

## **DIVISION VII DESIGN STANDARDS**

### **Section 7.01 General Statement**

The California Waterworks Standard Requirements for Water Distribution Systems establish the minimum acceptable standards for design and construction of water distribution systems within the Squaw Valley Public Service District. See Code of Regulations Title 22 Division 4 Environmental Health Chapter 16. [Amended by Ord 99-01, amended Ord 2007-04]

### **Section 7.02 Plans by Registered Civil Engineer**

Any plans submitted for approval under the provisions of this Chapter shall be prepared by or under the direction of and shall be signed by a Registered Civil Engineer of the State of California.

### **Section 7.03 Water Facility Plans**

A. Before a Permit may be issued, plans for the proposed construction shall be submitted to and approved by the District. The plans submitted shall become the exclusive property of the District.

B. After the fees required by this Chapter have been paid, the District shall check the submitted plans for compliance with the requirements of this Chapter and other applicable laws and ordinances of the city, county, state and other governmental entities. See 7.01 General Statement, above.

C. The plans submitted shall be identical to plans for the same project submitted to the city, county or other governmental entity. The District shall be notified of any changes in the plans. Any changes in the plans must be checked and approved by the District prior to the issuance or modification of the water permit and shall be subject to Division VI concerning plan checking fees.

D. All structures, facilities, and other appurtenances shown on the plans shall comply with all applicable District standards including, but not limited to, design.

E. The plans submitted shall be adequate for the District to determine the proposed demand to be placed on the District's water system. The plans submitted shall be adequate for the District to calculate the applicable fees and charges.

### **Section 7.04 Water Line Easement Requirement**

A person who wishes to have constructed a water line in an easement under the provisions of this Chapter shall present to the District a request for processing, sufficient information to enable the preparation of a written description, the appropriate fees, and plans showing the locations of all structures in the proximity of the proposed water line.

The location and dimensions of water line easements shall be sufficient to provide present and future water service to abutting areas and adequate access for maintenance, as determined by the District. No easement shall be less than ten feet in width.

Until the required easements have been properly executed and recorded, no plan shall be approved by the District for construction of water lines across private property and no water line shall be accepted for public use or placed in use by any person.

#### **Section 7.05 Bench Marks**

A system of benchmarks on the U.S.C. & G.S. Sea Level Datum of 1929 and adequate to construct the work shall be shown on the drawings.

#### **Section 7.06 Exception May Be Granted**

If a literal compliance with any engineering requirements of this Chapter is impossible or impractical because of peculiar conditions in no way the fault of the person requesting an exception, and the purposes of this Chapter may be accomplished and public safety secured by an alternate construction or procedure, and the District Manager so finds that such alternate complies with sound engineering practice, he may grant an exception permitting such alternate construction or procedure.

#### **Section 7.07 Water and Sewer Separation**

Water and sewer connections to District mains shall be separated so that no potential cross connection exists. Water connections shall be a minimum of 12 inches above the top of the sewer service lateral with a horizontal separation of two (2) feet minimum between the two pipes. If the vertical and horizontal separations cannot be met as stipulated, a horizontal separation of ten (10) feet shall be required. Water and sewer line crossings on the applicant's property shall have a vertical separation of three (3) feet minimum between the bottom of the water line and the top of the sewer service lateral (water line on top). If the clearance is less than three (3) feet, the sewer shall be encased in a concrete envelope for a distance of five (5) feet on each side of the water line, measured at right angles from the outside of the water line. The concrete encasement shall provide a minimum of six (6) inches of cover around the periphery of the sewer line. The alternative to this section is the acceptable practice of the State of California, Department of Health Services Standards.

#### **Section 7.08 Record Maps**

Two sets of blue line prints and one set of reproducible drawings delineating a record of water lines and appurtenances shall be filed with the District prior to and as a condition of approval and acceptance of construction. No final inspection will be issued until record maps have been filed with the District.

## Section 7.09 Standards of Design

**A. General.** These design standards are meant to coordinate with the requirements set by the National Bureau of Fire Underwriters and the State of California, and other regulatory agencies to permit the use of sound engineering judgment in the design of water distribution systems.

The District will require that a review for adequacy of design be made on water distribution systems to be constructed within the District. Sufficient design data and construction details shall be made available to the District to permit determination of completeness of design by the District.

### **B. Water Demands.**

1. **Average** water demands on a population basis shall provide at least 100 gallons per day per capita. For residential areas at least 3.5 people shall be assumed to live in a house. For areas other than residential, such as business, commercial, or industrial areas, the average water demand may be derived based on expected populations or on an area average water use for that type of development.

2. **Peak Demands.** Peak water demands for normal service shall be at least equal to the following percentage of yearly average demands:

Average of peak month	150%
Average of peak day	200%
Average of peak hour	300%

3. **Fire Flow Demands.** Fire flow demands shall be calculated in accordance with the 1988 Uniform Fire Code or most recent revision thereof. These flows shall be assumed to occur simultaneously with the average flow of a peak day.

### **C. Fire Hydrants.**

1. **Fire hydrant spacing** shall conform to the requirements set by the N.B.F.U. and shall be at least:

Maximum distance between fire hydrants along one street                      500 feet

Maximum area covered by one fire hydrant    120,000 square feet

In the higher value areas of multi-family residential and commercial development the requirements shall be generally higher than those shown above.

2. All fire hydrant connections to the water main shall be of 6 inch diameter. Each hydrant connection shall include a gate valve of the same size as connection piping. Shut-off valves for fire hydrants shall be located in accordance with detail W-04. Hydrants shall be protected with two six inch (6") concrete filled standard steel guard posts set in concrete and extending 3 feet above the street or ground level. Posts and hydrants shall be painted as directed by the District. The location of hydrants, distance from edge of paving, and height above finished grade shall be approved by the District. It is the intent that all hydrants be accessible for snow removal, be located so that the hydrants are not buried during snow removal. [Amended by Ord. 99-01]

**D. Line Pressure Requirements.** Distribution system piping shall be designed to supply the required peak flow quantities and to maintain the following pressures at the water main in the street.

<u>Flow Condition</u>	<u>Minimum Pressure-psig</u>	<u>Maximum Pressure-psig</u>
No flow	--	150
Normal peak flows	35	125
Hourly peak flows	30	125
Fire demand flows	20	125

**E. Distribution System Piping** should be adequately looped to avoid dead end connections. In general, minimum pipe sizes should be:

Smallest pipe in gridiron (limited service only)	4-inch
Smallest dead end pipe	6-inch
Largest spacing of 6-inch grid	800-feet
Smallest pipes in high-value districts	8-inch

**F. Gate Valves** shall be provided as required to adequately regulate water flow. In the distribution system three valves should be provided at crosses and two at tee connections. Maximum spacing between valves should be 800 feet on long branches and 500 feet in any high-value districts.

**G. Service Connections.** The size of the water service connection shall be not less than one inch (1") nominal size for residential use. Actual size shall be determined by total water flow requirements and main pressures in order to maintain adequate service pressure. The water service connection shall be equipped with a ball curb stop valve at the property line with a meter box. A corporation stop shall be directly connected to the water main. Where property will be served by two or more water service connections from different street water mains, but from one source of supply, each service connection shall be equipped with a single check valve to prevent inter-street flow. [Amended by Ord. 99-01]

**H. Pressure Reducing Stations.** In regions where ground elevations differ greatly, pressure reducing valves shall be used to reduce excessively high pressures in water distribution mains. Normal operating water main pressures should be in the range of 35 to 60 psig with maximum limitations as given herein. Pressure zones have been established by the District and shall be followed in new system design.

1. Wherever feasible, pressures in any water main shall be maintained below maximum

limitations. Where pressures in a transmission main must be greater than the above-mentioned limits, any taps into this main shall be followed by a pressure reducing valve installation designed to reduce the line pressure to a reasonable operating pressure. For individual service taps to a high pressure main, a pressure reducing valve shall be installed inside the serviced structure and shall be adequately protected from frost damage.

2. A pressure reducing station shall be used to reduce line pressures on any branch service main 4 inches or larger connecting to a main exceeding the pressure limitations. The pressure reducing station shall consist of at least two pressure reducing valves so sized to pass minimum and maximum flows. The pressure reduction valves and appurtenances shall be enclosed in a concrete vault with ready access and shall be protected against frost damage.

**I. Booster Pump Stations.** Wherever, due to high ground elevations, adequate water service to a region cannot be obtained from existing water main pressures, a booster pump station and storage tank shall be installed. The system shall take suction from the low elevation service water main and discharge water at pressures sufficient to serve the high elevation ground. Installed pump capacity shall consist of at least two pumping units with sufficient capacity to pump the expected maximum peak flows with the largest pumping unit out of service. The station may be constructed above or below ground surface. [Amended by Ord. 94-04]

The pumping installation shall comply with recognized standards of design and construction. The entire installation shall be adequately housed and protected against possible damage by weather.

## **J. Water Pipe.**

**1. Pressures.** All water pipes and fittings used in water distribution mains shall be designed for the pressure transmitted to them. The minimum class of pipe used shall be for 150 psi pressures.

### **2. Plastic Pipe - Polyvinyl Chloride.**

a. All plastic water pipe shall be polyvinyl chloride (PVC). PVC C900 shall conform to ANSI/AWWA Standard C900. The Class shall be as specified by a Licensed Civil Engineer. Pipe shall conform to the requirements of National Sanitation Foundation Standard No. 14. [Amended by Ord. 99-01]

### **3. Ductile Iron Pipe.** Ductile iron pipe shall conform to the following:

a. AWWA C104: Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

b. AWWA C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

c. AWWA C115: Flanged Ductile-iron Pipe with Threaded Flanges.

- d. AWWA C150: Thickness Design of Ductile-Iron Pipe.
- e. AWWA C151: Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.

Unless otherwise noted or required, pipe wall thickness for push-on joint and mechanical joint pipe shall be Pressure Class 350 psi for pipe 12 inches and smaller, and Pressure Class 250 for larger pipe.

Unless otherwise noted, all pipe shall have a cement mortar lining with asphaltic seal coat.  
[Amended by Ord. 99-01]

**4. Ductile Iron Fittings.** Fittings and specials shall be ductile iron and shall conform to the following standards as applicable:

- a. AWWA C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- b. AWWA C110: Ductile-Iron and Gray Iron Fittings, 3 inch through 48 inch for Water and Other Liquids.
- c. AWWA C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- d. AWWA C153: Ductile-Iron Compact Fittings, 3 inch through 24 inch and 54 inch through 64 inch for Water Service.

Unless otherwise noted or required, either standard or compact fittings may be used.

Unless otherwise noted, all fittings shall have a cement mortar lining with asphaltic seal coat. [Amended by Ord. 99-01]

5. Pressure Pipe Fittings shall conform to either AWWA/ANSI Standard C110/A21.10 or AWWA/ANSI Standard C153/A21.53.

## **K. Valves.**

**1. Main Line Gates Valves.** All main line gate valves on distribution mains shall be in accordance with AWWA C500-86. Gate valves shall be epoxy coated resilient seat with mechanical joint for connection to PVC C-900 pipe. Construction shall be iron body, non-rising stem with 2" operating nut, turn counter-clockwise to open, as manufactured by Mueller Model A-2360, Waterous Model AFC-2500 or approved equal. [Amended by Ord. 99-01]

**2. Valve Boxes and Vaults.** Valve Boxes and Extensions shall be precast units, Christy G5, or approved equal. Lid shall be of cast iron construction marked "WATER" unless specified otherwise on the plans or elsewhere herein. Extensions to valve bonnet shall be provided.

All vaults shall be of reinforced concrete construction suitable for any vehicular loads transferred to it. All valve box caps shall be marked with the word "WATER," or a "W," and a suitable identification of the District. [Amended by Ord. 99-01]

**3. Air and Vacuum Release Valves** shall be installed in the water system at all points where it is indicated that air pockets may form. The design shall be such so as to insure the release of air automatically from the water main. These valves may also insure the entrance of air into the water main when the pressure inside the line is below atmospheric pressure. All valves shall be designed to withstand operating line pressure and for a minimum of 150 psi operating pressure. The inlet to each valve shall be provided with a ball curb stop valve to provide a positive closure between the main and the air and vacuum release valve. A recommended manufacturer would be APCO or approved equal. (See Detail W-07 & W-08 for installation.) [Amended by Ord. 99-01]

**4. Check Valves** shall set readily and completely to assure water tightness. The face of the closure element and valve seat shall be bronze, composition, or other non-corrodible material which will seat tightly under all prevailing conditions of field use.

Slow-closing check valves shall be used where excessive pressures or water hammer may occur, and the static operating pressure is within 20 percent of the pressure class or rating of the pipe. All check valves, 4-inch and larger in size for use on distribution mains, shall be designed for a minimum of 175 psi cold water working pressure.

**5. Flush outs (Blowoffs)** shall be a minimum outlet size of 2 inches, shall be designed for a minimum operating pressure of 150 psi, and shall be installed at the terminus of all dead-end water mains or non-circulating flow water mains and at low points in the distribution system piping where sediment could collect. (See Detail W-05 for installation.)

**6. Pressure Reduction Valves.** Valves used in pressure reduction installations shall automatically reduce the higher upstream pressure to a selected downstream pressure. Pressure reduction shall not be affected by flow fluctuations. The valves may or may not incorporate a device for sustaining upstream pressure. The valves shall incorporate a pilot operated regulator capable of holding delivery pressures within two psig of the preset pressure. Pressure rating shall be equal or greater than the expected main pressure. Valve body and cover shall be of cast iron conforming to ASTM A-48 and main valve shall have a bronze trim conforming to ASTM B-61. Pilot control valve shall be of bronze conforming to ASTM B-61 with stainless steel trim conforming to AISI 303.

**L. Fire Hydrants.** All fire hydrants shall be of the "dry barrel" type, shall conform to AWWA C-502-85, where applicable, and shall be designed to transmit the pressures existing in the water main or a minimum working pressure of 150 psi. Hydrants shall have two 2-1/2 inch and one 4 1/2 inch National Hose Thread discharge ports and shall be Mueller Model A-423 Super Centurion 250 with a minimum 12-inch bury extension or Waterous Pacer #WB67-250 with 28" break-off top section approved equal. Installation shall be in accordance to Detail W-04. [Amended by Ord. 99-01; 2007-04]

**M. Pipe Fittings.** All pipe fittings shall comply with the requirements for Section J, "Water Pipe," in so far as these may be applicable.

**1. Cast-Iron Bell and Spigot Fittings** shall conform with either AWWA C100-55 or AWWA C110-52, or of the long radius type, in Class D, 173 psi water working pressure. Class D or Class 150 is the minimum class acceptable and all fittings shall be designed to safely transmit the actual water main working pressure. All cast-iron fittings installed below ground shall be lined and coated in accordance with Sections J.2.a. and J.2.b.

**2. Cast-Iron Flanged Fittings.** All cast-iron pipe flanges and flanged fittings shall conform to ASA B15-1. 1953. All cast-iron screwed fittings shall comply with ASA B16.5-1949. All cast-iron fittings installed below ground shall be lined and coated in accordance with Sections J.2.a. and J.2.b.

**3. Cast-Iron Rubber Ring Fittings.** All short-body cast-iron fittings 3-inch to 12-inch with bells to accommodate rubber rings shall conform with AWWA C110-52, except that the bells shall be modified for use with rubber ring type joints. All other cast-iron pressure fittings with bells to accommodate rubber rings shall conform with AWWA C100-55, except that the bells shall be modified for use with rubber ring type joint. The rubber ring used shall be designed for the particular type groove in the fittings. All cast-iron rubber ring fittings shall be provided with a reaction or thrust backing or a metal harness in accordance with Section P.6.

The rubber ring recess shall be free of all coating runs and sand pits. All cast-iron rubber ring fittings shall be lined and coated to conform with Sections J.2.a. and J.2.b.

**N. Concrete and Cement Grout.**

**1. Cement.** All cement shall conform to ASTM C150-59.

**2. Sand.** All sand shall be fine granular material resulting from the natural disintegration of rock, and shall be free from injurious amounts of oil, mica, clay and other deleterious substances. Sand, when tested in accordance with Standard Method of Test, ASTM C117-49, shall not exceed three percent by weight of clay and silt.

**3. Rock and Gravel** for use in concrete shall be mechanically washed. It shall consist of gravel or a combination of gravel and sound crushed rock, having clean, hard, tough, durable and uncoated pieces, free from injurious amount of soft, friable, thin, elongated, or laminated pieces, alkali, oil, organic, or other deleterious substances.

**4. Water** used for cement mortar or grout shall be clean and free from oil or vegetable matter.

**5. Concrete** used for thrust blocks shall develop an ultimate compressive strength of 2,000 psi at 28 days, in accordance with ASTM C39-56T. All Ready-Mix Concrete shall comply with ASTM C94-58.

**6. Cement Mortar** used for lining pipe and fittings shall develop an ultimate compressive strength of 3,000 psi at 28 days, in accordance with ASTM C39-56T.

#### **O. Water Service Connections.**

**1. All threads** for underground service line fittings and materials for these fittings, corporation and meter stops shall comply with AWWA C800-05 [Amended by Ord. 2008-01]

**2. Connection Pipe.** All 1 inch water service connections may be Type "K" seamless copper water tubing, soft annealed or iron pipe size (IPS) Class 200 polyethylene (PE) pipe. Construction shall be in accordance with Detail W-09, W10 and W-11 as specified herein, and as directed by the Engineer. [Amended by Ord. 2008-01]

All 1-1/2 inch and larger water service connections may be Type "K" copper tubing or IPS Class 200 PE pipe. Construction shall be in accordance with Detail W-12 as specified herein, and as directed by the Engineer. [Amended by Ord. 2008-01]

**3. IPS PE Pipe.** IPS PE pipe shall comply with AWWA C901-02, ASTM D-2239, pressure Class 200. [Amended by Ord. 2008-01]

**4. Copper Pipe** shall be Type K seamless copper conforming to ASTM B42-58.

**5. Brass Pipe** for use in water service connections shall be seamless red brass conforming to ASTM B43-58.

~~**6. Cast Iron Pipe** for use in water service connections shall comply with Section J.2 and be protected in accordance with Section J.2.a and J.2.b. [Deleted by Ord. 2008-01]~~

**6. Corporation Stops** shall conform to AWWA C800-05 with male iron pipe (I.P.) thread inlet and outlet for copper or PE. All corporation stops shall have a pressure rating capable of transmitting the full pressure of the water in the distribution main. Corporation stops shall be Ford Ballcorp with Grip Joint connection, Mueller 300 ball type corporation valve with Mueller 110 compression connection, or approved equal. Female I.P. threads may also be used with the appropriate compression adapters. [Amended by Ord. 99-01; 2008-01]

**7. Ball Valve Curb Stops.** All ball valve curb stops shall conform to AWWA C800-05, with inlet to match water service pipe material. All ball valve curb stops shall be ball valve Mueller 300 Ball Curb Valve with Mueller 110 compression connection, Ford Ball Valve Curb Stops with Grip Joint connection, or approved equal. Female I.P. threads may also be used with the appropriate compression adapters. [Amended by Ord. 2008-01]

~~For 1-1/2 inch and 2 inch service, bronze ball curb stop valve, or AWWA gate valve (minimum of 200 psi rated working pressure) may be used. Inlet and outlet shall be copper service pipe thread, or I.P.S. thread. All valves shall be hydro-tested to 300 psi or air-tested to 100 psi under water.~~ [Amended by Ord. 94-04 and 99-01, deleted by 2008-01]

**8. Gate Valves.** All gate valves shall comply with AWWA C509-02 and shall be of the same construction as main line gate valves. Gate valves shall be Mueller 2360 Series, or approved equal. [Amended by Ord. 99-01; 2008-01]

**9. Standard Service Saddles** shall be ductile iron construction; epoxy coated with stainless steel band and bolts and conform to AWWA C800-05. Service saddle outlet thread shall be I.P.S. thread. Service saddles shall be Ford Style FC202, Smith Blair 317, or approved equal.

Connection of services to existing mains shall be done only after such services have been tested, disinfected and accepted. [Amended by Ord. 94-04, 99-01, 2008-01]

**11. Repair Service Clamp.** A repair service clamp shall be used only as directed by the District. [Amended by Ord. 99-01]

**12. Copper Tubing Fittings** shall comply with one of the following types: Bronze or brass, fittings with compression-type joints; or bronze or brass fittings with solder-type joints. All solder shall be "silver" or "hard" type, no "50-50" or "soft" type. (No use of solder containing lead is permitted.) [Amended by Ord. 99-01]

All compression type fittings used on copper tubing shall have all bronze or brass parts.

## **P. Water Pipe Installation.**

**1. Trench Excavations** shall be in accordance with excavation and/or encroachment permit and details W-01, W-02 & W-03 specified herein.

**2. Pipe Depth.** All water mains shall be installed so that the top of the pipe is not less than the depth of maximum frost penetration or three and one-half (3-1/2) feet, whichever is greater, below the surface of the ground.

**3. Material Handling.** All handling of materials, laying, blocking and joining cast-iron pipe shall be in accordance with AWWA C600-54T. All other pipe materials shall be handled, laid, blocked, and joined in accordance with current manufacturer's recommendations.

**4. Backfilling and restoration** of surface material removed for trenching shall be, in general, in accordance with the excavation and/or encroachment permit. With no excavation and/or encroachment permit the following specifications shall be followed:

a. Backfill material:

Class 1: Clean unwashed gravel or crushed rock, free of organic matter or loam, conforming to the following gradation:

<u>Sieve Size</u>	<u>Percentage Passing*</u>
1 inch	100
3/4 inch	90-100
3/8 inch	30-75
#4	10-50
#8	0-30
#30	0-10

Sand equivalent not less than 20.

\*Percentage composition by weight as determined by laboratory sieve analysis.

Class 2: Select excavated native material, uniformly graded, free of organic matter, debris, clay and sod. Maximum particle size shall not exceed 3 inches in greatest dimension. Sand equivalent shall not be less than 15. Any material deemed unsuitable by the Engineer shall not be used.

Should sufficient suitable select material not be available from the construction excavation, additional select material as required shall be imported from approved borrow areas obtained by the Contractor.

Class 3: Native material from the excavation, free of rocks exceeding 3-1/2 inches in greatest dimension, organic matter, debris, clay and sod. Any clay-type material that may be encountered that is deemed unsuitable by the Engineer shall not be used.

Aggregate Base: Class 3, 3/4 inch maximum grading, as specified in Section 26 of the State Standard Specifications.

1. Installation:

The trench must be dewatered and maintained in a dry condition until the pipe has been installed and all joints completed.

Each length of pipe shall be laid on a firm bed and shall have true bearings for the entire length between bell holes. The manufacturer's recommendations for assembling pipe sections and completing joint protection will be enforced.

A copper tracer wire minimum 10 gauge shall be installed with all non-metallic water mains. Wire shall be properly connected for electrical continuity by silver soldering or other approved means. After installation, wire shall be "rung out" to test the continuity of the complete installation. All water mains shall have a minimum 3 inch wide metallic warning tape marked "Buried water line below" placed in the trench above the bedding material. [Amended by Ord. 99-01]

Every precaution shall be taken to prevent foreign material from entering the pipe. Whenever pipe laying is discontinued for short periods or at the end of the work day, the open ends of the pipe shall be closed with a watertight plug or bulkhead. The plug or bulkhead shall not be removed unless the trench is dry.

After installation, all ferrous metal items not protected by factory applied protective coatings, or where such coatings have been damaged, shall be adequately painted with a protective paint, Koppers "50," Scotch Clad 244, or approved equal.

Prior to testing, all pipe shall be properly backfilled to a minimum depth of 12 inches above the top of the pipe.

Cleaning, disinfection, testing and other related items shall be in accordance with specifications elsewhere herein.

The type and gradation of material and the relative compaction thereof shall be as specified on the excavation and/or encroachment permit or on detail W-01 or W-02 incorporated herein.

Bedding material shall be placed for the full width of the trench and raked to grade ahead of the pipe laying operation to the depth as shown on the plans. Bedding shall be excavated at bell or coupling to allow full length of pipe to bear on bedding.

The pipe zone shall be considered to extend 12 inches above the top of the pipe and for the full width of the trench. The Class 1 pipe zone material shall be placed simultaneously on both sides of the pipe in lifts not to exceed 6 inches, except the lift from the top of the pipe to the top of the pipe zone which shall be placed in a single lift. Each lift shall be compacted by approved methods to the density specified. Particular attention shall be paid to the underside of the pipe to provide a solid backing and to prevent lateral movement during the final backfilling procedure. [Amended by Ord. 94-04]

Class 1 and Class 3 material placed above the pipe zone or adjacent to structures shall be placed in lifts not exceeding 8 inches in depth, except in areas where shown otherwise on the plans. Each lift shall be compacted by approved methods to the density specified. In trenches under or near structures where other specific material is specified, or where additional compaction is required, the backfill material above the pipe zone and the compaction requirements therefor shall conform to the specifications for the other specific material.

Prior to and during the compacting operations, the material in each lift shall have the moisture content necessary to provide the specified density. Insofar as possible, required moisture will be added to the material before placement. Moisture shall be added in such a manner so as to be uniformly distributed throughout the material.

Prior to and during the compacting operations, the material in each lift shall have the moisture content necessary to provide the specified density. Insofar as possible, required moisture will be added to the material before placement. Moisture shall be added in such a manner so as to be uniformly distributed throughout the material.

Compaction equipment shall be approved by the Engineer, of suitable type and adequate to obtain the densities specified. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations. Equipment shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort.

If it can be satisfactorily demonstrated to the Engineer that an alternative method of placing the backfill meets all requirements, other than the layer thickness, the Engineer may permit the alternative method. Under no circumstances will the alternative be allowed unless the Engineer's approval is obtained in writing. If ponding and jetting is permitted, the work shall be performed in such a manner that water will not be impounded. Ponding and jetting methods shall be supplemented by the use of vibratory or other compaction equipment when necessary to obtain the required compaction.

Backfill material shall not be placed until the pipe, structure or appurtenance has been inspected by the Engineer and approved for backfilling. Any backfill that may be placed prior to such inspection and approval shall be removed as directed at no cost to the District.

c. Backfill Testing:

All materials testing will be done in conformance with the following test methods:

<u>Tests</u>	<u>Test Method No.</u>
Relative Compaction	ASTM D-1557 & 1556, Ca.216 & 231
Sand Equivalent	Calif. 217
Resistance (R-Value)	Calif. 301
Sieve Analysis	Calif. 202

**5. Thrust Devices.** A reaction or thrust backing shall be installed at all rubber-ring valves and at all rubber-ring fittings; at all caulked elbows and bends of more than 5 degrees in the horizontal plane, under a maximum static pressure of 200 psig. On slopes or at higher static pressure, thrust devices shall be installed in accordance with design data and plans submitted to the Engineer. (See Detail W-01 for standard thrust block sizes under optimum native conditions.)

A reaction or thrust device shall be provided on all caulked tees and crosses having one or more openings plugged and on all dead ends except welded steel pipe. The size and shape of the thrust device shall be designed to prevent movement of the water mains when subjected to the maximum hydrostatic test pressure. Thrust devices shall be cast-in-place concrete, metal harness, or other suitable devices. If the thrust exceeds the bearing value of the surrounding soil, the soil shall be pre-compacted before placing concrete. To ensure against lateral movement of the water main and/or valve or fittings where a change in direction of the water main is made by the use of such fitting, a metal harness of tie rods and pipe clamps may be used, except for pipe having rubber-ring type joints. Steel tie rods and pipe clamps shall be galvanized or otherwise rust-proofed or painted.

**6. Water Main Testing.** The section of water distribution mains shall be tested to a minimum hydrostatic pressure of 50 psi greater than the design pressure or pipe class. Class 150 pipe shall be tested to a minimum of 200 psi. The duration of the test shall be a minimum one hour. All water mains with cement joints shall not be tested until 36 hours after the joint has been made.

Before applying the hydrostatic pressure, all entrapped air shall be thoroughly bled off. For all types of water mains there shall be no visible leakage at any joint or section of pipe and the allowable leakage for the total length of all water mains under test shall not exceed that amount specified in AWWA C600-54T.

All tests shall be made only in the presence of an authorized representative of the District and no joint, valve or fitting shall be completely backfilled until it has been inspected, tested, and approved.

When it is necessary to backfill the ditch as soon as the water main is laid, the authorized representative of the District may permit the backfilling to be completed prior to testing and disinfecting. If the pipe then tested exceeds the allowable leakage, the pipe must be uncovered, repaired and tested until it meets the allowable leakage.

After installation of all thrust blocks, the minimum elapsed time before testing shall be 36 hours for high-early-strength concrete and 7 days for Class B concrete.

No pipe installation will be accepted if the leakage is greater than that determined by the formula:

15 gallons x pipe diameter in inches x length of pipe in miles x period of test time in days

[Example: 15 gallons x 6" x  $\frac{600 \text{ feet pipe}}{5280 \text{ ft/mile}} \times \frac{3 \text{ hours}}{24 \text{ hr/day}} = 1.27 \text{ gal.}$ ]

[Amended by Ord. 94-04]

**7. Water Main Disinfection.** All new or repaired water mains, before being placed in service, shall be completely disinfected in accordance with AWWA C601 and any additional requirements, if required, by the District. Any other disinfecting procedure, if approved by the District, may be used. Water used for disinfecting shall be potable and contain a minimum residual chlorine content of 10 ppm after standing 24 hours in the pipe. The water mains shall be thoroughly drained and flushed before being placed in service. [Amended by Ord. 99-01]

All open ends of all water mains being installed shall be properly covered at the end of each day's work to prevent the entry of foreign matter, animals or debris.

## Q. Storage Facilities.

**1. Design.** All steel tanks, standpipes, reservoirs, and elevated tanks for water storage shall comply with AWWA D100 or A.P.I. Standards provided that they meet foundation and seismic requirements. [Amended by Ord. 99-01]

**2. Repairing.** All inspection and repairing of steel tanks, standpipes, reservoirs and elevated tanks for water storage shall comply with AWWA D102. [Amended by Ord. 99-01]

**3. Painting and Disinfecting.** All painting, repairing, and disinfecting of steel tanks, standpipes, reservoirs, and elevated tanks for water storage shall comply with AWWA D102. [Amended by Ord. 99-01]

**R. Water Wells.** Water wells shall be designed by a California Registered Civil Engineer and shall conform to California Well Standards Bulletin 74-81 and 74-90, and AWWA Standard A-100 and Detail W-14. A proposed water well must meet the approval of the California Department of Health Services and the Placer County Health Department. Water quality from a new water well must be in compliance with EPA Standards and meet all criteria set forth in Title 22 of the California Health Code. The location, design, and equipment for a new well shall be approved by the District Engineer and formally accepted by the District Manager and Board of Directors. [Added by Ord. 99-01; revised by Ord 2007-04]

**S. Electric Motors** shall comply with ASA C50, complete series.

**T. New Material.** The provisions of these Standards are not intended to prevent the use of any material or method of construction not specifically prescribed herein if such alternate is submitted to and approved by the District.

The District may approve such alternate if such alternate is found to be for the purpose intended and at least the equivalent of that prescribed in these Standards in quality, strength, sanitation, durability, safety and effectiveness.

The District may require the person seeking approval of such alternate to submit a description or sample of such alternate material, together with copies of technical reports, design data, reports of material and chemical analysis, or details of laboratory tests which have been performed, plus copies of all tests and approvals, if any, under AWWA, ASTM, ASA or other recognized standards.

#### **U. Tests.**

**1. All Tests** to determine compliance with any portions of these Standards shall be made within the continental United States.

If requested by the District, the results shall be certified by an established reputable materials testing firm and a copy forwarded to the District.

Any materials delivered to the job site and suspected of damage due to shipping and handling, if requested by the District, shall be tested again and the test results certified by an approved materials testing firm.

**2. Reclaimed Materials.** Any material that has been used or reclaimed may be reused only after it has been properly reconditioned so as to comply with the specifications for new material and has been retested satisfactorily in accordance with any such requirements of the specifications.

**STANDARD CONSTRUCTION DETAILS**

<b>PAGE</b>		<b>DETAIL</b>	<b>ADOPTED</b>
7-18	WATER MAIN TRENCH DETAIL	W-06	04-00-94
7-19	1" WATER SERVICE DETAIL (1 OF 3)	W-09	
7-20	1" WATER SERVICE DETAIL (2 OF 3)	W-10	
7-21	1" WATER SERVICE DETAIL (3 OF 3)	W-11	
7-22	BLOW-OFF VALVE	W-05	06-26-07
7-23	TYPE "I" RELEASE VALVE	W-07	04-00-94
7-24	TYPE "II" RELEASE VALVE	W-08	04-00-94
7-25	PLACER COUNTY - TRENCH RESURFACING SECTIONS	P-01	07-00-83
7-26	PLACER COUNTY - TRENCH EXCAVATION AND BACKFILL	P-02	07-00-83
7-27	THRUST BLOCK SCHEDULE	W-01	06-30-86
7-28	GATE VALVE DETAIL	W-02	06-30-86
7-29	STUB OUT & ANCHOR BLOCK	W-03	06-30-86
7-30	FIRE HYDRANT DETAIL	W-04	12-19-02
7-31	2" WATER SERVICE DETAIL	W-12	04-29-99
7-32	FIRE LINE DETAIL	W-13	06-26-07
7-33	STANDARD WELL DETAIL	W-14	06-26-07

[Amended by Ord. 99-01, 02-02, 2007-04]