

SCOTTS VALLEY WATER DISTRICT

SCOTTS VALLEY, CALIFORNIA

**STANDARD TECHNICAL SPECIFICATIONS**

FOR

INSTALLATION OF WATER MAINS

AND

APPURTENANCES

**REVISED** – August 1994

RESOLUTION NO. 20-84

STANDARD TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

**SECTION 1**

GENERAL PROVISIONS ..... 2

- 1.1 General.....2
- 1.2 Definitions..... 2
- 1.3 Drawings.....2
- 1.4 Rights-of-way..... 3
- 1.5 Licenses & Insurance.....3
- 1.6 Inspection ..... 3
- 1.7 Lines, Grades, and Measurements ..... 3
- 1.8 Authority of Engineer..... 4
- 1.9 Guarantee ..... 4
- 1.10 Standard Specifications .....4

**SECTION 2**

MATERIALS OF CONSTRUCTION ..... 5

**SECTION 3**

EXCAVATION.....6

- 3.1 General ..... 6
- 3.2 Trench Excavation.....6
- 3.3 Excavation to Grade and Below Grade..... 6
- 3.4 Bell Holes.....6
- 3.5 Blasting..... 6
- 3.6 Bracing and Shoring..... 7
- 3.7 Excavation in areas Paved with Portland Cement Concrete .....7
- 3.8 Protection of Other Utilities.....7
- 3.9 Safety.....8
- 3.10 Protection of Property..... 8
- 3.11 Disposal of Excavated Materials.....8
- 3.12 Bridge Over Trench.....8

**SECTION 4**

INSTALLATION OF CAST IRON PIPE.....10

- 4.1 Handling of Pipe and Accessories.....10
- 4.2 Hammer Test..... 10
- 4.3 Cleaning Pipe.....10
- 4.4 Pipe Joints..... 10
- 4.5 Laying Pipe..... 10

**SECTION 4 – Continued**

INSTALLATION OF CAST IRON PIPE – continued

4.6 Cutting Pipe. . . . .10  
4.7 Bell Ends to Face Direction of Laying . . . . .10  
4.8 Permissible Deflection at Joints. . . . .11  
4.9 Unsuitable Conditions for Laying Pipe. . . . . 11

**SECTION 5**

INSTALLATION OF STEEL PIPE. . . . . 12

5.1 Handling of Pipe. . . . . 12  
5.2 Placing Pipe in Trenches. . . . . 12  
5.3 Field Joints. . . . .12  
5.4 Field Alterations and Closures. . . . .12  
5.5 Welding. . . . . 12

**SECTION 6**

CORROSION MONITORING, DIP & STEEL PIPE. . . . .14

6.1 General. . . . .14  
6.2 Description. . . . .14  
6.3 Quality Assurance. . . . . 14  
6.4 Submittals. . . . . 14  
6.5 Test Stations. . . . .14  
6.6 Insulating Flange Joints. . . . .14  
6.7 Joint Bonding. . . . .15  
6.8 Testing. . . . . 15

**SECTION 7**

INSTALLATION OF APPURTENANCES. . . . .16

7.1 Installation of Valves. . . . .16  
7.2 Installation of Blow-Offs. . . . .16  
7.3 Installation of Air an Vacuum Relief Valves. . . . .16  
7.4 Installation of Fire Hydrants. . . . . 16  
7.5 Installation of Flexible Couplings. . . . . 17  
7.6 Installation of Customer Service Lines. . . . . 17  
7.7 Concrete. . . . .17  
7.8 Exclusion of Water. . . . . 17  
7.9 Pipe Locating Wire. . . . . 18

**SECTION 8**

BACKFILLING AND PAVEMENT REPLACEMENT..... 19

- 8.1 General.....19
- 8.2 Backfill of Trenches.....19
- 8.3 Pavement Repair..... 20

**SECTION 9**

CLEAN – UP OF SITE.....22

- 9.1 General.....22

**SECTION 10**

HYDROSTATIC TESTS..... 23

- 10.1 Pressure Test..... 23
- 10.2 Duration of Pressure Test.....23
- 10.3 Procedure.....23
- 10.4 Expelling Air Before Test..... 23
- 10.5 Examination Under Pressure..... 23
- 10.6 Leakage Test..... 23
- 10.7 Variation from Permissible Leakage.....24
- 10.8 Time for Making Test..... 24

**SECTION 11**

CONNECTION TO EXISTING MAINS AND DISINFECTION..... 25

- 11.1 Connection to Existing Mains..... 25
- 11.2 Disinfection of Mains..... 25

**SECTION 12**

INSTALLATION OF POLY VINYL CHLORIDE PIPE..... 26

DELETED

**SECTION 13**

INSTALLATION OF PIPE THROUGH CASINGS..... 27

- 13.1 Casing Applications.....27
- 13.2 Placement of Casings.....27
- 13.3 Placing Pipe Through Casings.....27
- 13.4 Pulling Pipe Through Casings.....27

**SECTION 13 – continued**

INSTALLATION OF PIPE THROUGH CASINGS – continued

13.5 Pushing Pipe Through Casings. . . . . 28  
13.6 Checking Coupling Rings. . . . . 28  
13.7 Backfilling Requirements. . . . . 28  
13.8 Method for Backfilling, When Required. . . . . 28

**SECTION 14**

PROTECTION OF PUBLIC WATER SUPPLY. . . . . 29

14.1 Authority. . . . . 29  
14.2 Approved Devices. . . . . 29  
14.3 Location. . . . . 29  
14.4 Dual Devices. . . . . 29  
14.5 Isolation. . . . . 29  
14.6 Responsibility. . . . . 29  
14.7 Type of Devices Required. . . . . 29  
14.8 Where Devices are Required. . . . . 30  
14.9 Abbreviations. . . . . 30

**SECTION 15**

CRITERIA FOR THE SEPARATION OF  
WATER MAINS AND SANITARY SEWERS. . . . . 31

15.1 Basic Separation Standards. . . . . 31  
15.2 Exceptions to Basic Separation Standards. . . . . 31  
15.3 Special Provisions. . . . . 31  
15.4 Sewer Force Mains. . . . . 32  
15.5 Alternate Criteria for Construction. . . . . 32  
15.6 New Sewer Being Installed – Drawings 16A and 17 A. . . . . 33  
15.7 New water Mains Being Installed – Drawing 16A and 17A. . . . . 34  
15.8 Notes and Definitions. . . . . 35

**MISCELLANEOUS**

Sample Insurance Forms. . . . . 36 & 37

## **SECTION 1**

### **GENERAL PROVISIONS**

**1.1 General.** These specifications are intended to cover the design and installation, complete in place, of water distribution facilities for the Scotts Valley Water District. When not otherwise defined, all work shall conform to the correct pipe manufacturer's installation guide.

**1.2 Definitions.** The word "District" as used herein, shall mean the Scotts Valley Water District. The word "Contractor" means the person, firm, company or corporation with whom the agreement is made by the District or its authorized agent. The word "Engineer" means the Water District Manager of the Scotts Valley Water District, acting personally or through the manager's authorized representatives. "Shall" is mandatory; "may" is permissive. "Provide" shall mean to provide, complete in place, that is "furnish and install".

**1.3 Drawings.** The following drawings show the standards as revised to be followed in the design and installation of mains and appurtenances. Prints of these drawings are attached and form a part of these specifications.

- 1-A Service Line to Main Connections
- 2-A ¾" and 1" Water Service Installation
- 3-A 1-1/2" and 2" Water Service Installation
- 4-A ¾" thru 2" Dual Branch Service Installation
- 4-B Multiple Services Manifold
- 4-C 4" Manifolded Meter Installation
- 5-A Chlorination Tap
- 6-A Below Grade Blow-Off Assembly
- 6-B Above Grade Blow-Off Assembly
- 7-A Air and Vacuum Release Blow-Off Assembly
- 8-A Backflow Prevention Device Installation
- 8-B Air-Gap Separation –  
Backflow Prevention Device Installation
- 9-A 4" and Larger Fire Service Installation
- 10-A Fire Hydrant Installation
- 11-A Gate Valve and Valve Box Installation
- 12-A System Connection
- 13-A Anchorage for Horizontal Elbows in Water Mains
- 14-A Concrete Cap
- 15-A Pipe Through Casing Installation
- 16-A Parallel Construction – Water and Sewer
- 17-A Crossings – Water and Sewer
- 18-A Standard Water Main Installation
- 19-A Tees, Crosses, Elbows and Valves Installation

- 20-A Joint Bonding Detail
- 21-A Dresser Coupling bonding Detail
- 22-A Insulating Flange Detail
- 23-A Bonding Detail for Valve
- 24-A Typical 2 Wire Test Station
- 25-A Test Station at Insulating Flange
- 26-A Thermite Weld Detail

Additional drawings showing the size, type, and location of mains to be installed and other pertinent details, will be prepared by the Scotts Valley Water District or, at the District's option and at the Contractor's expense, by a private engineering firm. These drawings shall be approved by the Engineer prior to the start of actual construction and will show the location of mains and details of construction as nearly as it is possible to determine in advance of construction.

1.4 Rights-of-way. Where the main location is not in public property, a right-of-way shall be obtained by the District or by the Contractor, at the option of the District, and the title shall be vested in the Scotts Valley Water District.

1.5 Licenses & Insurance. The Contractor performing the work shall possess such State or Local Contractor's Licenses as are required by law, and shall furnish satisfactory proof to the Engineer, upon request, that such licenses are in effect during the entire period of construction, and shall have demonstrated experience in underground pipeline construction. The Contractor must provide certificates of insurance for auto liability of no less than \$1 Million per occurrence, general liability of no less than \$1 Million/\$2 Million per occurrence/aggregate (the Scotts Valley Water District, its Officials, Officers, Employees, Agents and Volunteers are to be named as additional insured with the ISO CG 2010 endorsement form or equivalent), workers compensation (statutory limit), and employers liability of no less than \$1 Million. **No work shall commence until the Engineer has approved the Contractor and all subcontractors, and insurance submittals meet with the approval of SVWD legal counsel.**

1.6 Inspection. All work done under this agreement will be subject to rigid inspection. The Inspector shall have access to all parts of the work at all times. Work or material that does not conform to the specifications may be rejected at any stage of the work. The Contractor shall remove and rebuild, at the Contractor's own expense, any part of the work that has been improperly executed. The Contractor shall notify the Inspector not less than forty-eight (48) hours prior to commencement of work on the water system, and whenever work done under these specifications is to be done on Saturday, Sunday or on holidays, the Contractor shall pay all costs to the District of such extra inspection.

1.7 Lines, Grades, and Measurements. All lines, grades and measurements shall be established by the Contractor, subject to inspection, review and approval of the Engineer. A minimum of ten feet (10') of horizontal distance shall be maintained between sewer

and water facilities. Where the minimum distance cannot be maintained, special designs shall be prepared and approved by the Engineer.

1.8 Authority of Engineer. On all questions concerning the acceptability of materials or machinery, the classification of material, the execution of the work and conflicting interests of contractors performing related work, the decisions of the Engineer shall be final and binding on all parties.

1.9 Guarantee. The Contractor hereby guarantees that any work performed by the Contractor under the agreement will be performed in the best manner; that any material furnished by the Contractor will be the best of its class; and that both work and material will meet fully the requirements of these specifications. The Contractor hereby agrees that if, within a period of one year after final acceptance of any portion of the work done under the agreement, any part of said pipelines or other structures furnished and installed or constructed by the Contractor shall develop leakage at joints or shall fail otherwise to fulfill any of the requirements of the agreement, or should the pavement or ground surface over the trench be damaged due to settlement of the backfill or to poor material and/or workmanship, the Contractor will, without delay and with the least practicable inconvenience and without further costs to the District, repair and replace defective or otherwise unsatisfactory parts of said pipelines or structures or pavement, make additional fill if required, and repair any leaks found that are due to faulty construction of said pipelines or any of their appurtenances, all to the satisfaction of the Engineer. Furthermore, any damage claims based upon a failure of the aforementioned nature within the one-year guarantee period shall be borne entirely by the Contractor.

Should the Contractor fail to act promptly in accordance with this requirement, or should the circumstances of the case require repairs or replacement to be made before the Contractor can be notified or can respond to notification, the District may, at its option, make the necessary repairs or replacements or perform the necessary work, and the Contractor shall pay to the District the actual cost of such repairs plus standard overhead charges.

The Contractor shall be responsible for the full expense incidental to making good any and all of the above guarantees and agreements. The above guarantees and agreements are covenants, and performance of which shall be binding upon the Contractor and the Contractor's sureties.

1.10 Standard Specifications. The Standard Specifications are specific clauses setting forth the general requirements for contracting for work with the Scotts Valley Water District. The City of Scotts Valley, Department of Public Works—Standard Specifications are supplementary to the specifications and are incorporated herein by reference.

## **SECTION 2**

### **MATERIALS OF CONSTRUCTION**

The Contractor shall furnish all materials needed to complete all work indicated on the drawings and specifications. The materials shall be of the type, size, and class indicated on the drawings, and shall conform in all respects to the Scotts Valley Water District Standard Material Specifications, which are attached and hereby are a part of these specifications.

The Contractor shall furnish, without additional cost to the District, such quantities of construction materials as may be required by the Engineer for test purposes. The Contractor shall place at the Engineer's disposal all available facilities for, and cooperate with him in the sampling and testing of all materials.

## SECTION 3

### EXAVATION

3.1 General. The Contractor shall perform all excavation necessary or required for the construction of a pipeline and appurtenances covered by the project drawings and specifications. The excavation shall include the removal and disposal of all materials, of whatever nature encountered, including water and subsurface obstructions. No water mains shall be installed in the same trench with other utilities unless written approval of the Engineer is first obtained.

3.2 Trench Excavation. Excavation for the pipelines shall follow lines parallel to and equidistant from the location of the pipe centerline.

3.3 Excavation to Grade and Below Grade. Excavations shall be made to depths and widths required to accommodate construction of the pipeline and structures. The grades in general will be such as to provide a minimum depth to cover to finish grade of thirty-six inches (36") over the top of the pipe, unless otherwise shown on the drawings, and unless conditions develop in the field which require additional depth. A minimum of six inches (6") of vertical clearance shall be maintained between crossing utility lines.

Where material encountered at the bottom of the trench is found to be unsatisfactory, in the opinion of the Engineer, for properly supporting the pipe, the Contractor shall make further excavation to sound material and backfill in accordance with Section 8.2. Where the water main is installed in fill areas, the bottom of the trench shall have been compacted to a minimum of ninety percent (90%) relative compaction, as determined by California Impaction Compaction Test Procedures, before the pipe is installed. The trench shall be excavated to at least six inches (6") below the grade established for the bottom of the pipe in order that a uniform bearing base can be installed in accordance with Section 8.2. Upon approval of the Engineer, tunneling for short distances under existing facilities, sidewalks, and pavement will be allowed.

3.4 Bell Holes. Bell holes shall be excavated in the bottom of the trench at pipe joint locations, of such size that the process of making joints and inspection can be carried on satisfactorily so that the pipe barrel will bear evenly on the bearing base.

3.5 Blasting. No blasting will be permitted without the approval of the Engineer. When blasting is permitted, it shall be done only by skilled operators and under the direction of a competent foreman.

Blasting will be permitted only when proper precautions are taken for the protection of persons, the work, and existing structures. Any damage done to persons, private property, the work, or existing structures shall be the responsibility of the Contractor.

Storage, handling, and the use of explosives shall be in accordance with the Construction Safety orders of the Division of Industrial Safety, State of California.

Blasting shall be done with explosives of such power and in such quantities and positions as not to make the excavation unduly large, to shatter rock upon or against which embankments or concrete will be placed, to shatter the faces of cuts which are to remain open, or to injure masonry or other structures already built. Whenever, in the opinion of the Engineer, further blasting is liable to injure such rock or masonry, the Contractor shall cease blasting and continue to excavate the rock by other approved methods.

Excessive blasting or “overshooting” will not be permitted, and any material outside the authorized cross-section which may be shattered or loosened by blasting shall be removed and replaced with concrete or earth, as specified by the Engineer, at the Contractor’s expense. The Engineer shall have the authority to require the Contractor to discontinue any method of blasting which leads to overshooting or is dangerous to the public or destructive to property or to natural features.

Permits for blasting shall be obtained and paid for by the Contractor.

3.6 Bracing and Shoring. Excavations shall be adequately shored and braced so that the earth will not slide or settle, and so that all existing improvements of any kind will be fully protected from damage. Any damage resulting from lack of or inadequate shoring and bracing shall be the responsibility of the Contractor. The contractor shall effect all necessary repairs or reconstruction at the Contractor’s own expense, as directed by the Engineer, and shall bear all other expenses resulting from such damage. All shoring and bracing shall conform to the latest State of California Occupations Safety and Health Standards (CAL/OSHA).

3.7 Excavation in areas Paved with Portland Cement Concrete. Where excavation is located within the sidewalk area and the sidewalk is four feet (4’) or less in width, the entire sidewalk shall be removed and replaced. Where excavation is located within the sidewalk area and the sidewalk is more than four feet (4’) in width, it shall, in general, be removed and replaced to the nearest existing longitudinal groove or score located outside of the limits of the appropriate minimum excavation. In all sidewalk areas, the Contractor shall use a concrete saw to score the sidewalk, and it shall be neatly removed to such score. In any case, whether the alignment of the new excavation parallels or crosses the sidewalk, the limits of sidewalk removal and replacement will be designated by the Engineer.

Where the excavation is located within a street which is paved with concrete, a concrete saw shall be used to score the edges of the pavement six inches (6”) wider than the trench wide (3” on each side), and the concrete shall be neatly removed between these scores.

3.8 Protection of Other Utilities. If, during the progress, of the work, the Contractor encounters existing sewers, water mains, gas lines, power cables, or telephone cables

which require laying the new main line at a new grade, or require other minor alterations, such relaying or alterations will be made at no expense to the District.

The approximate location of all recorded underground utilities is shown on the drawings. Excavation and other work under or adjacent to sewers, water and gas services, conduits, and other structures, or appurtenances thereto, shall be prosecuted in such manner as not to interfere with their safe operation or use, and proper precautions shall be taken to prevent damage to them. Should any such structure or property be damaged during operations of the Contractor, the Contractor shall immediately notify the property owners or authorities and arrange for immediate repairs of the same at the Contractor's own expense. The exact location of underground utilities shall be determined by the Contractor sufficiently in advance of excavation so that the pipe alignment can be confirmed or rerouted without delay.

3.9 Safety. All safety orders, rules, and recommendations of the State of California, City of Scotts Valley, and County of Santa Cruz regulations applicable to the work to be done under this contract, shall be obeyed and enforced by the Contractor.

3.10 Protection of Property. The Contractor shall restore or cause to be restored all damaged property, including sidewalks; curbing; pipes; conduit; gas, water and other services; sewers; monuments; stakes; trees; shrubs and other plantings; and other public or private property to a condition as good as it was when the Contractor entered upon the work. The Contractor shall provide and maintain such fences, barricades, "Street Closed" signs, warning lights, and watchmen as may be required to provide safety against accidents to the public.

In no case shall the spacing between the warning lights be more than twenty-five feet (25') along the length of the trench where it is adjacent to or within the boundaries of a thoroughfare. No material or other obstruction shall be placed within fifteen feet (15') of fire hydrants. Convenient access to driveways, houses, buildings, sewer manholes, water main valves and gas main valves along the line of work must be maintained at all times. Temporary approaches to, and crossing of, intersection streets shall be provided and kept in good condition.

3.11 Disposal of Excavated Materials. The materials excavated from the trench shall be so placed as to offer minimum obstruction to traffic. Gutters shall be kept clear, or other provisions shall be made for handling street or road drainage. Excess material shall be disposed of by the Contractor at the Contractor's own expense and on the Contractor's own responsibility.

3.12 Bridge Over Trench. Foot bridges of approved construction, not less than four feet (4') in width, and provided with handrails and uprights of dressed lumber, shall be installed over the trench at all crosswalk, intersections, and at other points where, in the opinion of the Engineer, traffic conditions make it advisable.

Substantially constructed bridges, adequate for handling all vehicular traffic, shall be installed over the trench or other excavation in each street or road intersection, so as to provide a traffic lane extending over not less than one-half of the width of the street or road, wherever such excavation obstructs in excess of one-half of the width of the street or road crossing. Adequate bridges shall be provided to make possible the safe use of all garage driveways and other driveways or roadways used to move vehicles from the public street onto private property.

## SECTION 4

### INSTALLATION OF CAST IRON PIPE

4.1 Handling of Pipe and Accessories. Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe prosecution of the work. All pipe, fittings, and valves shall be carefully lowered into the trench, piece by piece, by means of a crane, ropes or other suitable equipment, in such as to prevent damage to water main material, protective coating, and linings. Under no circumstances shall water main materials be dropped off into the trench.

4.2 Hammer Test. Cast iron pipe and fittings shall be inspected for defects and, while suspended above grade, be rung with a light hammer to detect cracks.

4.3 Cleaning Pipe and Fittings. All lumps, blisters and excess coal tar coating shall be removed from the bell-and-spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean, dry and free from oil and grease before the pipe is laid.

4.4 Pipe Joints. Joints in straight runs of cast iron pipe shall be ring-tite (tyton) unless specified otherwise by the Engineer and must conform to AWWA E111/A-21.11, Sections 11-7 and 11-8. Joints at all fittings and valves are to be restrained joints, such as U.S. Pipe TR Flex, Flanged, or approved equal. **All fittings which pose a potential thrust direction change shall have concrete blocking installed per Section 7.0 of these specifications and appropriate drawings. NO EXCEPTIONS!** All joints are to be electrically bonded per Section 6 of these Specifications.

4.5 Laying Pipe. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe-laying crew cannot put the pipe into the trench and in-place without getting earth into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connections is to be made to the adjacent pipe. No debris, tools, clothing or other material shall be placed in the pipe and a visual inspection shall be made of each piece of pipe. At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a water-tight plug or other means approved by the Engineer. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

4.6 Cutting Pipe. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. The flame cutting of pipe by means of oxyacetylene torch shall not be allowed.

4.7 Bell Ends to Face Direction of Laying. Pipe shall be laid with bell ends facing in the direction of laying, unless directed otherwise by the Engineer.

4.8 Permissible Deflection at Joints. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstruction or to plumb stems, or where long-radius curves are permitted, the deflection shall not exceed the manufacturer's recommendation.

4.9 Unsuitable Conditions for Laying Pipe. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable.

## **SECTION 5**

### **INSTALLATION OF STEEL PIPE**

**5.1 Handling of Pipe.** Whenever a section of lined and coated or wrapped steel pipe is to be lifted or moved, it shall be handled in such a manner as not to distort the pipe excessively and/or damage the lining, coating or wrapping in any way.

Belt slings shall be used whenever coated pipe is to be lifted. The belts shall be so constructed that no metal bears against the pipe coating.

**5.2 Placing Pipe in Trenches.** The pipe shall be accurately laid to grades and alignments shown on the drawings. It is the intent of this specification that the pipe shall be installed as prefabricated in the shop by the manufacturer. If a discrepancy is discovered during installation between field conditions and the plans and specifications, the first attempt at conformity shall be to regrade the area in question before the pipe is altered in the field to meet ground conditions. In any case, the decisions of the Engineer shall be final.

Just prior to placing the pipe sections in position, they shall be thoroughly cleaned. Pipe installed in the trench shall have uniform support along the bearing material, except at bell holes for field joints and at locations where excavation below pipe grade has been performed to provide for structures.

Pipe shall be laid and joined in accordance with instructions of the pipe manufacturer. Joint deflections shall not exceed the maximum recommended by the manufacturer.

**5.3 Field Joints.** Field joints may be lap welded, flanged, flexible coupled, or of the rubber gasket bell and spigot type. Flanged joints shall be fitted with ring gaskets.

The jointing operation for bell and spigot pipe shall provide for the use of a feeler gauge to check the position of the rubber gasket for proper seating. If pipe is specified as cement mortar lined, all joints shall be finished inside with cement mortar after final placement. After joints in wrapped or coated pipe have been inspected, exterior wrapping or coating shall be applied to the joints so as to produce a protective covering equal to that of the manufactured pipe. All joints shall be electrically bonded per Section 6 of these Specifications.

**5.4 Field Alterations and Closures.** Whenever the pipe is cut for the purpose of making alterations or closures, the coating shall be cleaned back from the line of cut approximately three inches (3"), and the pipe shell accurately cut. All field fabricated elbows shall be in accordance with AWWA C208, latest revision, Table 2.

5.5     Welding. Welding of steel pipe shall conform with the Standard specifications of the American Water Works Association for Field Welding of Steel Water Pipe Joints and designated as AWWA C206, latest revision, and shall be done by a certified welder, Grade 6-G or greater.

## **SECTION 6**

### **CORROSION MONITORING, DUCTILE IRON PIPE & STEEL PIPE**

**6.1** General. Work shall consist of providing all labor, equipment and materials to install a complete and operating corrosion monitoring system for the pipelines and appurtenances, including testing and documentation of tests.

**6.2** Description. The corrosion monitoring system shall include, but not be limited to, providing the materials and installation of the following:

- a: Underground Cables
- b: Test Stations
- c: Bond Cables
- d: Insulating Flange Kits

**6.3** Quality Assurance Standard. The cathodic installation shall comply with applicable requirements, codes, laws and ordinances of Federal, State, and Local Bodies having jurisdiction; the Institute of Electrical and Electrical Engineers (IEEE), and the National Association of Corrosion engineers (NACE), including applicable supplements, bulletins, and special rulings. Where more stringent requirements than code are shown or specified, the more stringent requirements shall apply.

**6.4** Submittals. The Contractor shall submit two (2) copies of the following catalog cuts for approval:

- a: Test Station(s)
- b: Wire
- c: Insulating Flange Set(s)
- d: Bond Cables

**6.5** Test Stations. Concrete test boxes shall be installed flush with grade in a 2' x 2' x 6" concrete collar. The words "CP Test" shall appear on the cast iron covers. The letters shall not be less than 1-1/2" high. The test boxes shall be used in common with pipe test leads, and insulator test leads as shown on the drawings.

**6.6** Insulating Flange Joints. All insulating components of the insulating flanged gasket shall be cleaned of all dirt, oil, grease, and other foreign materials immediately prior to assembly. Bolt holes in mating flanges shall be properly aligned at the time bolts and insulating sleeves are inserted, to prevent damage to the insulation. After flange bolts have been tightened, each insulating washer shall be inspected for cracks or other damage. All damaged washers shall be replaced. After assembly, resistance between each bolt and flange shall be measured with an approved ohmmeter, and the minimum

resistance shall be 50,000 ohms. All underground insulating flanged joints shall be installed with a test station.

6.7 Joint Bonding. a: All mechanical joints, push on joints, non-welded rubber gasket joints, and fusion epoxy coated flanges shall be bonded in accordance with the details shown on the drawings. The overall length of the conductor shall permit maximum movement of the pipe joint without transferring and tensile stress to the cable. Cable to pipe connections shall be accomplished as specified in paragraph b:. All exposed surfaces of the weld area shall be completely encased with plastic caps and bitumastic 50 insulating material or approved equal as shown on the drawings.

b: Cable connections shall be installed in the manner and at the locations shown on the drawings. Coating materials shall be removed from the surface over an area just sufficient to make the connection. The metal shall be cleaned to white metal by grinding or filing prior to welding the conductor. Grinding with resin impregnated wheels shall not be allowed. The conductor shall be welded to the pipe by the exothermic process with a copper sleeve fitted over the conductor, and only sufficient insulation shall be removed from the conductor to allow its placement in the welding mold. After the weld has cooled, all slag shall be removed and the weld shall be tested with a sharp hammer blow to assure proper metallurgical bond. All defective welds shall be removed and replaced. All exposed surfaces of copper and base metal shall be covered with a minimum thickness of ¼ inch of insulating materials as shown in the drawings.

6.8 Testing. The corrosion monitoring system shall be tested in the presence of the owner's representative, by a qualified corrosion engineer. The work must be under the direct supervision of a Registered Professional Corrosion Engineer in Corrosion Engineering in the State of California. All deficiencies in materials and installation shall be corrected at the Contractor's expense. Testing shall verify compliance with the applicable requirements of NACE standard RP-01-69 (Rev. 83). The tests shall include all measurements considered necessary by the owner to verify proper operation of the system and shall include as a minimum, but not be limited to, the following field measurements:

- a: Structure to Soil Potentials
- b: Electrical Continuity Tests of Bonded Pipeline(s)
- c: Dielectric isolation test of all insulators and casings, if applicable.
- d: Verify operation of reference electrodes, if applicable.
- e: Test electrical continuity of all test wires and cables.

The Contractor shall submit five (5) copies of a typewritten report documenting all data log sheets collected.

## **SECTION 7**

### **INSTALLATION OF APPURTENANCES**

**7.1 Installation of Valves.** The Contractor shall install gate, butterfly, or plug valves at the location shown on the drawings or where directed by the Engineer. The valves shall be properly fitted to the adjacent sections of the main and supported on concrete piers or redwood blocking as shown on the Standard Drawings. Restrained joints or rubber ring joints shall be made in accordance with good practice, and as directed by the Engineer. Flanged joints shall be fitted with gaskets.

By-pass valves shall be installed on all valves fourteen inches (14") and larger in diameter, except on butterfly valves. Extension stems shall be installed as a part of the installation of the valve when they are required. A valve box and cover shall be installed over operating nuts as indicated on Drawing 11-A, as revised. If the stands and covers are exposed above the ground surface, they shall be protected from damage until completion and acceptance of the concrete work.

**7.2 Installation of Blow-Offs.** Where necessary for use in disinfecting the main, the Contractor shall install and remove temporary blow-offs at locations shown on the drawings or designated by the Engineer.

The diameter size of the blow-off to be provided will be two inches (2") on all mains, unless specified otherwise by the Engineer.

Where indicated on the drawings, the Contractor shall install permanent blow-offs. A permanent blow-off is defined as one which will be left in place upon completion of the work. The Contractor shall perform all required excavation, backfill, and repair of pavement necessary for the installation, and shall install all blow-off material as shown on the Standard Drawings, or as specified by the Engineer.

**7.3 Installation of Air and Vacuum Relief Valves.** Air and vacuum relief valves shall be installed on the pipeline where shown on the drawings. The valve shall be located outside the roadway at a location to be designated by the Engineer. Pipe and fittings required for connecting the valve to the main shall be as specified on Drawing 7-A, as revised, and shall be installed in a workmanlike manner.

**7.4 Installation of Fire Hydrants.** The Contractor shall install new fire hydrants at location shown on the drawings. He shall excavate the trench, place the pipe and hydrant, make joints, backfill the trench, and repair the pavement and sidewalk in accordance with the specifications of those classes of work and the details shown on Drawing 10-A, as revised.

When indicated on the drawings, existing fire hydrants and connecting pipe shall be removed, relocated in the new position along the new main, or disconnected from an existing main and connected to the new main. The Contractor shall perform all required excavation, backfill and repair of pavement necessary for these operations.

If the hydrant is to be relocated, the hydrant and appurtenance up to the hydrant tee in the main shall be installed at the location shown on the drawings. If the hydrant is to be reconnected, any unnecessary material shall be salvaged and the new connection made with new material. The salvaged hydrants and appurtenances shall be delivered to the District at the Corporation Yard. All hydrant tees from which piping has been removed shall be plugged and the plug tied back by means of collars and rods.

In all cases – if a fire hydrant is taken out of service, notification shall be made to both the Scotts Valley Fire District and Scotts Valley Water District. Any fire hydrant standing but not in service, shall be covered with a burlap bag wired at the bottom to prevent easy removal.

7.5 Installation of Flexible Couplings. Flexible couplings shall be installed at the locations shown on the drawings. Care shall be taken to see that the pipe is in proper alignment, and that smooth surfaces have been provided so that the couplings can be properly fitted. After installation, the flexible coupling shall be coated with a heavy coating of Protecto Wrap #1170 Primer, or equal.

7.6 Installation of Customer Service Lines. When indicated on the drawings or called for in the agreement with the Contractor, the Contractor shall install a complete customer service line with meter box and all other appurtenances, including tap or connection to the main, as shown on the Standard Drawings. The service line may be laid in an open cut or place through a hole produced by a jacking or drilling tool.

Backfill of trenches containing service lines shall be performed as provided in Paragraph 8.2.

7.7 Concrete. Plain and reinforced concrete anchors for the pipelines, support of valves, and other structures shall be constructed wherever shown or required. The anchors shall be constructed so as to obtain a full bearing, opposed to axial and lateral thrust, against solid undisturbed material.

Ground against which concrete is to be placed shall be moistened previous to placing so that it will not absorb excessive moisture from the green concrete. Forms required shall be smooth, mortar tight, and of sufficient strength to maintain shape during the placement of concrete. Placing methods shall be such that the concrete will be placed in its final position without segregation. All concrete shall be rodded and spaded to ensure smooth surfaces along form lines and to eliminate rock pockets. The use of mechanical vibrators will not be required on anchors and valve supports.

7.8 Exclusion of Water. Concrete shall not be placed in free water. Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of concrete, or for a period of twenty-four (24) hours thereafter, unless it be done from a suitable sump separated from the concrete.

Water shall not be allowed to rise on any concrete until the concrete shall have attained its initial set. Every precaution shall be taken against the floating of the pipe, either in existing lines or in the new lines, due to water entering the trench. In case of such floating, the Contractor shall replace the pipe at his own expense, and make good any injury or damage which may have resulted.

The water resulting from cutting or operating existing mains shall be removed and the excavation kept dry until all necessary work within the excavation has been completed.

7.9 Pipe Locating Wire. The installation of non-metallic mainline water pipe shall include an eight-gauge bare copper wire installed directly above the pipe at one foot (1') below finish grade. The copper wire shall be continuous and shall be brought up in each valve box to within six inches (6") of the valve box lid.

## **SECTION 8**

### **BACKFILLING AND PAVEMENT REPLACEMENT**

**8.1**    **General.** Before backfilling, the trench shall be cleared of all debris such as wood blocks, grade stakes, paper, rope and rags. Caution shall be taken to ensure that the material used for backfill is free from such debris.

Under any roadbed and in areas adjoining such roadbeds, material used for trench backfill shall have a sand equivalent value of not less than thirty (30), as measured by the California Test Method No. 217.

Following completion and acceptance of the backfill, pavement repair, as specified in Section 8.3, shall be completed as soon as possible.

**8.2**    **Backfill of Trenches.** This includes all pipelines, services and special location trenches that are excavated in conjunction with the project. Where a trench has been excavated below the design grade of the pipe, that portion of the trench up to the grade of the pipe shall be backfilled with imported structural backfill material (see Material Specifications Section 18) and compacted by means of mechanical tampers in layers not exceeding six inches (6") in thickness, or by other approved methods, to provide support for the pipe. The material shall be compacted to a minimum of ninety percent (90%) relative compaction, as determined by California Impaction Compaction Test Procedures. After completion of the installation of the pipe and appurtenances to the satisfaction of the Engineer, the remainder of the trench shall be backfilled.

The backfill material for the portion of the trench from the bottom of the pipe to a level of one foot (1') over the top of the pipe shall be imported structural backfill material (see Material Specifications Section 18). It shall be brought up evenly on each side of the pipe and thoroughly jetted or tamped in place. With asbestos cement pipe and poly vinyl chloride pipe the material from the bottom of the pipe to the spring line of the pipe shall be hand-tamped under the pipe by a method approved by the Engineer.

Unless otherwise ordered by the Engineer, the remaining portion of the backfill extending to the underside of the base course shall be backfilled with imported structural backfill material (see Material Specification Section 18). If compaction of backfill is to be accomplished by mechanical tampers, the backfill material shall be placed in uniform horizontal layers not exceeding one foot (1') in thickness, before compaction.

Compaction of backfill by ponding and/or jetting will be permitted if the native ground is of such character that it will not soften or be otherwise damaged by the applied water. When ponding or jetting is permitted by the Engineer, the Contractor is still required to

obtain the required compaction. All ponded or jetted backfill material shall be placed and compacted in layers not exceeding four feet (4') in depth.

No broken concrete or rocks larger than those which pass a one inch (1") screen shall be used in any portion of the backfill. As backfill material is placed around structures or in trenches, it shall be compacted to a minimum of ninety-five percent (95%) relative compaction, except as stated above, as determined by the California Impaction Compaction Test Procedure. All compaction tests will be the responsibility of the Contractor and approved by the Engineer.

During the process of backfilling, any timbering, sheeting, shoring, or sheet piling used to shore the excavation shall be carefully removed in such a manner as will result in a minimum of caving, lateral movement, or flowing of the soil.

The final course of backfill material in trenches in unpaved areas shall be of such material, and compacted in such a manner, that the resulting surface will be as nearly as possible the same as the original surface, and shall be armored with such material required by the Engineer to prevent erosion.

Backfill material shall not be placed over or around any insulating joint until the joint has been inspected and approved by the Engineer.

Unless otherwise approved by the Engineer, the length of the trench for any installation remaining open at the end of each day's work shall not exceed fifty feet (50'), as measured from the point where the excavation has been ended to the point where backfill has been completed to a degree that the trench is safely passable to traffic.

8.3 Pavement Repair. Following acceptance of the backfill, pavement and/or sidewalk shall be replaced wherever they have been cut or damaged by operations of the Contractor. The material used for the repairs, the method adopted in the placing thereof, and the final surface attained shall be subject to the approval of the Engineer. Unless otherwise provided in the drawings, the completed pavement and sidewalk from subgrade to surface shall be identical with that of the original, as near as practicable.

In trenches in all streets or roadways, base material shall be placed and compacted, and shall be of a depth equal to the existing depth plus two inches (2"), but not less than six inches (6"). In trenches in unpaved parking strips between the curb and sidewalk, no base material will be required. The top six inches (6") of the backfill in trenches or excavations in such locations shall be replaced with topsoil similar to that removed, or as approved by the Engineer.

If required by the Engineer, a temporary one-inch thick asphaltic plant mix surface shall be placed immediately after backfilling has been completed, and removed just prior to placing the permanent surfacing material.

Material to be used as base material shall conform to the specifications for Class 2 aggregate base, 1 ½ inch maximum size, as described in the Standard Specifications of the Department of Transportation of the State of California, latest edition.

A paint binder and its application shall conform to the requirements of Sections 94 and 38-4.01, respectively, of the above specifications.

Surfacing material shall be placed on the base as soon as possible after backfilling is accepted. Prior to replacing the pavement, the edges of the existing pavement shall be cut to a vertical plane and in straight lines. The edges shall be thoroughly cleaned of all mud, dirt, and dust before placing the surface material. Where the surface material is concrete, the sides of the existing pavement and the surface of the base material shall be thoroughly wetted just prior to placing the concrete. Where the surface material is bituminous material, the edges of the existing pavement shall be completely coated with a tack coat by spraying. Brushing or daubers shall not be used.

Until the permanent pavement is placed, the base rock or temporary asphaltic plant mix at the surface of the trench shall be maintained at all times at a grade level with the adjacent street. Continuous inspection and maintenance of the trench area will be required. Lights and barriers shall be maintained on all work that is not safe for travel until such time as it is made safe.

In all roadways, except those paved with Portland Cement Concrete, the surfacing shall be replaced to a depth equal to the existing depth, but not less than two inches (2") of Type B asphaltic concrete as called for in Section 39 of the California Department of Transportation Standard Specifications, latest edition.

The completed surfacing shall be thoroughly compacted and shall be free from ruts, bumps, depressions or irregularities. A seal coat shall be required to conform to the surface texture of the existing pavement.

Concrete paving shall be replaced in kind. Concrete used for pavement shall contain not less than 564 pounds (6 sacks) of cement per cubic yard, and shall be Class A concrete as specified in Section 90 of California Department of Transportation Specifications, latest edition.

## **SECTION 9**

### **CLEAN – UP OF SITE**

**9.1 General.** The Contractor shall keep the construction site in a neat and sanitary condition at all times. He shall remove all trash and excess excavated material from the site as soon as possible. On or before completion of the work, the Contractor shall remove all temporary structures built by him and leave all areas in a condition satisfactory to the Engineer.

Street areas shall be swept by power or hand broom at the end of each workday. Frequent street watering and, in some cases, light oiling of the trench may be required if dust problems occur.

## **SECTION 10**

### **HYDROSTATIC TESTS**

**10.1 Pressure Test.** After the pipe has been laid and backfilled, the pipe, or any valved section thereof, shall be subjected to a hydrostatic pressure of 150 pounds per square inch, or a pressure fifty percent (50%) greater than the operating pressure, whichever is greater.

**10.2 Duration of Pressure Test.** The duration of each pressure tests shall be at least one hour.

**10.3 Procedure.** Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connection, and all necessary apparatus and gauges for the test shall be furnished by the Contractor. The Contractor shall make all taps into the pipe and furnish all necessary assistance for conducting the tests.

**10.4 Expelling Air Before Test.** Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow-offs are not available at high points the Contractor shall make the necessary taps at points of highest elevation before the test is made, and insert plugs after the test has been completed.

**10.5 Examination Under Pressure.** All exposed pipes, fittings, valves, hydrants, and joints will be carefully examined during the test. All services shall be visually checked while the main is under test pressure. Any cracked or defective pipes, fittings, valves, services, or hydrants discovered in consequence of this pressure test shall be removed and replaced by the Contractor with sound material, and the test shall be repeated until satisfactory to the Engineer.

**10.6 Leakage Test.** A leakage test shall be conducted concurrently with the pressure test. The Engineer will furnish the gauge for the leakage test. The Contractor shall furnish the pump, pipe, connections, and all other necessary apparatus, and shall furnish all necessary assistance to conduct the test. The duration of each leakage test shall be one (1) hour, and during the test, the main shall be subjected to 150 pounds per square inch pressure, which is the greater.

Leakage is defined as the quantity of water to be supplied into the newly-laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{ND\sqrt{P}}{3700}$$

in which L equals the allowable leakage, in gallons per hour; N is the number of joints in the length of pipeline tested; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test in pounds per square inch gauge.

10.7 Variation from Permissible Leakage. Should any test of pipe laid disclose leakage greater than that specified in Section 10.6, the Contractor shall, at his own expense, locate and repair the defect until the leakage is within the specified allowance.

10.8 Time for Making Test. The pipe shall be tested after the trench has been backfilled, compacted, and all concrete reaction block have had at least three (3) days to cure.

## SECTION 11

### CONNECTION TO EXISTING MAINS AND DISINFECTION

11.1 Connection to Existing Mains. The Contractor shall connect the new mains to existing mains at the locations shown on the drawings. The Contractor shall give the Engineer not less than forty-eight (48) hours notice before these operations are to be made, so that advance notice of shutdown may be given to the customers affected unless stipulated otherwise by the Engineer. The Contractor shall be responsible for notification of customers. The District shall provide forms for this purpose.

In general, shutdowns in residential or industrial areas shall be made at times when there will be the least interference with preparation of meals or production. In all cases, shutdowns shall be made in cooperation with and under the direction of the Engineer.

Unless specified by the Engineer, the District will close all valves in making a shutdown, and open all valves in restoring pressure to the existing main and initiating pressure in the new installation. Connections to water lines shall be made by the Contractor only after complete and satisfactory preparation for such work has been made, in order that the shutdown may be as short as possible. In general, all connections to existing mains will be made while flow in the existing main is shut off. All work required to make connections shall be done by the Contractor.

Where existing mains are provided with fittings for the purpose of connecting to the new main, the Contractor shall remove the plugs or bulkheads, clean the ends, prepare them for connection to the new main, and make the new joint.

11.2 Disinfection of Mains. The Contractor will perform the initial disinfection of the pipeline, using its own forces, and at no cost to the District. Any additional disinfection will be done by the Contractor's forces at the Contractor's expense. Where designated by the Engineer, the Contractor shall provide taps and shall install corporation stops in the pipeline for the introduction of the chlorine solution and for sampling purposes at no cost to the District.

The pipelines shall be disinfected, tested, flushed, and rechecked, in accordance with AWWA Specification C601, latest revision.

The minimum time for the laboratory tests is forty-eight (48) hours, and no connections to existing lines or services shall be made until the pipeline has passed the laboratory tests.

SECTION 12

INSTALLATION OF POLY VINYL CHLORIDE PIPE

DELETED

## SECTION 13

### INSTALLATION OF PIPE THROUGH CASINGS

13.1 Casing Applications. Casing installations are made where pipelines must pass under airport runways, highways, railroad tracks, and other locations where conditions prevent the use of “open cut” excavation. Where these situations are encountered, the Engineer will specify boring or tunneling. With this type of excavation, insert a casing, usually of steel piping, through the obstruction by one of several methods.

13.2 Placement of Casings. In the smaller diameters, the steel casing is placed progressively, following the boring equipment as it tunnels through the obstruction. Use plain steel pipe (not corrugated) for the casing to facilitate movement of the pipe through the casing with a minimum of resistance.

For large diameters, casing construction is done by jacking the pipe from excavated pits. Where long lines are involved, numerous pits for jacking operations are required along the route.

Accuracy in alignment and grade of the casing pipe is necessary in maintaining the established invert grade of the pipeline to be inserted.

13.3 Placing Pipe Through Casings. Pipe inserted through a casing shall not rest on the couplings. Therefore, the pipe lengths must be raised a sufficient distance to position the couplings above the interior wall surface and position the pipe lengths in the casing.

The inserted pipe shall be circumferentially braced within the casing to prevent excessive movement in any direction caused by thrust action generated by slightly deflected joints or flotation from flooding of the annular space between the casing and inner pipe.

The leading or forward ends of the skids should be rounded. Skid attachments must be secure to prevent movement of the skids along the pipe barrel during the pulling or pushing operations. The center of the skids (lengthwise) should be located at points about one-fifth the pipe length from each end. Fasten skids securely to pipe.

Skids shall be provided for both ends of each pipe length. Positioning all skids an equal distance from the couplings for all pipe lengths will make insertion easier and lessen the possibility of buckling. In NO case shall the distance between skids exceed ten feet (10').

13.4 Pulling Pipe Through Casings. To pull the pipe, a cable shall be passed through the casing and the first pipe length. The cable end shall be fastened to a suitable

crosspiece at the end of the pipe. The cable then shall be pulled steadily (don't jerk) by a truck winch, dozer, or other method until two feet (2') of pipe is left projecting out of the casing. After the cable is passed through the next pipe, the two pipe sections are assembled and the pulling operation begins.

13.5 Pushing Pipe Through Casings. Pipe may be pushed through the placed casing, using equipment which will exert constant and uniform pressure against the pipe end. To accomplish this, the pushing equipment shall be firmly anchored.

13.6 Checking Coupling Rings. Whether the pipe is pulled or pushed through the casing, extra care shall be taken in checking the rubber sealing rings immediately following each joint assembly. After the rings have been carefully checked with a feeler gauge, the assembled sections are then pushed into the casing, leaving two feet (2') extending from the casing for assembly of the next pipe length, as previously explained. This operation is repeated until the pipe is through the entire casing.

13.7 Backfilling Requirements. Backfilling the annular space in the casing under and around the pipe depends strictly on job specifications applicable to the installation. Functionally, it is not necessary to backfill around the pipe inside the casing with sand or other material when the proper skid arrangement has been employed. If the annular space is to be filled, the line shall be tested before this operation is undertaken.

13.8 Method for Backfilling, When Required. Where backfilling is required the space in the casing under and around the pipe (three-fourths of the distance to the casing top) shall be filled with sand or other approved backfill material. This will assist in preventing movement of the pipe.

Sand shall be forced into the casing with water, under pressure, from a hose line. Care must be taken that not too much water is forced into the casing as there is a possibility of floating the pipe. This could result in uneven support for the completed line should the skid system fail to prevent movement in all directions.

Under no conditions shall wedges be used between the top of the pipe lengths and the inside top of the casing, to keep the pipe from moving. This could result in high concentrated crush loads being applied to the pipe as deflection of the casing occurs.

## SECTION 14

### PROTECTION OF PUBLIC WATER SUPPLY

14.1 Authority. In accordance with the administrative code of California (Title 17, Section 7583), and the Scotts Valley Water District Ordinance 68-82, Article 2, Section 2.2.8, the SVWD shall determine the type of approved backflow preventive device required and shall approve the locations for each device.

14.2 Approved Devices. Each device installed shall be approved by the Scotts Valley Water District. Presently, approved devices are those approved by the California Department of Health Services. Each device shall be installed in accordance with Scotts Valley Water District standard drawings.

14.3 Location. Backflow prevention devices shall be installed as close to the water meter as practicable.

14.4 Dual Devices. Where a continuous supply of water is essential, two sets of backflow preventive devices may be installed in parallel at the option of the Scotts Valley Water District.

14.5 Isolation. There must be no outlet, tee, tap or connection of any kind to or from the supply pipe between the water meter and protective devices.

14.6 Responsibility. State law required that the customer be responsible for installation and maintenance of any device required to protect the water supply. The preventative device must be tested a minimum of once a year or more often, as conditions warrant.

14.7 Type of Devices Required. An approved backflow preventive device of the type designated below shall be a standard installation at each service connection (the water service may be from a fire hydrant, temporary, regular or other water service connection) to the following:

- |    |  |      |
|----|--|------|
| a. | Auxiliary water systems (interconnected)           | R.P. |
| b. | Auxiliary water systems (not interconnected)       | D.C. |
| c. | Premises with house pump and/or water storage tank | D.C. |
| d. | Premises with sewage ejectors                      |      |

	(inadequate in-plant protection)	R.P.
e.	Premises with sewage ejectors (adequate in-plant protection)	R.P.
f.	Chemically treated potable water systems (except small domestic water softeners)	D.C.
g.	Fire system with pump and/or storage tank	D.C.
h.	Fire system with auxiliary supply	D.C.
i.	Premises with boiler treatment	D.C.
j.	Premises with cooling towers	D.C.
k.	Premises with multiple service connections	D.C.
l.	Sewage and storm drainage facilities	A.G.
m.	Where the manner in which the water is utilized may subject it to possible quality deterioration	R.P.

14.8 Where Devices are Required. The following is a list of premises that will be evaluated on an individual basis. When it is determined how the water within is used, a backflow prevention device may be required.

- a. Chemical plants
- b. Film processing laboratories
- c. High schools or colleges
- d. Hospitals, mortuaries, medical and dental buildings
- e. Irrigation systems
- f. Plating plants
- g. Restricted, classified or other closed facilities
- h. Manufacturing, processing or fabricating plants using toxic or non-toxic materials

14.9 Abbreviations.

D.C. – Double check valve assembly

R.P. – Reduced pressure principal assembly

A.G. – Air Gap

## **SECTION 15**

### **CRITERIA FOR THE SEPARATION OF**

### **WATER MAINS AND SANITARY SEWERS**

**15.1 Basic Separation Standards.** The “California Waterworks Standards” set forth the minimum separation requirements for water mains and sewer lines. These standards, contained in Section 64630, Title 22, California Administrative Code, specify:

- (c) (1) Parallel Construction: The horizontal distance between pressure water mains and sewer lines shall be at least ten feet (10’).
- (2) Perpendicular Construction (Crossing): Pressure water mains shall be at least one foot (1’) above sanitary sewer lines where these lines must cross.
- (d) Separation distances specified in (c) shall be measured from the nearest edges of the facilities.
- (e) (2) Common Trench: Water mains and sewer lines must not be installed in the same trench.

When water mains and sanitary sewers are not adequately separated, the potential for contamination of the water supply increases. Therefore, when adequate physical separation cannot be attained, an increase in the factor of safety should be provided by increasing the structural integrity of both the pipe materials and joints.

**15.2 Exceptions to Basic Separation Standards.** Local conditions, such as available space, limited slope, existing structures, etc., may create a situation where there is no alternative but to install water mains or sewer lines at a distance less than that required by the Basic Separation Standards. In such cases, alternative construction criteria as specified in Section e should be followed, subject to the special provisions in Section d.

Water mains and sewers of 24 inches in diameter or greater may create special hazards because of the large volumes of flow. Therefore, installations of water mains and sewer lines 24 inches in diameter or larger should be reviewed and approved by the health agency prior to construction.

**15.3 Special Provisions.**

- a) The Basic Separation Standards are applicable under normal conditions for sewage collection lines and water distribution mains. More stringent requirements may be necessary if conditions such as higher groundwater exist.
- b) Sewer lines shall not be installed within twenty-five feet (25') horizontally of a low head (5 psi or less pressure) water main.
- c) New water mains and sewers shall be pressure tested where the conduits are located ten feet (10') apart or less.
- d) In the installation of water mains or sewer lines, measures should be taken to prevent or minimize disturbances of the existing line. Disturbance of the supporting base of this line could eventually result in failure of this existing pipeline.
- e) Special consideration shall be given to the selection of pipe materials if corrosive conditions are likely to exist. These conditions may be due to soil type and/or the nature of the fluid conveyed in the conduit, such as a septic sewage which produces corrosive hydrogen sulfide.

#### 15.4 Sewer Force Mains.

- a) Sewer force mains shall not be installed within ten feet (10') (horizontally) of a water main.
- b) When a sewer force main must cross a water line, the crossing should be as close as practical to the perpendicular. The sewer force main should be at least one foot (1') below the water line.
- c) When a new sewer force main crosses under an existing water main, all portions of the sewer force main within ten feet (10') (horizontally) of the water main shall be enclosed in a continuous sleeve.
- d) When a new water main crosses over an existing sewer force main, the water main shall be constructed of pipe materials with a minimum rated working pressure of 200 psi or equivalent pressure rating.

15.5 Alternate Criteria for Construction. The construction criteria for sewer lines or water mains where the Basic Separation Standards cannot be attained are shown in Drawings 16A & 17A. There are two situations encountered:

Case 1 - New sewer line – new or existing water main.

Case 2 – New water main – existing sewer line.

For Case 1, the alternate construction criteria apply to the sewer line.

For Case 2, the alternate construction criteria may apply to either or both the water main and sewer line.

The construction criteria should apply to the house laterals that cross above a pressure water main but not to those house laterals that cross below a pressure water main.

#### 15.6 New Sewer Being Installed – Drawings 16A and 17A.

##### Zone Special Construction Required for Sewer

- A Sewer lines parallel to water mains shall not be permitted in this zone without approval from the responsible health agency and water supplier.
- B A sewer line placed parallel to a water line shall be constructed of:
1. Extra strength vitrified clay pipe with compression joints.
  2. Class 4000, Type II, asbestos-cement pipe with rubber gasket joints.
  3. Plastic sewer 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 sewer 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 of Class 200 (DR 14 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 sewer pipe within a continuous sleeve.
- D A sewer 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 of Class 200 (DR 14 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 sewer pipe within a continuous sleeve.
5. Any sewer pipe separated by a ten-foot (10') by ten-foot (10'), four-inch thick reinforced concrete slab.

15.7 New Water Mains Being Installed – Drawings 16A and 17A.

Zone

- A No water mains parallel to sewers shall be constructed without approval from the health agency.
- B If the sewer 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 dip bituminous coating.
  2. Dipped and wrapped one-fourth-inch thick, welded steel pipe.
  3. Deleted
  4. Class 200 pressure-rated plastic water pipe (DR 14 per AWWA C900) or equivalent.
  5. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-74 or C301-74 or C303-70).
- C If the sewer crossing the water main does not meet the Case 1, Zone C requirements, the water main shall have no joints in Zone C and be constructed of:
1. Ductile iron pipe with hot dip bituminous coating.
  2. Dipped and wrapped one-fourth-inch thick, welded steel pipe.
  3. Class 200 pressure-rated plastic water pipe (DR 14 per AWWA C900) or equivalent.
  4. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-74 or C301-79 or C303-30).

D If the sewer crossing the water main does not meet the requirements for Case 1, Zone D, the water main shall have no joints within four feet (4') from either side of the sewer and shall be constructed of:

1. Ductile iron pipe with hot dip bituminous coating.
2. Dipped and wrapped one-fourth-inch thick, welded steel pipe.
3. Class 200 pressure-rated plastic water pipe (DR 14 per AWWA C900) or equivalent.
4. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-74 or C301-79 or C303-30).

### 15.8 Notes and Definitions.

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

Water Supplier: "Person operating a public water system" or "supplier of water" means any person who owns or operated a public water system.

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.

Dimensions are from outside of water main to outside of sewer line or manhole.

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

Mechanical Joints: Bolted joints.

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

Fused Joint: The jointing of sections of pipe using thermal or chemical bonding processes.

Sleeve: A protective tube of steel with a wall thickness of not less than one-fourth-inch into which a pipe is inserted.

Ground Water: Subsurface water found in the saturation zone.

House Lateral: A sewer connecting the building drain and the main sewer line.