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-132

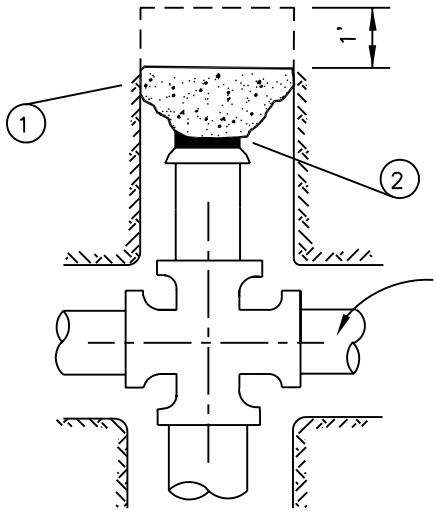


FIG. 1
PLAN VIEW

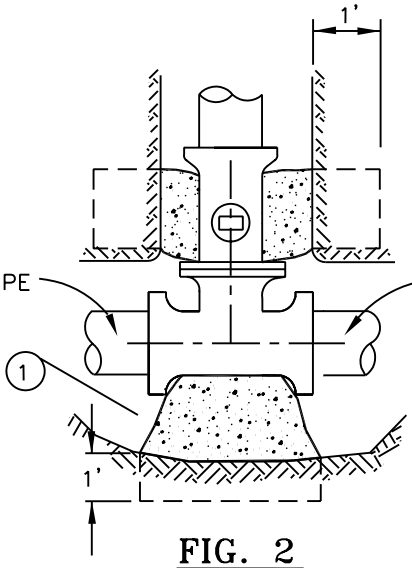
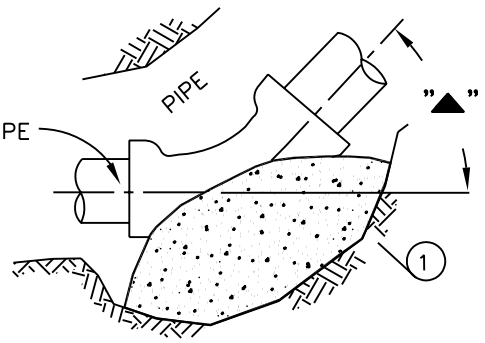


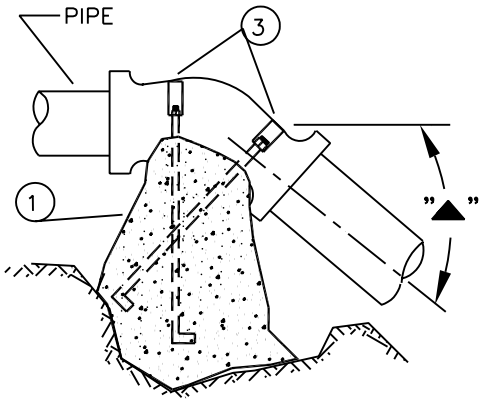
FIG. 2
PLAN VIEW

"▲"= 90,° 45, ° 22-1/2, ° 11-1/4 °



(HORIZONTAL OR VERTICAL BEND)

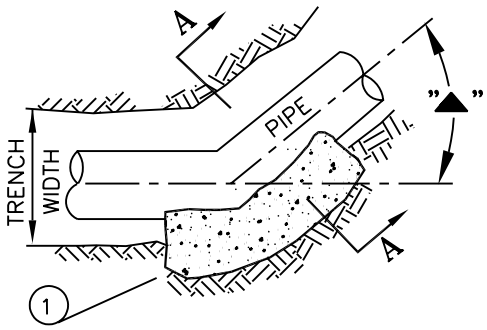
FIG. 3



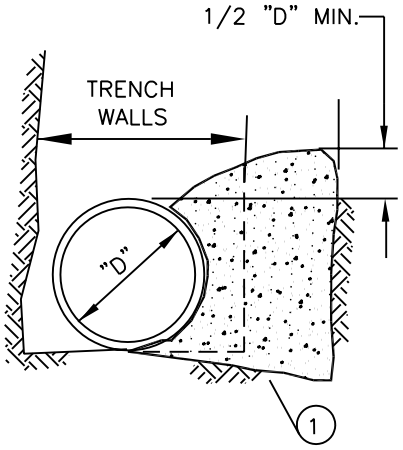
(VERTICAL BEND ONLY)

FIG. 4

"▲"= 90,° 45, ° 22-1/2, ° 11-1/4 °



PLAN VIEW



SECTION "A-A"

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Place concrete against undisturbed soil. Bearing area to be adequate for pressure & soil. Length to depth ratio not to exceed 2 to 1.
2. 3/8" x 2" straps with 5/8" anchor bolts. Bolts to extend depth of block. Coat exposed meter with Sanchem (no-oxide). Special design in field may be required.
3. Do not cover nuts and bolts with concrete.

(1) See Note No. 1.
(2) Felt Paper (refer to Standard Drawing PW-131 for specifics).
(3) Straps (see Note Nos. 2 and 3).

THRUST BLOCK DETAILS

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-133
1 OF 2

THRUST BLOCK SIZES

(MINIMUM BEARING AREA IN SQUARE FEET)

PIPE SIZE	ELBOWS 3				END ASSEMBLY OR TEE 4
	90°	45°	22.5°	11.25°	
6"	9 / 11	5 / 6	3 / 3	3 / 3	6 / 8
8"	14 / 19	8 / 11	4 / 6	4 / 6	10 / 14
10"	23 / 31	13 / 17	7 / 9	7 / 9	17 / 22
12"	33 / 44	18 / 24	9 / 12	9 / 12	23 / 31

FOR CLASS 150 PIPE — 23 / 31 — FOR CLASS 200 PIPE

NOTES:

1. Table above denotes MINIMUM design standards for thrust block installation.
2. Sizes based on 1500 PSF bearing soil. Special design required for soils of lower bearing strength.
3. Figure 3
4. Figures 1 and 2

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

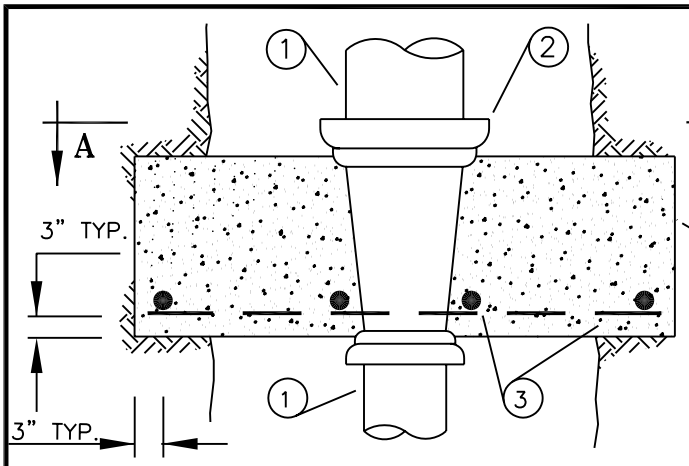
THRUST BLOCK DETAILS

REVISIONS			
NO.	BY	DATE	APRVD.

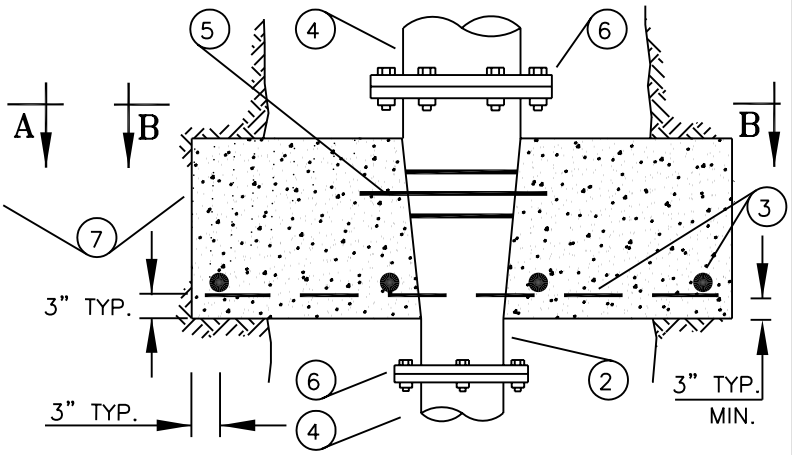
PRINCIPAL ENGINEER _____ DATE _____

PW-133

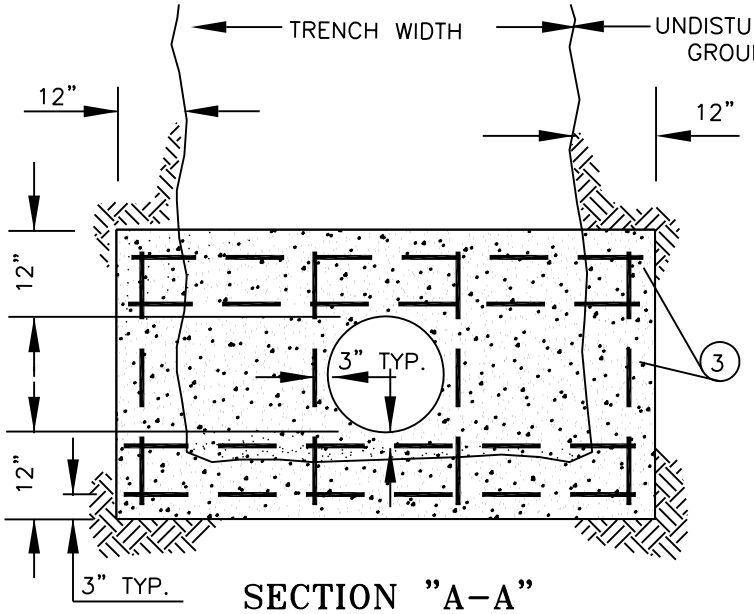
2 OF 2



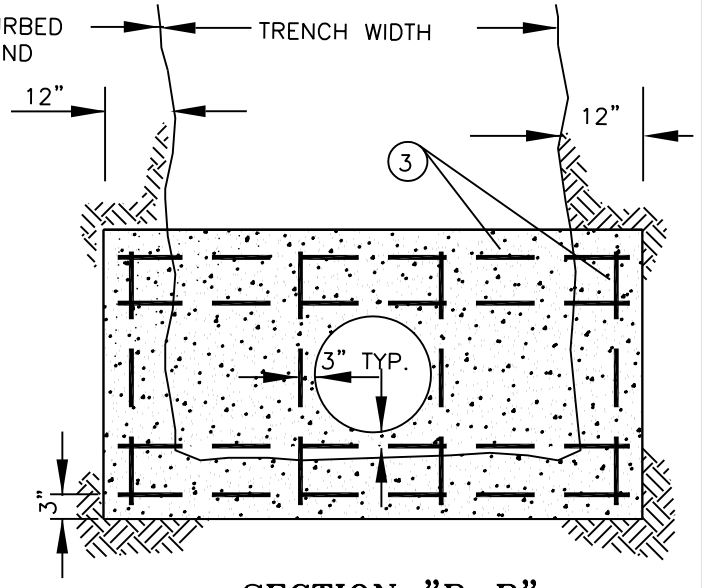
PVC AND CI PIPE
PLAN



STEEL PIPE
PLAN



SECTION "A–A"



SECTION "B–B"

NOTES:

1. Refer to Standard Drawing 135 when using steel reducer or for special anchor block detail.
2. 9" x 3/8" plate collar and 3" x 1/2" ring. Ship in halves, weld in field with 3/8" fillet weld.
3. Concrete thickness = Reducer length (3' max.).

(1) PVC and DI Pipe
(2) Reducer (see Note No. 1).
(3) #4 Bars
(4) Steel Pipe
(5) Collar (see Note Nos. 1 & 2).
(6) Flange
(7) Concrete (see Note No. 3).

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

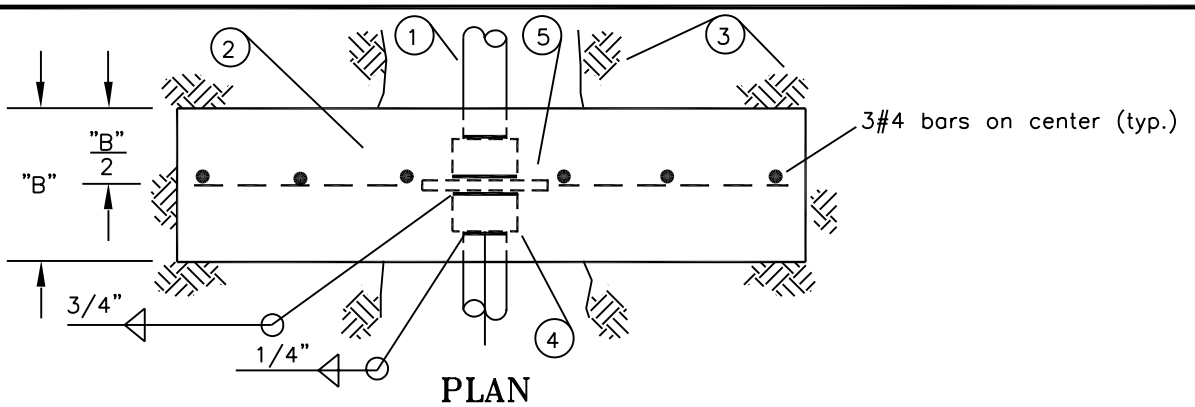
ANCHOR BLOCK DETAILS (16" PIPE MAX.)

REVISIONS			
NO.	BY	DATE	APRVD.

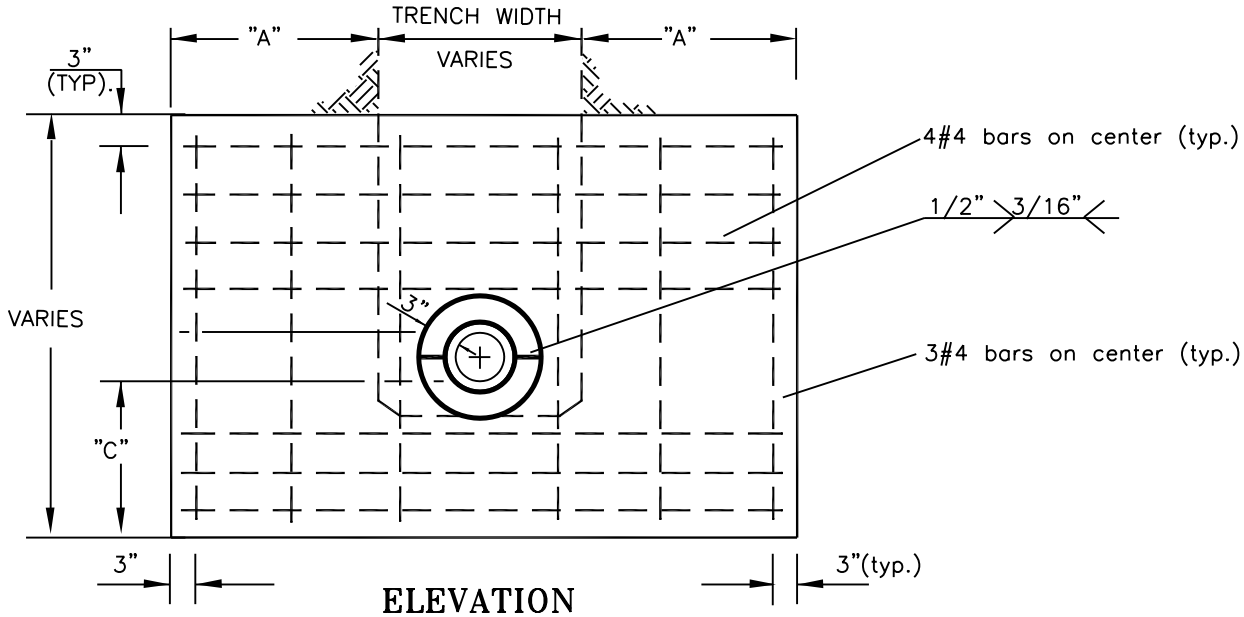
PRINCIPAL ENGINEER

DATE

PW-134



PLAN



ELEVATION

SIZE OF PIPE	CLASS 150			CLASS 200			ABOVE CLASS 200		
	A	B	C	A	B	C	A	B	C
8"	12"	12"	6"	12"	12"	12"	SPECIAL DESIGN REQUIRED		
10"	12"	12"	12"	15"	12"	12"			
12"	15"	12"	15"	24"	12"	15"			
14"	24"	12"	15"	30"	15"	15"			

NOTES:

1. Table denotes minimum design standards for anchor block installation. Special design in field shall be required when determined that the soil bearing load area is below 1500 lb./sq. ft. or pipe buried less than 3'.
2. 9" x 3/8" plate wrapper– ship in halves and weld in field.
3. 3" x 1/2" – ship in halves and weld in field.

(1) Steel Pipe
(2) Bars (No. 6 bars)
(3) Undisturbed ground
(4) Collar (see Note No. 2).
(5) Ring (see Note No. 3).

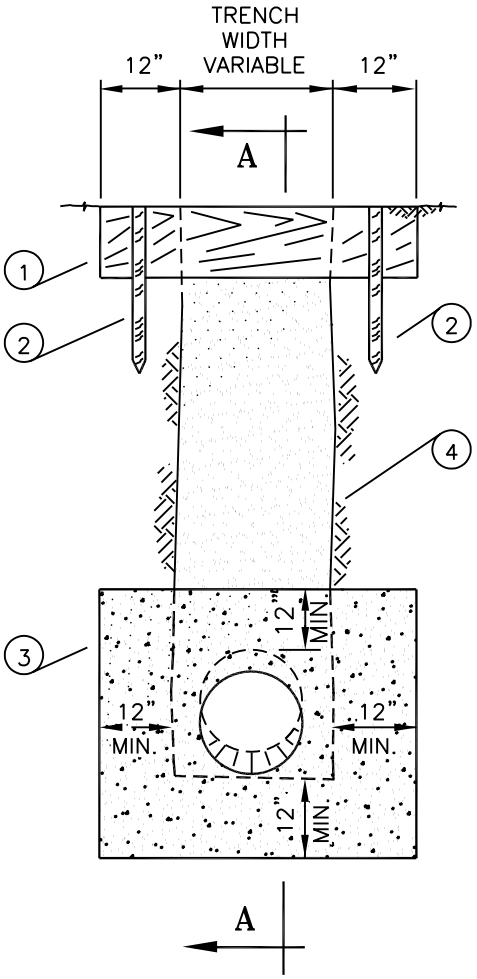
TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

SPECIAL ANCHOR BLOCK DETAIL

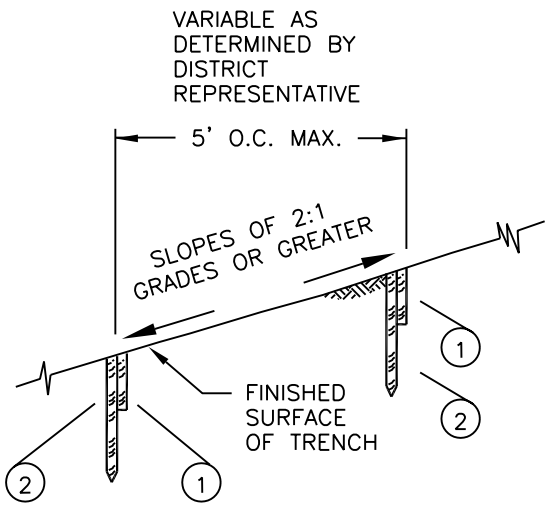
REVISIONS			
NO.	BY	DATE	APRVD.

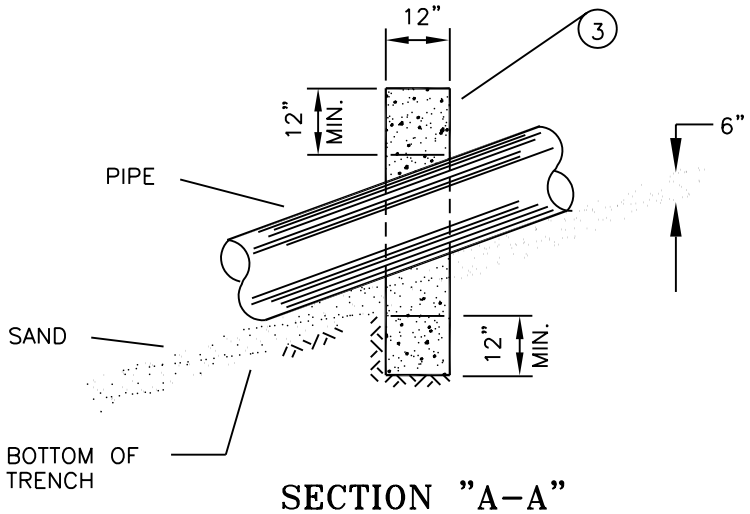
PRINCIPAL ENGINEER _____ DATE _____

PW-135



ELEVATION





SECTION "A–A"

NOTES:

1. 2" x 12" redwood baffle.
   2" x 4" x 24" redwood stakes at 3'–0" on center.
2. Concrete collars shall be placed on water line pipes at 20' on center maximum, where designated on project plans.

(1) Baffle (see Note No. 1).
(2) Stake (see Note No. 1).
(3) Concrete Collar
(4) Back fill (refer to Standard Drawing PW–101 for specifics).

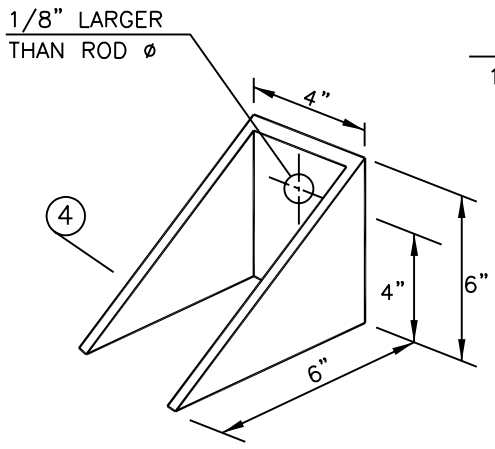
TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

REDWOOD BAFFLES AND CONCRETE COLLARS

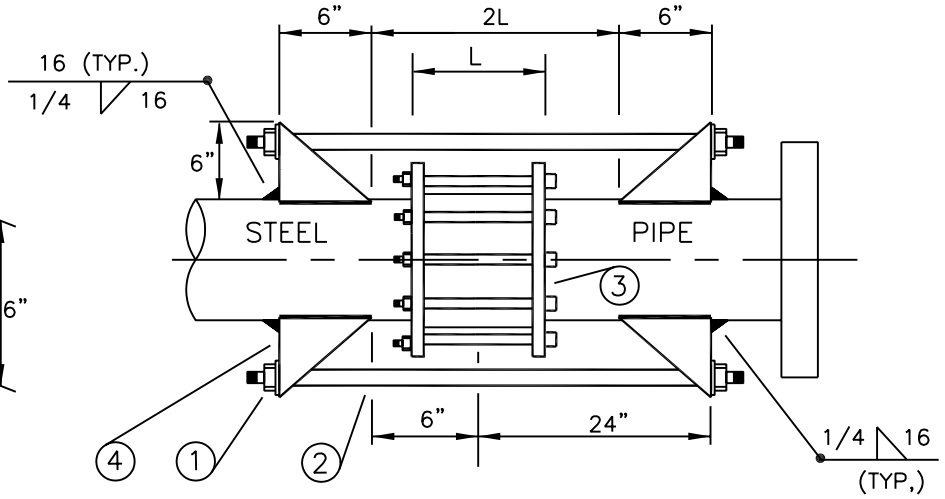
REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

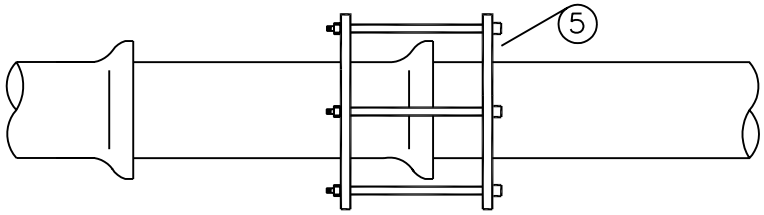
PW-136



ANCHOR



ANCHOR BOX ASSEMBLY



JOINT RESTRAINT
FOR PVC & DI PIPE

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Pipe sizes 6" and 8" use 2 rods 7/8"ø x 32" long, 7/8"–9 UNC 2A RH; 12" pipe use 2 rods 1–1/8"ø x 32" long, 1–1/8"–4 UNC 2A RH.
2. Anchors to be fabricated from 6" x 4" x 3/8" structural tube section (4 required). Drill all holes in the shop. Torch cut pipe radius at installation site.

(1) Nut (heavy steel nut & washer, 8 required)
(2) Rod (see Note No. 1).
(3) Pipe Joint Mechanical Coupling (dresser style 38 or Rockwell Series 416)
(4) Anchor (see Note No. 2).
(5) Pipe (refer to Section 1.4 for specifics).

JOINT RESTRAINT AND ANCHOR BOX ASSEMBLY FOR MECHANICAL COUPLING SIZES 6" THRU 12"

REVISIONS			
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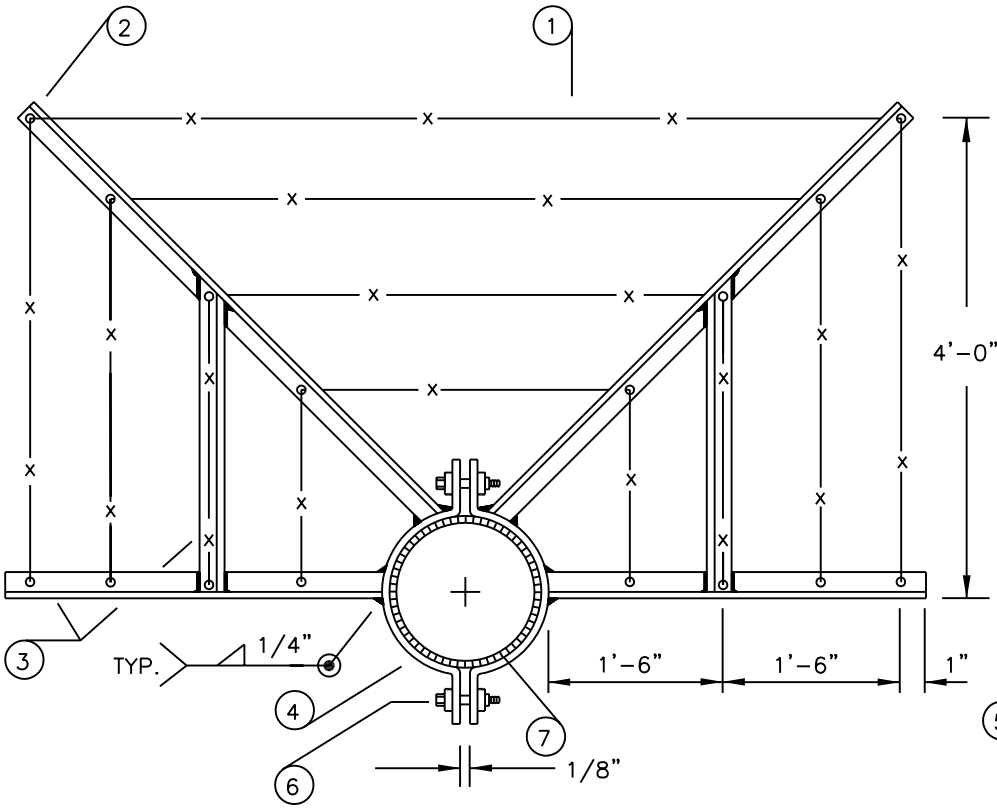
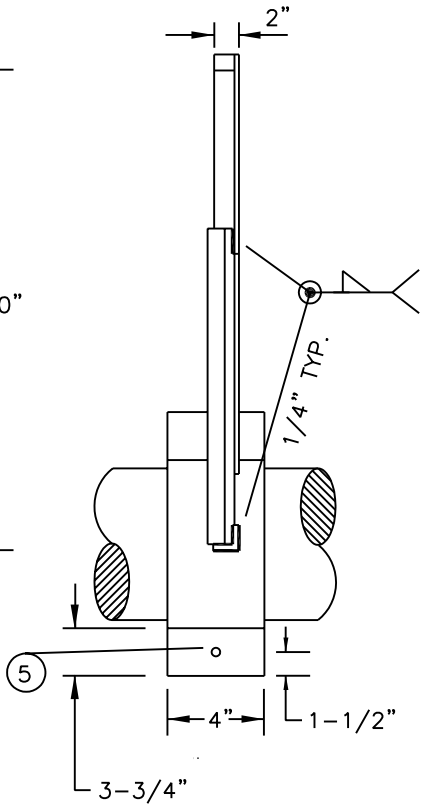
PW-137



FRONT ELEVATION



SIDE ELEVATION

NOTES:

1. Paint exposed metal.

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

(1) Wire (barbed wire 9" on center).
(2) Hole (3/8"ø holes – typical).
(3) Angle (2" x 2" x 1/4" 'L'– typical).
(4) Strap (4" x 1/4" steel – typical).
(5) Bolt Hole (5/8"ø bolt hole – typical).
(6) Bolt (1/2" bolt, nut & washer – typical).
(7) Felt paper (No. 15 building felt)

PIPE PROTECTION FENCE ASSEMBLY

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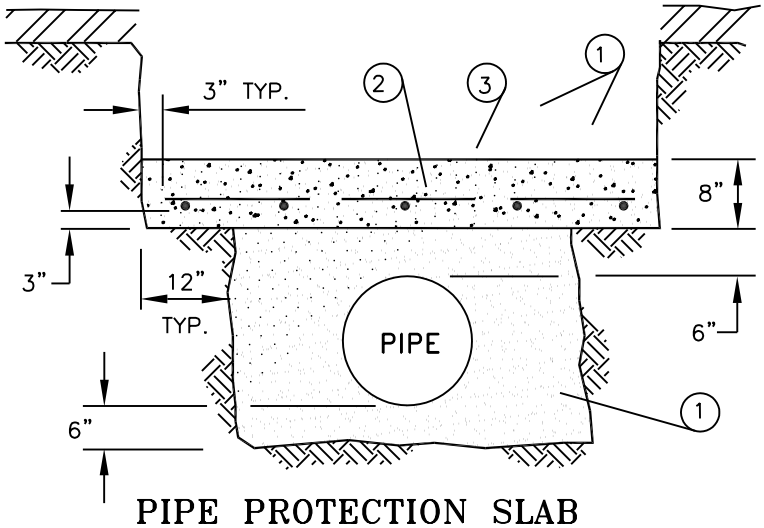
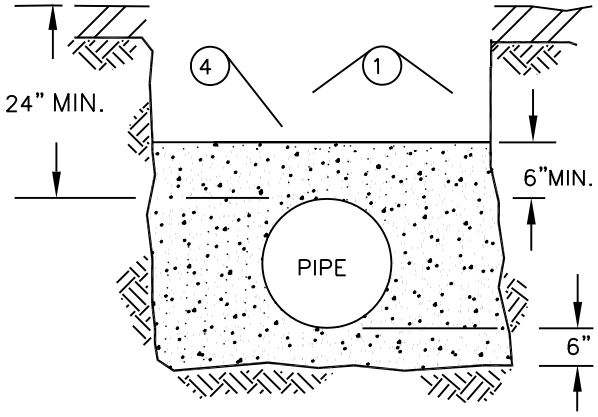
PRINCIPAL ENGINEER _____ DATE _____

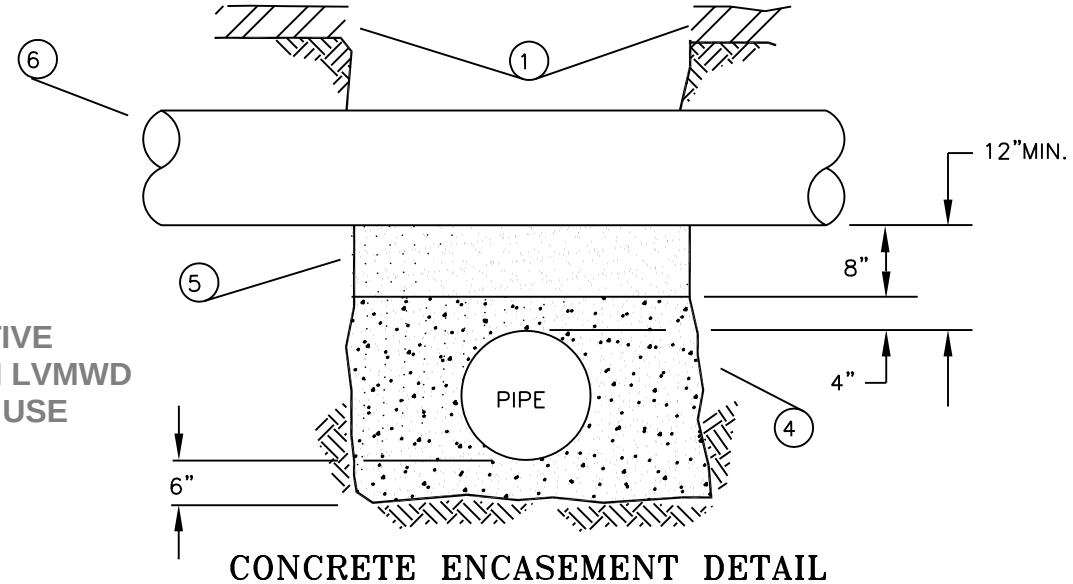
PW-138



PIPE PROTECTION SLAB
FOR LESS THAN 3' OF COVER



CONCRETE ENCASEMENT DETAIL
FOR LESS THAN 3' OF COVER



CONCRETE ENCASEMENT DETAIL
UNDER STRUCTURES

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Class "B" concrete. Length of concrete pad to extend at level grade to 1' beyond point at which pipe cover exeeeds 3'.
2. Sand to have a sand equivalent of more than 50 (per ASTM D2419).

(1) Backfill (refer to Standard Drawing PW-101 for specifics).
(2) Rebar (No. 5 bars at 12" on center each way or special design).
(3) Concrete Slab (class "B" concrete)
(4) Concrete Encasement (class "B" concrete)
(5) Sand (see Note No. 2).
(6) Structure (refer to Standard Drawings PW-101 & PW-102 for specifics).

PIPE PROTECTION SLAB AND CONCRETE ENCASEMENT DETAIL

REVISIONS			
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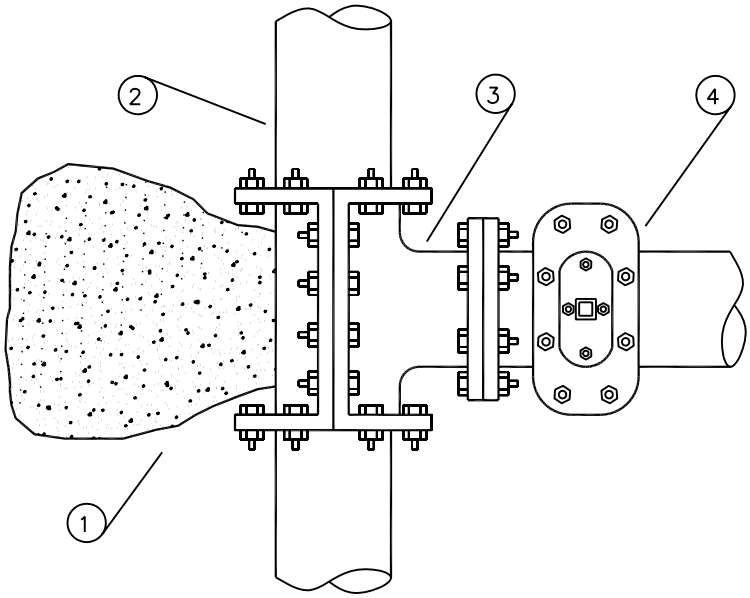
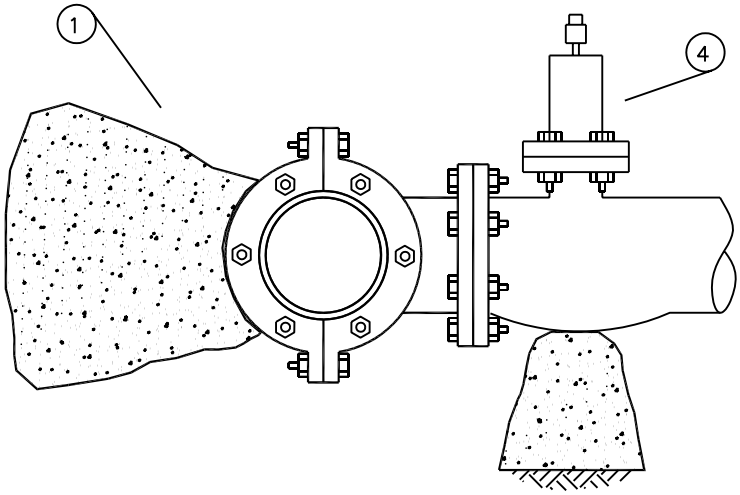
PRINCIPAL ENGINEER _____ DATE _____

PW-139



PLAN



ELEVATION

TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

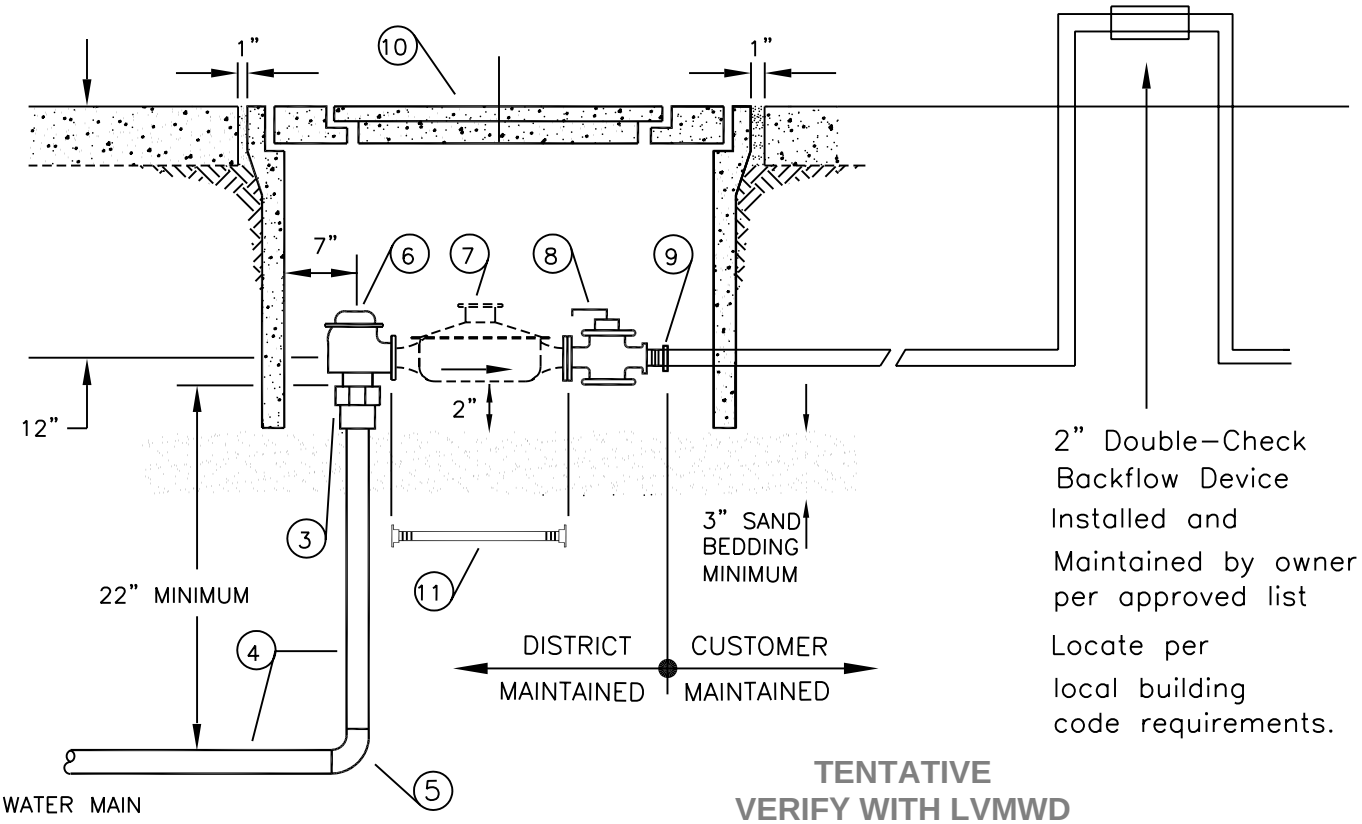
1. Thrust Block (refer to Standard Drawing PW-133 for specifics).
2. Existing Pipe
3. Tapping Sleeve (refer to Section 1.5).
4. Valve

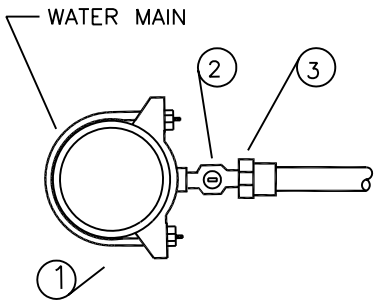
MECHANICAL JOINT TAPPING SLEEVE

REVISIONS			
NO.	BY	DATE	APRVD.

PRINCIPAL ENGINEER _____ DATE _____

PW-140





TENTATIVE
VERIFY WITH LVMWD
BEFORE USE

NOTES:

1. Refer to Section 1.10 for materials specifications.
2. No intermediate joints permitted without approval of LVMWD. Service lines to receive backfill of imported sand within pipe zone (refer to Standard Drawing PW-101 for specifics).
3. Spacer length: 2" meter 2" x 10"

(1) Service Saddle (refer to Standard Drawing PW-120 for connection to steel main).
(2) Corporation Stop (install with key on side and open position, unless otherwise directed).
(3) Adapter
(4) Service Tubing (see Note No. 2).
(5) 90° Ell
(6) Angle Meter Stop Valve
(7) 2" Meter (will be installed by LVMWD). **160 Gallons per Minute - Maximum**
(8) Customer Handle Valve
(9) Nylon Bushing
(10) Meter Box (refer to Section 1.10-4 and Standard Drawing PW-127 for specifics). ⚠1
(11) Meter Spacer (PVC Schedule 80 will be installed by contractor; see Note No. 3).

2" Meter Installation for Residential Fire Protection (MAXIMUM WORKING PRESSURE 225 psi)

REVISIONS			
NO.	BY	DATE	APRVD.
⚠1	OB	10-1-03	J.V.

ORIGINAL SIGNED BY BRIAN WHITAKER
PRINCIPAL ENGINEER

08/13/01
DATE

PW-2DC