

# ***SOUTH FEATHER WATER & POWER AGENCY***



## **DEVELOPMENT STANDARDS TREATED WATER SYSTEM**

ADOPTED: JULY 26, 2005

DEVELOPMENT STANDARDS

TREATED WATER SYSTEM

Preface

These Standards have been adopted by the Agency's Board of Directors and comply with, and will be administered in conformance with Agency Rules and Regulations Governing Water Service. They include Developer Requirements, Standard Specifications and Standard Details.

Subject to approval by the Agency's General Manager, the Agency's engineer may modify these Standard Specifications and Standard Details as necessary to ensure that they remain current with generally accepted construction, manufacturing, environmental and safety standards.

These Standards are for use by Developers and their Engineers for expansion of the Agency's treated water system, and may not be put to private use without prior written approval.

The latest amendment or addition to these Standards shall govern.

Adopted: July 2005

DEVELOPMENT STANDARDS  
TREATED WATER SYSTEM

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## DEVELOPER REQUIREMENTS FOR TREATED WATER SYSTEM EXTENSIONS

### GENERAL

An owner requesting treated water service to lands that do not otherwise have service available must comply with the Agency's Rules and Regulations Governing Water Service. These requirements serve to implement those regulations. The owner is referred to here as the "Developer."

#### Intent

The intent of the Agency's regulations and these requirements are to ensure orderly development of the treated water system and the use of high-quality materials, proper installation, and acceptable project management. The goal is to extend the useful life of the Agency's treated water system, reduce overall maintenance costs, and provide dependable service to existing and future customers.

#### Developer Guidelines

The Agency has compiled a set of "Developer Guidelines for Water System Extensions". They are included here as Appendix A. The outline is intended as a broad guide for compliance with the Agency's regulations and is not a step-by-step procedural guide.

#### Conveyance Agreement

All facilities to be offered for dedication to the Agency must be governed by a Conveyance Agreement. A form of the Agreement is included here as Appendix B. The Agreement will be binding on both the Agency and the Developer and will require, among other things, that plans and specifications comply with these requirements and Agency standards. Other requirements include prepayment of system capacity charges, plan check and inspection fees, bonding and insurance, lien releases, and conveyance of the facilities to the Agency. The Developer will hold harmless and indemnify the Agency from acts arising out of the Developer's performance under the terms of the Agreement and that of his engineer and contractor.

Water service will be available only after all the terms of the Conveyance Agreement have been fulfilled and the facilities accepted by the Agency's Board of Directors.

#### Developer's Responsibility

The Developer is responsible for compliance with the regulations and implementation of these requirements. This includes responsibility for the preparation and content of the plans and specifications, construction of the facilities, and fulfillment of the terms of the Conveyance Agreement. The Developer is responsible for overseeing and directing the Developer's engineer and contractor. The Agency or its employees shall not act as, nor shall the Developer rely upon same to act as, an agent or protectorate of the Developer.

Other parcels in the area may want water and the Developer might want to include them in planning for the project.

## PLANS AND SPECIFICATIONS

The plans and specifications must be prepared by a civil engineer registered in the state of California. These documents will be reviewed by Agency staff for compliance and must be approved by the Agency's engineer.

### Facility Design

Design of the facilities will be governed by Agency regulations. In part, the regulations require a minimum nominal water main diameter of eight inches, with noted exceptions. The Agency's engineer will determine broad design concepts. Agency treated water system master plans will be consulted. The Developer's design engineer shall employ sound water works design using current standards to achieve a reliable, long-lasting facility with operational flexibility. The plans and specifications shall include all applicable Agency standard specifications and details.

The Agency's engineer may restrict the use of polyvinyl chloride (PVC) water main materials by allowing only ductile iron pipe. Reasons may include, but are not be limited to: expected system pressure surges in excess of 35 psi; expected system cyclic pressure surges of 50 percent over, or 25 percent over to 25 percent under normal working pressure which might occur more than eight times per day; unusual loading configurations; or, expected rocky soils. PVC will not be allowed in areas where the soil is contaminated by, or has a potential for contamination by hydrocarbons. If PVC is not otherwise restricted and is the preferred water main material, the Agency's engineer may require the use of an incrementally larger size pipe to compensate for restricted inside diameters when compared to ductile iron pipe.

### Environmental Requirements

The Developer is responsible for preparing environmental documents per the California Environmental Quality Act (CEQA). Approved environmental documents must be delivered to the Agency's engineer for review prior to the signing of the Improvement Plans.

### Improvement Plans

The improvement plans must incorporate the following:

- Plan sheet size: 24" x 36", inked on Mylar (or Mylar second original).
- Minimum printing size: 1/8" (for CAD drawings: 1/10").
- Elevation data: USGS (stated on plans).
- Plan Cover Sheet with signature blocks and a 200-scale map of the area or subdivision.
- Plan view: minimum scale of 50' per inch.
- Profile: horizontal scale same as plan view and a minimum vertical scale of 10' per inch.
- Water main profile and vertical alignment data, including all other utilities and structures.
- Maximum system hydraulic grade line stated on each alignment profile sheet.
- All applicable property and easement lines.
- Limits of pipeline material, size, and class.
- Limits of polyethylene encasement for ductile iron pipe.
- All other improvements, existing or proposed, affecting the water facilities.
- Details of fittings and joint configurations.



- All appropriate Agency standard details.
- All other necessary details and instructions.
- Quality: Plans must be microfilmable and scanable such that reproductions, full-sized and reduced, are easily readable. Provide sharp contrast between line work and background.

### Standard Specifications and Details

The Agency has prepared Standard Specifications and Details governing construction of the treated water system. These Standards are administered in accordance with Agency regulations. They include Special Conditions and Technical Provisions and are augmented by Standard Details. They are available to engineers and suppliers working with the Agency at an appropriate fee.

All treated water system expansions must comply with Agency Standard Specifications and Details. Project specifications must include all applicable Standards. The Developer is responsible for preparation of the remaining contract documents such as Bid Forms and General Conditions and any Special Conditions or Technical Provisions required for the project that are not included in the Agency Standards.

Items not included in the Agency Standard Specifications or Details must be designed by the Developer's engineer and plans and specifications prepared for the Agency's engineer's approval.

Agency Standard Specifications and Details may not be revised without a written request and prior Agency approval.

The Developer shall provide prospective bidders, contractors, and subcontractors copies of the Standard Specifications and Details and shall not rely on the Agency to provide copies.

Agency Standard Specifications and Details will require periodic revisions to assure use of the most current and acceptable construction materials and methods and changes in construction law and regulations. Updates will be administered according to Agency regulations. The most current revisions will apply.

## CONSTRUCTION

The treated water facilities called for in the approved plans and specifications must be constructed by a contractor with a valid California Class A or C-34 license.

The Developer's engineer shall act as a project manager during construction to ensure compliance with the plans and specifications and shall be available to provide technical assistance when required. The Developer shall identify, in writing, the project manager if different than the Developer's design engineer.

### Construction Management

The Developer must maintain control over their contractor's activities by providing effective construction management. To help ensure proper control of the work and materials, compliance with applicable laws, and acceptable prosecution and progress, the Developer shall include in the General Conditions of the construction contract or shall otherwise provide for or ensure that the Developer's contractor will:

- Designate in writing his authorized field representative on a current basis. (Copies to be sent to the Agency's engineer).
- Comply with field surveys and construction staking provided by the Developer or Developer's engineer.
- Cooperate with Agency forces on and off the job site.
- Prohibit work on any part of the water system facilities before 7 a.m. and after 5 p.m. and further prohibit such work on Saturdays, Sundays, and adopted Agency holidays. (Note: Work performed during these prohibited times may be rejected.)
- Maintain a set of plans and specifications at the job site for use by the Agency's engineer and/or inspector.
- Observe all applicable laws including, but not limited to, hours of labor, equal opportunity, contractor's licensing, vehicle code, worker's compensation, air pollution, water pollution, use of pesticides, Clean Air and Water acts, protection of underground infrastructure, payment of taxes, permits and licenses, and patent infringements.
- Observe and practice all applicable safety regulations and laws.
- Provide for and maintain public convenience and public safety.
- Provide for and practice safe and legal use of explosives.
- Provide for and practice fire prevention measures.
- Salvage Agency facilities from the job as directed by the Agency's engineer, and protect and deliver same to the Agency's yard at 2310 Oro-Quincy Highway, Oroville, California.
- Remove promptly from the work site all work or materials having been rejected or deemed unauthorized or unsuitable by the Agency's engineer.
- Dismiss and remove from the job site employees of the contractor or subcontractors who, in the opinion of the Agency's engineer, are incompetent, intemperate, unsafe, abusive, threatening, or otherwise unsatisfactory.
- Suspend work due to unfavorable weather, unsafe act or acts, or other conditions as directed by the Agency's engineer.
- Cease all construction operations at the location of the discovery of surface or subsurface cultural resources and secure the services of a qualified archeologist to make recommendations to the State Historical Preservation Officer and comply with further directions of the State Officer or the Agency's engineer.

### Submittals

All materials and equipment not in conformance with the Agency-approved plans and specifications that are delivered to the work site and all work incorporating such nonconforming materials and equipment will be rejected. Preapproval of materials and equipment through the submittal process may avoid delays in the work.

The Developer shall provide or perform, or cause the Developer's contractor to provide or perform, the following for all submittals:

- Coordinate submittals so that related items are provided in groups. (Uncoordinated submittals will be returned without consideration.)
- Describe in writing any variations from the specifications.

- Review submittals for legibility, accuracy, completeness, and compliance with the specifications.
- Route through Developer's engineer for comments.
- Indicate Developer's contractor and engineer's approval on each copy of individual submittals.
- Provide at least two conforming copies (three copies if one is to be returned).
- Allow at least 30 days for review by the Agency's engineer.
- Prohibit work incorporating materials or equipment requiring approved submittals until a favorable review from the Agency's engineer has been received.

### Inspection

Each phase of the work, as defined in the technical provisions of the standard specifications, must pass inspection by the Agency's engineer before commencing work on the next phase. The Developer shall cause the Developer's contractor to comply with the following:

- Notify the Agency's engineer two working days prior to the start or restart of any construction that might affect or deal directly with the water system facilities.
- Cooperate with the Agency's engineer during inspection activities including, but not limited to, furnishing facilities, labor, material, or equipment reasonably needed to perform safe and convenient inspections and tests.
- Ensure that each phase of work, as identified in the technical provisions of the specification, passes inspection prior to attempting the next phase of work.  
(Note: Failure to pass inspection may cause rejection of subsequent phases of work.)

### Clearing and Grubbing

The Developer must dictate to the contractor provisions governing the clearing and grubbing phase of the work. The Developer shall include in the technical provisions of the construction contract, or shall otherwise provide for and ensure that the Developer's contractor will:

- Remove all stumps and roots left by the clearing operation if within 10 feet of an Agency facility or within the work area, whichever is greater.
- Backfill and properly compact to the original ground elevation, prior to starting work in the area, all depressions created by the removal of the stumps and roots.
- Dispose of all debris within the work area resulting from the clearing, grubbing, or demolition work.

### Measurement and Payment

Each section of the Technical Provisions in the Agency Standard Specifications includes a subsection governing measurement and payment to the contractor. Use of these subsections by the Developer is optional. The Developer is responsible for making all measurements for payment and making all payments to the contractor for the work.

**STANDARD SPECIFICATIONS  
FOR  
TREATED WATER SYSTEM**

**Preface**

The Developer must comply with the Agency's Rules & Regulations Governing Water Service and the "Development Standards for Treated Water System". Those Standards include Developer Requirements and these Standard Specifications.

The Developer is responsible for preparation of the plans and specifications, to which these Standards must be added. These Standards contain only Special Conditions and Technical Provisions to cover most system extensions. The Developer is also responsible for preparation of the remaining contract documents such as Bid Forms and General Conditions and any Special Conditions or Technical Provisions required for the project that are not included in these Standards.

These Standard Specifications are for use by Developers and their Engineers for expansion of the Agency's treated water system and may not be put to private use without prior written approval. These Standard Specifications may not be altered, qualified, or superseded without prior written approval.

The Developer is responsible for overseeing and directing the Developer's engineer and contractor. The Developer shall not rely upon the Agency or its employees to act as an agent or protectorate of the Developer.

**NOTE**

The Specifications begin with Section 10. Sections 1 through 9 have been left blank intentionally. Other sections have been left blank to allow for development of additional standards.

Appendix C to these Standards contains a cover memorandum for each section outlining the revisions over the Standards adopted in 2005.

These Specifications do not include a section for clearing and grubbing. Minimum provisions governing this work are contained in the Developer Requirements. It remains the responsibility of the Developer and his engineer to include provisions for clearing and grubbing.

## SECTION 10

### SPECIAL CONDITIONS FOR DEVELOPER

#### Preface

These Special Conditions contain the minimum Agency requirements necessary to govern the activities of the Developer's contractor while performing work on any facilities covered by a Conveyance Agreement.

The Developer, through the project engineer, is responsible for adding any provisions necessary to tailor the Special Conditions to a specific project.

#### 10-1 General

These Special Conditions supplement the requirements contained in the Technical Provisions of these Specifications and shall be deemed as a part of the Specifications. These Special Conditions shall govern over the General Conditions and the drawings.

#### 10-2 Control of Work

##### 10-2.01 Permits, Agreements, and Licenses

The Contractor shall comply with all the requirements of the permits, agreements, and licenses including, but not limited to, encroachment permits, stream alteration agreements, and timber harvest plans.

##### 10-2.02 Construction Staking

The Developer or his engineer will establish on the ground, pipe centerline by staking angle points, beginning of curves, ends of curves, and at approximately 50-foot intervals in remaining areas. In addition, pipeline invert elevation cut stakes will be established at the same intervals in those areas shown on the plans as requiring vertical control in accordance with the Vertical Alignment as specified for Water Mains elsewhere in these specifications. In addition to pipe centerline stakes, construction staking for lines and grades of other facilities will be provided and shall be used and adhered to by the Contractor.

##### 10-2.03 Use of Water from Agency System

If Agency water is required for construction purposes, the Contractor shall make application for Bulk Water Service at the Agency's Main Office in Oroville and shall comply with all rules and regulations governing such service.

The Agency reserves the right to temporarily discontinue the drafting of construction water at a given location at any time. No compensation will be due the Contractor for costs incurred from such discontinuance.

The Contractor shall make all arrangements and supply all pumps, hoses, fittings, or other related items for drawing water and/or conveying water for construction or testing purposes.

### 10-2.04 Inclement Weather Shutdown

In the event the Contractor is ordered, either by the County or City under the requirements of the Encroachment Permit, or by the Agency's engineer, to suspend work due to inclement weather, the Contractor shall secure all areas of operation in a manner so as to facilitate public convenience, eliminate public safety hazards, and so as not to allow, cause, or create substantial erosion or loss of silt, mud, or rocks from the work areas. Such measures shall be maintained until no longer required.

## 10-3 Control of Materials

### 10-3.01 Materials Furnished by Agency

The Agency will not supply materials for use by the Developer.

### 10-3.02 Pipeline Material

Two types of pipeline material are acceptable for water mains 4" and larger: Ductile Iron (DIP) and Polyvinyl Chloride (PVC). Water mains 2" in size shall be PVC. The type of pipeline material, size, class, rating, and schedule allowed shall be as shown on the plans. The type of pipeline material specified on the plans shall be used throughout the work.

The pipe materials used for assembling other appurtenances such as air release valves, blowoff valves, services, and pressure reducing and pump stations, shall be as shown on the plans and as designated elsewhere in these Specifications.

### 10-3.03 Polyethylene Encasement for Ductile Iron Pipe

Ductile iron pipe shall be furnished with an 8-mil polyethylene encasement, all as described for Water Mains elsewhere in these specifications, and conforming to AWWA C105, unless noncorrosive soils are found from the tests and observations described in AWWA C105 Appendix A. The tests and observations shall be made by certified soils testing laboratory or by the Ductile Iron Pipe Research Association, and a report shall be filed with the Agency's engineer. Testing shall be done at not more than 300-foot intervals. Shorter intervals shall be used when required by the Agency's engineer or the testing laboratory. Soil resistivity shall be measured using the soil-box method with an Ohm resistance meter. Soil samples shall be taken from pipe depth after subgrade has been completed. The four-pin method shall not be used unless approved by the Agency's engineer. The Agency's engineer shall only approve the four-pin method in cases where drilling equipment cannot be used to obtain soil samples. If the four-pin method is allowed, the Barn's layer-resistance method shall be used as described in the Peabody "Corrosion Control Handbook" published by the National Society of Corrosion Engineers. Regardless of testing method, soil samples shall also be tested for pH, oxidation-reduction (Redox), sulfides, and moisture content. The report shall also contain a description of the soils and evaluation of potential stray direct currents.

10-4 Submittals10-4.01 General

Descriptive submittals shall be furnished for the items listed below and in accordance with the legend set forth below, or as required by other sections of these specifications. Omission of an item from this tabulation does not relieve the Contractor from the responsibility of submitting the required items.

LEGEND

A Catalog Data	I Design Calculations
B Shop Drawings	J Shipping Tags & Labels
C Laying diagram (if required)	K Application Instructions
D Sample of Material	L Operating Instructions
E Load Slips	M Affidavits of Compliance
F Mix Design	N Torque data or calcs (if required)
G Trenching Permit (if required)	P Written description of method
H Shoring Plan (if required)	

Item	Type of Submittal
------	-------------------

Section 12: Water Mains

Pipeline Material	AC
Fittings	A
Mechanical Couplings	A
Restrained Joints	A
Sand	DE
Gravel	DE
Permeable Backfill	DE
Asphalt Paving	E
Sand-Cement Slurry	E
Permeable Backfill	D

Section 13: Water Main Taps

Saddles	A
Sleeves	A
Hole Cutters	A
Wet Tap Machines	L
Sleeves Over 150 psi	M

Section 14: Main Line Valve Assemblies

Valves	AN
Valve Box, Lid and Extension	A
Valve Operator Shaft Extension	A or B

Item	Type of Submittal
<u>Section 15: Air Valve Assemblies</u>	
Air Release Valve	A
Shutoff Valve	A
Valve box, lid, and ext. (non-traffic)	A
Valve box and lid (traffic)	AM
<u>Section 16: Blowoff Valve Assemblies</u>	
Blowoff Valve	A
Valve Box, Lid, and Extensions	A
Valve Operator Shaft Extension	A or B
<u>Section 17: Fire Hydrants</u>	
Fire Hydrants	A
<u>Section 19: Service Assemblies – 2" and Smaller</u>	
Service Line Material	A
Compression Fittings	AM
Branch Fitting	A
Meter Valve	AM
Meter Box, Lid, and Slab (nontraffic)	A
Meter Box and Lid (traffic)	AM
<u>Section 27: Concrete Work</u>	
Concrete	FE
Course Aggregate	D
Fine Aggregate	D
Admixtures	A
Reinforcing Supports	A
Expansion Joint Filler	A
Waterstop	A
Floor Hardener	A
Curing Aids	A
Bonding Agent	A
Nonshrink Grout	A
Epoxy Anchors	A
Reinforcing Steel	AB
Welded Wire Fabric	A
Form Work	ABP



Item	Type of Submittal
<u>Section 28: Shoring</u>	
Shoring	GHI
<u>Section 29: Seeding and Mulching</u>	
Seed	JE
Fertilizer	AKE
Stabilizing Emulsion	AKE
Straw	DE

### 10-5 Prosecution and Progress

#### 10-5.01 Sequence of Work

Each section in the Technical Provisions of these Standards may include a sequence of work. The Contractor shall comply with such provisions.

#### 10-5.02 Connections to Agency's System

The Contractor shall make all connections to the Agency's existing treated water system, as shown on the plans, and all materials and workmanship shall conform to Water Mains or Water Main Taps as described elsewhere in these specifications. The Agency will, upon written request by the Contractor, mark on the surface the approximate location of existing Agency pipelines. The Contractor shall expose the pipelines using caution not to cause damage.

#### 10-5.03 Scheduled Water Service Outages

If the Contractor's work will require scheduled water outages for making connections to the Agency's existing system, the Contractor shall make a written request 14 days in advance of the day he wants the outage. Prior to making such a request, all materials necessary to complete the tie-in work shall be on site and the water main shall have passed all required pressure, leakage, and bacteriological tests. This requires the existing water main be exposed and all necessary information for ordering materials field verified. This facilities verification shall be done in the presence of the Agency's engineer.

Only Agency personnel shall operate the Agency's system.

Concrete finishing shall conform to the general classifications as described for Concrete Work in the Technical Provisions of these Standards, or as shown on the plans.

#### 10-5.04 Concrete Quality Testing

The type, method and frequency of concrete quality tests shall be as described for Concrete Work under Testing. In addition, the Contractor may at any time, and at his own expense, perform additional testing for

the purpose of quality control and shall not depend on any testing by the Developer for such purposes. The Contractor shall, at his own expense, perform any tests necessary to acquire the strength of the concrete for the purpose of, and shall be solely responsible for, form removal and safety of the structure.

**SECTION 11 – RESERVED**

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## SECTION 12

### WATER MAINS

#### 12-1 GENERAL

##### 12-1.01 Scope

This section describes the requirements for furnishing and installing treated water mains, 2" and larger, including the materials to be used, methods and requirements for installation, and measurement for payment.

This section does not include installation of appurtenances to water mains such as main line valves, air release valves, blowoff valves, or fire hydrants. This section does not include provisions for testing and disinfecting the water mains. This section does not include the piping within, or to the limits outside of special structures such as pressure reducing or pump stations, and storage tanks; all as shown on the plans. If required, items such as these have been described elsewhere in these specifications.

##### 12-1.02 Description of Work

Work under this section shall include, but not be limited to, controlling dust, excavation of the pipe trench (regardless of surface or subsurface conditions), placing straw bales where required, locating other utilities, drilling and blasting, over excavating the trench bottom where required, dewatering, transporting and stockpiling of material, installing the pipe including storing and handling, laying of the pipe and fittings, installing protective wrap where required; completing joints including application of corrosion protection materials, placing of reaction blocking, installing and testing the locating wire, importing backfill material including permeable backfill material as required and preparing native materials for backfilling, compacting backfill, exporting overburden and unsuitable material, connecting to existing mains, placing and removing temporary erosion control, replacing existing facilities and other utilities, and restoring the pipe alignment including front yard areas, road surfaces and striping, shoulders, and driveway crossings, reshaping and restoring roadside drainage facilities, gutters and sidewalks, removing straw bales from streams, and installing new graveled shoulders along paved roads.

##### 12-1.03 Public Convenience, Preservation of Property and Cleanup

While performing work under this section, the Contractor shall comply with the terms and conditions concerning Public Convenience, Preservation of Property, and Cleanup, as described in the General Conditions of these Standards.

##### 12-1.04 Permits

The Contractor's attention is directed to the Special Conditions of these Standards which requires compliance with encroachment permits, agreements for modification of stream or lake, and all other permits, agreements, and licenses required under these specifications.

### 12-1.05 Submittals

Submittals supplied by the Contractor shall include: catalog information on pipeline material, fittings, mechanical couplings, restrained joints, and flange insulation kits; samples of gravel, permeable backfill, and sand; load tickets for asphalt paving, gravel, sand, sand-cement slurry, permeable backfill, and ready-mix concrete; and laying diagrams for any sections of water main that cannot be laid with standard length material. The Contractor's attention is directed to the General Conditions of these Standards under "Submittals".

### 12-1.06 Inspection

The Contractor shall make all water main materials available for inspection by the Agency's engineer prior to their installation. The Contractor shall provide the necessary men and equipment to make these materials available. Each phase of work shall pass inspection by the Agency's engineer before commencing work on the next phase. The phases shall consist of, but not be limited to, pavement cutting, excavation, bedding, pipe laying, application of corrosion protection, including protective wrap of DI pipe, where required, shading around pipe, installing the locating wire, backfilling each layer, testing the locating wire, and trench restoration. Pressure and leak testing, and disinfecting requirements are described elsewhere in these specifications.

## 12-2 Materials

### 12-2.01 General

Materials furnished for water mains shall include, but not be limited to, pipeline materials; fittings including bends, tees, wyes, crosses, reducers, caps, couplings, flanges, and other special joints, flange insulating kits, polyethylene encasement, primers and solvents for use with PVC pipe, native and imported backfill, straw bales, concrete for reaction blocking and structure replacement, sand-cement slurry, water and palliatives for backfill conditioning and dust control, locating wire, and materials used for restoration of the trench and work area.

Requirements for backfill materials, both native and imported, are included with installation procedures contained elsewhere in this section.

### 12-2.02 Pipeline Material

Pipeline materials shall be either ductile iron pipe (DIP) or polyvinyl chloride pipe (PVC). The type of pipeline material, the nominal size; class, rating, or schedule, shall be as shown on the plans, or as further limited by the Special Conditions of these Standards. In no case shall the system working pressure exceed the maximum working pressure for the pipeline material, size, class, rating, or schedule listed below:

<u>Pipeline Material</u>	<u>Min. Pipe Size (in.)</u>	<u>Max. Pipe Size (in.)</u>	<u>Max. Working Pressure (psi)</u>
DIP (AWWA C151):			
Class 350	4	12	350
All Classes	14	36	*
PVC Pressure Pipe (AWWA C900):			
Class 150	4	12	100
Class 200	4	12	150
PVC Transmission Pipe (AWWA C905):			
PR 235	14	24	100
PVC Schedule Pipe (ASTM D-1985):			
Sch 40	2	2	100
Sch 80	2	2	200

\*The maximum allowable working pressure for DIP sizes 14" through 36" shall be based on pressure classes listed in AWWA C151.

The same type of pipeline material and manufacturer shall be used throughout the work unless specific types are listed for specific areas in the Special Conditions of these Standards.

#### 12-2.02-A Ductile Iron Pipe (DIP)

Ductile iron pipe shall conform to AWWA C151, except as modified herein, and shall have a 60,000 psi minimum tensile strength, 42,000 psi minimum yield strength, and 10% minimum elongation. The size and class of pipe shall be as shown on the plans and as designated in the Special Conditions of these Standards. Ductile iron pipe shall have a cement mortar lining with an asphaltic seal coat conforming to AWWA C104 and an asphaltic outside coating conforming to AWWA C151.

Pipe sections shall be nominal 18-foot laying lengths. At least 90% of the pipe shall be furnished as standard 18-foot lengths, except that shorter lengths may be required for horizontal and vertical curves, as described for Installation elsewhere in this section. The remainder may be random lengths, but not less than 16-foot long. The Contractor shall not substitute multiple short lengths of pipe where one or more standard lengths will fit.

Pipe ends shall be furnished with push-on or mechanical joints, except as noted on the plans, or as specified herein. Push-on and mechanical joints shall conform to AWWA C111. Integrally cast flanges shall conform to AWWA C110. Grooved and shouldered type joints shall conform to AWWA C606. Screwed flanges shall conform to AWWA C115, shall be furnished on minimum Special Class 53 pipe barrels, and shall be limited in use to 200 psi working pressure. Flanges shall be "two holed" wherever required for proper alignment of valves and fittings.

Each section of pipe shall be clearly marked with the nominal pipe size, class, weight, and casting period. The manufacturer's mark, the year the pipe was produced and the lettering "DI" or DUCTILE" shall be cast or stamped on the pipe.

#### 12-2.02-B PVC Pressure Pipe (Polyvinyl Chloride)

PVC Pressure pipe shall conform to AWWA C900, except as modified herein. This pipeline material shall be limited to nominal sizes ranging from 4" to 12" and further restricted to Class 150 and 200, all as shown on the plans and designated in this section and in the Special Conditions of these Standards.

PVC pressure pipe shall be furnished with cast iron equivalent outside diameters.

PVC pipe sections shall be supplied in 20-foot laying lengths. Pipe cut for closures shall be machined or otherwise rendered suitable for inserting into and making a tight joint with the coupling or fitting. At least 90% of pipe furnished shall be standard 20-foot lengths, except that shorter lengths may be required for horizontal and vertical curves, as described for Installation elsewhere in this section. The remainder of pipe fit.

Pipe shall be supplied with plain ends suitable for use with PVC couplings using two elastomeric gaskets, or supplied with one plain end and one bell end using one elastomeric gasket. Solvent weld joints will not be allowed. Restrained joints using clamps or other devices will not be allowed. PVC couplings used for plain end pipe shall be of the same type of material and equivalent to the class of pipe for which they are to be used and shall be appropriately marked.

Rubber gaskets shall conform to the requirements of ASTM F477.

Each section of pipe shall be clearly marked with the nominal size and OD base (for example, 8-CI), type of pipe, dimension ratio number (for example, DR18), AWWA Pressure Class (for example, PC150), AWWA Designation Number (AWWA C900), the manufacturer's name or trademark and production record code.

#### 12-2.02-C PVC Transmission Pipe (Polyvinyl Chloride)

PVC transmission pipe shall conform to AWWA C905, except as modified herein. This pipeline material shall be limited to nominal sizes ranging from 14" to 24" and further restricted to pressure rating (PR) 235 having a standard dimension ratio (DR) of 18, all as shown on the plans and designated in this section and the Special Conditions of these Standards.

PVC transmission pipe shall be furnished with cast iron equivalent outside diameters.

PVC transmission pipe shall also conform to all other requirements described in this section for PVC pressure pipe.

#### 12-2.02-D PVC Schedule 40 and 80 (Polyvinyl Chloride)

Schedule (Sch) 40 and 80 PVC shall conform to ASTM D-1785, with a cell classification of 12454-A or 12454-B. This pipeline material shall be limited to 2" nominal size for use as small diameter distribution laterals and large diameter service lines, all as shown on the plans and described in this section and in the Special Conditions of these Standards.

Pipe Sections shall be nominal 20-foot lengths. 100% of the pipe shall be furnished as standard 20-foot lengths. Standard 20-foot lengths shall be used wherever possible. The Contractor shall not substitute multiple short lengths of pipe where one or more standard lengths will fit.

PVC Schedule pipe shall be furnished with belled ends as solvent-weld socket conforming to ASTM D-2672 or plain ends suitable for use with solvent-weld fittings, as specified in this section. Restrained joints using clamps or other devices will not be allowed.

Each section of pipe shall be marked with the nominal pipe size (2"), the plastic pipe designation code, the schedule, the ASTM designation, the manufacturer's name or trademark, and the laboratory's mark certifying the pipe for use with potable water.

#### 12-2.03 Fittings

Fittings for ductile iron pipe, and PVC pressure and transmission pipe shall be either gray or ductile iron, conforming in all respects to AWWA C110, except as allowed herein. Fittings up to 16 inch, which require push-on or mechanical joints only, shall conform in all respects to either AWWA C110 or C153. Fittings up to 16 inch which require one or more flanges may be ductile iron fittings conforming in all respects to AWWA C153, except that the flanges shall have the following minimum thicknesses:

#### Minimum Flange Thickness (t) (in)

<u>Nominal Dia.</u>	<u>t</u>
3	0.60
4	0.70
6	0.75
8	0.85
10	0.90
12	1.00
14	1.05
16	1.10

All gray and ductile iron fittings shall have a cement mortar lining with an asphaltic seal coat conforming to AWWA C104 and an asphaltic outside coating conforming to AWWA C151.



All gray and ductile iron fittings shall have distinctly cast on the outside of their bodies the pressure rating, nominal diameter of openings, manufacturer's identification, country where cast, the number of degrees of the circle on all bends, the letter "DI" for ductile iron, all as required by AWWA C110 and C153.

Fittings for PVC Schedule 40 and 80 pipe shall be socket type conforming in all respects to ASTM D-2466 and ASTM D-2467 respectively. Except where Schedule 80 fittings require threads, as shown on the plans, they shall conform in all respects to ASTM D-2464. These fittings shall be distinctively marked with the manufacturer's mark, material designation, size, ASTM designation number (D-2464 for Sch 40 and D-2467 for Sch 80), and the seal of NSF.

#### 12-2.04 Joint Configurations

Push-on joints for ductile iron, and PVC pressure and transmission pipe and related fittings may be substituted for mechanical joints where shown on the plans except where restrained joints for ductile iron pipe using mechanical joints are required.

Flanged joints on fittings shall conform in all respects to AWWA C110 except as otherwise allowed in certain instances for specific types of compact fittings described elsewhere in this section. Screwed flanges for ductile iron pipe shall conform to AWWA C115 and shall be furnished on minimum Special Class 53 pipe barrels. The flanges shall be properly aligned wherever required for valves and fittings. Gaskets for all flanges shall be full face 1/8 inch thick fiber reinforced rubber, except for flanged joints requiring insulation kits.

Where angle points in the pipe alignment require two elbow fittings to be flanged and bolted together, the Contractor may substitute a single fitting of proper degree bend to match the required angle. Such substitute elbow fittings shall comply fully with these specifications.

#### 12-2.05 Flange Insulation for Discontinuity

Flanged joints shown on the plans or required by these specifications to be insulated for electrical discontinuity, shall use insulating kits conforming to this section. Insulation kits shall consist of one steel washer for each bolt, one phenolic insulating washer for each bolt, one full length polyethylene insulating sleeve for each bolt, one full-face phenolic gasket, and two standard 1/16" full-face service gaskets (install the phenolic gasket between the two standard gaskets). The three gaskets may be replaced by a special duty phenolic gasket, which uses "O" rings to achieve a competent seal. Flange insulating kits shall be as manufactured by Pipeline Seal and Insulator, Inc. (psi), or approved equal.

#### 12-2.06 Restrained Joints

Restrained joints shall be limited to use on ductile iron pipe only and shall not be allowed on PVC pipe. Restrained joints for ductile iron pipe are shown on the plans as "MJ with Retainer Glands". This designation refers to a mechanical joint, which is to be physically restrained. One of the following joint-restraining systems shall be used at these locations within the indicated size and class restrictions:

	<u>Dia. (inches)</u>	<u>Min. DIP Pressure Class</u>	<u>Min. DIP Special Class</u>
TR FLEX (US Pipe)	4"-20"	350	50
	24"-36"	250	50
TR FLEX GRIPPER (US Pipe)	4"-8"	350	50
MJ GRIPPER (US Pipe)	4"-8"	350	50
GRIP RING (Romac)	4"-8"	350	50
MEGALUG-MJ (EBBA Iron)	4"-20"	350	50
	24"-36"	250	50
MJ RETAINER Gland (EBBA Iron) (Set-Screw Type)	4"-6"	NOT ALLOWED	53
	8"	NOT ALLOWED	52
	10"	NOT ALLOWED	51
	12"	NOT ALLOWED	50
	14"-20"	350	50
	24"-36"	250	50

Other types of joint restraining systems may not be used unless approved by the Agency's Engineer.

Joint restraining systems using Tyton joint gaskets with metal retainer clips shall not be used. Tie rods shall not be used.

The approved restrained joints shall have been tested to withstand the thrust of a blind end assembly at the rated working pressure of either the pipeline or the fitting on which the restrained joint is used with not less than a 2.0 safety factor.

#### 12-2.07 Polyethylene Encasement for Ductile Iron Pipe

Where shown on the plans or designated in the Special Conditions of these Standards, ductile iron pipe shall be furnished with an 8-mil polyethylene encasement conforming to AWWA C105.

#### 12-2.08 PVC Primer and Solvent Cement

Primer and solvent cement for use with PVC Schedule 40 and 80 pipeline material and fittings shall conform to ASTM F-656 and D-2564 respectively.

#### 12-2.09 Mechanical Couplings

This section shall include flexible couplings, flanged adapter couplings, transition couplings, insulated couplings and reducing couplings required for use with ductile iron, and PVC distribution and transmission pipe.

Unless specified otherwise, cast-iron couplings shall be used. If the plans call for connection to steel pipe, steel couplings shall be used. Cast insulated couplings shall be used to connect steel pipe to ductile iron pipe. Full circle clamp couplings will not be allowed in place of PVC pipe couplings. All couplings shall be furnished with zinc-plated, chromate protected steel bolts and nuts.

Couplings shall be as manufactured by Christy Metal Products, Inc., Dresser Industries, Inc., Smith-Blair, Inc., or approved equal.

#### 12-2.10 Concrete

Concrete for reaction blocking shall be 2,000 psi and concrete for replacing sidewalks, curbs, gutters, driveways, and road crossing caps shall be 3,000 psi, both conforming in all respects to the requirements for Concrete Work.

#### 12-2.11 Locating Wire and Connectors

Locating wire shall be bare No. 8-gauge, single strand soft drawn copper.

Connectors shall be brass split-bolt connectors or other type of mechanically tightened joint connector approved by the Agency's engineer. Wire nuts or twisted joints shall not be used.

#### 12-2.12 Sand-cement Slurry Backfill

Sand-cement slurry shall consist of washed sand, free from clay and organic material of which 100% will pass a  $\frac{3}{4}$ " screen, at least 75% will pass a No. 4 sieve and no more than 5% will pass a No. 200 sieve. The sand shall be mixed thoroughly with type 1 or 2 cement, at a ratio of  $1\frac{1}{2}$  sacks per cubic yard of sand and enough water to accommodate mixing and placing, but not more than will allow a 4" slump. The sand slurry shall cure for 48 hours prior to placing and compacting replacement asphalt.

#### 12-2.13 Aggregate Base and Crushed Rock

Rock products used for replacing base materials under pavement, replacing shoulders, placing gravel roads and driveway, and all other locations shown on the plans or required by existing condition to be replaced, shall be CALTRANS Class 2 aggregate base, or crushed rock, all as shown on the plans and specified herein.

##### 12-2.13-A CALTRANS Class 2 Aggregate Base

Aggregate base used under pavement restoration and along paved road shoulders shall conform to CALTRANS, Section 26, Class 2,  $\frac{3}{4}$ " maximum.

##### 12-2.13-B Crushed Rock

Crushed rock aggregate for use in restoring gravel roads, road shoulders, gravel driveways and other similar areas, shall conform to CALTRANS, Section 26, Class 2,  $1\frac{1}{2}$ " maximum ( $\frac{3}{4}$ "

maximum, if replacing  $\frac{3}{4}$ " gravel), except that all material shall have 100% crushed, angular surfaces.

#### 12-2.14 Replacement Pavement

Replacement of asphalt pavement shall be asphaltic concrete pavement conforming to CALTRANS, Section 39, and meeting the aggregate grading requirement for  $\frac{1}{2}$ " maximum, medium gradation, and using grade AR-4000 paving asphalt conforming to CALTRANS, Section 92. Replacement of concrete pavement shall be at least Class A concrete conforming to concrete described elsewhere in these specifications, and installed and finished equal to original concrete.

#### 12-2.15 Chip Seal

Replacement of chip seal shall consist of medium screenings and RS-2 oil, all conforming to CALTRANS, Section 37-1.

#### 12-2.16 Straw Bales

Straw bales used for sediment filters shall be full size bales bound with wire or nylon; twine binding will not be accepted.

### 12-3 Installation

#### 12-3.01 General

This work shall consist of excavating the pipe trench to the lines and grades shown on the plans, controlling groundwater, installing the pipe, fittings, locating wire, and backfilling. The Contractor's attention is directed to the Special Conditions of these Standards and all applicable permits for other conditions affecting installation.

#### 12-3.02 Horizontal Alignment

The Contractor shall follow the horizontal alignment as staked in the field. The Contractor's attention is directed to Construction Staking in the Special Conditions of these Standards. The horizontal alignment shall follow the staked alignment with a maximum variation of plus or minus 6 inches on straight sections and plus or minus 12 inches on curved sections.

#### 12-3.03 Vertical Alignment

The vertical alignment shown on the plans shall be maintained within the limits described herein. If construction staking is required, the Contractor shall comply with requirements for Construction Staking as described in the Special Conditions of these Standards.

##### 12-3.03-A Vertical Alignment Design Data

In areas where the vertical alignment is delineated on the plans with alignment data including, but not limited to, vertical curve data with elevations, beginning and end of curves, length of curves and

slope of intervening tangents; the vertical alignment shall be staked. The Contractor shall follow the staked vertical alignment with a maximum variation of plus or minus one-tenth of a foot, except that allowed variations shall not create a slope within any one length of pipeline material that has a positive or negative slope opposite of that shown on the plans. The Contractor shall make a written request for construction staking for these areas.

#### 12-3.03-B Percent Slopes

In areas where the vertical alignment is delineated on the plans with a percent slope, a minimum uniform slope must be maintained. The percent slope is intended to establish a uniform grade between two locations of critical depth in order to avoid installing an air release valve. These locations of critical depth may include, but are not limited to, areas of low ground elevation with intervening high ground, structures or underground utilities, or other areas that fix water main elevations. The Contractor shall, in advance of trench excavation in the area, assist the Surveyors by clearing, potholing, or by other means necessary to establish the required critical elevations for verifying the required grade in the field. The vertical alignment shall then be staked. The Contractor shall follow the staked vertical alignment with a maximum variation of plus or minus one-tenth of a foot, except that allowed variations shall not create a slope within any one length of pipeline material that has a positive or negative slope opposite of that shown on the plans. The Contractor shall make a written request for construction staking for these areas.

#### 12-3.03-C Vertical Clearances and Other Controlling Elevations

In areas where the vertical alignment is dimensioned on the plans, or is a requirement of applicable encroachment permits, as a clearance requirement; examples include, but are not limited to, clearance under or over a road culvert, canal, drainage course, structure, or utility or clearance under a road surface; or where the vertical alignment is shown on the plans entering or exiting new or existing vaults or structures which then become controlling elevations; the Contractor shall, in advance of trench excavation in the area, verify the depth of any features that must be cleared, entered, or exited; and shall adjust grades in the vicinity of the controlling elevation so as to closely follow the profile shown on the plans and to avoid changes in the overall positive or negative slope of the vertical alignment. Depths found in conflict with the vertical alignment shown on the plans shall immediately be brought to the attention of the Agency's engineer. The Contractor shall not vary from the vertical alignment as shown on the plans, without prior approval of the Agency's engineer.

#### 12-3.03-D Minimum Cover

In areas where the vertical alignment is delineated on the plans as minimum cover, it is the intent to maintain the stated minimum cover at all the critically low ground elevations along the alignment; to create a smooth, even line for the pipeline invert despite undulations in the ground surface between the low elevations; and to avoid changes in the overall positive or negative slope of the vertical alignment. This intent shall apply to all areas not covered by vertical alignment data, percent slopes, or controlling elevations; all as described in this section. The Contractor shall plan the trench excavation far enough in advance by identifying the areas of critically low ground elevation and then shall comply with the intent stated herein for the vertical alignment shown on the plans. This process will create short sections of pipeline with more than the minimum cover, but

only for the purpose of following the vertical alignment shown on the plans. The Contractor shall not create sections with less than minimum cover. The Contractor shall not vary from the vertical alignment as shown on the plans, without prior approval of the Agency's engineer.

#### 12-3.04 Separation of Water Mains and Sanitary Sewers

All water main installations shall conform to the "California Waterworks Standards" contained in Section 64630, Title 22, California Administrative Code. Among others, these standards specify separation requirements between water mains and sanitary sewer lines. It was the intent in the design of the water main horizontal and vertical alignment to provide the separations shown on the plans. No water mains shall be installed or changes made that conflict with the separation requirements. The Agency's engineer shall be notified immediately if a conflict or potential conflict exists.

#### 12-3.05 Pipe Lengths

Pipe lengths shall be selected so that pipe can be installed through horizontal or vertical curves, or any combination thereof, without exceeding the maximum joint deflection as recommended by the manufacturer, or maximum pipe barrel deflection as allowed by these specifications. All curves exceeding these requirements shall be made with fittings, or by selecting shorter pipe lengths. Individual pipe lengths shall not be less than one half the standard length unless approved by the Agency's engineer.

#### 12-3.06 Dust Control

The Contractor shall control dust resulting from performance of this work either inside or outside of the right of way. Dust shall be controlled by applying either water or dust palliative, or both, for the alleviation or prevention of dust nuisance. Water shall be applied in accordance with CALTRANS, Section 17 and Dust Palliatives shall conform to and shall be applied in accordance with CALTRANS, Section 18. Tank water may be obtained from the Agency in accordance with the Special Conditions of these contract documents.

#### 12-3.07 Pipe Trench Excavation

This work shall consist of pipe trench excavation regardless of character of surface and subsurface conditions including location of underground facilities, blasting, overexcavating, and shoring. The Contractor's attention is directed to any applicable permits, agreements and licenses contained in the Special Conditions of these Standards.

##### 12-3.07-A Paved Areas

Areas paved with asphalt or concrete shall be marked for alignment and trench width. Asphalt and concrete paving, or sidewalks, shall be cut with a saw in neat parallel lines. The cut lines shall be at least 6" outside each edge of the trench width to prevent overbreaking and cracking of the paved surfaces.

##### 12-3.07-B Trench Configuration

The trench shall be excavated to allow the pipe to be aligned in the approximate center. Trench widths shall permit the pipe to be laid and joined properly and to allow for proper placement and

compaction of backfill material. In no case shall the trench width be less than the pipe OD plus 16 inches. The trench sidewalls shall be as near vertical as possible except where sloping is permitted by Agency's engineer. The trench bottom shall be as smooth as possible. The trench bottom shall provide a firm, uniform, and continuous bedding for the pipe. Properly sized and placed bell holes shall be provided at each joint. Mounding of trench bottom to support pipe will not be allowed.

#### 12-3.07-C Stockpiling

The Contractor shall exercise caution in stockpiling excavated and import materials so as not to interfere with public traffic and so as to maintain a clear distance from the trench sufficient to prevent collapse of the trench wall.

#### 12-3.07-D Tree Roots

Tree roots 3 inches in diameter and larger, which are encountered during trenching operations, shall not be cut or damaged. The vertical alignment of the pipe shall be adjusted, at the direction of the Agency's engineer, to avoid conflict with large tree roots. Should large tree roots be damaged or broken, the Contractor shall cut the root cleanly and wrap the cut end with 6-mil polyethylene film and secure with tape.

#### 12-3.07-E Underground Facilities

The Contractor shall proceed with caution in excavation and preparation of the trench so that the exact location of all underground facilities may be determined. Upon request, the Agency will locate its facilities at no expense to the Contractor. The request shall be placed with the "Underground Service Alert" by calling (800) 642-2444. It shall be the Contractor's responsibility to contact the owners of all other underground facilities, including private water mains and private service lines. All damage to underground facilities due to the failure of the Contractor to have the facilities located or due to carelessness in excavation after the facilities are located, shall be the Contractor's responsibility. Location of existing underground facilities on the plans or in the field does not relieve the Contractor of his responsibility to determine their exact location.

#### 12-3.07-F Drilling and Blasting

The handling, transport, and usage of explosives shall be in accordance with California State General Industry Safety Orders, Group 18, and applicable local laws and regulations. Required permits shall be obtained by the Contractor and a copy furnished to the Agency's engineer. The Contractor shall be fully responsible for any damage to the work or adjacent private property due to blasting operations. The Contractor shall also be held liable for all injury to, or death of persons caused by explosives.

Blasting shall be done with light charges and in such a manner that the material outside the prescribed neat lines will be preserved with a minimum of damage or disturbance. Whenever it is determined by the Agency's engineer that blasting might injure the foundation upon or against which concrete is to be placed, the Agency's engineer may direct that the use of explosives be discontinued and the removal of material be completed by means of pneumatic hand tools, barring

or wedging. No blasting shall be done within one hundred (100) feet of any concrete that is less than seven (7) days old. The depth of holes, loading and intensity of the blasting shall be determined by the Contractor subject to the acceptance of the Agency's engineer. Said acceptance shall in no way relieve the Contractor of his liability.

#### 12-3.07-G Over Excavation

Trenches for all types of PVC pipeline materials shall be over excavated to provide for a minimum 6-inch sand bedding. Trenches for ductile iron pipe shall be over excavated by a minimum of 6 inches in areas of rock, hardpan, shale, or other unsuitable bedding materials, all as shown on the plans.

Trenches in areas of underground water shall be over excavated to allow for 6 inches or more of permeable backfill, as required for Pipe Trench Backfill, as described elsewhere in this section.

Any areas of trench over excavated beyond the lines and grades shown on the plans or specified herein shall be brought back up to proper grade using suitable materials as approved by the Agency's engineer. This material shall be compacted to the specified degree prior to placing any pipe or sand bedding in the trench.

#### 12-3.07-H Ground Water and Unsuitable Material

Material taken from excavations where excessive ground water or surface water or other sources of water have rendered the material unsuitable for trench backfill shall be removed from the site and replaced with suitable material. The over wet material may, at the Contractor's option, be dried to a proper moisture content and reused in the work, provided the material meets all other requirements of these specifications.

#### 12-3.07-I Disposal of Material

The Contractor shall dispose of all unused and unsuitable material. The Contractor shall make his own arrangements for disposing of, storing, or areas for drying unsuitable material. Prior to using any areas outside the project right of way, the Contractor shall secure a signed release from the owner, all as required in the Special Conditions of these Standards

#### 12-3.07-J Trench and Excavation Support

Trench and excavation support shall conform in all respects to shoring, as described elsewhere in these specifications.

#### 12-3.08 Pipe and Fitting Installation

This work shall include storing and handling of the pipe and fittings, installation procedures and precautions, completion of joints, corrosion protection, pipes placed in casings, locating wires, and reaction blocking requirements.



12-3.08-A Storage and Handling

All pipe and fittings shall be unloaded, stored, lowered into the trench and joined, using suitable tools and equipment and in a manner that will prevent damage to the material, joints, coating, or lining. Storage and handling shall be in accordance with manufacturer's recommendations.

Damaged pipe will be rejected. The Contractor shall clearly mark the rejected pipe and remove it from the immediate construction area. When approved by the Agency's engineer, damaged pipe may be repaired in accordance with the manufacturer's recommendations and used in the construction. Replacement or repair of rejected pipe, if allowed, shall be the Contractor's responsibility and accomplished at his expense.

12-3.08-B Installation

In addition to the specific guidelines contained herein, the following references shall be used as guidelines and specifications for the installation of the listed pipeline material:

Ductile Iron (DIP) .....	AWWA C600
PVC Pressure Pipe .....	AWWA Manual M23*
PVC Transmission Pipe .....	AWWA Manual M23
PVC Schedule 40 and 80 Pipe .....	ASTM D-2855 and AWWA Manual M23

\*Except that the allowable minimum bending radius for PVC pipe shall be increased as follows:

4" dia.=	200'
6" dia.=	300'
8" dia.=	300'
10" dia. =	350'.

All foreign material shall be removed from the inside of the pipe or fitting and the joint shall be properly cleaned prior to lowering the pipe or fitting into the trench. Care shall be taken to prevent foreign material from entering the pipe or fitting while it is being placed in the trench. The pipe and fittings shall be kept clean and dry in accordance with AWWA C651, Section 4.1.

The bell end of the pipe shall face the direction of laying. On slopes greater than 10 percent, laying shall begin at the bottom of the slope and proceed upward. The joining procedure and the maximum allowable joint deflection shall be as recommended by the manufacturer. Pipe shall not be installed when water is in the trench, when the trench bottom is wet or frozen, or when, in the opinion of the Agency's engineer, the trench conditions or weather are unsuitable for proper installation.

All plain ends of pipe, either standard lengths or cut lengths, shall be marked on the barrel with a circumferential stripe that will accurately indicate the position of the pipe end within the joint when assembled correctly.

The Contractor shall take all necessary precautions to prevent floatation of the pipe. Any pipe and fitting displaced by floatation shall be removed and reinstalled.

At all times when pipe laying is not in progress, the open ends of the pipe in the trench shall be closed with a water tight plug or other means approved by the Agency's engineer. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Cutting of pipe for valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or its coating and lining. Cut ends shall be properly prepared to be equivalent to the factory joint. Any coating or lining damaged by the cutting shall be repaired as directed by the Agency's engineer. Remnant pieces shall be set aside for use at the next closure if possible.

All pipe with bell-and-spigot joints, joint couplings or other joint configuration constituting an increase in pipe diameter shall have holes provided for the joints such that the pipe is in continuous contact with the trench bottom between joints.

Insulating couplings, flanges, or bushings specified herein shall be used for all connections between dissimilar metals.

Where shown on the plans or designated in the General Conditions of these Standards, ductile iron pipe shall be furnished with a polyethylene wrap. Installation of the film shall conform to AWWA C105. Where the limits of required wrapping do not end at a joint, the wrap shall be extended to the next joint so that no individual length of pipe is partially wrapped.

No trenches or excavations shall be left open overnight, except as described in the Special Conditions of these Standards.

The Contractor's attention is also directed to the General Conditions of these Standards regarding restrictions on weekend, holiday, and night work.

#### 12-3.08-C Corrosion Protection

All pipe, fittings, and couplings and joints having bolts, glands, set screws or other metal fasteners to be covered with backfill material, regardless of the type of water main material, shall be protected from corrosion after assembly by wrapping with polyethylene film. The valve body, joints, couplings, and pipe or fittings within three feet on either side of the joint shall be thoroughly wrapped with two layers of 6-mil polyethylene film having a minimum sheet width of 3 feet. The film shall be held firmly in place with duct tape.

Backfilling operations shall be conducted so as not to damage or displace the polyethylene wrap.

If polyethylene encasement for sections of ductile iron pipe are shown on the plans or designated in the Special Conditions of these Standards, it shall be installed in conformance with AWWA C105. The Contractor's attention is directed to the materials section for a description of polyethylene encasement for ductile iron pipe.

12-3.08-D Reaction Blocking

All pipe joints, fittings, and appurtenances that will remain in the final work and are exposed to thrust or deflection and not positively restrained shall be supported by concrete reaction blocking. Concrete reaction blocking shall also be placed on all fittings used for 2" PVC Schedule 40 and 80 pipe. The size and configuration of reaction blocking shall be as shown on the plans or as directed by the Agency's engineer.

The concrete shall be placed between undisturbed soil and the fittings or appurtenance to be supported. Concrete shall not be placed on or around the pipe, bells, flanges, or other joints. If contact with concrete is unavoidable, these areas shall be protected with a double wrap of 6-mil polyethylene film to allow for disassembly and repair of the fitting or appurtenance. Thrust blocks placed on blind flanges shall be separated from other thrust blocks on the same fitting with plywood so as to facilitate future removal of the thrust block and blind flange.

All horizontal deflections in excess of 6 degrees and all vertical deflections that are concaved upward and in excess of 6 degrees shall have a thrust block placed to the limits shown on the plans. Thrust blocks shall be installed at the terminus of each pipeline reach unless otherwise shown on the plans. Thrust blocks shall also be installed at all tees, wyes, crosses, and reduced fittings.

All vertical deflections that are concaved downward and in excess of 6 degrees shall have an anchor block placed to the limits shown on the drawings or as directed by the Agency's engineer.

No structural load or pressure shall be applied to a thrust block for a minimum of 24 hours after installation.

12-3.08-E Locating Wire Installation

A locating wire shall be installed over all non-metallic pipe and over all metallic pipe with O-ring or mechanical joints which do not have bonding straps as shown on the plans. The wire shall be centered 6 inches above the pipe. All splices and branch connections shall be secured tightly with brass split-bolt or parallel connectors.

12-3.09 Pipe Trench Backfill

This work shall consist of selecting, preparing, importing, placing, and compacting backfill materials.

12-3.09-A Backfill Selection

Native material removed from the trench may be used for backfill material provided it meets all of the requirements set forth on the plans and in these specifications. Native backfill material may be mechanically screened to meet these requirements. Materials excavated from the trench which are found to excess, and materials found to be unsuitable for trench backfill shall be disposed of in a manner described elsewhere in this section.

The Contractor shall import the type and quantities of backfill materials not found on the job site at his own cost. The Contractor shall provide the equipment and materials necessary to collect samples of the native materials and proposed import material for testing, all as directed by the Agency's engineer.

The class or type of backfill material shown on the plans and designated in these specifications shall meet the following criteria:

Class 1 Material. Three types of materials are acceptable; 1) naturally occurring (not crushed) rounded sand, 2) crushed sand, and 3) decomposed granite. All material shall be free from clay, organic, or other deleterious material, shall have a sand equivalent of at least 50, and shall meet the following percent passing by weight gradations:

<u>Sieve Size</u>	<u>Natural Sand</u>	<u>Crushed Sand</u>	<u>Decomposed Granite</u>
1 1/2"	100	--	
3/4"	75-100	100	100
No. 4	55-100	75-100	75-100
No. 200	0-5	0-15	0-5

Class 2 Material. Select excavated earth, free from stones or lumps exceeding 1" in greatest dimension, vegetable matter, or other deleterious material. Class 3 Material. Select excavated earth, free from stones or lumps exceeding 2" in greatest dimension, vegetable matter or other deleterious material.

Class 4 Material. Select excavated earth, free from stones or lumps exceeding 4" in greatest dimension, vegetable matter or other deleterious material.

Permeable Backfill Material. Hard, durable, clean gravel, or crushed stone, free from organic material, clay balls, or other deleterious substance, conforming to one of the following grades:

<u>Sieve Size</u>	<u>Percentage</u> <u>1/2"</u>	<u>Passing</u> <u>1 1/2"</u>
2"	--	100
1 1/2"	--	95-100
3/4"	100	50-100
1/2"	95-100	
3/8"	70-100	13-55
No. 4	0-55	0-25
No. 8	9-10	0-5
No. 200	0-3	0-3

12-3.09-B Backfilling Operations

Native and imported backfill material shall be screened or otherwise prepared before placing the material in the trench. Backfill material shall be at or near optimum moisture content. Excessive

moisture must be removed by windrowing and air-drying. Dry soils shall be moistened and thoroughly mixed.

Backfill material required for over-excavated trenches shall be placed, compacted to the required density, and smoothed out prior to installing the pipe.

Backfill material shall be placed up to the springline (horizontal centerline) of the pipe and compacted to the required density.

The remainder of the backfill material shall be placed in uniform horizontal layers not exceeding 8" in thickness before compaction.

#### 12-3.09-C Sand-cement Slurry Backfill

All water main and service line crossings under paved roadways (excluding paved residential driveways) shall be backfilled from 6" above the pipe to the underside of the replacement paving with sand-cement slurry, except as shown otherwise on the plans, or required by provisions of an encroachment permit or other agreement. The pipeline shall be bedded and backfilled to 6" above the pipe with Class 1 material prior to placing the sand-cement slurry.

All pipe trench which requires tunneling under features such as walks, curbs, retaining walls, or other rigid or concrete features, shall be backfilled with sand-cement slurry from within 6" of the top of the pipe to up underneath, and if necessary, around the bottom of the feature so as to provide adequate support.

Sand-cement slurry shall not be placed around valve complexes and related fittings. These areas shall be backfilled and compacted with aggregate base material conforming to CALTRANS Class 2.

Sand-cement slurry shall be as specified elsewhere in this section.

#### 12-3.09-D Backfill for Wet Conditions

Where groundwater or other sources of water are encountered in the trench which create unsuitable trench conditions, or render the native material unsuitable, the trench shall be over excavated and the pipe bedded on permeable backfill. The pipe shall also be shaded and a portion of the remainder of the trench depth backfilled with permeable backfill, as directed by the Agency's engineer.

Impervious clay plugs shall be placed across the trench to prevent migration of the water down the pipeline trench, all at the direction of the Agency's engineer.

#### 12-3.09-E Backfill Compaction

Backfill material shall be compacted by mechanical tamping. Other means of mechanical compaction may be employed only after receiving approval of the Agency's engineer. Compacting

equipment or methods that produce horizontal or vertical earth pressure that may cause excessive displacement or damage to the pipe or trench walls, shall not be used.

Compaction of backfill material by ponding or jetting will not be permitted.

Relative compaction of not less than 95 percent shall be obtained within all roadways and driveways. This shall include all areas within the road or driveway cross sections which includes the area between the top of cut and toe of fill. 95 percent relative compaction is specified here and on the plans as a minimum requirement, and the Contractor shall apply additional compactive effort so as to prevent any and all future settlement of the trench and surrounding areas. The Contractor shall be responsible for restoring the trench to a condition as good or better than the road cross section and its ability to perform its intended function, including proper compaction over and above 95%, if required.

Relative compaction in all other areas, unless otherwise shown on the plans, shall be 85 percent.

To prevent excessive live loads on the pipe, sufficient densified backfill, but not less than 2 feet over the pipe, shall be in place before power-operated hauling or compacting equipment travels over the pipe.

#### 12-3.10 Connection to Existing Water Mains

Connection of new water mains to existing water mains where a "Wet Tap" is not required, shall be as shown on the plans and as described elsewhere in these specifications. Where a "Wet Tap" is required on the plans, the work shall be as described for Water Main Taps elsewhere in these specifications. Connections will be allowed only after the new water mains and appurtenances have successfully passed a pressure and leak test in conformance with Testing and Disinfecting, as described elsewhere in these specifications. For additional details regarding connections and outages, the Contractor's attention is directed to the Special Conditions of these Standards.

#### 12-3.11 Temporary Erosion Control

The Contractor shall take whatever measures necessary to prevent excessive erosion of areas disturbed by this work and shall prevent sediments from leaving the work areas. Measures may include, but not be limited to filter fabric fences, straw bale dikes, interceptor swales, or other methods, all as approved by Agency's engineer.

The Contractor's attention is directed to the Special Conditions of these Standards for permits or agreements requiring temporary erosion control.

##### 12-3.11-A Straw Bale Dikes

Straw bales shall be placed across streams downstream of the areas to be disturbed prior to working in the area. Enough bales shall be used so as to adequately cross and filter the stream. Bales shall be placed in a row with their ends tightly abutting the adjacent bale so as not to allow normal stream flows to pass around, between, or underneath the bales.

Each bale shall be staked in place with at least three No. 4 rebar stakes, each of which must penetrate firm ground by 18". The first stake in each bale shall be driven toward the previously laid bale to force the bales together.

The straw bale dikes shall be monitored and maintained during its period of use. After construction is done in the area, the straw bales and collected silt shall be removed. Removal of the bales shall be done so as not to break up the bales, or allow them to drop or lose any part of their sediment load. The Contractor shall dispose of the used bales and silt at his own expense.

## 12-4 Trench Restoration and Final Cleanup

### 12-4.01 General

This work shall consist of restoration of areas above and adjacent to the trench and areas outside the immediate work area, including paved surfaces, graveled surfaces, unimproved surfaces, and final cleanup. This work shall be performed in a timely manner so as to minimize any inconvenience to the public.

The Contractor's attention is directed to the Special Conditions of these Standards for any specific requirements contained in Right-of-Way Agreements, Encroachment Permits, agreements or licenses.

### 12-4.02 Paved Surfaces

Trench restoration in areas of asphalt or concrete pavement shall be as shown on the plans, and as specified in the Encroachment Permit. Materials shall be as specified elsewhere in this section. Asphalt pavement shall be stored, proportioned, mixed, spread and compacted; and a paint binder (tack coat) shall be applied, all as specified in CALTRANS Section 39. Concrete pavement shall conform in all respects to Concrete Work, described elsewhere in these specifications. This work shall be done with a high degree of workmanship in order to produce a smooth, uniform and visually appealing patch without disturbance, marring or blemishing of adjacent paved areas. All pavement striping, including letters and arrows, shall be replaced.

All trench crossings and other trenches or excavation located within chip seal roads shall be patched using a minimum of 8" aggregate base and 2" of asphaltic pavement, except as shown otherwise on the plans, or required by provisions of an encroachment permit or other agreement.

### 12-4.03 Chip Seal

All new pavement in chip seal roads, all pavement replacement in areas of pavement which have been previously chip sealed, or "armour coated" and areas of existing chip seal or "armour coat" which are damaged by the Contractor's activities, shall receive a coat of chip seal, all as shown on the plans and as specified in the Encroachment Permit. Materials for chip seal shall be as specified elsewhere in this section. Site preparation, emulsion application, spreading screenings, and finishing shall all conform to CALTRANS, Section 37-1.

#### 12-4.04 Paved Road Shoulders

Shoulders within 2 feet of the edge of paved roads which are disturbed by trenching and backfilling operations, shall be finished with a 2' wide aggregate base shoulder, all as shown on the plans, specified herein, and as specified in the Encroachment Permit, if applicable. This gravel shoulder will be required regardless of shoulder condition prior to start of work, unless shoulder area was treated with materials superior to that specified herein, in which case, the shoulder area shall be restored to an as good or better condition.

#### 12-4.05 Graveled Surfaces

Graveled surfaces include, but are not limited to roadways, driveways, shoulder areas of unpaved roads, or walkways; all of which had gravel surfaces prior to the start of work.

Trench restoration in areas of graveled surfaces shall be as shown on the plans. Materials shall be as specified elsewhere in this section. The 8" minimum depth of gravel shall be placed over the trench limits after the underlying trench backfill has been compacted and approved. The gravel shall be compacted to 95 percent relative compaction. Enough gravel shall be placed over the trench so that after compaction, the trench surface blends into surrounding areas.

Graveled surfaces outside the trench limits that have been used for storing spoils, or which have been otherwise contaminated directly or indirectly by Contractor's operations, or otherwise damaged, shall have the contaminated materials removed and fresh gravel of equal quantities spread and compacted in its place.

Other gravel surfaces of roads, driveways and shoulders damaged by the Contractor's activities shall be repaired as directed by the Agency's engineer.

The type of gravel, either aggregate base or crushed rock, used for restoration shall be as shown on the plans. If not shown on the plans, the type shall closely match the type of gravel present prior to the start of construction. The Agency's engineer must approve the type of gravel prior to placement by the Contractor. If necessary, to match pre-existing conditions, the gravel shall be compacted and rolled in place for a hard durable surface.

#### 12-4.06 Unimproved Surfaces

Unimproved surfaces include all areas not paved or graveled, or having a particular type of hard surface. These areas shall be restored to their original ground contours. The Contractor's attention is directed to the Special Conditions of these Standards for Yard and Pasture Restoration, and Special Rights-of-Way requirements. In addition, all irrigation and sprinkler systems shall be restored and all ornamental structures and materials including, but not limited to, fences, planters, curbs, dividers, walkways, stepping stones, and paving slabs shall be restored. Unless otherwise specified in the Special Conditions, vegetative ground cover within the designated working areas shall not be replaced by the Contractor.

The area directly over the trench outside of yard areas shall be left slightly mounded parallel with the trench.



#### 12-4.07 Final Cleanup

All areas over and around the trench and appurtenances, and all other areas and surfaces disturbed by the construction activities shall be restored to an equal or better condition as existed prior to the start of construction. This also includes fences, walkways, mailboxes, signs, walls and all other private and public appurtenances to the property or right of way.

### 12-5 Measurement and Payment

#### 12-5.01 Measurement

Work performed under this section shall be measured as the number of lineal feet of the various diameter water mains, all of which have been completely installed. Measurement shall be made to the nearest lineal foot, measured along the centerline of the pipe and bends. Tees, wyes, and crosses shall be measured along their centerline as the size of the larger pipe involved.

#### 12-5.02 Payment

The contract unit prices shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work necessary for the installation of Water Mains as shown on the plans, or as designated in these specifications. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this Section.

## SECTION 13

### WATER MAIN TAPS

#### 13-1 General

##### 13-1.01 Scope

This section describes the requirements for furnishing and installing water main taps using tapping saddles, couplings, and sleeves; including the materials to be used, methods and requirements for installation, and measurement and payment. Two types of water main taps are included: taps installed concurrent with construction, and taps required on existing water mains under pressure (referred to herein as "Wet Taps"). Taps installed concurrent with construction are limited to maximum nominal size of 2" and are intended for appurtenances such as service assemblies, air release valves, and blowoff valves. Taps made concurrent with construction that are larger than 2" usually require cast iron fittings and inline valves, which are described elsewhere in these specifications.

This section does not include the shutoff valve located at the tap, if required. This section does not include installation of branches in water mains, which are shown on the plans using AWWA C110 or C153 cast iron fittings such as tees, crosses, and wyes. If required, items such as these have been described elsewhere in these specifications.

##### 13-1.02 Description of Work

Work under this section shall include, but not be limited to, excavation, backfill, corrosion protection, reaction blocking, locating wire, and surface restoration, all as described for Water Mains elsewhere in these specifications. Work under this section shall also include, but not be limited to, storage and handling of materials, installation of the saddle or sleeve, tapping the water main, installing the valve (if required), and pressure testing the installation (if required).

##### 13-1.03 Public Convenience, Preservation of Property and Cleanup

While performing work under this section, the Contractor shall comply with the terms and conditions concerning public convenience, preservation of property and cleanup, all as described in the General Conditions of these Standards.

##### 13-1.04 Permits

The Contractor's attention is directed to the Special Conditions of these Standards for permit compliance requirements.

##### 13-1.05 Design

Saddles and sleeves used for water main taps shall be rated for a working pressure equal to the working pressure in the system at the point of connection, or as specified herein, but not less than 150 psi. The saddle or sleeve shall be designed and tested to withstand a sustained pressure of at least two times the

system working pressure, but not less than 300 psi. Representative samples of the saddle or sleeve shall be designed and tested to fail at a pressure of not less than 2.5 times the system pressure, but not less than 375 psi. Other tests for specific types of saddles or sleeves shall be as specified herein. An affidavit confirming design criteria and testing results may be required by the Agency's engineer.

#### 13-1.06 Submittals

Submittals supplied by the Contractor shall include: catalog data for saddles, sleeves, and hole cutting device; operating instructions for wet-tap machines (if machine is required); certificate of factory pressure and leak tests; and affidavits confirming design criteria and testing results for all installations where the system working pressure exceeds 150 psi. The Contractor's attention is directed to the General Conditions of these Standards under "Submittals".

#### 13-1.07 Notice of Intent to Wet-Tap

Performing wet-taps 4" nominal size and larger must be scheduled with the Agency's engineer. The Contractor shall make a written request for a date and time to perform the work at least five (5) working days in advance of wet-tap operations. The Contractor shall have received submittal approval and have all necessary saddles, sleeves and valves on site and inspected prior to the written request. The Agency reserves the right to make the final determination for scheduling a wet-tap operation. The Contractor must receive written approval of the date and time prior to performing the wet-tap.

#### 13-1.08 Inspection

The Contractor shall make all saddles, tapping couplings, sleeves, and valves (if required) available for inspection by the Agency's engineer prior to installation. Each phase of the work shall pass inspection by the Agency's engineer before commencing with work on the next phase. The phases of work shall consist of, but not be limited to, excavation for the connection, tapping the main, cleaning the outside of the pipe, installing the saddle or sleeve and valve, if necessary, testing the sleeve, making the wet-tap, applying corrosion protection, connecting and wrapping the locating wire, backfilling, and surface restoration.

### 13-2 Materials and Installation

#### 13-2.01 General

Materials furnished for water main taps shall include tapping saddles, tapped couplings, tapping sleeves, and all the necessary bolts, nuts, and washers; concrete, backfill materials, and materials used for restoration of area around the tap location. Materials and installation shall be as shown on the plans and as designated in these specifications.

#### 13-2.02 Storage and Handling

Saddles and sleeves used for water main taps shall be stored and handled in their original containers, which shall not be unpacked until 24 hours prior to installation, except for inspection. Saddles and sleeves shall be maintained free from dirt and foreign matter and shall be stored on wooden pallets in their original containers.

### 13-2.03 Excavation and Backfill

Excavation and backfill operations for Water Main Taps shall conform to all the requirements for Pipe Trench Excavation and Pipe Trench Backfill, as described for Water Mains elsewhere in these specifications.

### 13-2.04 Tapping Saddles

Tapping saddles may be used for water main taps either concurrent with new construction, or for tapping existing water mains under pressure. Tapping saddles shall be limited to a maximum nominal outlet diameter of 2".

#### 13-2.04-A Materials

Tapping saddles used for taps on DIP water mains shall be double strap saddles for pipe sizes up to 16" and triple strap saddles for pipe sizes 18" and larger. Saddle bodies shall be ductile iron conforming to ASTM A536, grade 65-45-12, protected with a corrosion-resistant paint. The gasket shall be virgin NBR, or Buna-N rubber; formulated for treated water. Gaskets shall be cemented in place on the saddle bodies prior to shipment from the manufacturer. The straps, nuts, and washers shall all be AISI C1018 steel electrogalvanized with Di-chromate seal, or Mayari-R (Corten) steel. The saddle boss shall be tapped with standard iron pipe threads. Double strap saddles shall be Romac Style 202, Ford Style F202, or approved equal.

Tapping saddles used for taps on PVC water mains shall have ductile iron bodies conforming to ASTM A536, grade 65-45-12, and protected with a corrosion-resistant paint. They shall have one or two 304 stainless steel bands using not less than four 304 stainless steel bolts, nuts and washers, all threaded areas and the washer having been factory coated with fluorocarbon. Single bands with four bolts (two bolts on either side of the saddle) shall be a minimum of 3¼" wide. Double bands with two bolts each (one bolt on either side of the saddle for each of the two bands for a total of four bolts) shall have a total combined width of not less than 3". The gasket shall be virgin NBR, or Buna-N rubber; formulated for treated water. Gaskets shall be cemented in place on the saddle bodies prior to shipment from the manufacturer. The saddle boss shall be tapped with standard iron pipe threads. The saddle bodies shall be preformed at the factory to fit cast iron OD PVC. Each body shall be marked with the OD to which it has been formed. Saddles for taps on PVC water mains shall be Ford Style FS 202 or FC 202 (epoxy coated body); or Romac style 202S or 202N (nylon coated body); or approved equal.

#### 13-2.04-B Installation of Tapping Saddles

Installation of saddles shall be in accordance with the manufacturer's recommendations. The hole drilled or cut in the main shall be equal to the stated nominal size of the threaded tap on the saddle.

Note: Holes cut in PVC water mains shall be accomplished with a ribbon-type cutter. Drills and hole saws are not recommended by the pipe manufacturer and are, therefore, prohibited. Ribbon cutters shall be advanced slowly and not forced through the pipe wall. Forcing the bit will cause undue heat or fracturing of the PVC material.

Holes cut in DIP water mains may be accomplished by either drilling or the use of a hole saw.

The outside of the pipe shall be cleaned thoroughly of all dirt, grease, oil, and other foreign matter prior to installing the saddle.

Bolts shall be drawn up in an acceptable pattern and torqued to the manufacturer's specifications.

Apply corrosion control materials as specified elsewhere in this section.

### 13-2.05 Tapped Couplings

Tapped couplings may be used for water main taps concurrent with construction only, and shall be limited to a maximum nominal outlet diameter of 2".

#### 13-2.05-A Materials

Tapped couplings shall be solid cast fittings conforming in all respects to fittings required for Water Mains elsewhere in these specifications. In general, they shall be AWWA C110 or C153 ductile iron, with a cement mortar lining and asphaltic coatings, and end configurations of either push-on or mechanical joints. The coupling shall be cast with a raised boss. The boss shall be tapped with standard iron pipe threads. Tapped couplings shall be U.S. Pipe "Tapped Tees", or approved qual.

#### 13-2.05-B Installation of Tapped Couplings

Tapped couplings shall be installed as a water main fitting, as described in the section entitled "Water Mains", elsewhere in these specifications. Apply corrosion control materials as specified elsewhere in this section.

### 13-2.06 Tapping Sleeves

Tapping sleeves shall be used for making wet taps 4" nominal size and larger on existing water mains 6" nominal size and larger. Tapping sleeves shall not be used for water main taps concurrent with construction. Tapping sleeves shall be either cast iron split-sleeve type with a flanged outlet and mechanical joints to seal around the pipe (CI), or stainless steel split sleeves with a flanged outlet and a full-face rubber gasket to form the seal (SS), all as specified herein. The type of tapping sleeve used shall be as shown on the plans, or as determined by the Agency's engineer.

These two types of tapping sleeves shall be limited to use on the water main materials, water main sizes, and tap sizes listed below:

Water Main Size (in.)	Tap Size (in.)	DIP	ACP	PVC	STEEL	GCIP
6	4	CI,SS	CI,SS	CI,SS	SS	SS
8	4	CI,SS	CI,SS	CI,SS	SS	CI,SS
8	6	CI,SS	CI,SS	SS	SS	SS
10	4	CI,SS	CI,SS	CI,SS	SS	CI,SS
10	6	CI,SS	CI,SS	CI,SS	SS	SS
12	4	CI,SS	CI,SS	CI,SS	SS	
12	6	CI,SS	CI,SS	CI,SS	SS	
12	8	CI,SS	CI,SS	SS	SS	
14 to 24	Up to 10	CI,SS	CI,SS	SS		

Where: DIP = Ductile Iron Pipe  
 ACP = Asbestos-Cement Pipe  
 PVC = Polyvinyl Chloride Pipe  
 Steel = 10-gauge minimum wall thickness  
 GCIP = Gray Cast Iron Pipe  
 CI = Cast Iron Split-sleeve with mechanical joints.  
 SS = Stainless Steel Band with full-face gasket.

Alternative methods for tapping steel water mains, such as weld-on half sleeves, or weld-on split sleeves, shall not be used without prior approval from the Agency's engineer. The Agency's engineer may require design calculations, shop drawings, and specific details on coating repairs. Weld-on sleeves shall be allowed only on cement mortar lined water mains.

#### 13-2.06-A Cast Iron Split-sleeve (CI)

Cast iron split sleeves shall have standard mechanical joint ends complying with AWWA C111, except that the mechanical joint glands shall be split to accommodate installation. The outlet shall be flanged with dimensions and drilling that comply with ANSI B16.1, Class 125. The body shall have a 3/8" NPT minimum size test plug. The body shall be coated with corrosion-resistant paint that is compatible with treated water. Cast iron split sleeves shall be Mueller H-615, U.S. Pipe "Tapping Sleeve", Clow F-5205, or approved equal.

#### 13-2.06-B Stainless Steel Tapping Sleeve (SS)

Stainless steel tapping sleeves, including flanges, outlets, armour plates, lugs, nuts, bolts, and washers shall be constructed of 18-8 type 304 stainless steel. Each sleeve shall be rated at a minimum working pressure of 150 psi and shall be factory hydrostatically tested on a pipe to a minimum of 300 psi for a minimum of three minutes with zero leakage allowed. Certified leak test results shall be provided if required by the Agency's engineer.

The sleeves shall incorporate drop-in type bolt lugs with pass-through bolt design and supplied with a minimum of two longer starter-bolts. Sleeves employing lifter bars and/or bolts welded to one half of the sleeve shall not be accepted.

Sleeves shall incorporate a full circle, full length, overlapping body gasket made of virgin Buna-N, or equal, compounded for water service. The body gasket may be protected by heavy gauge armour plates at the seams in the sleeve body. The body gasket may be factory bonded to the outlet half of the sleeve and the armour plates shall be factory bonded to the body gasket. The body gasket shall be full thickness between the armour plates and the pipe.

The stainless steel flange shall have ANSI 125 lb drilling and be recessed for a tapping valve per MSS-SP60 and furnished with a full-face gasket permanently bonded in place.

Sleeves shall be sized properly to fit the pipe outside diameter. The branch outlet shall be oversized to accept standard tapping saws or bits. The outlet shall be furnished with a 3/8" NPT minimum size stainless steel test plug. All welds shall be passivated. All threads shall be factory coated with fluorocarbon to prevent galling. Nylon washers may be added to reduce installation torque.

Stainless steel tapping sleeves shall be as manufactured by JCM Industries, Inc. Model JCM 432 or PowerSeal Pipeline Products Corporation Model 3490, or approved equal.

Valves used for wet-taps shall be resilient seat gate valves, designed specifically for wet-tapping and shall conform to Main Line Valves described elsewhere in these specifications.

#### 13-2.06-C Installation of Tapping Sleeves

Installation of tapping sleeves shall be in accordance with the manufacturer's recommendations and these specifications. A calibrated torque wrench shall be used to achieve all recommended torques.

After excavating the water main and immediately prior to installing the sleeve, remove all dirt, grease, oil and foreign material from the outside of the water main. The water main shall then be then rinsed thoroughly with water. Install the tapping sleeve with particular attention to position of gaskets, "O" rings, and seals. Bolts shall be drawn up and torqued to manufacturer's specifications in a uniform and accepted pattern.

The tapping valve shall be installed on the flange, as recommended by the valve manufacturer.

The downstream flange of the valve shall be blocked temporarily so as to accept the weight of the valve and the tapping machine.

The sleeve and valve installation shall be air tested for leaks prior to installing the tapping machine. The sleeve shall be pressurized with water through the test coupling to at least 100% of the system working pressure at the point of the tap. Care shall be taken to insure that working pressure is maintained in the water main for the duration of the test. The testing equipment shall be fitted with an appropriate gauge. After test pressure is achieved, the complete installation shall be inspected visually for leaks. Then, all joints shall be tested with a solution of soap and water. All visible leaks shall be repaired in a manner approved by the Agency's engineer. The test pressure shall then be maintained on the gauge without any further aid from the pressure source, for a period of 10 minutes without any perceivable decline in pressure. If the pressure declines, the visual test shall

be repeated. The water main shall not be tapped if a leak is present. If the tapping valve is the suspected source of leakage, the valve shall be replaced and the test repeated.

Prior to installing the tapping machine and in time for an initial cure of the concrete to occur, a concrete thrust block shall be poured behind the sleeve and under the outlet of valve, all as required for a "tee" fitting described for Water Main Fittings elsewhere in these specifications. The concrete block shall be formed and extended underneath the sleeve and the valve so as to provide support once the temporary blocks are removed. All bolts and connectors shall be protected against contact with the concrete by wrapping with polyethylene film, as required for corrosion protection described elsewhere in this section.

The tap shall be performed in accordance with the tapping machine manufacturer's recommendations. The tapping machine shall be supported and blocked so as to reduce strain on the sleeve, valve, or water main.

Note: PVC pipe shall be tapped using a ribbon cutting bit only. Do not use a drill or hole saw-type bit.

The coupon shall be removed with the tapping machine. If, for whatever reason, the coupon is not recovered with the machine, the Contractor shall be responsible for coupon retrieval from the system and shall cooperate fully with directions given by the Agency's engineer while locating and removing the coupon.

Upon removal of the tapping machine, the entire tapping sleeve and valve assembly shall be inspected for water leaks. All visual leaks shall be repaired. All repair methods shall be subject to Agency's engineer's approval. The valve shall be opened enough to flush any shavings, chips, and debris from the water main.

Apply corrosion control as specified elsewhere in this section.

### 13-2.07 Corrosion Control

All fittings, couplings, saddles, sleeves, joints, straps, and fasteners having bolts, straps, glands, set screws or other metal fasteners used for water main taps shall be protected from corrosion after assembly and leak test (if applicable), as specified herein. The tapping saddle or sleeve, the valve, and the water main and lateral for three feet on either side of the sleeve and valve, shall be thoroughly wrapped with two layers of 6-mil polyethylene film having a minimum sheet width of 3 feet. The film shall be held firmly in place with tape. Backfilling operations shall be conducted so as not to damage or displace the film.

Taps made on ductile iron having a polyethylene encasement shall, prior to backfilling, provide for repair of the film in compliance with AWWA C105. The saddles, couplings, or sleeves shall be wrapped as described above.

### 13-2.08 Reaction Blocking

Concrete used for reaction (thrust) blocks and as support under the sleeve and valve, and its installation shall be as described herein and for Water Mains elsewhere in these specifications.



13-2.09 Locating Wire

Connection of the new locating wire from the lateral to the locating wire on the water main shall be as described for Water Mains elsewhere in these specifications.

13-2.10 Surface Restoration and Cleanup

Surface restoration and cleanup for the area around the tap shall comply with Trench Restoration and Final Cleanup, as described for Water Mains elsewhere in these specifications.

13-3 Measurement and Payment

No measurement for separate payment shall be made for any of the work specified in this section, and all costs in connection therewith shall be included in the contract price for the item to which the work is pertinent.

## SECTION 14

### MAIN LINE VALVE ASSEMBLIES

#### 14-1 General

##### 14-1.01 Scope

This section describes the requirements for furnishing and installing Main Line Valve Assemblies, 2 inch and larger, as an appurtenance to treated water mains. These requirements include the types of valves and materials to be used, methods and requirements for installation, and measurement for payment.

This section does not include valves smaller than 2 inch and valves that are an integral part of other major installations or assemblies, such as pumping and pressure reducing stations, and in-plant valves at treatment plants. This section does not include shut-off valves associated with air release, blowoff, fire hydrant, and service assemblies. If required, items such as these have been shown on the plans and have been described elsewhere in these specifications.

##### 14-1.02 Description of Work

Work under this section shall include, but not be limited to, excavation (regardless of surface and subsurface conditions), installing the valve, completing joints including corrosive protection, placing anchor blocks and tie-downs, placing and compacting backfill, placing the valve box along with a lid and extensions, forming and pouring the concrete valve box pad, placing stone slope protection, installing and testing the locating wire, installing a valve operator extension shaft, restoring the surface area around the valve assembly, and installing a post and guide marker.

##### 14-1.03 Location

Valve assemblies shall be installed at the locations shown on the plans. Valves located at tees, wyes, and crosses shall have flanged connections to the fittings. Location shown on the plans for in-line valves (valves located between branch connections) are approximate and intended for general location only. Final stationing of in-line valves shall be determined by the Agency's engineer.

##### 14-1.04 Design

Each valve shall be designed to meet the requirements of this section and the requirements listed for each specific type of main line valve assembly.

Valves shall be designed to withstand the working pressures shown on the plans, or to a design working pressure of 150 psi, whichever is greater. Valves designed for the working pressures greater than those contained in the standards and specifications referred to herein, shall meet those same design requirements and testing procedures after they have been upgraded to meet the higher design working pressures.

14-1.05 Submittals

Submittals supplied by the Contractor shall include: catalog data for the valves and valve box, lid, and extensions; valve operating torque data or calculations (if required); and catalog data or shop drawings for the valve operator extension shaft. The Contractor's attention is directed to Submittals in the Special Conditions.

14-1.06 Inspection

The Contractor shall make all valves and valve boxes available for inspection by the Agency's engineer prior to installation. The Contractor shall assist in the inspection by providing men and equipment necessary to move valves to an area and position where the valves can be operated and inspected. Each phase of work shall pass inspection by the Agency's engineer before commencing work on the next phase. The phases shall consist of, but not be limited to, valve installation, completion of joints, applying corrosion protection, installing valve box riser and locating wire, backfilling, raising the valve box to final grade, testing the locating wire, and surface restoration. After installation is complete, the valve will be inspected for proper operation and water tightness.

14-2 Materials14-2.01 General

Materials furnished for Main Line Valve Assemblies shall include, but not be limited to, the various size and types of valves and all gaskets, bolts, and other hardware necessary for completion of the joints, locating wire, valve boxes with lids and extensions, concrete for anchor blocks and valve box pads, stone slope protection, valve operator extension shafts, posts and guide markers, and materials used for restoration of the area around the assemblies.

14-2.02 Valves

Valves supplied under this section shall be either resilient seat gate valves (RSGV) or rubberseated butterfly valves (BFV), conforming in all respects to these specifications.

The type and manufacture of valves selected within the allowable size and torque ranges shall be used throughout the work, except where specific types of valves are shown on the plans or in the Special Conditions of these Standards.

Types of valves used in pipeline appurtenances, such as air release and service assemblies, pressure reducing and pumping stations, in-plant uses, and other "special function" valves shall be as shown on the plans and as designated elsewhere in these specifications.

Valves supplied under this section shall be suitable for buried service and shall have a nonrising stem furnished with a 2" (nominal size) operating nut, unless otherwise shown on the plans, or designated in these specifications. The operating nut shall be cast iron and measure 1-15/16" square at the top and 2" square at the base and 1-3/4" high.

Valves larger than 2" shall be furnished with mechanical, push on or flanged joints, which are compatible with the adjacent pipe or fitting, all as shown on the plans. 2-inch valves shall be furnished with Female Iron Pipe (FIP) threads.

All valves shall be marked in raised letters on the outside of the body with the manufacturer's name or mark, the year the valve casting was made, the nominal size of the valve, and the valve's pressure rating.

Torque applied to the operating nut for seating or unseating the valve shall not exceed 100 footpounds when the maximum operating pressure expected at the point of valve use is applied across the valve disc.

The Contractor shall provide, except as otherwise provided herein, the type of valve given in the following table for the various sizes and working pressures shown on the plans:

SIZE AND TYPE OF VALVES REQUIRED (1) (2)

Valve Size (in)	Working Pressure at Point of Application (psi)						
	Up to 50	50 to 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200
2	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV
4	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV
6	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	BFV
8	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	BFV
10	RSGV	RSGV	RSGV	RSGV	BFV	BFV	BFV
12	RSGV	RSGV	RSGV	BFV	BFV	BFV	BFV
14	RSGV	RSGV	BFV	BFV	BFV	BFV	BFV
16 and larger (3)	BFV	BFV	BFV	BFV	BFV	BFV	BFV

RSGV = Resilient Seat Gate Valve  
 BFV = Butterfly Valve

- (1) Resilient seat gate valves, up to 16-inch nominal size, may be substituted for butterfly valves in areas where the working pressure exceeds those listed in the table, provided the Contractor submits for approval certified test data from an independent laboratory, indicating that the torque required to seat and unseat the valve at the working pressure shown on the plans will not exceed the maximum torque allowed under this specification.
- (2) Butterfly valves may not be substituted for resilient seat gate valves in the table.
- (3) Valves larger than 16-inch nominal size shall be butterfly valves. The seating and unseating operating torques shall not exceed the maximum allowed herein given the maximum working pressure as shown on the plans and a maximum velocity of 16 feet per second. The Contractor shall submit for approval, manufacturer's torque calculations using the method found in Appendix A of AWWA C504, or certified test data from an independent testing laboratory.

14-2.02-A Resilient Seat Gate Valves (RSGV)

Resilient Seat Gate Valves shall conform to AWWA C509 and these specifications. These valves shall have a minimum pressure rating of 200 psi, and limited to sizes 2 inch through 16 inch.

The valve body, bonnet, and disc shall be cast of ductile iron. All ferrous metal interior wetted surfaces, including inside surfaces of the disc, shall be shop coated with epoxy or fusion epoxy, conforming to AWWA C550 to a minimum thickness of 6 mils.

All ferrous parts on the outside of the valve shall be primed and shop painted with two coats of asphalt varnish conforming to Federal Specification TT-V-51c, or coated with 3 mils of epoxy conforming to AWWA C550.

Valves shall have non-rising stems (NRS) fitted with a 2" (nominal size) wrench nut and shall be suitable for buried service. Open stem and yoke (OS&Y) valves shall not be allowed unless specified on the plans.

The stem, stem nut, gland, and bushings shall be made of grade B, C, D, or E bronze.

Valve stems shall be sealed using O-rings. Stuffing boxes shall not be allowed.

Valve end configurations shall be as shown on the plans or as specified herein. Flanges shall conform to AWWA C110. Mechanical joints shall conform to AWWA C111.

Resilient seat gate valves shall be as manufactured by Clow, Kennedy, Mueller, Waterous, US Pipe, or approved equal.

14-2.02-B Butterfly Valves (BFV)

Butterfly valves shall conform to AWWA C504 and these specifications, and shall be suitable for buried service. These valves shall have a minimum pressure rating of Class 150-B.

The valve body and disc shall be either cast iron, alloy cast iron, or ductile iron. All interior ferrous surfaces, including the disc and seat bearing surfaces, shall be coated with a minimum of 6 mil epoxy per AWWA C550. Surfaces used to seal against the rubber valve seat shall be either treated with Ni-Chrome, or constructed of type 304, 18-8 stainless steel; or may be otherwise treated for corrosion resistance as approved by the Agency's engineer. All ferrous parts on the outside of the valve shall be primed and shop painted with two coats of asphalt varnish conforming to Federal Specifications TTV- 51C, or coated with 3 mils of epoxy conforming to AWWA C550. The valve seat shall be rubber, clamped or vulcanized to either the disc or the valve body. Metal to metal seals are not acceptable. Valve sizes 30 inch and larger shall have rubber seats designed for removal and replacement at the site of installation.

Valve shafts shall be constructed of type 304, 18-8 stainless steel. Shafts shall be either one-piece or stub-shaft type. The pins or dowels securing the disc to the shaft shall also be type 304, 18-8 stainless steel. Shaft seals shall be either O-ring or V-type packing. V-type packing shall be self-

adjusting and suitable for both pressure and vacuum service. Seals shall be replaceable without removing the valve shaft.

All valves in buried service shall be furnished with a geared or traveling nut type manual actuator fitted with a standard 2" operating nut. The actuator shall be 90% grease packed and totally sealed. The actuator shall conform to AWWA C504.

Valve end configurations shall be as shown on the plans or as specified herein. Flanges shall conform to ANSI B16.0 Class 125. Mechanical joints shall conform to AWWA C111. Laying lengths for flanged-end valves shall be the short body style. Wafer-type valves shall not be allowed except when specifically shown on the plans or designated elsewhere in these specifications.

Butterfly valves shall be as manufactured by Pratt, Clow, Mueller, Keystone, M & H, or approved equal.

#### 14-2.03 Valve Box, Lid and Extensions

Valve boxes shall be reinforced concrete with rattle proof cast iron lids marked "WATER". Extensions shall be precast concrete or 8" PVC Pipe, smooth wall with a standard dimension ratio (SDR) of not less than 35, and with ends cut square. Valve boxes and lids shall be Christy G5 Traffic box with a G5C lid.

#### 14-2.04 Locating Wire

Locating wire shall be bare No. 8 gauge, single strand soft drawn copper.

Connectors shall be brass split-bolt connectors or other type of mechanically tightened joint connector approved by the Agency's engineer. Wire nuts or twisted joints shall not be used.

#### 14-2.05 Concrete

Concrete used for valve anchor blocks shall be 2,000 psi and concrete used for valve box pads shall be 3,000 psi, all conforming to concrete as described elsewhere in these specifications.

#### 14-2.06 Stone Slope Protection

Stone slope protection shall meet all the requirements for No. 3 backing rock as designated in CALTRANS Section 72.

#### 14-2.07 Replacement Pavement

Replacement pavement shall be asphaltic concrete pavement conforming to CALTRANS, Section 39, and meeting the aggregate grading requirement for 1/2" maximum, medium gradation, and using grade AR-4000 paving asphalt conforming to CALTRANS, Section 92.

#### 14-2.08 Valve Operator Extension Shaft

Valve operator extension shafts shall conform to the details as shown on the plans or approved equal. After fabrication, extensions shall be prepared, primed, and painted with two coats of asphalt varnish or coal-tar enamel; black in color.

#### 14-2.09 Guide Markers

Guide markers and posts shall conform to the plans and to CALTRANS, Section 82. Posts shall be metal and target plates shall be Type-M.

### 14-3 Installation

#### 14-3.01 General

Main Line Valve Assemblies shall be installed in accordance with the manufacturer's recommendations. Valves shall be laid in sequence with adjacent pipe and fittings. Pipe ends shall be cut where required to create a tight, flush fit against the valve shoulder.

#### 14-3.02 Storage and Handling

Materials for Main Line Valve assemblies shall be stored and handled in their original containers, which shall not be unpackaged until 24 hours prior to installation, except for inspection. Valves shall be maintained free from dirt and foreign matter. Valves and their containers shall be stored on wooden pallets. Valves and valve boxes shall not be strung out on the job more than 3 days prior to installation.

#### 14-3.03 Excavation and Backfill

Excavation and backfill operations shall conform to all the requirements for Water Main Pipe Trench Excavation and Backfilling, as described elsewhere in these specifications.

#### 14-3.04 Corrosion Protection

All joints included in the Main Line Valve Assembly having bolts, glands, setscrews, or other metal fasteners shall be protected from corrosion after assembly. These joints shall be wrapped with polyethylene film, all as described for corrosion protection for Water Main joints.

#### 14-3.05 Anchor Blocks

Main Line Valve Assemblies that require anchor blocks shall be shown on the plans and shall conform to the details shown thereon. Tie down bars, straps and other fasteners shall be painted to protect against corrosion. Concrete shall not be placed around bells, flanges, and bolts. If contact with concrete is unavoidable, these areas shall be protected with a double wrap of 6-mil polyethylene film to allow for disassembly and repair of the valve. No structural load or pressure shall be applied to the valve for a minimum of 3 days after installation of the anchor block.

#### 14-3.06 Valve Box Installation

All buried main line valves shall be furnished with a valve box including a lid, extensions and locating wire, all as shown on the plans and described in these specifications. The box and extensions shall be centered over the valve operating nut and perpendicular to the valve centerline. The box and extension shall be placed so as not to transmit any shock or stress to the valve or adjacent pipe.

Valve boxes placed outside the traveled way and road shoulder areas shall be raised slightly above the ground surface. A concrete pad conforming to the plans shall be formed with wood or other suitable materials to the full depth of the pad, and the concrete poured around the box. The concrete shall be finished in a workmanlike manner and so as to eliminate any sharp corners. All forms shall be removed after concrete has cured. All adjacent slopes shall be covered with a stone slope protection as directed by the Agency's engineer.

Valve boxes placed within the traveled way shall be placed flush with the road surface. In paved areas, the valve location shall be referenced and the box removed. Once paving operations are complete, the pavement over the valve shall be cut to the proper dimensions and removed. A sufficient amount of aggregate shall also be removed to allow for the pouring of a concrete pad and to expose the box extension. The valve box shall be rigidly supported in its proper position and the concrete pad poured up to the bottom side of the surrounding pavement. After the concrete has cured sufficiently, the supports may be removed and the paving replaced. If the paving is asphaltic concrete, a tack coat shall be applied and the hot mix shall be properly compacted.

#### 14-3.07 Valve Operator Extension Shaft

A valve operator extension shaft conforming to the plans and these specifications shall be installed for any valves with their operating nut 36 inches or more below the top of the valve box.

#### 14-3.08 Locating Wire

The locating wire from the water main shall be extended into the valve box, all as shown on the plans and as described for Water Mains elsewhere in these specifications.

#### 14-3.09 Surface Restoration and Final Cleanup

After backfill and compaction is complete, the surface over the valve assembly and all other surfaces disturbed by this work shall be restored to an "equal to or better than" condition as it existed prior to the start of construction, all in conformance with Trench Restoration and Final Cleaning for Water Mains described elsewhere in these specifications. The Contractor shall also comply with all city, county, and state encroachment permit conditions.

### 14-4 Measurement and Payment

#### 14-4.01 Measurement

Work performed under this section shall be measured as the number of the various sized Main Line Valve Assemblies that have been completely installed.



14-4.02 Payment

The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work necessary for the installation of Main Line Valve Assemblies, as shown on the plans, or as designated in these specifications. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this section.

## SECTION 15

### AIR RELEASE VALVE ASSEMBLIES

#### 15-1 General

##### 15-1.01 Scope

This section describes the requirements for furnishing and installing Air Release Valve Assemblies of the size and type shown on the plans, as an appurtenance to domestic water mains. These requirements include the types of valves and materials to be used, methods and requirements for installation, and measurement for payment.

This section does not include air valves that are an integral part of other major installations such as pumping and pressure reducing stations, and other in-plant air valves. If required, items such as these have been shown on the plans and have been described elsewhere in these specifications.

##### 15-1.02 Description of Work

Work under this section shall include, but not be limited to, excavation (regardless of surface and subsurface conditions), installing the connection to the main, shutoff valve and valve operator extension shaft, air valve lateral, air valve, vent pipe, completing all joints and corrosion protection, installing and testing the locating wire, installing the shutoff valve box and air valve box along with lids and extensions, painting the lid, core drilling the air valve box, installing the vent pipe, forming and pouring the concrete valve box foundation (if required) and pads, placing of stone slope protection, restoration of the surface area around the Air Release Valve Assembly, and installing a post and guide marker.

##### 15-1.03 Location

Location stationing shown on the plans for Air Release Valve Assemblies is approximate and intended as a general location only. The final location of the connection to the water main for air valves shall be at the high point as determined in the field. The lateral location of the Air Release Valve Assemblies shall be as shown on the plans, or as designated by the Agency's engineer. The Air Release Valve Assemblies shall not be located in areas subject to standing or running water. Air Release Valve Assemblies shall be located at all high points, whether or not shown on the plans.

If an Air Release Valve Assembly is installed at the Contractor's convenience, such as raising the water main grade to avoid an overly deep trench, the assembly shall be installed at the Contractor's expense. Such deviations from the plans shall be subject to approval of the Agency's engineer prior to starting the work.

##### 15-1.04 Design

Air Release Valve Assemblies shall be designed to withstand the working pressures shown on the plans or to a design working pressure of 250 psi, whichever is greater.

##### 15-1.05 Submittals

Submittals supplied by the Contractor shall include: catalog data for air release valves, shutoff valves, and air valve boxes, lids, and extensions; Affidavit of Compliance and catalog data for traffic boxes and lids for H<sub>2</sub>O loading. All other materials shall be furnished with submittals, as described elsewhere in these specifications. The Contractor's attention is directed to the General Conditions of these Standards under "Submittals".

15-1.06 Inspection

The Contractor shall make all air valves, shutoff valves, pipe and fittings, and valve boxes available for inspection by the Agency's engineer prior to installation. The Contractor shall provide men and equipment necessary for the Inspector to examine all materials thoroughly. Each phase of the work shall pass inspection by the Agency's engineer before commencing with work on the next phase. The phases of work shall consist of, but not be limited to, excavation for the lateral, tapping of the main, installation of the shutoff valve, pouring the box foundation (if required), installing the air valve lateral and vent pipe, applying corrosion protection, backfilling, raising shutoff valve and air valve boxes to final grade, forming and pouring the valve box pad, testing the locating wire, and completing surface restoration. After installation is complete, the shutoff valve and air valve will be inspected for leaks and proper operation.

15-2 Materials15-2.01 General

Materials furnished for Air Release Valve Assemblies shall include, but not be limited to, saddles or fittings used for the connection to the main, pipe and fittings used for the air valve lateral and vent pipe, shutoff valves; air valve boxes, lids, and extensions; drain rock, concrete for valve box pads, stone slope protection, posts and guide markers, and materials used for restoration of the area around the assemblies.

15-2.02 Air Valves

The types of air valves described in this section include air and vacuum release valves, air release valves, and combination air release valves. Air valves shall conform to AWWA C512 and these specifications.

Air valves of the size and type shown on the plans shall be as manufactured by the Valve and Primer Corporation (APCO) or the Multiplex Manufacturing Company (Crispen). The valve manufacturer selected shall be used throughout the work except where specific types of valves are shown on the plans. Alternate valves may be furnished only after receiving written approval from the Agency's engineer. The Agency has limited the list of valves and manufacturers in order to reduce valve maintenance costs and spare parts inventory.

All air valves shall be furnished with a stainless steel float, rubber seats, and brass or stainless steel lever arms. Valve bodies and valve covers shall be cast iron.

All air valves shall be marked in raised letters on the outside of the body with the manufacturer's name or mark, model identification number, the valves nominal size, and the pressure rating.

15-2.02-A Air and Vacuum Release Valves

These valves shall have a large venting orifice that will exhaust large volumes of air when the pipeline is being filled. When the pipeline is being drained, these valves will allow large volumes of air to enter the pipeline to prevent excessive vacuum pressures and to facilitate the draining process. Once the pipeline is filled and under pressure, the valves shall remain closed until the pressure in the pipe reaches atmospheric pressure.

15-2.02-B Air Release Valves

Air release valves shall automatically release small amounts of air that accumulate at high points along a pipeline. This automatic operation shall take place while the pipeline is in service and under pressure. Air

release valves 3/4 inch and smaller may use a single lever action. Air release valves 1 inch and larger shall use a compound lever action.

#### 15-2.02-C Combination Air Release Valves

Combination air release valves shall have a large orifice, which will allow large quantities of air to escape from the pipeline when the line is being filled. Once the pipeline is filled and under pressure, the valve shall automatically release small quantities of air which become trapped at the high points of the pipeline through a smaller auxiliary orifice. When the pipeline is being drained, these valves will allow large volumes of air to enter the pipeline to prevent excessive vacuum pressures and to facilitate the draining process.

#### 15-2.03 Connection to the Water Main

Connections to the water mains for Air Release Valve Assemblies 2-inch nominal size and smaller, shall be as shown on the plans and as described for Water Main Taps elsewhere in these specifications.

Connections to water mains for Air Release Valve Assemblies larger than 2-inch nominal size shall be as shown in the plans and shall use fittings conforming to AWWA C110 or C153, all as shown on the plans and as described for fittings for Water Mains elsewhere in these specifications.

#### 15-2.04 Pipe and Fittings for Air Valve Laterals

Pipe and fittings for the lateral; i.e., the pipe between the water main and the air valve, shall be as shown on the plans and as specified herein.

For air valves 3 inch and smaller, the pipe and fittings shall be brass. Brass pipe shall conform in all respects to ASTM B43, standard weight. Pipe ends shall be finished with male iron pipe threads. Brass fittings shall be red brass conforming in all respects to AMSI, B16.15 and Federal Specification WW-P-460b.

For air valves 4 inch and larger, the pipe and fittings shall be ductile iron, conforming in all respects to Water Mains described elsewhere in these specifications. Pipe and fitting end configurations shall be as shown on the plans.

#### 15-2.05 Pipe and Fittings for Vent Pipe

Pipe and fittings for the vent pipe shall be as shown on the plans and as specified herein.

For air valves 3 inch and smaller, the vent pipe shall be Schedule 40 galvanized steel pipe with ends finished with male iron pipe threads. The fittings shall also be banded galvanized steel, with dimensions and threads conforming to ASA B16.3 and B2.1.

For air valves 4 inch and larger, the vent pipe and fittings shall be ductile iron conforming in all respects to Water Mains described elsewhere in these specifications. Pipe and fitting end configurations shall be as shown on the plans.

#### 15-2.06 Vent Pipe Clamps

Clamps used to secure the vent pipe to the guide marker post for 3/4" and 1" valves shall be constructed entirely of stainless steel.

15-2.07 Shutoff Valve

Shutoff valves for Air Release Valve Assemblies shall be as shown on the plans and as specified herein. Shutoff valves shall be of the same nominal size as the air valve. Shutoff valves for 1" and smaller Air Release Valve Assemblies shall be full port brass gate valves or full port brass ball valves with lever handle and of the proper pressure rating. Shutoff valves 2" and larger shall conform in all respects to the requirements for Main Line Valve Assemblies.

15-2.08 Drain Rock

Drain rock to be placed in the drain pit below the air valve box shall conform to the requirements for 1" size permeable backfill, as required for Water Mains designated elsewhere in these specifications.

15-2.09 Locating Wire

Locating wire shall be bare No. 8 gauge, single strand soft drawn copper.

Connectors shall be brass split-bolt connectors or other type of mechanically tightened joint connector approved by the Agency's engineer. Wire nuts or twisted joints shall not be used.

15-2.10 Box, Lid and Extensions

Air Release Valve Assemblies shall be placed in the locations shown on the plans, or as directed by the Agency's engineer. The locations may include traffic or non-traffic. Traffic areas shall be those areas that are routinely, or occasionally, subjected to traffic loads including, but not limited to roadways, driveways, parking areas, and sidewalks with rolled curbs.

15-2.10-A Non-Traffic Locations

The box and extension for air release valve assemblies located in areas not subject to traffic, shall be precast reinforced concrete as shown on the plans. The lid shall be a minimum of ¼" steel checkered plate, primed and painted with two coats of asphalt varnish or coal-tar enamel; black in color. The box, lid and extensions shall all be supplied by the same manufacturer. They shall be as manufactured by Christy Concrete Products, Inc., or approved equal.

15-2.10-B Traffic Locations

The box, lid, extensions, and slabs for air release valve assemblies located in traffic areas shall be as shown on the plans, as specified herein, and shall be rated for H20 loading. The box, extensions, and slab shall be precast reinforced concrete with inside dimensions, including depth, at least as large as those shown on the plans. The lid shall be fabricated of steel checker plate. The lid shall be segmented so that no segment weighs more than 80 pounds, or lid segments shall be spring assisted. The lid shall be held firmly in place with bolts or screws with recessed heads. The lid shall be primed and painted with two coats of asphalt varnish or coal-tar enamel; black in color. The box, lid and extensions shall all be supplied by the same manufacturer. They shall be as manufactured by Christy Concrete Products, Inc., or approved equal.

15-2.11 Concrete for Foundations and Pads

Concrete used for the air valve box pad and shutoff valve box pad shall be 3,000 psi conforming in all respects to the requirements for Concrete Work.

15-2.12 Stone Slope Protection

Stone slope protection shall meet all the requirements for No. 3 backing rock as designated in CALTRANS, Section 72.

15-2.13 Replacement Pavement

Replacement pavement shall be asphaltic concrete pavement conforming to CALTRANS, Section 39, and meeting the aggregate grading requirement for 1/2" maximum, medium gradation, and using grade AR-4000 paving asphalt conforming to CALTRANS, Section 92.

15-2.14 Guide Markers

Guide markers and posts shall conform to the plans and to CALTRANS, Section 82. Posts shall be metal, and target plates shall be Type M.

15-3 Installation15-3.01 General

Air Release Valve Assemblies shall be installed as shown on the plans and as designated in these specifications. Air valves shall be mounted as near vertical as possible to insure proper operation

15-3.02 Storage and Handling

Air valves and shutoff valves shall be stored and handled in their original containers which shall not be unpackaged until 24 hours prior to installation except for inspection. Both valves shall be maintained free from dirt and foreign matter, and shall be stored on wooden pallets in their original containers. Air valves and shutoff valves and their valve boxes shall not be strung out on the job more than three days prior to installation.

15-3.03 Excavation and Backfill

Excavation and backfill operations shall conform to all the requirements for Water Main Pipe Trench Excavation and Backfilling.

15-3.04 Air Valve Lateral and Vent Pipe Installation

Pipe and fittings for air valve laterals and vent pipes shall be installed in conformance with all the requirements for Water Mains. In addition, the pipe and fittings for air valves 3 inch and smaller shall be installed by the cut and thread method. Threaded pipe joints shall be completed in a neat workmanlike manner and shall be assembled using joint sealant compound.

15-3.05 Corrosion Protection

Corrosion protection for the connection to the main shall conform to Corrosion Protection for Water Main Taps described elsewhere in these specifications.

All brass and galvanized pipe and fittings to be buried shall be primed and wrapped with tape after assembly is complete. The tape shall be made of coal tar and/or synthetic resin compounds and shall be laminated to an outer film of vinyl for added strength. The tape, with the vinyl cover, shall have a total minimum thickness of 45 mils. The pipe and fittings shall be cleaned of all loose scale and dirt, and all grease, oil and other foreign matter before

applying the primer. The tape shall be spiral-wrapped with a 1/2 inch minimum overlap. The primer and tape shall both be supplied by the same manufacturer and applied in accordance with the manufacturer's recommendation. This corrosion protection tape shall be as manufactured by Protecto Wrap (Primer No. 1170 and Tape No. 200) or Polyguard (Primer No. 600 and Tape No. 610).

Air valve laterals and vent pipes constructed with ductile iron pipe shall have all bolts, glands, set screws and other metal fasteners protected from corrosion. These joints shall be wrapped with polyethylene film in conformance with corrosion protection for Water Main Joints as designated elsewhere in these specifications. If the water main to which the Air Release Valve Assembly is attached requires polyethylene encasement per AWWA C105, then the ductile iron lateral and vent pipes shall be encased accordingly.

#### 15-3.06 Shutoff Valve Box Installation

Shutoff valves not contained in the same box as the Air Release Valve Assembly, as shown on the plans, shall be installed complete with a valve box, lid and extensions. Installation of the shutoff valve box shall conform in all respects to that required for a valve box for Main Line Valve Assemblies.

#### 15-3.07 Air Valve Box Installation

Air Valve boxes shall be placed in the locations as shown on the plans, or as directed by the Agency's engineer.

Air Valve boxes placed outside of the traveled way and road shoulder areas, shall be raised slightly above the ground surface. All surrounding drainage shall be directed away from the box. A concrete pad conforming to the plans shall be formed to full depth with wood or other suitable materials and poured around the box. The concrete shall be finished in a workmanlike manner and so as to eliminate any sharp corners. All forms shall be removed after concrete has cured. All adjacent slopes shall be covered with stone slope protection as directed by the Agency's engineer.

Air valve boxes placed within the traveled way shall be placed on a concrete foundation as shown on the plans. The lid shall be depressed slightly below the road surface so as not to interfere with snow removal equipment. In paved areas, the proposed location of the air valve shall be referenced so that once paving operations are complete, the pavement may be cut to the proper dimensions and removed. A sufficient amount of aggregate and base material shall be removed to allow for final positioning of the box and for the pouring of the concrete pad. The top section of the valve box shall be rigidly supported in the proper position and the concrete pad poured up to the bottom side of the surrounding pavement. After the concrete has cured sufficiently, the supports may be removed and the paving replaced. If the paving is asphalt concrete, a tack coat shall be applied, and the hot mix shall be properly compacted.

#### 15-3.08 Locating Wire

The locating wire for the air valve lateral shall be extended into the air release valve box, all as shown on the plans and as described for Water Mains elsewhere in these specifications.

#### 15-3.09 Surface Restoration and Final Cleanup

After backfill and compaction is complete, the surface over the shutoff valve, air valve lateral and air release valve assembly, and all other surfaces disturbed by this work, shall be restored to an "equal to or better than" condition as it existed prior to the start of construction, all in conformance with Trench Restoration and Final Cleanup for Water Mains, as described elsewhere in these specifications.

15-4 Measurement and Payment

15-4.01 Measurement

Work performed under this section shall be measured as the number of the various sizes and types of Air Release Valve Assemblies that have been completely installed.

15-4.02 Payment

The Contract unit prices shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work necessary for the installation of Air Release Valve Assemblies as shown on the plans or as designated in these specifications. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this section.



## SECTION 16

### BLOWOFF VALVE ASSEMBLIES

#### 16-1 General

##### 16-1.01 Scope

This section describes the requirements for furnishing and installing Blowoff Valve Assemblies as an appurtenance to treated water mains. These requirements include the materials to be used, methods and requirements for installation, and measurement for payment.

This section does not include blowoff valves that are an integral part of other major installations, such as pumping and pressure reducing stations and other in-plant blowoff or purge valves. If required, items such as these have been shown on the plans and have been described elsewhere in these specifications.

##### 16-1.02 Description of Work

Work under this section shall include, but not be limited to, excavation (regardless of surface and subsurface conditions), installing the connection to the main, blowoff lateral and valve, blowoff discharge pipeline, corrosion protection, backfilling, installing the blowoff valve box and riser box along with lid and extensions, forming and pouring of valve and riser box pad, installing and testing the locating wire, installing a valve operator extension shaft, placement of stone slope protection, restoration of the surface area around the Blowoff Valve Assembly, and installing a post and guide marker.

##### 16-1.03 Location

Blowoff Valve Assemblies shall be located at the low points of the water main, at the end of all water mains that are not looped, and at other locations shown on the plans. Location stationing is approximate and intended as a general location only. The final location of the Blowoff Valve Assembly shall be as determined by the Agency's engineer in the field.

##### 16-1.04 Design

The minimum size blowoff valve assembly covered by this specification is 2". Larger assemblies shall be sized in 2" increments.

Blowoff Valve Assemblies shall be designed to withstand the working pressures shown on the plans, or to a design working pressure of 150 psi, whichever is greater.

##### 16-1.05 Submittals

Submittals furnished by the Contractor shall include: catalog data for the valves: valve boxes, lids, and extensions; and catalog data or shop drawings for the valve operator extension shaft. All other materials shall be furnished with materials as described elsewhere in the specifications. The Contractor's attention is directed to the General Conditions of these Standards under "Submittals".

### 16-1.06 Inspection

The Contractor shall make all blowoff valves, piping and fittings, and valve boxes available for inspection by the Agency's engineer prior to installation. The Contractor shall provide men and equipment necessary for the Inspector to examine all materials thoroughly. Each phase of the work shall pass inspection by the Agency's engineer before commencing work on the next phase. Phases shall consist of, but not be limited to, pavement cutting, excavation, tapping the water main, installing the blowoff lateral, valve, and discharge piping, applying corrosion protection, backfilling, raising the valve box and riser box to final grade, testing the locating wire, and surface restoration. After installation is complete, the blowoff valve will be inspected for leaks and proper operation.

## 16-2 Materials

### 16-2.01 General

Materials furnished for Blowoff Valve Assemblies shall include, but not be limited to, saddles or fittings used for the connection to the main, pipe and fittings used for the blowoff discharge line, blowoff valve, valve and riser boxes along with lid and extensions, drain rock, concrete for valve and riser box pads, valve operator extension shafts, slope protection, materials necessary for restoration of the area around the assemblies, and posts and guide markers.

### 16-2.02 Connection to the Water Main

Connections to the water mains for 2" Blowoff Valve Assemblies shall be as shown on the plans and as described for Water Main Taps elsewhere in these specifications.

Connections to water mains for Blowoff Valve Assemblies 4" and larger shall be as shown in the plans and shall use fittings conforming to AWWA C110 or C153, all as shown on the plans and as described for fittings of Water Mains elsewhere in these specifications.

### 16-2.03 Pipe and Fittings for Blowoff Valve Laterals

Pipe and fittings for the lateral; i.e., the pipe between the water main and the valve, shall be as shown on the plans and as specified herein.

For 2" blowoff valve assemblies, the pipe and fittings shall be brass. Brass pipe shall conform in all respects to ASTM B43, standard weight. Pipe ends shall be finished with male iron pipe threads. Brass fittings shall be red brass conforming in all respects to AMSI, B16.15 and Federal Specification WW-P-4606.

For blowoff valve assemblies 4 inch and larger, the pipe and fittings shall be ductile iron, conforming in all respects to Water Mains described elsewhere in these specifications. Pipe and fitting end configurations shall be as shown on the plans.

#### 16-2.04 Pipe and Fittings for Blowoff Discharge Pipes

Pipe and fittings for the discharge pipe shall be as shown on the plans and as specified herein.

For 2" blowoff valve assemblies, the discharge pipe shall be Schedule 40 galvanized steel pipe with ends finished with male iron pipe threads. The fittings shall also be galvanized steel, banded with dimensions and threads conforming to ASA B16.3 and B2.1.

For blowoff valve assemblies 4 inch and larger, the discharge pipe and fittings shall be ductile iron conforming in all respects to Water Mains described elsewhere in these specifications. Pipe and fitting end configurations shall be as shown on the plans.

#### 16-2.05 Blowoff Valves

Blowoff valves shall conform in all respects to the requirements for Main Line Valve Assemblies.

#### 16-2.06 Locating Wire

Locating wire shall be bare No. 8-gauge, single strand soft drawn copper.

Connectors shall be brass split-bolt connectors or other type of mechanically tightened joint connector approved by the Agency's engineer. Wire nuts or twisted joints shall not be used.

#### 16-2.07 Valve and Riser Box, Lid, and Extensions

Blowoff valves of all sizes and risers on discharge pipes for 2" blowoff pipes shall be furnished with a box, lid, and extensions, conforming in all respects to those shown on the plans and to those required for Main Line Valve Assemblies. Boxes for risers on discharge pipes for blowoff pipes larger than 2" shall be as shown on the plans.

#### 16-2.08 Drain Rock

Drain rock to be placed beneath the box containing the blowoff pipe risers and in other locations as shown on the plans shall conform to 1" size permeable backfill as described for Water Mains.

#### 16-2.09 Concrete

Concrete used for the valve and riser box pads shall be 3,000 psi conforming in all respects to the requirements for Concrete Work.

#### 16-2.10 Replacement Pavement

Replacement pavement shall be asphaltic concrete pavement conforming to CALTRANS, Section 39, and meeting the aggregate grading requirement for ½" maximum, medium gradation, and using grade AR-4000 paving asphalt conforming to CALTRANS, Section 92.

### 16-2.11 Valve Operator Extension Shaft

Valve operator extension shafts shall conform to the details as shown on the plans or approved equal. After fabrication, extensions shall be prepared, primed, and painted with two coats of asphalt varnish or coal-tar enamel; black in color.

### 16-2.12 Stone Slope Protection

Stone slope protection for cut banks around the valve and riser box shall meet all the requirements for No. 3 backing rock, as designated in CALTRANS, Section 72.

Stone slope protection for blowoff discharge lines shall be hard, dense, durable stone free from cracks, seams and other defects that would tend to foster deterioration from natural causes. The maximum stone size shall be 12 inches and the minimum size shall be 3 inches. The stones shall meet all requirements for No. 1 Backing material, as designated in CALTRANS, Section 72. The Contractor shall obtain approval of the materials from the Agency's engineer prior to use.

### 16-2.13 Guide Markers

Guide markers and posts shall conform to the plans and to CALTRANS, Section 82. Posts shall be metal, and target plates shall be Type M.

## 16-3 Installation

### 16-3.01 General

Blowoff Valve Assemblies shall be installed as shown on the plans and as designated in these specifications.

Blowoff discharge pipelines are constructed as either a riser pipe, or as a discharge pipe into a drainage structure or natural drainage course. Fittings shall be placed on the end of discharge pipe to direct the flow of water so as to minimize damage to surrounding areas. The Agency's engineer will make the final determination as to the direction of the discharge water, and the amount of slope protection to be placed around the end of the discharge pipe in order to dissipate the velocity of the water and prevent erosion.

### 16-3.02 Storage and Handling

Blowoff valves shall be stored and handled in their original containers, which shall not be unpackaged until 24 hours prior to the installation, except for inspection. The valves shall be maintained free from dirt and foreign matter and shall be stored on wooden pallets in their original containers. Blowoff valves and discharge piping and related fittings and valve boxes shall not be strung out on the job more than three days prior to installation.

### 16-3.03 Excavation and Backfill

Excavation and backfill operations shall conform to all the requirements for Water Main Pipe Trench Excavation and Backfilling.

#### 16-3.04 Pipe and Fitting Installation

Installation of the pipe and fittings necessary for blowoff discharge pipes shall be in conformance with all the requirements for Water Mains.

#### 16-3.05 Corrosion Protection

Corrosion protection for the connections to the main shall conform to Corrosion Protection for Water Main Taps described elsewhere in these specifications.

All brass and galvanized pipe and fittings to be buried shall be primed and wrapped with tape after assembly is complete. The tape shall be made of coal tar and/or synthetic resin compounds and shall be laminated to an outer film of vinyl for added strength. The tape, with the vinyl cover, shall have a total minimum thickness of 45 mils. The pipe and fittings shall be cleaned of all loose scale and dirt, and all grease, oil and other foreign matter before applying the primer. The tape shall be spiral-wrapped with a ½" minimum overlap. The primer and tape shall both be supplied by the same manufacturer and applied in accordance with the manufacturer's recommendation. This corrosion protection tape shall be as manufactured by Protecto Wrap (Primer No. 1170 and Tape No. 200) or Polyguard (Primer No. 600 and Tape No. 610).

Blowoff valve assembly laterals and discharge pipes constructed with ductile iron pipe shall have all bolts, glands, set screws and other metal fasteners protected from corrosion. These joints shall be wrapped in conformance with corrosion protection for Water Main Joints as designated elsewhere in these Standards. If the plans require the water main to which the blowoff laterals are attached to be polyethylene encasement per AWWA C105, then the ductile iron blowoff lateral and discharge pipes shall be encased accordingly.

#### 16-3.06 Blowoff Valve Assembly Installation

Installation of the Blowoff Valve Assembly shall conform in all respects to the installation of Main Line Valve Assemblies.

#### 16-3.07 Valve and Riser Box Installation

Valves installed for Blowoff Valve Assemblies and riser pipes shall be installed complete with a valve box, lid, and extensions as shown on the plans. Installation of these boxes shall conform in all respects to that of a valve box for Main Line Valve Assemblies.

#### 16-3.08 Locating Wire

The locating wire from the water main shall be extended into the blowoff valve box, all as shown on the plans and as described for Water Mains elsewhere in these specifications.

### 16-3.09 Stone Slope Protection

Installation of stone slope protection shall be in accordance with CALTRANS, Section 72, Method B placement.

### 16-3.10 Surface Restoration and Final Cleanup

After backfill and compaction is complete, the surface over the Blowoff Valve Assembly and all other surfaces disturbed by this work shall be restored to an "equal to, or better than" condition as it existed prior to the start of construction, all conforming to Trench Restoration and Final Cleanup for Water Mains, as described elsewhere in these specifications.

## 16-4 Measurement and Payment

### 16-4.01 Measurement

Work performed under this section shall be measured as the number of various size Blowoff Valve Assemblies that have been completely installed.

### 16-4.02 Payment

The contract unit prices shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work necessary for the installation of Blowoff Valve Assemblies as shown on the plans or as designated in these specifications. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this section.

## SECTION 17

### FIRE HYDRANT ASSEMBLIES

#### 17-1 General

##### 17-1.01 Scope

This section describes the requirements for furnishing and installing Fire Hydrant Assemblies as appurtenances to treated water mains. These requirements include the materials to be used, methods and requirements for installation, and measurement and payment.

This section does not include fire hydrants and wharf hydrants that are appurtenant to other structures such as buildings or storage tanks. If required, items such as these have been shown on the plans and have been described elsewhere in these specifications.

##### 17-1.02 Description of Work

Work under this section shall include, but not be limited to, excavation (regardless of surface or subsurface conditions), installing the connection to the main, shutoff valve and valve operator extension shaft, pipe and fittings for the fire hydrant lateral, fire hydrant, corrosion protection, placing reaction blocking, backfilling including the drain pit, installing the shutoff valve box along with lid and extensions, forming and pouring the valve box pad, completing the hydrant pad, and restoration of the surface area around the Fire Hydrant Assembly.

##### 17-1.03 Location

Location stationing shown on the plans for Fire Hydrant Assemblies is approximate and intended as a general location only. The final location of the fire hydrant assembly shall be as determined by the Agency's engineer in the field.

##### 17-1.04 Design

Fire Hydrant Assemblies shall be designed to meet the requirements of this subsection and all other requirements listed in this section. Fire Hydrant Assemblies shall be designed to withstand the working pressures shown on the plans, or a design working pressure of 150 psi, whichever is greater. Fire Hydrant Assemblies designed for working pressures greater than those contained in the standards and specifications referred to herein shall meet those same design requirements and testing procedures after they have been upgraded to meet the higher design working pressures.

##### 17-1.05 Submittals

The following submittals for fire hydrants shall be furnished in duplicate: Catalog data, maintenance instructions, affidavit of compliance, and warranties. All other materials shall be furnished with submittals as described for each material elsewhere in these specifications.

### 17-1.06 Inspection

The Contractor shall make all fire hydrants, shutoff valves, pipe, and fittings available for inspection by the Agency's engineer prior to installation. The Contractor shall provide men and equipment necessary for the inspector to examine all materials thoroughly. Each phase of the work shall pass inspection by the Agency's engineer before commencing work on the next phase. The phases shall consist of, but not be limited to, cutting of pavement, excavation, tapping the water main, installation of the shutoff valve, fire hydrant lateral, fire hydrant, and drain pit, application of corrosion protection, backfilling, raising the valve box to final grade, and surface restoration. After installation is complete, the shutoff valve and fire hydrant will be inspected for proper operation and water tightness.

## 17-2 Materials

### 17-2.01 General

Materials furnished for Fire Hydrant Assemblies shall include, but not be limited to, tees and other fittings used for the connection to the main, pipe and fittings used for the fire hydrant laterals, shutoff valves along with a box, lid and extension, valve operator extension shaft, drain rock, concrete for reaction blocking and valve box pad and materials necessary for restoration of the area around the Fire Hydrant Assembly.

### 17-2.02 Fire Hydrants

Fire hydrants shall conform to AWWA C502, "Dry-Barrel Fire Hydrants" and these specifications. Fire hydrants shall be 6" nominal size and shall be traffic type models with breakaway flange and lugs incorporated into the hydrant barrel located just above ground level. Fire hydrant main valve shall close automatically upon breaking of the traffic flange. Fire hydrants shall have a 5 1/4-inch main valve opening. Drain valves shall be provided at the base of the hydrant which open only when the valve is in the closed or near closed position.

Fire hydrant operating stems shall use O-ring type seals and shall be fitted with a pentagon operating nut, conforming to AWWA C502. Operating stems shall open in a counterclockwise direction and shall also have a breakaway coupling located at the same elevation as the breakaway flange on the hydrant barrel. The operating threads and thrust bearing housing shall be sealed from water and dirt and shall be permanently lubricated or lubricated in the field by using a permanent grease fitting.

Fire hydrants shall have one 4½" steamer nozzle and two 2½" side outlet nozzles. All nozzle threads shall be National Standard Fire Hose Coupling Screw Threads. Nozzle shall be fitted with caps having pentagon nuts conforming to the hydrant-operating nut. Nozzle caps shall be secured to the hydrant body by a length of steel chain.

Fire hydrant boots shall be flanged or mechanical joint with retainer glands. All fire hydrants shall have permanent markings identifying the manufacturer by name, initials, insignia, or abbreviations in common usage, designating the size of the main valve opening, the hydrant model number, and the year of manufacture.

Fire hydrants shall be ordered with varying lengths of hydrant barrels to suit field conditions and the lines and grades shown on the plans. Extension kits for the hydrant barrel shall be avoided. Where hydrant



extensions are unavoidable, they shall be supplied in lengths of 6" increments (6", 12", 18"....). Stacking (using more than one) fire hydrant extensions will not be allowed. The hydrant valve shall remain in the base fitting.

The fire hydrant model selected shall be used throughout the work within the allowable pressure classes. Alternate fire hydrants may be furnished only after receiving written approval from the Agency's engineer. The Agency has limited the list of fire hydrant models in order to reduce valve maintenance costs and spare parts inventory. Fire hydrants shall be one of the following models:

#### 150 psi Working Pressure or Less

Kennedy	Model K81A (GUARDIAN)
Mueller	Model A-423 (CENTURION)
Waterous	Model WB-67
American Darling	Model B-62-B

#### 150 psi to 250 psi Working Pressure

American Darling	Model B-50-B
Waterous	Model WB-59

### 17-2.03 Connection to the Water Main

Connections to the water main for Fire Hydrant Assemblies shall use tee fittings with 6" flanged outlets. The tee fittings shall be fabricated steel, cast or ductile iron and shall conform in all respects to the requirements for Water Main fittings.

### 17-2.04 Shutoff Valves

Shutoff valves, valve boxes, lids and extensions, and valve operator extension shafts for Fire Hydrant Assemblies shall conform in all respects to the requirements for Main Line Valve Assemblies. Shutoff valves shall be flanged by flanged or flanged by mechanical joint and shall provide positive restraint for the fire hydrant lateral.

### 17-2.05 Pipe and Fittings for Fire Hydrant Laterals

Pipe and fittings for fire hydrant laterals shall conform in all respects to the requirements for ductile iron pipe and fittings for Water Mains. Pipe and fittings shall provide positive restraint between the shutoff valve and the fire hydrant. Tie rods will not be allowed.

### 17-2.06 Concrete

Concrete used for reaction blocking shall be 2,000 psi and concrete used for shutoff valve box pads shall be 3,000 psi, both conforming in all respects to the requirements for Concrete Work.

### 17-2.07 Drain Rock

Drain rock to be placed in the drain pit below the hydrant boot shall conform to the requirements for 1" minus permeable backfill as described for Water Mains.

### 17-2.08 Replacement Pavement

Replacement pavement shall be asphalt concrete pavement conforming to CALTRANS, Section 39, Type B and shall have a maximum aggregate of 1/2 inch. A fog seal conforming to CALTRANS, Section 37 shall also be applied.

## 17-3 Installation

### 17-3.01 General

Fire Hydrant Assemblies shall be installed as shown on the plans and as designated in these specifications. Fire hydrants shall be installed in a vertical position and shall have the 4½" steamer nozzle approximately 18" above the hydrant pad, sidewalk, or top of curb. The steamer nozzle shall be pointed perpendicular to the road, unless otherwise specified by the Agency's engineer.

### 17-3.02 Storage and Handling

Fire hydrants and shutoff valves shall be stored and handled in their original containers and shall not be unpacked until 24 hours prior to installation, except for inspection. The shutoff valve and hydrant shall be maintained free from dirt and foreign matter and shall be stored on wooden pallets in their original containers. Piping and fittings for fire hydrant laterals shall be stored and handled in a manner described for Water Main materials elsewhere in these specifications. Materials for Fire Hydrant Assemblies shall not be strung out on the job more than two days prior to installation.

### 17-3.03 Excavation and Backfill

Excavation and backfill operations shall conform to all the requirements for Water Main Pipe Trench Excavation and Backfill.

### 17-3.04 Shutoff Valve Installation

Installation of the shutoff valves and related valve box, lid, extensions, and valve operator extension shaft shall conform to all the requirements for installation of Main Line Valve Assemblies.

### 17-3.05 Fire Hydrant Lateral Installation

Installation of the fire hydrant lateral pipe and fittings shall conform to all the requirements for Water Mains. The lateral shall provide positive restraint between the shutoff valve and the fire hydrant. Tie rods will not be allowed.

#### 17-3.06 Corrosion Protection

All joints contained in the fire hydrant lateral shall either be painted or wrapped in conformance to corrosion protection for Water Main joints.

#### 17-3.07 Reaction Blocking

All areas of the Fire Hydrant Assembly subject to thrust, including but not limited to, the branch tee and the hydrant boot, shall be provided with concrete reaction blocking conforming in all respects to reaction blocking for Water Mains. Care shall be taken when pouring the thrust block for the hydrant boot not to allow concrete to plug the drain holes.

#### 17-3.08 Drain Pit Installation

A drain pit below the hydrant boot shall be excavated to the lines and volume shown on the plans. This pit shall be backfilled with 1" size permeable backfill to a level at least 3" above the drain holes in the hydrant barrel. After compacting this material in place, a sheet of 15 lb. Felt roofing paper or a layer of 6-mil polyethylene film shall be laid over the entire top surface of the drain pit. This barrier shall then be anchored in place and care shall be taken during backfill operations not to displace the barrier.

#### 17-3.09 Surface Restoration and Final Cleanup

After backfilling and compaction is complete, the surface over the Fire Hydrant Assembly including the shutoff valve and fire hydrant lateral, and all surfaces disturbed by this work, shall be restored to an "equal to, or better than" condition as it existed prior to the start of construction. The Contractor shall also comply with all city, county and state encroachment permit conditions.

### 17-4 Measurement and Payment

#### 17-4.01 Measurement

Work performed under this section shall be measured as the number of Fire Hydrant Assemblies, regardless of the fire hydrant lateral lengths, that have been completely installed.

#### 17-4.02 Payment

The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all work necessary for the installation of Fire Hydrant Assemblies as shown on the plans or as designated in these specifications. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this section.

**SECTION 18 – RESERVED**

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SECTION 19  
SERVICE ASSEMBLIES

19-1 General

19-1.01 Scope

This section describes the requirements for furnishing and installing service assemblies, both single and double service settings, as an appurtenance to treated water mains. These requirements include the materials to be used, methods and requirements for installation, and measurement and payment.

This section does not include the meter, customer service valve, or any part of the private service line located on the customer-side of the meter assembly.

19-1.02 Description of Work

Work under this section shall include, but not be limited to, excavating (regardless of surface or subsurface conditions), installing the connection to the main, service shutoff valve (if required), service line and fittings, meter valve, meter box slab and wood blocks, meter box with lid and extensions, corrosion protection, installing and testing the locating wire, backfilling including imported material, forming and pouring concrete meter box pads (if required), and restoration of the surface area around the service assembly.

19-1.03 Location

The final location of service assemblies shall be as detailed on the plans or as determined in the field by the Agency’s engineer. Meter boxes for service assemblies shall not be located in areas subject to standing or running water.

19-1.04 Design

Service assemblies shall be designed to meet the requirements of this subsection and all other requirements listed in this section. Service assemblies shall be designed to withstand the working pressures shown on the plans, or a design working pressure of 150 psi, whichever is greater.

Service line size and type, and service shutoff valve requirements shall be as follows:

<u>Size of Meter</u>	<u>Service Line Size &amp; Type</u>	<u>Service Shutoff Valve</u>
Single 5/8"x3/4" or 3/4"	1" PE	Not Required
Double 7/8"x3/4" or 3/4"	1-1/4" PE	Not Required
Single 1"	1-1/4" PE	Not Required
Single 1-1/2"	2" PVC	Required
Single 2"	4" DIP	Required
Single 3" & larger	Per Plans (4" min.) DIP	Required

PE = Polyethylene Pipe  
 PVC = Polyvinyl Chloride Pipe  
 DIP = Ductile Iron Pipe

\* The term service shut-off valve identifies the valve located at the water main that controls flow to the service line.

These are general requirements and the final configuration of the meter assembly shall be as shown on the plans. The types of materials and their installation shall be governed by these specifications unless shown otherwise on the plans.

#### 19-1.05 Submittals

Submittals supplied by the Contractor shall include: catalog data for service line material and fittings, compression fittings, branch fitting, meter valve, meter box, lid and slab. Affidavits of Compliance may be required for verification of valve and fitting casting materials, maximum working pressures, and ultimate pressure, and for traffic boxes and lids for H<sub>2</sub>O loading. All other materials shall be furnished with submittals as described elsewhere in these Standards. The Contractor's attention is directed to the General Conditions in each Section of these Standards under "Submittals".

#### 19-1.06 Inspection

The Contractor shall make all service assembly materials available for inspection by the Agency's engineer prior to installation. Each phase of work shall pass inspection by the Agency's engineer before commencing work on the next phase. The phases shall consist of, but not be limited to, cutting of pavement, excavation, tapping the water main, installation of the service line, fittings, and locating wire, application of corrosion protection, backfilling, installation of the meter boxes, and surface restoration.

### 19-2 Materials

#### 19-2.01 General

Materials furnished for service assemblies shall include, but not be limited to, the connection to the main, service line pipe and fittings, meter valve, locating wire, meter box including a lid, extension (if required), concrete for meter box pad, and materials necessary for restoration of the area around the service assembly.

#### 19-2.02 Connection to the Water Main

Connections to the water mains for service assemblies shall be as shown on the plans and as described for Water Main Taps elsewhere in these specifications.

#### 19-2.03 Service Lines

Materials used for 1" and 1¼" service lines shall be polyethylene (PE) pipe with an inside-diameter based dimension ratio of 7, a pressure class of 200, made with PE 3408 material, and all conforming to AWWA

C901. The inside diameter, minimum wall thickness, and maximum tolerance shall all conform to Table 3 of AWWA C901. Polyethylene pipe shall be supplied with plain ends only and in either straight lengths or in coils. Pipe ends shall be jointed using brass compression fittings as shown on the plans. Fusion fittings or heat molded flair fittings will not be allowed. Polyethylene pipe shall be marked at 5-foot intervals with the pipe nominal size, the material code design (PE 3408), the dimension ratio and diameter base (IDR 7), the AWWA pressure class (PC200), the AWWA standard designation (AWWA C901), the manufacturer's name or trademark and production record, and the seal or mark of the testing agency that certified the suitability of the pipe material for potable-water products (for example, NSF).

Materials used for 2" service lines shall be Schedule 40 or 80 polyvinyl chloride (PVC) (schedule determined by the working pressure) and shall comply with the requirements for Water Mains described elsewhere in these specifications.

Service lines 3" in diameter shall not be allowed.

Materials for service lines 4" and larger shall be ductile iron and shall comply with the requirements for Water Mains described elsewhere in these specifications.

#### 19-2.04 Service Shutoff Valves

Service shutoff valves located at the connection to the water main, if required, shall be of the size shown on the plans and shall comply with the requirements for Main Line Valves described elsewhere in these specifications.

#### 19-2.05 Service Line Fittings

Fittings for 2" and smaller service lines shall be brass conforming in all respects to AWWA C800 and these specifications. Castings shall be made from copper alloy No. C83600, per ASTM B62, or ASTM B584. The alloy shall contain 85 percent copper and no more than 5 percent each tin, lead, and zinc. All valves and fittings shall be suitable for use in high-pressure service lines with a minimum 150 psi working pressure, as defined in AWWA C800 and shall withstand a maximum pressure of 300 psi without leaking. All valves and fittings shall be furnished with end configuration as shown on the plans. Affidavits of Compliance may be required from the manufacturer stating that the casting materials, minimum working pressure, and minimum burst pressures of the fittings comply with these specifications.

Fittings for 2" and smaller service lines shall be furnished with the end configurations as shown on the plans. All threaded ends shall be National Pipe Thread Standard (NPT). Compression joints or pack joints shall be furnished with stainless steel insert stiffeners when required by the fitting manufacturer. Fittings shall be as manufactured by the Ford Meter Box Co., or approved equal.

Fittings for service lines 4" and larger shall be ductile iron, conforming in all respects to Water Mains described elsewhere in these specifications.

#### 19-2.06 Meter Valves

Meter valves are located in the meter box immediately before the meter. Meter valves size, type and end configurations shall be as shown on the plans and as specified herein.

Meter Valves 2" and smaller shall be of brass construction and shall be fitted with a coupling or flange of adequate size and configuration to connect to the meter. Meter valves shall be either straight or angle ball valves with end configurations as shown on the plans and conforming to fittings as described in this section. Ball valves shall be 1/4 turn, pull-port valves. All meter valves shall be furnished with locking wings. Meter valves shall be as manufactured by the Ford Meter Box Co., or approved equal.

Meter valves 4" and larger shall comply with the requirements for Main Line Valves described elsewhere in these specifications.

#### 19-2.07 Brass Pipe and Fittings

Brass pipe used for service assemblies, as shown on the plans, shall conform in all respects to ASTM B43, standard weight. Pipe ends shall be finished with male iron pipe threads.

Brass fittings used for 2" and smaller service assemblies such as tees, elbows, nipples, bushings, shall be red brass conforming in all respects to A.M.S.I., B16.15 and Federal Specification WW-P-460b. They shall have ends finished with male or female iron pipe threads and shall have a pressure rating equal to or higher than the working pressure at the point of application. Brass fittings shall be as manufactured by Lee or approved equal.

#### 19-2.08 Meter Boxes for 2" and Smaller Meters

Meter boxes shall be placed in the locations shown on the plans, or as directed by the Agency's engineer. The locations may include traffic or non-traffic. Traffic areas shall be those areas that are routinely, or occasionally, subjected to traffic loads including, but not limited to roadways, driveways, parking areas, and sidewalks with rolled curbs. The meter boxes shall comply with the following requirements for the respective locations:

##### 19-2.08-A Non-Traffic Locations

Meter boxes, lids, extensions, slabs, and wooden block shall be as shown on the plans and as specified herein. The meter box, lid, and extensions shall be precast reinforced concrete, all by the same manufacturer. The slabs shall be precast and a minimum of 1½" thick. Poured-in-place slabs shall not be accepted. The wooden blocks in contact with soil shall be pressure treated suitable for buried service. Wooden blocks used as spacers inside of box shall be construction grade Douglas Fir.

The lids shall have a cast iron reading lid with self-closing hinge, or, where shown on the plans, a concrete insert reading lid.

The box, lid and extensions shall be as manufactured by Christy Concrete Products, Inc., or approved equal.



19-2.08-B Traffic Locations

Meter boxes, lids and slabs for single  $\frac{5}{8}$ " and  $\frac{3}{4}$ " meter assemblies in traffic locations shall be Christy B1324 Box, a B1324-61GH lid, and a B30SL slab. Double  $\frac{5}{8}$ " and  $\frac{3}{4}$ " meter assemblies in traffic locations shall be split at the branch piece into two single boxes, as described above. A 6" thick by 8" wide concrete collar or pad shall be poured around the top of the box and under the pavement and shall conform to valve pads described for Main Line Valves elsewhere in these specifications.

Meter boxes, extensions, lids and slabs for meter assemblies larger than  $\frac{3}{4}$ " and up to 2", and located in traffic areas shall be as shown on the plans and as specified herein. The box, extension, and slab shall be precast reinforced concrete. The box inside dimensions, including depth, shall be at least as large as those shown on the plans. The lid shall be of steel checker plate with an 8" diameter self-closing reading lid centered over the meter dial. The lid shall be segmented so that no segment weighs more than 80 pounds, or segments shall be hinged and spring assisted. The lid segments shall be held firmly in place with bolts or screws with recessed heads. The lid assembly shall be primed and painted with two coats of asphalt varnish or coal-tar enamel; black in color. Both the box and lid assembly shall be reinforced sufficiently to withstand high volume of vehicular traffic of H2O loading. The Contractor shall submit for approval an Affidavit of Compliance from the manufacturer regarding the box and lid's ability to withstand the traffic loading conditions described herein. A 6" thick by 8" wide concrete collar or pad shall be placed around the top of the box and under the pavement, and shall conform to valve pads described for Main Line Valves elsewhere in these specifications and on the plans. The box, lid and extensions shall be as manufactured by Christy Concrete Products, Inc., or approved equal.

19-2.09 Meter Vaults for 3-inch and Larger Meters

Vaults for meters 3" and larger shall be of the type and size shown on the plans.

19-2.10 Concrete for Meter Box Pad

Concrete used for the meter box pad and shutoff meter box pad shall be 3,000 psi conforming in all respects to the requirements for Concrete Work.

19-2.11 Locating Wire and Connectors

Locating wire shall be bare No. 8-gauge, single strand soft drawn copper.

Connectors shall be brass split-bolt connectors or other type of mechanically tightened joint connector approved by the Agency's engineer. Wire nuts or twisted joints shall not be used.

19-2.12 Trench Restoration Materials

Materials used for trench restoration including pavement, chip seal, aggregate base, sandcement slurry, and crushed rock shall be as designated for Water Mains elsewhere in these specifications.

## 19-3 Installation

### 19-3.01 General

Service assemblies shall be installed as shown on the plans and as designated in these specifications.

### 19-3.02 Storage and Handling

Service line materials and fittings shall be stored and handled in their original containers and shall be maintained free of dirt and foreign matter. They shall be stored on wooden pallets and protected from dirt and other contaminants. Service line materials shall be protected from direct sunlight while being stored. Materials for service assemblies shall not be strung out on the job more than two days prior to installation.

### 19-3.03 Excavation and Backfill

Excavation and backfill operations shall conform to all the requirements for Water Main Pipe Trench Excavation and Backfill. For service lines shown on the plans with a sand envelope, the sand shall conform to Class 1 material as designated for Water Main Backfill.

### 19-3.04 Service Line and Fitting Installation

In general, service lines shall be installed as Water Mains described elsewhere in these Standards, and in accordance with the requirements herein. The Plans or Special Conditions approved by the Agency's engineer for the Project may require service lines be installed by a bore-and-jack or similar method.

Polyethylene service lines between the water main and meter box shall be one continuous piece of pipe. Remnant pieces of service line material joined by couplings will not be allowed. Sharp bends in polyethylene service lines shall be avoided. Polyethylene service line(s) shall be slightly "snaked" in the trench to accommodate thermal expansion and contraction. Service line fittings with compression couplings shall be installed according to the manufacturer's recommendation. Compression fittings shall be supplied with stainless steel inserts, if required by the manufacturer.

Threaded brass fittings and nipples shall be installed in a workmanlike manner using teflon tape as a joint lubricant and sealant.

### 19-3.05 Corrosion Protection

Corrosion protection for the connection to the main shall conform to Corrosion Protection for Water Main Taps described elsewhere in these specifications.

The brass pipe and fittings, and brass compression fittings shall be primed and wrapped with tape after assembly is complete. The tape shall be made of coal tar and/or synthetic resin compounds and shall be laminated to an outer film of vinyl for added strength. The tape, with the vinyl cover, shall have a total minimum thickness of 45 mils. The brass pipe shall be cleaned of all loose scale and dirt, and all grease, oil and other foreign matter before applying the primer. The tape shall be spiral-wrapped with a 1/2" minimum overlap. The primer and tape shall both be supplied by the same manufacturer and applied in accordance with the manufacturer's recommendation. This corrosion protection tape shall be as

manufactured by Protecto Wrap (Primer No. 1170 and Tape No. 200) or Polyguard (Primer No. 600 and Tape No. 610).

Service lines constructed with ductile iron pipe shall have all bolts, glands, setscrews and other metal fasteners protected from corrosion. These joints shall be wrapped in conformance with corrosion protection for Water Main Joints as designated elsewhere in these specifications. If the plans require the water main to which the service lines are attached to be polyethylene encasement per AWWA C105, then the ductile iron service lines shall be encased accordingly.

#### 19-3.06 Locating Wire

A locating wire shall be installed with the service lateral and extended into the meter box, all as shown on the plans and as described for Water Mains, elsewhere in these specifications.

#### 19-3.07 Meter Box Installation

Meter boxes placed outside of the traveled way and road shoulder areas shall be raised slightly above ground level and all surrounding drainage shall be directed away from the meter box.

#### 19-3.08 Surface Restoration and Final Cleanup

After backfill and compaction is complete, the surface over the service assembly and all other surfaces disturbed by this work shall be restored to an "equal to or better than" condition as it existed prior to start of construction, all conforming to Trench Restoration and Final Cleanup for Water Mains, as described elsewhere in these specifications.

### 19-4 Trench Restoration and Final Cleanup

Trench restoration and final cleanup shall comply in all respects to Section 12, Water Mains, as described elsewhere in these Standards.

### 19-5 Measurement and Payment

#### 19-5.01 Measurement

Work performed under this section shall be measured as the number of the different size and types (single or double) service assemblies that have been completely installed. Note: On the Bid Schedule, each double service assembly is counted as one unit; even though each assembly is capable of receiving two meters.

#### 19-5.02 Payment

The Contract unit prices shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work necessary for the installation of Service Assemblies as shown on the plans or as designated in these specifications. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this section.

**SECTIONS 20-24 – RESERVED**

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## SECTION 25

### TESTING AND DISINFECTING WATER MAINS

#### 25-1 General

##### 25-1.01 Scope

This section describes the requirements for pressure and leak testing, and disinfecting of water mains and appurtenances, including but not limited to, air release valve assemblies, blowoff valve assemblies, fire hydrant assemblies, service assemblies, pressure reducing and pump stations, altitude valve stations, and all other appurtenances.

This section does not include disinfecting procedures for water storage tanks. If required, disinfecting of storage tanks is described elsewhere in these specifications.

##### 25-1.02 Description of Work and Materials

This work shall consist of filling the water main and appurtenances with water and bleeding off all entrapped air, allowing the pipe line to soak, making all connections to the water main for expelling air and for testing equipment; running the test, visually inspecting exposed appurtenances, locating and repairing all leaks, retesting, application of disinfectant, and flushing operations.

Materials furnished for this work shall include, but not be limited to, pipe and fittings for connections to the main, pumps, pressure regulator, a calibrated water storage tank, disinfectant, and all other materials, fittings and pipelines required to perform the tests and make the necessary repairs.

##### 25-1.03 Required Work Sequence

The pressure test and the test for allowable leakage shall be performed simultaneously. Testing shall not commence until the water main and all appurtenances have been completely installed, up to and including compaction of road aggregate base. The Contractor may, at any time, perform his own pressure and leak test, however, these tests will in no way offset the requirement for a final pressure and leak test.

After successfully testing the water main and appurtenances, they may then be flushed and disinfected.

After having been successfully tested and disinfected, the water main may be connected to the Agency's water system.

##### 25-1.04 System Operations

Only Agency personnel shall operate valves and appurtenances that are a part of the treated water system in active service.

### 25-1.05 Backflow Protection

The Contractor must obtain the Agency's engineer's approval for any connections between the Agency's treated water mains or appurtenances and the new water main for the purposes of filling or flushing. All such connections shall be installed with a UL approved backflow prevention device (double check valve assembly or reduced pressure principle type) located at the existing treated water main or appurtenance.

## 25-2 Testing

### 25-2.01 General

This section shall consist of testing the water main and appurtenances for both pressure and leakage requirements. These tests will be run simultaneously.

Prior to testing, the water main shall be slowly and carefully filled with water. All air shall be expelled slowly from the pipe and appurtenances in a manner so as not to create excessive surge pressures. All appurtenances shall be left on during the testing procedure.

The Contractor may, at his own risk, test against new or existing valves. Suspected leaking of these valves will not be accepted as a reason for having not passed the leakage test requirements. These valves shall either be repaired or replaced prior to the start of another testing sequence. If an existing valve is suspected of leaking, the Contractor may repair or replace the valve at his own expense, or disconnect the water main from the valve, install a bulkhead, and retest.

### 25-2.02 Test Section Length

The length of water main being tested at any one time shall not exceed 2,000 feet unless otherwise approved by the Agency's engineer, or allowed elsewhere in the Special Conditions of these Standards.

### 25-2.03 Testing Equipment

The Contractor shall be responsible for supplying, maintaining, and operating all testing equipment. In general, the testing equipment configuration shall consist of a pump receiving water from a calibrated storage tank. The pump discharge shall enter the water main through a tap or appurtenance. A pressure sustaining valve capable of being adjusted within the required pressure ranges shall be placed on a tee located in the pump discharge line. Discharge from the pressure-sustaining valve shall return to the calibrated storage tank. Other types or configurations of testing equipment shall be subject to Agency's engineer's approval. The pressure pump and pressure-sustaining valve shall remain in operation continuously throughout the test period.

### 25-2.04 Test Pressure

The test pressure shall be 150% of the working pressure, as calculated for the lowest elevation of the test section, or 150 psi, whichever is greatest. The pressure maintained at the pump shall be adjusted for the difference in elevation between the lowest elevation of the test section and the pump location.

25-2.05 Test Duration

The test duration shall be 2 hours. Pressure in the water main shall be maintained as near the calculated test pressure as possible for the full two-hour duration. The pressure pump and pressure-sustaining valve shall remain in operation continuously throughout the duration of the test.

25-2.06 Allowable Leakage

The allowable leakage per test section shall be calculated from the formula contained in this subsection. Different sized water mains that might be contained within the same test section shall be calculated separately and their allowable leakage added together. This formula represents the allowable leakage regardless of the number of joints, couplings, fittings, valves, pressure reducing or pump station or any other appurtenances on the water main. The length of pipe contained in these appurtenances shall not be counted as adding to the length of water main being tested.

$$V = \frac{LD}{148,000}(P^{1/2})$$

Where:

**V** = Allowable leakage in gallons per hour.

**L** = Length of water main in feet.

**D** = Nominal diameter in inches.

**P** = Average test pressure in psi\*\*

\*\* The average test pressure shall be calculated as the test pressure for the lowest elevation of the test section less one-half the elevation change to the highest point on the test section.

25-2.07 Repairs

During the pressure and leakage test, all accessible appurtenances shall be inspected for visual signs of leakage. All visual leaks shall be corrected immediately, regardless of the amount of leakage and the test shall be run again for its full duration. Should the pressure and leakage test fail, the Contractor shall begin to investigate all areas of suspected leakage and shall make all repairs necessary in order to affect a successful test. All repair methods shall be subject to Agency's engineer approval. All leaks detected shall be repaired to a water tight condition. All repairs made shall be retested in accordance with these specifications. All repairs shall be made and a successful test accomplished prior to taking bacteriological samples.

## 25-3 Disinfecting

### 25-3.01 General

The interior of all water mains and appurtenances shall be disinfected in accordance with AWWA C651 and these specifications. Disinfection requirements shall include preventive and corrective measures during construction, forms of chlorine and methods of application, final flushing, and bacteriological tests.

The methods and techniques described in these specifications are minimum requirements only. The Contractor shall be solely responsible for the methods and techniques used to successfully disinfect the water mains and appurtenances and for disposing of the highly chlorinated water during flushing operations.

### 25-3.02 Preventive and Corrective Measures During Construction

Precautions shall be taken to protect the interior of water mains and appurtenances against contamination. The open ends of all water main layed in the trench shall be closed with water tight plugs when pipe laying has stopped. Stockpiled pipe and appurtenances shall also be protected from contamination.

If dirt or other contaminates enter the water main or appurtenances and, in the opinion of the Agency's engineer, the contaminate will not be removed by the flushing operation, the interior surfaces shall be cleaned by mechanical means.

Water mains and appurtenances flooded during construction shall be cleared of floodwater, flushed with potable water, isolated, and filled with chlorinated water so that at the end of a 24-hour holding period, the free chlorine residual is not less than 25 mg/L. The chlorinated water shall be flushed as described under Final Flush of these specifications.

### 25-3.03 Methods of Chlorination

Two methods of chlorination are accepted: tablets, and continuous feed. The slug method described in AWWA C651 will not be allowed.

#### 25-3.03-A Tablet Method

This method may be used only if the mains and appurtenances are kept clean and dry during construction. The placing of calcium hypochlorite granules in addition to the tablets during construction is optional.

Calcium hypochlorite, 65%, 5-gram tablets shall be attached to the top inside surface of each length of pipe immediately prior to installation with a food-grade adhesive. Use only Permatex Form-a-Gasket No. 2, or Permatex Clear RTV Silicon Adhesive Sealant, or approved equal. Do not use Permatex Form-a-Gasket No. 1. The number of tablets for each pipe section shall be calculated as the following:

$$N = .0012d^2L$$



Where:

**N** = Number of 5-gram tablets required for each pipe section, rounded to the next higher integer.

**d** = Nominal pipe diameter in inches.

**L** = Length of each pipe section in feet.

When installation has been completed, the water main shall be filled with water at a rate so as not to create a velocity of more than 1 ft/sec. All air pockets shall be eliminated. The heavy chlorine solution shall remain in the mains at least 24 hours. If water temperatures below 41°F, it shall remain for at least 48 hours.

#### 25-3.03-B Continuous-Feed Method

This method shall consist of filling the completed mains and appurtenances to remove all air pockets, flushing to remove particulates, and refilling the mains with potable water chlorinated so that after a 24-hour holding period in the mains, there will be a free chlorine residual of not less than 10 mg/L.

The methods and techniques used for Preliminary flushing and chlorinating the mains shall be as described in Section 5.2 of AWWA C651. The placing of calcium hypochlorite granules during construction is optional.

#### 25-3.04 Final Flushing

The heavily chlorinated water shall be flushed from the mains and appurtenances and shall not remain in the mains more than 48 hours beyond the times required in this section. The heavily chlorinated water shall be flushed from the mains and appurtenances until chlorine measurements show that the concentrations in the water leaving the main is no higher than that generally prevailing in the system, but not more than 1.0 mg/L.

The environment to which the chlorinated water is to be discharged shall be inspected. The Contractor shall be solely responsible for any damage caused by the discharge of heavily chlorinated water. If there is any question that the chlorinated discharge will cause damage to the environment, then a reducing agent shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. Reducing agents and their use shall comply with AWWA C651, Appendix B. Where necessary, federal, state, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

#### 25-3.05 Bacteriological Samples

Upon completion of the disinfection process, water samples shall be tested for bacteriological quality in accordance with AWWA "Standard Methods for the Examination of Water and Wastewater" and shall show the absence of coliform organisms.

Bacteriological samples shall be collected by the Agency and tested at a laboratory approved by the Agency's engineer. The number and location of samples shall be determined by the Agency's engineer. Should any of the samples prove positive, the Contractor shall repeat the disinfecting process and the Agency will again collect samples for testing.

#### 25-3.06 Redisinfection

If the initial disinfection fails to produce satisfactory bacteriological samples, the main may be refushed and shall be resampled. If these second check samples continue to show the presence of coliform organisms, then the main shall be rechlorinated by the continuous-feed method of chlorination until satisfactory results are obtained.

### 25-4 Measurement and Payment

#### 25-4.01 Measurement

Measurement shall be on a lump sum basis. Partial payment for testing and disinfecting will not be considered except for approved isolated sections of pipeline that have been successfully tested and disinfected. In these cases, the amount of work completed will be calculated as the length of Water Main successfully tested and disinfected as it compares to the total length of Water Main to be installed under these Standards.

#### 25-4.02 Payment

The Contract lump sum price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work necessary for the testing and Disinfecting of Water Main and appurtenances. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this section.

**SECTION 26 – RESERVED**

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## SECTION 27

### CONCRETE

#### 27-1 General

##### 27-1.01 Scope

This section describes the requirements for concrete including, but not limited to, materials to be used, forms and details of construction, workmanship, and measurement and payment.

##### 27-1.02 Description of Work

Work under this section shall include, but not be limited to, furnishing and placing all materials for mass concrete and reinforced concrete, reinforcing steel and supports, expansion joint fillers, waterstops, floor hardener, bonding agents, packing and nonshrink grout, epoxy anchors; constructing and removing form work, measuring, mixing and transporting concrete; placing, conveying, and vibrating concrete; installing construction and expansion joints, removing the forms, curing and protecting the concrete, finishing the concrete; placing concrete fillets, topping and equipment pads; and testing for quality and watertightness.

##### 27-1.03 Sequence of Work

The type of forming system must be approved by the Agency's engineer prior to starting work on the forms. Forms, reinforcement, inserts, and attachments must be completed and approved by the Agency's engineer prior to placing concrete. The strength or class of concrete and the curing methods must also be approved by the Agency's engineer prior to placing concrete. Prior to starting backfill or repair operations, all formed surfaces must be inspected by the Agency's engineer.

##### 27-1.04 Submittals

Submittals supplied by the Contractor are described in detail in each subsection herein and generally include: samples and catalog data of materials used, a written description of the proposed forming methods, reinforcing steel shop drawings, and concrete mix design(s). The Contractor's attention is directed to the General Conditions of these Standards under "Submittals".

##### 27-1.05 Storage

Cement and aggregates to be used for concrete mixed on the job site shall be stored in such a manner as to prevent deterioration of their quality or intrusion of foreign matter. Reinforcing steel shall be stored on pallets, off the ground, and kept free of dirt and oils. All other materials, except forms, shall be stored in dry, clean containers. Any materials which have been deteriorated or damaged shall not be used and shall be removed from the job site.

### 27-1.06 Lines and Grades

Offset lines or coordinates, and grades shall be established for the Contractor, as necessary, for accurate location of concrete structures, all as described in the Special Conditions elsewhere in these Standards. The Contractor shall, at his own expense and responsibility, transfer offset lines and coordinates, and grade and set batter boards and string lines, and make all necessary measurements and sightings, all from the construction staking provided, and all as necessary to accurately place the structures.

### 27-1.07 Excavation

Clearing and grubbing operations for concrete work shall conform in all respects to Clearing and Grubbing described elsewhere in these specifications. Dust control and excavation for concrete work shall conform in all respects to Dust Control and Pipe Trench Excavation for Water Mains described elsewhere in these Standards.

### 27-1.08 Backfill

Backfill around structures shall not begin until the concrete has reached sufficient strength, as determined by the Contractor, but not earlier than 7 days after the pour. All forms shall be removed, all repairs made, and all concrete shall pass inspection prior to beginning the backfill operation. The type of backfill shall be as shown on the plans. For areas requiring backfill, but the type is not shown on the plans, the area shall be backfilled with a Class 4 Material. Backfill of areas with intruding ground water shall be with a permeable material. Backfilling operations, Class 4 Material, and Permeable Backfill Material shall comply in all respects to Pipe Trench Backfill for Water Mains described elsewhere in these Standards.

### 27-1.09 Inspection

The Contractor shall make all material stock piles available for inspection by the Agency's engineer. Plants used to produce ready mix concrete shall be subject to periodic inspection by the Agency's engineer. The Contractor shall make available, for testing purposes, samples of all materials and samples of the concrete being placed.

Each phase of work shall pass inspection by the Agency's engineer before commencing work on the next phase. The phases shall consist of, but not be limited to, clearing and grubbing, excavation, construction of forms, placing reinforcing steel and inserts, final inspection of forms, reinforcement, and inserts, prior to placing concrete, placing concrete, grouting, installing anchors, curing, removing forms, finishing concrete, backfilling, and testing.

## 27-2 Materials

### 27-2.01 General

Materials furnished for concrete and reinforced concrete shall include, but not be limited to, concrete and its constituents, reinforcing steel and supports, expansion joint filler, waterstops, floor hardeners, curing aids, bonding agents, patching grout, non-shrink grout, and epoxy anchors.

### 27-2.02 Submittals

Submittals supplied by the Contractor for materials include: samples of coarse and fine aggregate; and catalog data for admixtures, reinforcing supports, expansion joint filler, waterstops, floor hardener, curing aids, bonding agent, non-shrink grout and epoxy anchors, reinforcing steel, and welded wire fabric.

### 27-2.03 Concrete

The materials furnished for concrete shall include, but not be limited to, Portland cement, water, coarse and fine aggregates, fly ash, and admixtures.

#### 27-2.03-A Portland Cement

Portland Cement shall be Type II Modified conforming to Type II cement, as specified in ASTM C150. If high-early strength cement is allowed by the Agency's engineer, it shall conform to Type III cement as specified in ASTM C150.

#### 27-2.03-B Water

Water for washing aggregates and for mixing and curing concrete shall be clean, free from oil, acid, alkalis, vegetable matter, or other deleterious substances. No salt or sea water or water containing excessive amount of sodium sulfate, magnesium sulfate or magnesium chloride shall be used.

#### 27-2.03-C Coarse Aggregate

The coarse aggregate shall consist of clean, hard, dense, tough and durable natural gravel, crushed gravel, or crushed rock. It shall be free from oil, organic matter or other deleterious substances and shall conform to ASTM C33.

#### 27-2.03-D Fine Aggregate

Fine aggregate shall consist of hard, durable, uncoated natural sand or other approved material. It shall be free from oil or other deleterious substances.

#### 27-2.03-E Fly Ash

Fly ash shall conform to ASTM A618, Class F or N, except that the loss on ignition shall be limited to 1%.

#### 27-2.03-F Admixtures

Water-reducing agents such as Pozzoloth, WRDA, or equal shall be used in all concrete. The admixture shall conform to ASTM Specifications C494. Proportioning and mixing shall be as recommended by the manufacturer.

Admixtures causing accelerated setting of cement in concrete shall not be used.

Air-entraining admixtures compatible with the concrete mix shall be used, as required, as a moderate addition to the water-reducing agent, to obtain the specified percent air in the resultant concrete. The Contractor shall submit data verifying that the admixtures are compatible with the mix. Air-entraining admixture shall conform to ASTM Specification C260.

#### 27-2.04 Reinforcement

##### 27-2.04-A Steel Bars

All steel bars shall have a deformed surface and shall conform to ASTM A615, including Supplementary Requirement S1, Grade 60, free from dirt, rust, scale, oil, and frost. No. 3 bars may be Grade 40.

##### 27-2.04-B Epoxy-coated Steel Bars

Where shown on the plans, bars shall be epoxy coated in conformance with ASTM A775, Section 2.02A.

##### 27-2.04-C Welded Wire Fabric

Welded wire fabric shall be of gauge and mesh size shown on the plans and shall meet the requirements of ASTM A185 or ASTM A497 for smooth wire fabric. Wire fabric shall be free from dirt, rust, scale, oil, and frost.

#### 27-2.05 Reinforcing Supports

Reinforcement supported from form work shall rest on Class E (stainless steel protected) bar supports, as specified in "Manual of Standard Practice" by the Concrete Reinforcing Steel Institute (CRSI).

Reinforcement supported from the ground shall rest on 3-inch-high precast concrete blocks not less than 4 inches square, and having a compressive strength equal to the specified compressive strength of the concrete being placed. The precast blocks shall have been cured as specified for concrete and shall contain soft steel wires imbedded therein for fastening to the reinforcing.

Epoxy-coated reinforcing bars supported from formwork shall rest on coated wire bar supports, or on bar supports made of dielectric materials or other acceptable materials. Wire bar supports shall be coated with dielectric material, compatible with concrete, for a minimum distance of 2 inches from the point of contact with the epoxy-coated reinforcing bars. Reinforcing bars used as support bars shall be epoxy-coated.

#### 27-2.06 Expansion Joint Filler

Filler for expansion joints shall be ½" thick pre-molded type conforming to ASTM D1751.

### 27-2.07 Waterstops

Waterstops shall be neoprene or PVC conforming to State Specifications paragraph 51-1.14. Waterstops shall be of the size and type shown on the plans and shall have a hollow bulb in the center.

### 27-2.08 Floor Hardener

Compounds used for floor hardener shall be Lapidolith, non-metallic consisting of quartz aggregate, dispersing agent and Portland cement. The hardener shall be manufactured, not field mixed, and compatible with the curing method used.

### 27-2.09 Curing Aids

Aids for curing concrete shall be either a cover or applied spray. Covers shall be white or reflective 4-mil polyethylene, or moist burlap or rugs. Spray-applied curing compounds shall be white-pigment membrane type conforming to ASTM C309.

### 27-2.10 Bonding Agent

Agents used for bonding concrete fillets, topping slabs, equipment pads, or similar applications, shall be concrete 1001-LPL, or approved equal.

### 27-2.11 Patching Grout

Grout used for patching small surface blemishes shall consist of neat portland cement, water, and fine sand passing a No. 30 mesh sieve with an approved acrylic modifier.

### 27-2.12 Non-shrink Grout

Non-shrink grout shall be Masterflow 713 by Master Builders Co., or approved equal.

### 27-2.13 Epoxy Anchors

Compounds used for poured epoxy-grouted anchors shall be Concrete Epoxy Adhesives, or approved equal. The type used for each application, as shown on the plans, shall be as recommended by the manufacturer.

Systems used for injected epoxy for anchors shall be HVA adhesive anchors by HILTI Fastening Systems, or approved equal.

## 27-3 Form Work

### 27-3.01 General

The materials and installation requirements for form work shall include, but not be limited to, furnishing submittals, forming systems, tolerances, and chamfers.



### 27-3.02 Submittals

The type of forming systems must be approved by the Agency's engineer prior to starting work. The Contractor shall provide a written description of the proposed forming methods including form materials, shop drawings, catalog data, and other manufacturer's information.

Form work shop drawings shall be submitted for all form work and supports showing form plywood pattern, form work, ties, beams, walers, columns, struts; vertical limits of concrete placements, horizontal lifts, and construction joints.

### 27-3.03 Forming Systems

The forming system used by the Contractor shall allow for proper sequencing of the work and removal of the forms without damage to the concrete. Symmetrical panels shall be arranged with a minimum number of joints.

Form systems may be lumber, prefabricated wood panels, metal, or plastic-lined panels, all sound and free from any defects that will mar or detract from the surface of the finished concrete. Construction forms shall be placed sufficiently tight to prevent loss of mortar. The forms shall be designed to withstand vibrator action.

The forms shall be treated with a nonstaining material to eliminate absorption of water and to act as a form release agent.

Where the bottom of an area between forms is inaccessible from within, the forming system shall provide access panels to permit thorough and complete removal of extraneous material before placing concrete.

Walls and footings below existing and final grades may use earth trench walls as forms, provided the widths shown on the plans shall be increased two (2) inches, if approved after inspection of the trenches, provided the sides are clean, even, vertical, true, and further provided the bottoms are level, clean, and without fill.

### 27-3.04 Tolerances

The Contractor shall be responsible for setting and maintaining concrete forms sufficiently so as to insure that the completed work will be within the tolerance limits shown on the plans, or specified herein. Concrete work that exceeds these tolerance limits shall be remedied or removed at the discretion of and upon order of the Agency's engineer, and shall be replaced at the expense of the Contractor.

Tolerance limits for concrete:

1. Variations in Lines:

In the line and position of a structure as a unit; 1 inch.

2. Variations in Footings:

a. In dimensions in plan: minus, 1/2 inch; plus, 2 inches.

- b. In misplacement or eccentricity: 2 percent of the footing width in the direction of misplacement but not more than 2".
- c. In reduction in thickness: minus 5% of specified thickness.

3. Variation from the Level, Grades, or Slopes:

- a. In floors, slabs, walkways, ceilings, top of walls or beams, and beam soffits: in 10 feet,  $\frac{1}{4}$ "; in any bay or 20 feet maximum,  $\frac{3}{8}$ "; in 40 feet or more,  $\frac{3}{4}$ "; in floors to receive tile, maximum of  $\frac{1}{8}$ " in 10 feet.
- b. For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines; in any bay or 20 feet maximum,  $\frac{1}{4}$ "; in 40 feet or more,  $\frac{1}{2}$ ".
- c. In sidewalks, plazas, outdoor concrete slabs, curb and gutter sections: In 1 foot,  $\frac{1}{8}$ "; in 10 feet,  $\frac{1}{4}$ ".

4. Variation from Plumb:

- a. In the lines and surfaces of columns, piers, and walls; in 10 feet, 1/4 inch; in any story or 20 feet maximum,  $\frac{3}{8}$ "; in 40 feet or more,  $\frac{3}{4}$ ".
- b. For exposed corners and other conspicuous lines: in any bay or 20 feet maximum,  $\frac{1}{4}$ "; in 40 feet or more,  $\frac{1}{2}$ ".

5. Variation of Linear Structure Lines:

In plan and related established position of columns, walls and partitions: In any bay or 20 feet maximum,  $\frac{1}{2}$ "; in 40 feet or more, 1 inch.

6. Variations in Cross-section:

In columns, beams, piers, slabs, and walls: Minus  $\frac{1}{4}$ "; plus  $\frac{1}{2}$ ".

7. Variations in Openings:

In the size and location of sleeves, floor and wall openings:  $\frac{1}{4}$ ".

8. Variation in Steps:

- a. In a flight of stairs: total rise,  $\frac{1}{8}$ "; total run, 1".
- b. In consecutive individual steps: rise,  $\frac{1}{16}$ "; tread,  $\frac{1}{8}$ ".

27-3.05 Chamfers

All exposed horizontal and vertical edges or other corners, both interior and exterior of structures, shall be chamfered  $\frac{3}{4}$ " minimum, measured on the sides, not hypotenuse. If shown on the plans, larger chamfers shall be used for specific corners or structures.

27-4 Placing Reinforcement27-4.01 General

The requirements for placing reinforcement shall include, but not be limited to, furnishing submittals, bending, storage and protection, placement, splicing, welding, minimum concrete cover, and repair of epoxy coated bars.

27-4.02 Submittals

Prior to starting shop fabrication or field placement, the Contractor shall submit and receive approval of reinforcing steel shop drawings. The drawings shall comply with the requirements of ACI 318, detailed in accordance with ACI SP66, and adapted to the proposed placement schedule, showing size, dimension, bending, placing, and construction joint details and placement. The Contractor shall also submit the type, size, and location of all wire and bar supports.

27-4.03 Bending

Bending of the reinforcing steel shall be in accordance with the Concrete Reinforcing Steel Institute, Manual of Standard Practice, Chapter 7.

27-4.04 Storage and Protection

Reinforcing steel shall be stored off the ground and protected from oil, or other deleterious materials. Epoxy-coated reinforcing bars shall be stored on protective wood cribbing.

27-4.05 Placement

All reinforcing bars shall be accurately cut, bent and placed as shown on the drawings; they shall be securely tied at all intersections, and shall be firmly supported in the proper locations so that placing of concrete will not cause displacement of the reinforcing, all in conformance with Concrete Reinforcement Steel Institute, Manual of Standard Practice, Chapter 8. Other methods must be approved by the Agency's engineer. Concrete or steel chairs may be used to support reinforcing bars above subgrade.

Tolerance limits for placing reinforcing steel:

1. Variation of Protective Covering:
  - a. With  $2\frac{1}{2}$ " cover or less;  $\frac{1}{4}$ ".
  - b. With 3" cover or more;  $\frac{1}{2}$ ".

## 2. Variation From Indicated Spacing:

Between any two bars, but not accumulative; 1 inch.

Horizontal wall bars in double layer walls shall be staggered.

In walls reinforced with epoxy-coated bars, spreader bars where required, shall be epoxycoated. Proprietary combination barclips and spreaders used in walls with epoxy-coated reinforcing bars shall be made of corrosion-resistant material or coated with dielectric material. Epoxy-coated reinforcing bars shall be tied with plastic-, epoxy-, or nylon-coated tie wire, or other acceptable materials.

### 27-4.06 Splices

Splices shall be placed as shown on the plans. For any splices not shown, the bars shall be overlapped a minimum of 30-bar diameters. Splices in adjacent bars shall be staggered a minimum of 5 foot center to center. All laps forming splices shall be securely wired.

### 27-4.07 Welding

All welding of reinforcing steel shall be done by properly certified welders and operators, and shall be continuously inspected, at the Contractor's expense, by a qualified laboratory. The Contractor must furnish to the laboratory mill certificates showing the chemical analysis of the steel. All inspection reports shall be sent to the Agency's engineer. All preheating and welding shall be done in accordance with American Welding Society Standard D1.4. Tack welding of rebar is strictly prohibited.

### 27-4.08 Minimum Concrete Cover Over Reinforcement

Where not shown on the plans, the thickness of concrete over the reinforcement shall be as follows:

1. Where concrete is deposited against ground, not less than 3".
2. Where concrete is exposed to the weather, process liquids, or exposed to the ground but placed in forms; not less than 2 inch for bars more than 5/8 inch in diameter and 1½" for bars 5/8" or less in diameter.
3. In slabs and walls not exposed to the ground or to the weather; not less than ¾".
4. In all cases, the thickness of concrete over the reinforcement shall be not less than one and one-half times the bar diameter.

### 27-4.09 Repair of Epoxy-Coated Reinforcing Bars

Damage to the coating of epoxy-coated reinforcing bars due to bending, handling, shipment, and placing need not be repaired where the damaged area is 0.1 square inches or smaller; damaged areas larger than 0.1 square inches shall be repaired with patching material in accordance with manufacturer's printed

instructions. The maximum amount of damage, including repaired and unrepaired areas, shall not exceed 2% of the surface area of each bar. If so, the bars shall be rejected and removed from the work.

## 27-5 Concrete Mix

### 27-5.01 General

The requirements for concrete mix shall include, but not be limited to, furnishing submittals, mix composition and designation, minimum cement content, fly ash, aggregate sizing, measuring materials, and mixing and transporting the concrete.

### 27-5.02 Submittals

The Contractor shall submit and receive approval of the proposed concrete mix design prior to pouring concrete, a copy of all load slips, and catalog information on all additives shall be included.

### 27-5.03 Concrete Mix Composition

Concrete shall consist of Portland cement, fine aggregate, coarse aggregate, a water reducing agent, an air-entraining agent, pre-approved additives, and water, all of which shall conform to CALTRANS Section 90 and these Standards.

### 27-5.04 Concrete Designation

Concrete shall meet the minimum compressive strength or concrete class as shown on the plans. Concrete that is not assigned a minimum compressive strength or class on the plans shall comply with the minimum compressive strength or class using the types of uses described in this subsection. Prior to placing any concrete, the Contractor shall verify, in writing, and receive Agency's engineer's approval of the strength or class of concrete to be used. The allowable slump, maximum water-cement ratio, and air entrainment shall also comply with the following table:

TYPE OF USE	CLASS	MIN. (1) COMPRESS	SLUMP (inches)	(2) MAXIMUM WATER-CEMENT RATIO	(3) ENTRAINED AIR REQUIRED*
<u>Liquid Containing Structures:</u>					
Slabs & Footings	A	3500	2 to 3	0.45	5½% ±1%
Vertical Wall Sections & Columns	A	3500	3 to 4	0.45	5½% ±1%
Mass Concrete & Unformed Slopes	A	3500	1 to 2	0.45	5½% ±1%
<u>Other Structural Concrete:</u>					
Interior & Exterior Slabs, Footings, and Caissons	A	3000	2 to 3	0.50	-----
Vertical Wall Sections & Columns	A	3000	3 to 4	0.50	-----
<u>Curbs, Gutters, Sidewalks</u>	B	2500	3 to 4	0.55	-----
<u>Thrust Blocks, Concrete Fill</u>	C	2000	3 to 4	0.60	-----

(1) Minimum compressive strength to be attained at 28 days.

(2) Maximum water/cement ratio by weight.

(3) Based on 1½" maximum aggregate size. Where 1" maximum aggregate size is used, increase entrained air by ½%.

27-5.05 Minimum Cement Content

Concrete shall contain the following minimum amount of Portland cement per cubic yard:

Class A	564 pounds
Class B	470 pounds
Class C	376 pounds

27-5.06 Fly Ash

The Contractor may, at his option, substitute up to 15 percent by weight of fly ash for the Portland Cement required herein.

27-5.07 Aggregate Sizing

Grading shall be as set forth in CALTRANS Section 90. In addition, the maximum size aggregate shall be no larger than one-fifth of the narrowest distance between forms, nor larger than three-quarters of the minimum clear spacing between reinforcing bars. The maximum size aggregate grading shall be 1½"

27-5.08 Measuring Materials

Materials shall be measured by weighing, except as otherwise specified or where other methods recommended by the manufacturer to be measured by volume are specifically authorized by the Agency's engineer. Scales shall be approved by the Agency's engineer and have been certified by the local Sealer of Weights and Measures within one year of use. Each size of aggregate and the cement shall be weighed separately. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one percent of the desired amount. Cement in standard packages (sacks) need not be weighed, but bulk cement and fractional packages shall be weighed.

27-5.09 Concrete Mixing and Transporting

All concrete shall be machine mixed at the site, or delivered to the site by transit mixers under conditions approved by the Agency's engineer.

No concrete shall be placed in the work after it has begun to set. No concrete can be placed more than one hour after the constituents were first combined.

If transit mix is used, the rate of delivery, haul time, mixing time and hopper capacity shall be such that all mixed concrete delivered shall be placed in the forms within one hour from the time of introduction of cement and water to the mixer. All concrete shall be kept continuously agitated until discharged in the hopper at the job site.

Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94 and Chapter 7 of ACI 301. Plant equipment and facilities shall conform to the "Check List for Certification of Ready Mixed Concrete Production Facilities" of the National Ready Mixed Concrete Association.

## 27-6 Concrete Workmanship

### 27-6.01 Preparation for Placement

Before placing concrete, all form work shall be cleaned of dirt and construction debris, water drained, reinforcement shall be cleaned of dirt, rust, scale, frost or other coatings deleterious to the bond, then securely and properly fastened in its correct position, forms at construction joints re-tightened, and all bucks, sleeves, hangers, pipes, conduits, bolts, wires, etc., installed. No concrete shall be placed before the forms, reinforcing steel and all work that is to be embedded have been set, observed and approved by the Agency's engineer.

Excavations shall be kept free from water while concrete is being placed, cured and finished therein. Fresh concrete shall be protected at all times from running water.

### 27-6.02 Conveying and Placing

Concrete shall be conveyed from the mixer to the place of final deposit as rapidly as practicable by methods, which will prevent the separation or loss of the materials. The concrete shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling.

Concrete shall be placed and consolidated by methods that will not cause segregation of the aggregates and will result in a dense homogeneous concrete which is free of voids and rock pockets. All concrete shall be used while fresh and before it has taken an initial set. Retempering any partially hardened concrete with additional water will not be permitted.

Surfaces on which concrete is to be placed shall be thoroughly moistened with water immediately before placing concrete.

Concrete shall not be deposited on frozen or ice-coated ground nor on ice-coated forms, reinforcing steel, embedded items or construction joints.

Where a schedule for placing concrete is shown on the plans, no deviation will be permitted therefrom unless approved in writing by the Agency's engineer.

Mixed concrete, after being deposited, shall be consolidated until all voids are filled and free mortar appears on the surface. The concrete shall be placed as nearly as possible in its final position and the use of vibrators for extensive shifting of the mass of fresh concrete will not be permitted.

Fresh concrete shall not be permitted to fall from a height greater than 4 feet without the use of adjustable length pipes, tubes or double belting placed to prevent segregation of the concrete. Double belting shall not be used unless the thickness of the member is less than 16 inches. Concrete shall not be permitted to fall through areas constricted by reinforcing that tends to segregate the mix.

In vertical sections, concrete shall be deposited continuously in horizontal layers of 24 inches maximum depth so as to maintain a horizontal plastic surface until the completion of the unit. No concrete shall be



deposited on concrete that has hardened sufficiently to cause the formation of seams and planes of weakness within the section.

Concrete for horizontal members or sections shall not be placed until the concrete in the supporting vertical members or sections is no longer plastic and has been in place at least two hours.

In all slabs, concrete shall be deposited in a continuous or monolithic operation to the full thickness of the slab. Each batch shall be dumped against previously placed concrete and not away from it, and shall not be dumped in separate piles and then worked together.

Concrete shall not be mixed or placed while the atmospheric temperature surrounding the work is at or below 35 degrees F, or is expected to be at or below 35 degrees F, within 24 hours. The Contractor's attention is directed to Cold Weather Concrete Work in this section.

The concrete in each integral part of the structure shall be placed continuously, and work will not be allowed to commence on any such part unless sufficiently inspected and approved material for the concrete is on hand, and forces and equipment are sufficient to complete the part without interruption in the placing of the concrete.

#### 27-6.03 Concrete Vibrating

With the exception of concrete placed as slope paving and aprons, and concrete placed under water (where approved), all concrete shall be consolidated by means of high frequency internal vibrators within 15 minutes after it is deposited in the forms. The vibrators shall not be attached to or held against the forms or the reinforcing steel. Vibrating shall be done with care and in such manner so as not to displace forms, reinforcement, ducts, and embedded items.

All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Internal vibrators shall be the largest size and the most powerful that can be properly used in the work, as described in Table 5.1.4 of ACI 309. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be allowed. The vibrator shall be inserted vertically at uniform spacing over the entire area of the placement. The distance between insertions shall generally be about 1½ times the radius of action, or such that the area visibly affected by the vibrator overlaps the adjacent just-vibrated area by a few inches. In slabs, the vibrator shall be sloped toward the horizontal as necessary to operate in a fully embedded position.

The vibrator shall penetrate rapidly to the bottom of the layer, and at least 6 inches into the preceding layer if there is such. At each insertion, the vibrator shall be held stationary for a time sufficient to consolidate the concrete but not cause segregation, generally from 5 to 15 seconds. The vibrator shall then be withdrawn slowly, at the rate of approximately 3 inches per second.

A spare vibrator in good working condition shall be kept on the job site during all concrete placing operations. Where the concrete is to have an as-cast finish, a full surface of mortar shall be brought against the form by the vibration process, supplemented if necessary by spading to work the coarse aggregate back from the formed surface.

The use of external vibrators for consolidating concrete will be permitted when the concrete is inaccessible for adequate consolidation provided the forms are constructed sufficiently rigid to resist displacement or damage from external vibration. The Contractor must receive approval from the Agency's engineer prior to using external vibrators.

#### 27-6.04 Cold Weather Concrete Work

Concrete work may be carried on during cold weather, but only with the express permission of the Agency's engineer after approval of a plan of operation. Precautions shall be taken to see that the concrete is properly protected after pouring and during the cure period. In general, the requirements of the CALTRANS Section 90 in this regard will apply.

#### 27-6.05 Hot Weather Concrete Work

During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation which will impair the required strength or serviceability of the member or structure.

#### 27-6.06 Construction Joints

The Contractor shall obtain approval for joints not shown and locate them where they least impair the strength of the structure. Unless otherwise shown on the drawings, joints in walls and columns shall be at the underside of floors, slabs or grade beams, and at the top of footings or floor slabs. Place grade beams at the same time as slabs. At least two hours shall elapse after depositing concrete in columns or walls before depositing concrete in supported grade beams or slabs. As the new concrete is placed, revibration in tops of columns and walls is desirable.

Make joints perpendicular to the main reinforcement.

All horizontal construction joints in walls shall have a continuous wood screed strip at the outer face of the joint to form a true line. Screeds shall be removed and the joint thoroughly cleaned out before pouring the next portion of wall.

Exposed reinforcing steel shall be cleaned of all concrete and other unsuitable coatings.

Reinforcing steel and mesh shall continue across construction joints.

Construction joints shall be made rough and all laitance removed from the surface by chipping the entire surface, sandblasting with coarse silica sand, or hosing the surface 4 to 6 hours after the pour with a fine spray, exposing solidly embedded clean aggregate. Forms shall be scraped and cleaned of drippings, debris, etc., and dusted by means of compressed air. Surfaces of the hardened concrete shall be cleaned to the satisfaction of the Agency's engineer and wetted as required before placing of new concrete. Just before starting the new pour, all free water shall be removed and the horizontal surfaces shall be covered with at least 4 inch thickness of concrete composed of cement and fine aggregate, omitting the coarse aggregate. Cement content of such mortar shall be increased to at least 7½ sacks per cubic yard, but not less than the approved concrete design mix.

### 27-6.07 Expansion Joints

Install expansion joint fillers to within ½” below top of slab levels.

Where shown, load transfer dowels shall consist of plain bars with one-half coated with an approved antibond coating. The coated half shall be sleeved. No other reinforcement or metal shall extend continuously through expansion joint.

### 27-6.08 Waterstops

The design and location of waterstops shall be as shown on the plans. Each piece of premolded waterstop shall be of maximum practicable length to minimize the number of end joints. Embed center bulb in the center of the joint.

All joints in waterstops including but not limited to, intersections and end to end joints, shall be joined following the manufacturer's instructions. Joints shall develop effective watertightness fully equal to that of the continuous waterstop material and shall develop not less than 50% of the mechanical strength of the parent section. Do not lap sections of waterstop. All joints shall be butt spliced using a heat-sealing method and in conformance with the manufacturer's instructions.

Support waterstops securely against displacement by wire tie between the last rib and the end of the waterstop, or use a method specifically recommended by the manufacturer.

If the joint is not watertight after construction, the joint shall be grouted by drilling grout holes to the center of the structure unit and force epoxy grout into the joint under pressure. This shall be repeated until the leak has stopped completely.

### 27-6.09 Nonshrink Grout

Use nonshrink grout to fill voids around embedded items, at locations shown on the plans, and as directed by the Agency's engineer. Grout shall be mixed and used in accordance with manufacturer's recommendations. Exposed surfaces and edges shall be smooth, straight, even, and finished with a steel trowel.

### 27-6.10 Epoxy Anchors

These anchors shall be installed in strict conformance to the manufacturer's printed instructions. Embedded reinforcing bars shall not be damaged when drilling holes for these anchors.

### 27-6.11 Other Embedded Items

Prior to placing concrete, all required sleeves, inserts, anchor bolts and embedded items shall be in place. Give all trades whose work is related to the concrete ample notice and opportunity to introduce embedded items before concrete is placed.

Position embedded items accurately and support them against displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent the entry of concrete.

Anchor bolts placed in slabs, equipment pads, top of walls and similar installations, shall be held firmly in place by a plywood or similar type template to ensure accurate placement.

### 27-7 Form Removal, Curing, and Protecting

#### 27-7.01 Form Removal

Forms shall remain in place for seven days for curing purposes unless a curing method has been approved, as specified herein. When approved for removal, the forms shall be removed carefully to insure complete safety of the structure. For all portions of a structure supported by forms and shoring, the forms shall remain in place for a minimum of 10 days. Beam sides, columns, or other vertical forms may be removed after 24 hours, providing the concrete will not be injured and a curing method has been approved. Do not remove supporting forms or shoring until effected members have acquired sufficient strength to safely support their weight and imposed loads.

The Contractor shall assume full responsibility for safe removal of the forms.

#### 27-7.02 Curing and Protecting

The Contractor shall begin to protect the concrete immediately after placement from drying, excessively hot and cold temperatures, and mechanical injury. Measures shall be taken to keep moisture loss to a minimum until the cement has hydrated and the concrete is hard, but not less than seven days.

##### 27-7.02-A Curing

For formed surfaces, keep the forms wet. Cool metal forms exposed to sun with water. Forms shall remain in place for seven days for curing purposes unless an approved curing compound, water cure process, or waterproof membrane is used, as specified below.

For surfaces not formed or formed surfaces whose forms have been removed prior to the seven day requirement, immediately apply a curing compound, water cure, or waterproof membrane. The Contractor shall consult with the Agency's engineer and receive approval of the curing method prior to placing the concrete.

If approved for use, curing compound shall be applied to the concrete following the surface finishing operation immediately after the moisture sheen disappears from the surface, but before any drying shrinkage or craze cracks begin to appear.

Water curing shall keep the surfaces of the concrete wet for a period of seven (7) consecutive days by covering with water-saturated material kept wet by means of a system of perforated pipes, mechanical sprinklers, or porous hose, or by any approved methods which will keep all surfaces to be cured continuously (not periodically) wet.

Waterproof membrane curing shall be accomplished by first wetting the concrete surface with water using a nozzle that atomizes the flow into a mist, not a spray, until the concrete has set, then covering the concrete with a waterproof membrane. The waterproof membrane shall be a white or

silver reflective material. All joints in the membrane shall be securely cemented together to provide a waterproof joint. The membrane shall remain in place for a minimum of 72 hours after being placed.

#### 27-7.02-B Protecting

During curing period, the Contractor shall protect concrete from mechanical damage, loading, shock and vibration.

In cold weather, while curing proceeds, the Contractor shall maintain the moisture conditions, and shall maintain the temperature of the concrete between 50 degrees F and 70 degrees F for entire curing period by either heating or covering, or both.

In hot weather, the Contractor shall take immediate steps to protect newly finished concrete from drying effects of wind and sun, and maintain temperature of the air surrounding the concrete uniform within 5 degrees F in any one hour or 50 degrees F in any 24 hour period.

### 27-8 Finishing

#### 27-8.01 General

The type of finish applied to concrete surfaces shall be as shown on the plans or as specified in the Special Conditions of these Standards. Concrete surfaces with no finish type identified on the plans or in the Special Conditions shall be classified using the general descriptions given in this subsection, and the specified finish type shall be applied. Prior to applying a finish to any surface not identified on the plans or in this section, the Contractor shall obtain the Agency Engineer's approval of the proposed finish type.

All concrete surfaces, including precast vaults, shall receive one of the finishes described herein.

The finish types for concrete surfaces are divided into two main categories: surfaces created by forms, and flat or inclined surfaces created by screeding. Formed surfaces include precast vaults. The type of finishes and processes required are identified in the table below. Each process is then further described in subsections that follow:

Type of Finish	Required Processes
F1	Formed and repaired
F2	Formed, repaired, and dressed
S1	Screeded, floated, and broomed
S2	Screeded, floated, and troweled
S2B	Screeded, floated, troweled, and lightly broomed
S2F	Screeded, floated, troweled, and flooring applied
S2FH	Screeded, floated, troweled, floor hardener applied
S2NS	Screeded, floated, and troweled with abrasive

The following is a general description of where to apply the different finishes if not otherwise shown on the plans or described in the Special Conditions of these Standards:

<u>Type of Finish</u>	<u>General Location Description</u>
F1	Apply to all formed concrete surfaces, including vaults, to be backfilled or covered with a facade.
F2	Apply to all formed concrete surfaces, including vaults, that are to remain exposed in the final product. Areas to be backfilled shall receive an F2 finish to a level 6" below final grade.
S1	Apply to slabs and walkways located at canal structures, valve box pads, and similar field sites outside of plant areas.
S2	Apply to all inside floors, such as areas inside treatment plants, pumping plants; and tank floors, topping slabs, and equipment pads.
S2B	Apply to all outside slabs, walkways, and the exposed top of structures and walls.
S2F	Apply to all floor areas to receive paint, or floor covering. Consult with the floor covering manufacturer for type of finish required.
S2FH	Apply to all floor areas of loading docks, storage and warehouse, repair shops, and tool rooms.
S2NS	Apply to all stair treads and landings.

### 27-8.02 Formed Surfaces

Formed concrete surfaces shall be finished using the processes described herein. The degree of care in building forms, character of materials, and concrete placement techniques will be contributing factors in the amount of additional finishing required to produce smooth, even surfaces of uniform texture and appearance, free from bulges, depressions and other imperfections beyond allowable tolerances. The Agency's engineer shall be the sole judge in this respect.

#### 27-8.02-A Formed

The type of forms, form construction, form removal, and curing all affect the finish of formed concrete surfaces. These requirements shall be as described elsewhere in this section.

#### 27-8.02-B Repaired

Prior to beginning backfill or repair operations, all formed concrete surfaces must be inspected by the Agency's engineer.

If rock pockets, bulges, depressions, or other defects, in the opinion of the Agency's engineer, are of such extent or character as to substantially affect the strength or appearance of the structure or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of the structure affected.

This phase of the finishing process shall consist of cleaning, filling holes or depressions, repairing rock pockets and honeycombed areas, removing fins, bulges, offsets, and stains, and repairing any other defects required by the Agency's engineer.

Patching mortar shall contain enough silica sand and white cement to result in a patch which, when cured, will match the surrounding concrete.

All small holes, including tie holes, shall be cleaned thoroughly, dampened, then filled solid with patching mortar.

All large holes, rock pockets, and honeycombed areas shall have all defective concrete removed to edges perpendicular to the surface using a mechanical bush hammer. The area shall then be thoroughly cleaned and dampened. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without adding water, until it has reached the stiffest consistency that will permit placing. After surface water has evaporated from the area to be patched, a small amount of patching grout shall be mixed to the consistency of thick cream and brushed thoroughly into the surface to be patched. When the patching grout begins to lose the water sheen, apply the premixed patching mortar. The mortar shall be thoroughly consolidated into place and struck off to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, leave the patch undisturbed for at least 1 hour before finishing it. Keep the patched area damp for 7 days. Do not use metal tools in finishing a patch in a formed wall which will be exposed.

Depressions in areas not receiving backfill shall be repaired by roughening the surface enough to expose large aggregate using a mechanical bush hammer, then cleaning and patching as required herein for rock pockets.

Bulges in areas not receiving backfill shall be bush hammered or ground to the proper dimension, the area cleaned and patched, as required herein for rock pockets.

#### 27-8.02-C Dressed

All formed concrete surfaces that require final dressing shall receive a coat of mortar. The area shall be cleaned thoroughly and dampened. The dressing mortar shall be a mixture of one part Portland cement and two parts clean silica sand with enough water to form a loose paste. The dressing mortar shall be applied with a float having a resilient rubber surface. The dressing process shall create a smooth, uniform surface, both in texture and color. After taking its initial cure, the dressing mortar shall be kept damp for 48 hours. Surfaces shall be dressed prior to installing any conduits, pipe, ducts, or equipment that would interfere with the dressing process.

### 27-8.03 Screeded Areas

All surfaces not formed shall be screeded. This process is used to bring the concrete to near the desired level or shape. These areas are then float finished and, if required, troweled. Upon completion of this process, the finished surface shall meet the tolerances described in this section. The final finish shall be uniform in texture and appearance and done in a workmanlike manner. The Agency's engineer shall be the sole judge in this respect. Concrete given unsuitable finishes shall be removed and replaced.

#### 27-8.03-A Screeded

After the concrete has been thoroughly consolidated, the surface of all areas not formed shall be screeded to the desired elevation and contours by means of accurately placed edge forms and intermediate screed strips and striking off all excess concrete.

#### 27-8.03-B Floated

After the screeding process is complete, wait for the water sheen to disappear and the surface has stiffened sufficiently to start the floating process. For large flat areas, during or after the first floating, check for planeness of the surface with a 10-foot straightedge applied at not less than two different angles, and then cut down all high spots and fill all low spots to achieve a true plane within the allowable tolerances.

#### 27-8.03-C Troweled

After the floating process has been completed, the surface shall be troweled by machine or by hand using steel trowels. Additional trowelings shall be done by hand after the surface has hardened sufficiently. Final troweling shall produce a ringing sound from the trowel and the finished surface shall be free of trowel marks, uniform in texture and appearance, and shall be planed to the tolerance specified under Floated Finish.

Sidewalks and outside slabs shall be marked and scribed into rectangles of not less than 12 square feet nor more than 20 square feet with a scoring tool which will leave the edges rounded. All sidewalk and outside slab edges shall be tooled to a rounded edge.

#### 27-8.03-D Lightly Broomed

After the troweling process has been completed, the surface shall be lightly broomed perpendicular to the normal traffic pattern, if present. The Contractor shall consult with the Agency's engineer at the time brooming starts, to establish the texture and depth of profile created by the brooming process.

#### 27-8.03-E Flooring Applied

Where flooring is required on the plans or in these specifications, the surface shall be troweled to a finish recommended by the manufacturer for proper installation of the flooring.



27-8.03-F Floor Hardener Applied

Areas to receive floor hardeners shall be troweled and the floor hardener applied using methods and amounts to produce a floor suitable for heavy to heavy-duty use, as recommended by the manufacturer.

27-8.03-G Abrasive, Nonskid Applied

Areas to have nonslip finish shall incorporate 25 pounds per 100 square feet of aluminum oxide grains into the surface. Immediately before troweling begins, sprinkle two-thirds of the abrasive evenly over the surface and float. After embedment, sprinkle the remaining one-third at right angles to the previous application. Apply more heavily in areas not sufficiently covered by the first application, and trowel again immediately. Complete finishing as specified under Troweled Finish. Stairs and stair landings shall receive Nonslip Floor finish.

27-9 Concrete Fillets, Topping Slabs, and Equipment Pads27-9.01 General

Concrete fillets, topping slabs, and equipment pads shall be placed over a bonding agent as soon as possible after completion of the curing period of the concrete. Contact surfaces shall be thoroughly cleaned to the degree recommended by the bonding agent manufacturer.

27-9.02 Construction

The bonding agent shall be accurately and thoroughly mixed and applied at the manufacturer's recommended coverage rate. Mix only the amount which can be used prior to expiration of the pot life. Concrete shall be immediately placed over the fresh bonding agent before the surface takes an initial set, all as recommended by the manufacturer. Bonding agent which sets up prior to placing concrete shall be removed and a fresh coat of bonding agent applied prior to placing concrete.

Concrete fillets, topping slabs, and equipment pads shall be accurately screeded to the slopes and elevations shown on the plans. Cure the concrete as specified for slabs above. Set equipment anchor bolts in pad to accommodate equipment furnished. Finish fillets the same as adjacent surfaces. Finish topping slabs and equipment pads as shown on the plans, or as specified herein.

27-10 Testing27-10.01 General

Concrete shall be tested for quality, including slump, air entrainment, and compressive strength; and shall be tested for watertightness.

27-10.02 Quality Testing

Quality testing shall be done at the Contractor's expense, unless otherwise specified in the Special Conditions of these Standards. If the Contractor is required to arrange for testing, it shall be done by a

certified testing laboratory and all test results shall be forwarded immediately to the Agency's engineer. The Contractor shall cooperate with and provide any equipment or manpower necessary to assist the Agency's engineer in testing the concrete.

The Contractor may, at any time, and at his own expense, perform additional testing for purposes of quality control and shall not depend on testing by other parties for such purposes. The Contractor shall, at his own expense, perform any tests necessary to acquire the strength of the concrete for the purpose of, and shall be solely responsible for, form removal and safety of the structure.

Prior to placing the concrete, each load or batch shall be tested for proper slump and air entrainment. These tests shall be taken in accordance with ASTM C172 and ASTM C143. The acceptable strength of concrete shall be based on compressive test specimens taken and cured in accordance with ASTM C31. A minimum of three specimens shall be taken from every 20 cubic yards of concrete placed or for each major placement during the day. The Agency's engineer shall determine the number of specimens to be taken as he deems necessary to ensure the concrete meets the specifications. The compressive tests shall be in accordance with ASTM C39. The standard compressive test shall be 28 days.

#### 27-10.03 Watertightness

Watertightness testing shall be done at the expense of the Contractor.

All concrete structures and channels which will later be subjected to hydrostatic pressure shall be tested for watertightness. The tests shall be made prior to application of waterproof coating, if required. Testing shall consist of filling the structure with clean water to a level of 6" below the top. Cells adjacent to the cell being tested shall be empty and dry. Water shall be allowed to stabilize for 12 hours, refilled, then the water level shall be measured at the beginning, middle, and end of a 24-hour test period. Allowable leakage shall not exceed ½% of the contents. The Contractor shall repair any visible leaks and shall correct the cause of any test failures. The repair procedure shall be submitted to the Agency's engineer for approval. After repairs are made, the Agency's engineer may require retesting of structures and/or channels that have been repaired.

#### 27-11 Measurement and Payment

No measurement for separate payment shall be made for any work specified in this section. All costs in connection therewith shall be included in the contract price for the item to which the work is pertinent.

## SECTION 28

### SHORING

#### 28-1 General

##### 28-1.01 Scope

This section shall include the designing, supplying, installing, and removal of all sheeting, shoring, bracing or equivalent methods herein referred to collectively as "shoring" for protecting life and limb during the progress of any portion of the work.

##### 28-1.02 Description of Work

It shall be the responsibility of the Contractor to decide on the manner of support to provide for trench and excavation safety. Excavation for any trench or pit five feet or more in depth shall not begin until the Contractor has obtained a trenching permit from CAL OSHA. This may include requirements for submittals and approval of detailed plans for eliminating the hazards of caving ground during the excavation of the trench or pit, and hazards during the time workmen must enter the trench or pit. Such detailed plan shall be submitted at least 15 days before the Contractor intends to begin excavation of the trench or pit and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for eliminating hazards during such excavation. No such plan shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety and if such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an Engineer who is registered as a Civil or Structural Engineer in the State of California. The Agency's engineer may require submission of design calculations and other information on the shoring system, as he/she finds necessary.

Shoring, sheeting and bracing shall be removed after construction, unless otherwise directed by the Agency's engineer, and shall be withdrawn in a manner that will prevent caving of the sides or top of excavation.

##### 28-1.03 Submittals

Submittals supplied by the Contractor shall include a trenching permit, shoring plan with design calculations. The Contractor's attention is directed to the General Conditions of these Standards under "Submittals".

#### 28-2 Measurement and Payment

##### 28-2.01 Measurement

Measurement for shoring shall be made as the percent complete. This bid item will be considered 100% complete upon completion of the contract as a whole, regardless of the amount of shoring required.

28-2.02 Payment

Payment shall be based on the percent complete applied against the contract lump sum price. The lump sum contract price for shoring shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all work necessary for the installation and removal of shoring, all as described in these specifications. A description of the work is included at the head of this section. Any work associated herewith and not included in this or other bid items shall be deemed as included in the contract price for shoring.

If no dollar amount is shown, the cost shall be considered as included in the bid items requiring the shoring.

## SECTION 29

### SEEDING AND MULCHING

#### 29-1 General

##### 29-1.01 Scope

This section describes the requirements for furnishing and installing seed, straw mulch, fertilizer, and stabilizing emulsion. The requirements include the type of materials to be used, methods and requirements for installation and measurement for payment.

This section does not include temporary erosion control required elsewhere in these specifications.

##### 29-1.02 Description of Work

Work under this section shall include, but not be limited to, compacting and smoothing areas, disposing of debris, firming loose soil, roughening the seedbed, furnishing and applying the seed, straw mulch, fertilizer, and stabilizing emulsion.

##### 29-1.03 Sequence of Work

Work under this section shall be completed as soon as a portion of the pipe alignment or structure requiring erosion control has been completed and there is no further need to access these locations with heavy equipment.

Seedbed preparation shall be followed immediately and, in turn, by seeding, mulching, and application of fertilizer and stabilizing emulsion.

##### 29-1.04 Location

Generally, the areas that will require seeding and mulching, are identified in the Special Conditions of these Standards and are subject to change by the Agency's engineer.

The Contractor shall, at his sole cost, seed and mulch any areas disturbed by his activities which lie outside the working limits, as shown on the plans, if it is determined by the Agency's engineer that those areas will benefit from the process.

##### 29-1.05 Submittals

Submittals supplied by the Contractor shall include: tags and labels from seed containers, catalog data and application instructions for the fertilizer and stabilizing emulsion, and a sample and load slips for the straw. The Contractor's attention is directed to the General Conditions of these Standards under "Submittals".

### 29-1.06 Inspection

Each phase of the work shall pass inspection by the Agency's engineer before commencing work on the next phase. The phases shall consist of, but not be limited to, compacting and smoothing the areas, reparation of the seedbed, seeding operation, mulching operation, and application of the fertilizer and stabilizing emulsion.

## 29-2 Materials and Installation

### 29-2.01 General

The seeding and mulching operation shall consist of a four step process; seedbed preparation, seeding, mulching with straw, and applying the fertilizer and stabilizing emulsion together as the last step. The last three steps shall be accomplished within 48 hours of starting the seeding operation.

### 29-2.02 Seedbed Preparation

The areas to be seeded shall be reasonably smooth and shall conform to the original contours or new contours as shown on the plans before actual seedbed preparation begins. Any debris, including rocks and roots which would interfere with seeding, growth, or maintenance of the vegetation, or as specified elsewhere in these specifications, shall be removed.

The surface areas to be seeded, including fill slopes, shall be compacted by first bringing the soil to optimum moisture by drying or adding water, and track walking or rolling firm. The areas shall then be roughened by scarifying, discing, borrowing, or otherwise worked to a depth of 2" to 4". Scarifying operations shall be cross slope, where possible.

Cut slopes shall be dressed to neat line and all loose material raked to the toe and removed.

### 29-2.03 Seeding

All seed shall be delivered to the site tagged and labeled in accordance with California Agricultural Code. The seed shall be of a quality which has a minimum pure live seed content of 80% (% purity x % germination) and weed seed shall not exceed 0.5%. Legume seed shall be pellet inoculated with appropriate bacteria.

The seeding mixture and rates shall be specified in the Special Conditions of these Standards.

The seed shall be broadcast with a truck or tractor mounted automatic seeder, where possible. Hand held breast seeders, (belly grinders) are suitable for small areas.

### 29-2.04 Straw Mulch

Straw shall be blown or hand broadcasted onto the ground at the rate specified in the Special Conditions of these Standards. The application technique shall create a uniform depth of not less than 2 to 3 inches. The straw fibers shall be applied to form a uniform mat of loose straw through which no more than 15% of

the original ground surface can be seen. No large clumps or unscattered straw shall be present after application.

Straw shall be clean rice, barley or wheat straw. Fibers shall not be chopped less than 6" in length.

#### 29-2.05 Fertilizer and Stabilizing Emulsion

The fertilizer shall be commercial type ammonium phosphate (16-20-0) and shall contain a minimum of 16% nitrogen, 20% available phosphoric acid, and 0% water soluble potash, and shall contain a minimum of 12 percent sulfur. The fertilizer shall be uniform in composition, dry and free flowing, pelleted or granular. All fertilizer shall be delivered in unbroken, or unopened containers, labeled in accordance with applicable state regulations and bearing the warranty of the producer and the grade furnished.

The fertilizer shall be applied at the rate specified in the Special Conditions of these Standards.

The stabilizing emulsion shall be a concentrated liquid chemical that forms a plastic film upon drying and allows water and air to penetrate. The film shall be nonflammable and shall have an effective life of at least one year.

Stabilizing emulsion shall be nontoxic to plant or animal life and nonstaining to concrete or painted surfaces. In the cured state, the stabilizing emulsion shall not be re-emulsifiable. The material shall be registered with and licensed by the State of California, Department of Food and Agriculture, as an "auxiliary soil chemical."

The fertilizer and stabilizing emulsion shall be mixed together with water and applied uniformly and at the correct rates over the seed and straw mulch.

#### 29-2.06 Maintenance

The Developer's contractor shall be responsible for a successful ground cover and its survival through the one-year post-construction maintenance period of the project. This may include, but not be limited to, applying water or additional seed, fertilizer, or stabilizing emulsion. Any failed areas shall be replanted and successfully grown into mature plants, at the sole cost of the Developer.

### 29-3 Measurement and Payment

#### 29-3.01 Measurement

Work performed under this section shall be measured to the nearest one-tenth acre using the inclined areas of those locations to receive seeding and mulching, as directed by the Agency's engineer.

The Contractor shall seed and mulch any areas disturbed by his activities which lie outside the working limits as shown on the plans if it is determined by the Agency's engineer that those areas will benefit from the process. These areas shall not be measured for payment.

29-3.02 Payment

Payment shall be based on the number of acres completed with seeding and mulching. The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all seeding and mulching over those areas described herein and any other areas disturbed by the Contractor's operations and not measured for payment. A description of the work is included at the head of this section. Any work associated herewith and not included in this or other bid items shall be deemed as included in the contract unit price for the Seeding and Mulching.



STANDARD DETAILS  
TREATED WATER SYSTEM

Preface

The Developer must comply with the Agency's Development Standards, which include these Standard Details as an augmentation to the Standard Specifications. The Developer is also responsible for preparation of any remaining details necessary for a complete set of contract documents.

These Standard Details are for use by developers and their engineers for expansion of the Agency's treated water system and may not be put to private use without prior written approval. These Standard Details may not be altered, qualified, or superseded without prior written approval.

Index to Details

- SD1 Water Main, Service Line, and Lateral Trench Details
- SD2 Surface Restoration of Roads and Paths
- SD3 Thrust Blocks
- SD4 Locating Wire
- SD5 Main Line Valve Assembly
- SD6 ¾" & 1" Air Release Valve Assembly
- SD7 2" Blowoff Assembly - Type A & B
- SD8 Fire Hydrant Assembly
- SD9 Guide Marker & Valve Operating Shaft Extension
- SD10 ⅝" & ¾" Meter Box Location
- SD11 ⅝" & ¾" Meter Assembly Single and Double



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## APPENDIX A

### GUIDELINES FOR DEVELOPERS FOR WATER SYSTEM EXTENSIONS

This outline is intended for use only as a broad guide to the Developer. It is not intended to be a step-by-step procedural guide. South Feather Water and Power Agency (SFWPA) does not have a procedural guide because each request for water service varies, as do the proposed developments. The Developer must take the responsibility for completing all the necessary steps for any given project.

#### First Contact

By letter, telephone, or in person with appointment.

The Project will be discussed in *general* terms only.

The Developer should then request a letter of water availability. The request must be in writing, including: parcel number(s), type of development; and, any specific questions.

The Agency will respond in writing.

#### Engineering Study

It may be necessary to make an in-depth study of the request for water service in order to determine the improvements necessary for the water system.

The study will be at the cost of the Developer. A cash deposit will be requested through a letter agreement. If the information is easily obtainable, the charges may be waived.

The Agency will complete the study and issue a report.

#### Regulations And Requirements

The Developer must comply with the Agency's Rules & Regulations Governing Water Service, as well as its Development Standards for Treated Water Systems.

Compliance with the California Environmental Quality Act (CEQA) is a requirement. The Developer must provide approved copies of CEQA documents prior to the Agency's engineer or general manager signing the improvement plans.

A project site must be within the place-of-use boundary designated for SFWPA by the State Water Resources Control Board, and must be annexed to the Agency prior to acceptance of the constructed water system improvements by the Agency. Agency and/or Butte Local Agency Formation Commission (LAFCo, 530-538-6819) staff will provide information regarding how property may be annexed to the Agency.

### Public Contact

Other parcels in the area may want to annex to the Agency and receive water service and the Developer might want to include them in planning for the project to reduce costs.

### Improvement Plans

Plans and specifications must be prepared by a civil engineer.

The Agency's engineering staff will be available for predesign conferences and field meetings. The Agency has standard specifications and reproducible standard details available at a reasonable cost.

Two sets of the preliminary plans and specifications should be submitted as soon as possible.

The Developer will pay for all Agency engineering, plan-check, and inspection services. The Developer's engineer will estimate the cost of the water system improvements and submit it for review and approval by the Agency's engineer. A cash deposit of 3% of the Developer's engineer's estimate will be required initially. An additional cash deposit of 3% will be required at the time a Conveyance Agreement is executed.

### Conveyance Agreement

After completion of the first plan check, a conveyance agreement will be prepared and sent to the Developer. The plan checking process will continue until the plans and specifications are ready for approval.

Once the plans and specifications have been approved by the Agency's engineer, they must be reduced in size to 11" x 17" and attached to the conveyance agreement as an exhibit.

The Conveyance Agreement will be taken before the Agency's Board of Directors for approval. The agreement, with all of the exhibits attached and signed by the Developer, must be delivered to the Agency within 60 days of plan approval and at least one week prior to the Board meeting (fourth Tuesday of each month) for placement on the agenda.

After Board approval, and at the Developer's request, a letter may be written to the appropriate agency stating, "Water is not available at this time; however, arrangements satisfactory to the Agency have been made for construction of the necessary water system improvements. There are no provisions in the agreement requiring the Developer to guarantee completion of the improvements. The Agency will accept ownership of the improvements only after they have been completed, and will then serve water".

### Preconstruction Requirements

The Developer or his Contractor must supply proof of insurance in the form of a copy of the policy(ies) and endorsement(s) with the specified type and amounts of coverage, naming the Agency as additional insured.

If improvements are estimated over \$250,000, the Developer must furnish a 100 percent Labor and Material Payment Bond on the Agency's bond form.

### Construction

Construction on the water system improvements must start within 12 months of the date of the Conveyance Agreement.

The improvements must be constructed by a California Class A or C34 Contractor.

Construction must be completed within 24 months of the Conveyance Agreement date.

The Developer is advised that for facilities installed with public funds, the Labor Code requires that all craftsmen, mechanics, and laborers be paid the local prevailing wages. If the Agency participates in the costs of water system improvements, either through direct contribution or by way of fee reduction or fee waiver, workmen must be paid prevailing wages.

### Reimbursement Agreements

If desired, the Developer must make a written request 30 days prior to the completion of construction. The Agency will then determine if reimbursement is due. If entitled, the Developer must supply all necessary project cost information. The Agency will prepare an agreement.

The Reimbursement Agreement must be executed before the improvements are conveyed to the Agency. This is usually done at the same Board meeting. The agreement will be recorded in the office of the Butte County Recorder.

As noted above, the Labor Code requires that all craftsmen, mechanics, and laborers be paid the local prevailing wages when working on facilities installed with public funds. The Agency has not ascertained whether or not reimbursement could be construed as public funding. The Developer assumes all risk as to whether reimbursement could be construed as public funding and must indemnify the Agency from all liability claims arising from construction wages not conforming to local prevailing wages.

### Conveyance To The Agency

Prior to offering the improvements for conveyance, the Developer must provide proper documentation including, but not limited to:

- An "Offer of Dedication".
- A Labor and Material Payment Bond or release statements from contractors and suppliers (type is dependent upon project cost estimate).

- Payment of capacity charges.
- Reproducible "as-built" drawings.
- Easements and rights of way.
- A 25% one-year maintenance bond.
- Payment of any outstanding Agency charges for engineering, plan check, and inspection.

#### Water Availability

Once the improvements have been conveyed, applications for water service will be accepted.

A letter to the appropriate agency may be written stating, "Water is now available upon making proper application".

## APPENDIX B

### CONVEYANCE AGREEMENT – MASTER

#### LEGEND

ZZ –	Developer’s name (In Caps)	=
<< –	Mailing address of Developer	=
>> –	City, state, and zip code of Developer	=
YY –	Assessor’s Parcel Number (APN)	=
ww –	Project known as, etc.	=
xx –	Filed in Agency office as	=
vv –	Engineering Firm	=
uu –	Description listing length & diameter of pipe, etc.	=
## –	Number of plan sheets	=
** –	Number of project units	=

**AGREEMENT**  
(Conveyance)

THIS AGREEMENT, made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between the SOUTH FEATHER WATER AND POWER AGENCY, hereinafter referred to as "Agency" and ZZ, hereinafter referred to as "Developer".

**RECITALS**

WHEREAS, Developer has prepared or caused to be prepared, at Developer's sole cost, expense, and responsibility, plans and specifications entitled ww (filed in Agency's office as "xx"), as prepared by vv for construction of water-system improvements consisting generally of uu and all appurtenances thereto, to provide treated water to APN YY, a copy of which is attached hereto marked Exhibit "A" and made a part of this Agreement; and,

WHEREAS, the plans and specifications contained in Exhibit "A" meet with the Agency's engineer's acceptance; and,

WHEREAS, the facilities and lands to be served treated water by said water-system improvements lie within the boundaries of the Agency and are identified in Exhibit "A"; and,

WHEREAS, Developer desires Agency to accept said water-system improvements into Agency's overall water system upon completion; and,

WHEREAS, Agency, subject to the following terms and conditions, as well as those contained in the Agency's Rules and Regulations Governing Water Service (hereinafter referred to as "Rules and Regulations"), is willing to accept said water-system improvements upon completion, provided the water-system improvements are constructed in accordance with the plans and specifications and in a manner meeting Agency's approval.

NOW, THEREFORE, the parties mutually agree as follows.

ARTICLE 1 – RECITALS. The recitals contained herein are an integral part of this Agreement.

ARTICLE 2 – PLANS. Attached hereto, marked Exhibit "A" and made a part of this Agreement is one set of plans reduced to 11" x 17", prepared by the Developer's licensed civil engineer, and consisting of ## sheets, and specifications for construction of water-system improvements. The Agency's acceptance of these plans and specifications does not constitute a warranty or guaranty by Agency of proper design nor does it relieve Developer of responsibility for the proper design and construction of the improvements thereon.

EITHER (if 10 or fewer lots, or at discretion of General Manager)

ARTICLE 3 - CONNECTION FEES: Attached hereto, marked Exhibit "B" and made a part of this Agreement is Part D of the Rules and Regulations, entitled "Water Rates". Developer understands and

agrees to be bound by any Agency alterations, additions, amendments, revisions or modifications to Part D or any other Agency policies, rules, or regulations. All parties hereby agree that Agency is entitled to those connection fees (the sum of the New Service Charge, Meter Set Fee, and System Capacity Charge) as specified in Part D. Agency shall collect said connection fees at the time application for water service is made. It shall be incumbent upon the water service applicant to pay the then-current connection fees and all other then-applicable fees and charges.

OR (if more than 10 lots)

ARTICLE 3 – SYSTEM CAPACITY CHARGES AND CONNECTION FEES. Pursuant to Part A, Section 4.H of the Agency’s Rules and Regulations, a System Capacity Charge for a minimum-size ( $\frac{5}{8}$ ”) meter shall be paid by the Developer for each lot to be served by the water-system improvements prior to Agency’s acceptance of the improvements. The System Capacity Charge for a minimum-size meter shall be as shown in Part D of the Rules and Regulations, entitled “Water Rates”, which is attached hereto, marked Exhibit “B” and made a part of this Agreement. Developer shall prepay System Capacity Charges. Therefore, Developer, prior to conveying the water-system improvements to Agency, agrees to and shall pay Agency the then-current System Capacity Charge for a  $\frac{5}{8}$ ” meter (currently \$3,250) for each of the \*\* lots identified in Exhibit “A”. Based on the current Part D, the total System Capacity Charges to be paid prior to conveyance equals \$\_\_\_\_\_. Developer understands and agrees to be bound by any Agency alterations, additions, amendments, revisions, or modifications to Part D, or any other Agency policies, rules or regulations.

Those lots identified in Exhibit “A”, upon application for water service, shall be credited the then-current System Capacity Charge for a  $\frac{5}{8}$ ” meter and shall be subject to the then-current meter installation charges (“New Service Charge” and “Radio-Read Meter-Set Fees”) shown in Part D at the time of making application for water service, together with all other then-applicable fees and charges. Upon payment of all applicable fees and charges, water service for the applicant’s lot shall be initiated (“turned on”) by the Agency.

ARTICLE 4 - ENGINEERING, PLAN-CHECK, AND INSPECTION SERVICES PERFORMED BY AGENCY. Agency and Developer understand and agree that Developer shall assume the cost and expense of Agency’s performance of engineering, plan-check, and inspection services, in connection with Developer’s construction of water-system improvements described in Exhibit “A” attached hereto.

Prior to, or in conjunction with, the first submittal of plans and specifications for review by Agency’s engineer, Developer shall deposit the sum of \$\_\_\_\_\_, being 3% of Developer’s engineer’s estimate of the cost to construct that portion of the water system that will be conveyed upon completion to the Agency, which sum shall be payment for engineering and plan-check services performed by Agency in connection with Developer’s construction of treated water system facilities described in Exhibit “A”, attached hereto. Agency’s acceptance of payment for engineering and plan-check services performed is not a warranty or guarantee by Agency of proper design or proper specifications of materials for construction. If construction is not commenced within 12 months after approval of the plans and specifications by Agency’s engineer, Developer may be required to make additional payments to Agency for plan-check and review services. Such additional payments may not be in excess of 3% of Developer’s engineer’s estimate.

Prior to commencement of construction of any portion of the water system that will be conveyed upon completion to the Agency, Developer shall deposit the sum of \$\_\_\_\_\_, being 3% of Developer’s engineer’s estimate of the cost to construct that portion of the water system that will be conveyed upon completion to the Agency, which sum shall be payment for construction-inspection services performed by Agency in connection



with Developer's construction of treated water system facilities described in Exhibit "A" attached hereto. Agency's acceptance of payment for construction-inspection services performed is not a warranty or guarantee by Agency of proper design or proper specifications of materials for construction, or that the water system was constructed without fault, failure or omission.

ARTICLE 5 - LABOR AND MATERIAL PAYMENT BONDING REQUIREMENTS. Developer shall defend and indemnify Agency against all claims for nonpayment of labor, material, and other obligations incurred by Developer, its agents, contractors, employees and assigns. The cost of construction of the water-system improvements is estimated by Developer's engineer to be \$\_\_\_\_\_.

If the estimated cost of constructing the improvements is less than \$50,000 at the time of offering the water-system improvements to the Agency, Developer shall provide a written "OFFER OF DEDICATION" in the form as described in Exhibit "C", attached hereto and made a part hereof. The "OFFER OF DEDICATION" shall state *inter alia* that the improvements are free and clear of all liens, encumbrances, and other expense.

If the estimated cost of constructing the water-system improvements is less than \$500,000, but more than \$50,000 at the time of offering the water-system improvements to the Agency, in addition to supplying a written "OFFER OF DEDICATION" in the form as described in Exhibit "C", Developer shall either submit a "RELEASE" agreement in the form of Exhibit "D", attached hereto and made a part hereof, from each and every contractor, subcontractor, corporation, firm, person, or business entity furnishing materials for or performing labor or other services in performing the terms and provisions of this Agreement, or a Labor and Material Payment Bond to the Agency in the form prescribed by Exhibit "E", attached hereto and made a part hereof, the principal sum of which shall be not less than the estimated construction cost as provided herein. In addition, Developer shall maintain an accurate and current list of all contractors, subcontractors, business entities, corporations, firms, and/or persons performing the terms and provisions of this Agreement, and shall make this list available to the Agency's engineer or General Manager upon request.

Should the estimated cost of constructing the water-system improvements be in excess of \$500,000 at the time of the first submittal of plans and specifications for review by Agency's engineer, Developer shall, prior to commencing construction, submit a Labor and Material Payment Bond in the form as shown in Exhibit "E", attached hereto and made a part hereof. The bond shall be obtained at the sole cost of Developer and shall be in a principal amount of not less than the estimated cost of construction as set forth herein. In addition, the Developer shall, at the time of offering the water-system improvements to the Agency, provide an "OFFER OF DEDICATION" statement in the form as set forth in Exhibit "C", attached hereto and made a part hereof, which statement verifies that the water-system improvements are free and clear of all liens, encumbrances, and other expense.

ARTICLE 6 - INSURANCE REQUIREMENTS. Prior to Developer's commencement of construction of the water-system improvements as otherwise set forth in the terms and provisions of this Agreement, general liability insurance naming Agency as additional named insured shall be obtained and maintained for the duration of this Conveyance Agreement by Developer or Developer's contractor for claims for damages to property, personal injury, bodily injury, and accidental death. The types of insurance covered under the general liability policy shall include, but not be limited to, comprehensive form, premises-operations, underground hazard, products/ completed operations hazard, broad form property damage, independent contractor, and personal injury. Prior to any blasting operations for removal of rock, stumps, or other materials from the work area, the general liability policy must also contain explosion and collapse hazard coverage. It

shall also include coverage for Products-Completed Operations liability losses for a period of 12 months from the date of Agency's acceptance of the completed works. (This time period corresponds with the 12-month maintenance bond requirement.) All insurance acquired under the terms of this article must be obtained through an insurance company authorized and licensed to do business in the State of California. The general liability policy shall contain limits of liability as follows:

1. Bodily Injury: \$1,000,000 for each occurrence, \$2,000,000 aggregate
2. Property Damage: \$1,000,000 each occurrence, \$1,000,000 aggregate.

General Liability Insurance policies having combined single limits damage combined of liability shall carry limits for bodily injury and property damage combined of \$1,000,000 each occurrence and \$1,000,000 aggregate.

The certificate of insurance shall also have a description of operations/locations/vehicles that refers specifically to the water-system improvements.

Proof Of Insurance. Developer shall submit or cause to be submitted a copy of the insurance policy(ies) with endorsements and exclusions, and shall submit to Agency a certified copy of the endorsement naming Agency as additional insured as proof of general liability insurance required by this Agreement. Developer shall receive Agency approval that the insurance requirements of this Agreement have been met. The Developer must receive this approval prior to the start of construction pursuant to the terms of this Agreement.

ARTICLE 7 - HOLD HARMLESS AND INDEMNIFICATION. Developer shall hold Agency and Agency's agents, officers, and employees harmless from any and all claims, lawsuits, acts or omissions arising out of Developer's performance of the terms and conditions of this Agreement. Likewise, Developer shall defend and/or pay the cost of defending and indemnifying Agency together with Agency's agents, employees and officers from all civil proceedings, claims and/or judgments including, but not limited to, payment of all attorney fees and litigation costs.

ARTICLE 8 – INSPECTION OF WORK. Developer shall give two working days' advance notice prior to Developer's contractor starting any work associated with the water-system improvements and shall keep Agency informed of construction schedules throughout the course of the work in order for Agency to properly schedule inspection personnel. It is suggested that Developer's contractor provide Agency submittals on any materials proposed for the water-system improvements for approval prior to purchase.

ARTICLE 9 - BEGINNING OF WORK OR TERMINATION. This Agreement shall terminate and be of no further force or effect at Agency's discretion should Agency determine that Developer has failed to cause construction of the water-system improvements as shown on Exhibit "A" to commence within 12 months from the date of this Agreement.

For purposes of this Article, Developer's commencement of construction shall not be deemed to have occurred upon one or any combination of the following actions or events:

1. Bid advertisement
2. Execution of contracts or bonds
3. Ordering of material and supplies or the delivery and stockpiling of materials and supplies on the job site.

4. Clearing and grubbing for, or construction of roads, including the completion of rough subgrade work.

Agency and Developer understand and agree that construction of the water-system improvements shall be deemed to have commenced when Developer causes its properly-licensed contractor to excavate and backfill pipeline in excess of 10 percent of the total water system to be constructed pursuant to the terms of this Agreement. The Agency's engineer shall make the determination as to the percentage of water system caused to be constructed and installed by Developer.

ARTICLE 10 – CONSTRUCTION. Developer shall cause the water-system improvements described in Exhibit “A” to be constructed by a properly licensed contractor, without expense to Agency, and Agency shall not be responsible for any of the cost of said improvements. Developer is not acting as a contractor, agent, official, or representative of Agency in constructing or providing such water-system improvements, or in causing such improvements to be installed. This Agreement simply provides for the transfer and assumption of responsibility for such water-system improvements to be installed upon completion and upon performance of all terms of this Agreement to be performed by Developer. The approval of the plans and specifications as presented by Developer shall not be deemed as a warranty or guarantee by Agency of proper design or proper specifications of materials or construction. Agency specifically relies upon the design and specifications as prepared or caused to be prepared by Developer as being in keeping with the requirements of Agency, as being in accordance with the conditions of the geography, and as having specific materials and equipment of the highest practicable quality and character. The Developer will provide a licensed civil engineer to act as the project engineer during construction.

All proposed field modifications shall be identified for review by Agency's engineer. No field modifications shall be made prior to approval by Agency's engineer.

Developer's contractor shall provide and keep on site an up-to-date “as-built” set of plans that show changes from the original plans approved by Agency's engineer prior to commencement of construction.

ARTICLE 11 - NOTIFICATION OF DEVIATIONS OR FAILURES: Agency agrees to notify Developer in writing as to any deviations or failure in construction of the water-system improvements pursuant to said plans and specifications, and the requirements of said Agency as soon as any deviation is brought to Agency's attention, and Developer shall immediately cause such deviation or failure to be corrected at the sole cost of Developer. Developer agrees that Agency is not, by inspection of the construction or installation of the improvements, representing Developer or providing a substitute for inspection and control of the work by Developer. Developer agrees that any inspections and observations of the work by Agency are for the sole purposes of providing notice of the stage and character of the work. Developer agrees that the failure of the Agency to note variances from the plans and specifications for the project does not excuse or exempt Developer from complying with all terms of these plans and specifications.

ARTICLE 12 - REIMBURSEMENT FOR FUNDS EXPENDED BY DEVELOPER. Should Developer desire reimbursement for funds expended in the installation and construction of water-system improvements that benefit non-project parcels as provided in the terms and provisions of this Agreement in addition to all other funds expended for the acquisition of rights of way and employment of engineers and contractors for construction, planning, and design of the water-system improvements, then Developer shall request such reimbursement in writing and deliver such writing to the Agency's main business office 30 days prior to conveyance of the water-system improvements to Agency as provided in Article 16 herein. Agency, upon receiving Developer's written request for reimbursement of funds expended pursuant to the terms and

provisions of this Agreement, will then determine if Developer is entitled to reimbursement pursuant to Agency policies, rules, and regulations then in effect. Should Agency determine that Developer may be entitled to reimbursement, then Agency, in its sole discretion, may enter into a reimbursement agreement with Developer that shall provide for the method and manner by which Developer would achieve reimbursement of funds expended for the construction and installation of the water-system improvements. Should Agency, in its discretion, determine to enter into a reimbursement agreement with Developer, such agreement shall be prepared and entered into prior to Developer's conveyance of water distribution facilities to Agency, all as set forth in Article 16 herein. The reimbursement agreement shall provide for the method and manner by which Agency may assist Developer in obtaining reimbursement of a portion of funds expended by Developer for the water-system improvements constructed pursuant to the terms of this Agreement.

Developer is advised that, for facilities installed with public funds, the Labor Code requires that all craftsmen, mechanics and laborers be paid the local prevailing wages. Agency has not ascertained if reimbursement could be construed as public funding. Developer assumes all risk as to whether reimbursement could be construed as public funding, and indemnifies Agency from all liability claims arising or alleged to arise from construction wages not conforming to local prevailing wages.

**IF AGENCY PARTICIPATION (Fee Credit or Agency Contribution) IS INVOLVED, INCLUDE THE FOLLOWING:**

ARTICLE 13 – PREVAILING WAGES. Developer's attention is directed to and Developer shall comply with Sections 1720 to 1780, inclusive of the California Labor Code,.

All craftsman, mechanics, and laborers employed or working upon the site of the work (water-system improvements) will be paid unconditionally and without subsequent deductions or rebate on any account the full amounts due at the time of payment at wage rates not less than those contained in the wage determination which is referenced herein and made a part hereof, regardless of any contractual relationship which may be alleged to exist between Developer, Developer's contractor and subcontractors and such laborers and mechanics.

In accordance with Section 1770 of the Labor Code, Agency has ascertained that the local prevailing wage rates shall be as determined by the California Department of Industrial Relations. Said rates are accessible on the Internet under the heading "General Prevailing Wage Determination made by the Director of Industrial Relations pursuant to California Labor Code Part 7, Chapter 1, Article 2, Section 1770, 1773 and 1773.1". The Internet address is <http://www.dir.ca.gov/>. The wage determination shall be posted by Developer's contractor before start of work, throughout the work, and at the site of work in a prominent place where the workers can easily see it.

Developer, Developer's contractor, and their subcontractors shall comply with Section 1775 of the California Labor Code concerning the payment of prevailing rate of per diem wages. In accordance with this section, should Developer's contractor or his subcontractor fail to pay prevailing rates, the Labor Commissioner may assess monetary forfeitures. Developer will be responsible for payment of any penalties. A labor and material payment bond is required as specified in this Conveyance Agreement.

**IF AGENCY PARTICIPATION IS NOT INVOLVED, INCLUDE THE FOLLOWING:**

ARTICLE 13 – PREVAILING WAGES. The State’s Attorney General has opined that, in certain circumstances, construction of facilities for provision of public utility service, with the understanding and agreement that said facilities will be turned over to the Agency for ownership, operation and maintenance at the conclusion of construction, may be subject to the prevailing wage laws of the State of California.

It is the developer’s responsibility to determine if the Attorney General’s opinion affects the wages paid by him/her to workers employed on water facilities constructed for their project. However, should it be determined that the prevailing wage laws of the State (Labor Code §1770, et seq.) apply to the work performed for the project, then the developer will be required and shall agree to defend and hold the Agency harmless from any liability, claims, damages, or costs in any way associated with said determination by the State. Further, the developer shall take all necessary and appropriate action, including payment of back wages, and any associated penalties that may be required, due to enforcement of the prevailing wage law in connection with construction of the water system.

The Agency will not represent or advise the developer in connection with this matter except to advise him/her of their potential liability. The developer should not rely upon any opinion or information of the Agency in making his/her determination in connection with the payment or nonpayment of wages.

ARTICLE 14 - COMPLETION OF WORK OR TERMINATION: This Agreement shall terminate and be of no further force or effect at Agency’s discretion should Agency determine that Developer has failed to cause construction of the water-system improvements as shown on Exhibit “A” to be completed within one and one-half (1½) years from the date of this Agreement.

For the purposes of this Article, Developer’s completion of the construction shall occur upon Agency’s accepting conveyance of the water-system improvements pursuant to Article 16 of this Agreement. Developer further understands and agrees that Agency may withhold acceptance of Developer’s proposed dedication of the facilities should Agency’s engineer determine that any portion of the water-system improvements have failed to pass appropriate pressure and leakage tests or that samples of water taken from the treated water lines and tested are determined not to be safe by the Agency’s engineer. Developer understands and agrees that Agency may also withhold acceptance of the proposed dedication of the water system should Agency’s engineer determine that Developer failed to complete all other construction either over, under or adjacent to the water-system improvements including but not limited to final road grade, paving, curbs, gutters, sidewalks, all other utilities, and restoration of rights of way.

ARTICLE 15 – CONVEYANCE. Upon completion of the water-system improvements in a manner meeting Agency’s approval, Developer shall immediately convey said improvements and title thereto free and clear of all liens, encumbrances and expense to Agency by such conveyance and documents as deemed necessary by Agency, including but not limited to the following:

1. An executed “OFFER OF DEDICATION” (Exhibit “C”) offering the water-system improvements shown on Exhibit “A” to Agency.
2. “RELEASE” statements (Exhibit “D”) from every contractor, subcontractor, corporation, firm or business entity furnishing materials for or performing labor or other services, OR a Labor and Material Payment Bond (Exhibit “E”), all as specified in Article 5.
3. Developer shall provide Agency with proof satisfactory to Agency that Developer has acquired all local, state, and federal permits, maps or licenses and that Developer shall comply with all local, state and

federal rules, ordinances and regulations relevant to the real property on, over or under which the water-system improvements are situated.

4. Payment of System Capacity Charges due Agency pursuant to then-current Agency rules and regulations and as specified in Article 3 of this Agreement.
5. Payment of any balance due for engineering, plan-check, and inspection services performed by Agency.
6. One complete set of "as-built" drawings with the notation "As-Built" entered in the revision block, dated and initialed by Developer's engineer. Delivery of the as-built drawings shall include BOTH electronic copies (delivered on CD media and not spanned over more than one disk containing all the digital CAD files – i.e., .dwg, .dxf – files for the entire drawing set, or as otherwise specified by the Agency's engineer) and hard copies (24"x 36" reproducible copies on Mylar or material of suitable durability) of the improvements constructed.
7. All easements and rights of way required by Agency, including reasonable documentation of title provided at Developer's expense to confirm authority to convey the easements and facilities.
8. Approval by LAFCo of any annexation application needed for the project site to be included within the Agency's boundaries.
9. The Developer-constructed water-system improvements shall be flushed (or re-flushed) and shall pass bacteriological testing no earlier than 14 calendar days prior to the date Agency's General Manager accepts the Offer of Dedication. Developer shall provide for proper drainage and de-chlorination equipment during flushing operations.
10. Developer shall furnish a Maintenance Bond in the form prescribed in Exhibit "F" attached hereto and made a part hereof in an amount of not less than 25 percent of cost of construction of the water-system improvements at the time of offering the water-system improvements to the Agency, protecting Agency against any failure of the work due to faulty materials, poor workmanship, or defective equipment within a period of one year following acceptance of the "OFFER OF DEDICATION" of the water-system improvements by Agency's General Manager.

In place of a Maintenance Bond, the Developer may offer a certificate of deposit or an irrevocable letter of credit meeting the Agency's approval as to form and financial institute utilized. Certificates of deposit used in lieu of a maintenance bond must be opened either in the Developer's name and specifically assigned to the Agency or opened on behalf of the Agency only. The signatory for the Agency shall be the Treasurer or Assistant Treasurer of the Agency.

Upon written certification by the Developer and the Developer's engineer that the water system improvements have been completed in conformance with the Agency's Rules and Regulations Governing Water Service, its Development Standards for Treated Water Systems and the approve project plans and specification, and upon concurrence by Agency's engineer and General Manager, the General Manager will accept the "OFFER OF DEDICATION" of the completed water-system improvements and include said improvements into the Agency's overall water system and shall operate, maintain, and repair said improvements except as specified during the warranty period.

ARTICLE 16 - APPLICATION FOR WATER. No water shall be delivered to or conveyed by or through the water-system improvements shown on Exhibit "A", other than for testing purposes and construction purposes authorized by Agency's General Manager, until said water system is conveyed to Agency, formally accepted by Agency, and proper applications for water service have been filed with Agency and approved.

ARTICLE 17 - OBLIGATION FOR PIPELINES AND/OR FACILITIES. Agency shall be under no obligation to provide additional pipelines and/or facilities in order to serve water to Developer's project. Upon acceptance of the water-system improvements by Agency, it shall become the sole property of Agency and shall be used and operated at Agency's sole discretion.

ARTICLE 18 - RULES AND REGULATIONS. Upon acceptance of the water-system improvements by Agency, Developer, its successors and assigns, shall be subject to and shall comply with all of the rules and regulations of Agency and shall pay the water rates, tolls and charges as may be levied and/or established by Agency's Board of Directors from time to time.

ARTICLE 19 - ASSIGNMENT. No transfer or assignment may be made by Developer of this Agreement or any part or interest of law unless such transfer or assignment is approved in writing by Agency, provided further that Agency shall not unreasonably withhold consent to transfer or assign. In the event of such transfer or assignment, Agency may, at its sole option and in addition to any other remedy that it may have, elect to terminate this Agreement.

ARTICLE 20 - NOTICES. The mailing addresses of Agency and Developer for purposes of giving any notice required pursuant to this Agreement are as follows:

AGENCY	DEVELOPER
SOUTH FEATHER WATER AND POWER AGENCY	ZZ
P.O. Box 581	<<
Oroville, California 95965	>>

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first above written.

SOUTH FEATHER WATER AND POWER AGENCY

By \_\_\_\_\_  
President

By \_\_\_\_\_  
Secretary

DEVELOPER

By \_\_\_\_\_

By \_\_\_\_\_

EXHIBIT A  
DEVELOPER'S IMPROVEMENT PLANS



EXHIBIT B

Part D – Water Rates<sup>1</sup>

Potable Water-

Inactive Account Standby Charge (per month).....	\$5 <sup>2</sup>
Service Charge (per month) .....	\$15 <sup>3</sup>
Multi-Family Residential Units Service Charge .....	\$7.90 <sup>4</sup>
(per occupied unit per month)	
Rates-of-Use (in addition to Service Charge):	
First 100 Units (10,000 cubic feet).....	\$0.64/unit
After First 100 Units (over 10,000 cubic feet).....	\$0.25/unit
Oversized Meter Charge (in addition to Service Charge; not applicable to mobile home parks, apartment complexes, duplexes, multiple commercial units, etc. <sup>5</sup> ):	

<u>Meter Size</u>	<u>Monthly Charge</u>
1".....	\$6.00
1½".....	\$16.00
2".....	\$20.50
3".....	\$50.00
4".....	\$72.50
6".....	\$105.00

Oversized Meter Charges will be reduced by 50% if all watering is done between the hours of 9:00 PM and 6:00 AM (i.e., **NO** watering may be done during the day). Customers must come to the SFWPA office and apply for this reduction annually.

Non-Potable Water-

Service Charge (per month) .....	\$17.50 <sup>6</sup>
Rates-of-Use (in addition to Service Charge):	
Miners Inch Accounts.....	\$2.25/MI
Metered (unit = 100 cubic feet).....	10 <sup>1/3</sup> ¢
Flat Rate Accounts (per month).....	\$45.00 <sup>7</sup>
(All non-potable rates-of-use equate to \$45.00 per acre-foot.)	

Fees & Charges<sup>8</sup>

New Service Charge (installation estimates, processing, etc.) .....	\$40 <sup>9</sup>
Account Transfer Charge (processing, meter reading, etc.) .....	\$20 <sup>10</sup>

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1 Originally affected 2/13/90, "Part D" added 6/26/01.  
2 Effective 3/26/96. Applicable to parcels/lots that have an existing service line and are not receiving service ('inactive account'). This charge may be waived for parcels/lots with inactive accounts, if the owner executes a statement (1) authorizing the Agency to disconnect the service line from the main in the future event of a leak or maintenance problem, and (2) acknowledging financial responsibility for reconnecting or replacing (at the Agency's discretion) the service line if and after it is disconnected.  
3 Authorized 2/23/93; effective 3/1/93; multi-family residential units excluded as of 2/23/99.  
4 Effective 2/23/99.  
5 Effective 2/23/99.  
6 Authorized 2/23/93; effective 3/1/93; multi-family residential units excluded as of 2/23/99.  
7 Authorized 3/23/93; effective 4/1/93. Amended 3/26/96 to clarify that the flat rate is \$45/month, and that flat rate customers also pay the \$11/month service charge, for a total monthly rate of \$56.  
8 Originally affected 2/13/90  
9 Authorized 6/23/92; effective 7/1/92; renamed 2/27/01  
10 Effective 2/27/01

Turn-on Charge.....	\$15 <sup>11</sup>
(After Hours.....)	\$50 <sup>12</sup>
Standard Meter-Set Fee .....	\$85 <sup>13</sup>
Radio-read Meter-Set Fee .....	\$240 <sup>14</sup>
Development Plan Check (of Engineer's Estimate - potable water).....	3% ea. <sup>15</sup>
Development Inspection Fee (of Engineer's Estimate - potable water) .....	3% ea. <sup>15</sup>
Encroachment Permit (includes inspection) .....	\$50 <sup>16</sup>
Non-Standard Service <sup>17</sup>	
Temporary Building-Construction Service (6 month max.).....	\$10/month <sup>18</sup>
Bulk-Service Meter Deposit .....	\$650 <sup>19</sup>
Water-Truck or –Container Backflow Inspection Fee .....	\$30 <sup>20</sup>
Bulk-Service Meter Charge.....	\$20/month <sup>21</sup>
Bulk-Service Volume-of-Usage Rage .....	\$1.50/unit <sup>22</sup>
Minimum Bulk-Service Meter Damage Repair Fee .....	\$25 <sup>23</sup>
Bulk Raw-Water Charge (2,500 gal. max.).....	\$5/load <sup>24</sup>
Filling Station Charge (2,500 gal. max.) .....	\$5/load <sup>25</sup>
Flow Test Fee \$50/test <sup>26</sup>	
Returned Check Fee (returned by bank) .....	\$20/check <sup>27</sup>
Escrow Information Charge .....	\$5/order
Meter Tampering Fee (resetting, damaging, cutting locks, etc.)	
First Incident .....	\$25 + repair costs <sup>28</sup>
Second and Subsequent Incidents .....	\$250 + repair costs <sup>29</sup>
Delinquent Penalty.....	1½%/month penalty after 30 days <sup>30</sup>
Shutoff Notice Service Fee .....	\$10 <sup>31</sup>
Meter Lock Service Fee.....	\$40 <sup>32</sup>
Annexation Fees <sup>33</sup>	
Processing (if fully developed).....	\$ 115.97
Processing (if not fully developed).....	\$ 231.95
Annexation Fee	
Per-Acre Basis.....	\$ 342.25/lot or acre <sup>34</sup>
Size-of-Service Basis <sup>35</sup>	
¾" meter .....	\$ 685.63
1" meter .....	\$1,713.51
Flat Rate (irrigation system only).....	\$ 917.60
Miners' Inch (irrigation system only).....	\$1,371.27/MI

11 Effective 2/23/99

12 Effective 2/23/99

13 Name amended 2/27/01

14 Effective 2/27/01; amended 5/24/05

15 Name amended 2/27/01

16 Amended 10/27/98

17 Renamed 11/27/01

18 Renamed 11/27/01

19 Added 11/27/01

20 Added 11/27/01

21 Added 11/27/01

22 Added 11/27/01

23 Added 11/27/01

24 Added 11/27/01

25 Added 11/27/01

26 Effective 8/26/97

27 Authorized 3/23/93; effective 4/1/93; amended 2/27/01

28 Effective 2/27/01

29 Effective 8/26/97

30 Effective 2/27/01

31 Authorized 10/27/98

32 Authorized 3/23/93; effective 4/1/93; amended 2/27/01

33 Amended 3/23/99 to increase annually in accordance with the Engineering News Record's National Construction Cost Index

34 Amended 3/23/99, 1/25/2000

35 Added 8/22/00

Quitclaim Deed Processing Fee ..... \$25  
 Meter Check Fee:  
   5/8" Meter ..... \$45 prepaid<sup>36</sup>  
   Meters Over 5/8" ..... per estimate, prepaid<sup>37</sup>

SFWPA will check accuracy of water user's meter at user's request. If meter is within 2% accurate, SFWPA will retain fee. If inaccuracy exceeds 2% fast, fee will be returned. Adjustments for any over-charge will be made on next billing, with adjustment not to exceed three (3) months.

**System Capacity Charges<sup>38</sup>**

Miners Ranch Treatment Plant:

<u>Meter Size</u> .....	<u>Capacity Charges</u> .....	<u>GPM</u> .....	<u>Plant Capacity</u>
5/8" .....	\$3,250 .....	20 .....	0.206%
1" .....	\$8,123 .....	50 .....	0.514%
1 1/2" .....	\$16,248 .....	100 .....	1.029%
2" .....	\$25,999 .....	160 .....	1.646%
3" .....	\$51,988 .....	320 .....	3.291%
4" .....	\$81,233 .....	500 .....	5.143%
6" .....	\$162,467 .....	1,000 .....	10.286%
8" .....	\$389,918 .....	2,400 .....	24.686%
10" .....	\$617,370 .....	3,800 .....	39.086%
12" .....	\$812,329 .....	5,000 .....	51.429%

Larger meters will require evaluation of peak flows needed for service. Applicant will be responsible for providing required date. Based on this information, SFWPA will determine the capacity charge.

The System Capacity Charge shall be paid prior to the physical connection of any service to the domestic water system. For meter sizes greater than 2", payment of the System Capacity Charge may be required at the time the application for service is approved and prior to construction of the structure for which service is requested.<sup>39</sup>

**Bangor Treatment Plant:** ..... \$3,250

The System Capacity Charge shall be paid prior to the physical connection of any service to the domestic water system. Connections to this system shall be limited to 5/8" residential meters only.<sup>40</sup>

36 Authorized 6/23/92; effective 7/1/92

37 Authorized 6/23/92; effective 7/1/92

38 Effective 10/1/91, amended 3/23/99 (increases annually in accordance with Engineering News Record's National Construction Cost Index), and 1/25/2000

39 Paragraph added 6/26/01

40 Paragraph amended 9/23/03

EXHIBIT C  
OFFER OF DEDICATION

I/We hereby extend an offer to convey, transfer, and dedicate all rights, title, and interest in and to that certain water system and appurtenances more particularly described in Exhibit "A" attached to the Agreement by and between SOUTH FEATHER WATER AND POWER AGENCY and ZZ hereinafter referred to as DEVELOPER, dated \_\_\_\_\_, 20\_\_, a copy of which is on file in Agency headquarters located in Oroville, California; to SOUTH FEATHER WATER AND POWER AGENCY, assuring and warranting to said Agency that the water system for the project known as ww (filed in Agency's office as "xx"), is free and clear of all liens, encumbrances, and other expense.

I/We have constructed or caused the construction and installation of the water system and improvements described in Exhibit "A" attached to said Agreement, and do hereby assure and warrant to SOUTH FEATHER WATER AND POWER AGENCY that the water system improvement facilities together with the contractors, subcontractors, employees, or agents of the Developer have been fully and completely paid and there exist no liens, encumbrances, stop notices, or claims on the water system improvement facilities or by any of the subcontractors, employees, or agents against the water system improvement facilities constructed pursuant to the terms of the above Agreement or against SOUTH FEATHER WATER AND POWER AGENCY.

The undersigned hereby certify that he/she/they are the sole owners in fee of the parcels of property described as Foothill Estates Subdivision, that they are authorized to make this conveyance to Agency, and that they shall defend and indemnify Agency from and against any demands, claims, or damages arising from this conveyance and/or seeking to impose or enforce any lien or encumbrance on the facilities arising from their construction and conveyance.

I/We declare under penalty of perjury that the foregoing is true and correct. Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_, in the City of \_\_\_\_\_, County of \_\_\_\_\_, State of California.

DEVELOPER

By \_\_\_\_\_

By \_\_\_\_\_

We accept this "OFFER OF DEDICATION" made by \_\_\_\_\_  
\_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

SOUTH FEATHER WATER AND POWER AGENCY

By \_\_\_\_\_

General Manger

*Note: All blanks must be completed properly; otherwise the South Feather Water and Power Agency will not accept the Offer.*

EXHIBIT D  
RELEASE

FOR ADEQUATE CONSIDERATION, receipt of which is hereby acknowledged, the undersigned, jointly, severally, and individually releases and forever discharges the Developer, ZZ, and SOUTH FEATHER WATER AND POWER AGENCY, together with all other persons, firms, business entities, irrigation agencies, and government entities whatsoever of and from any and all actions, causes of action, claims, demands, damages, stop notice actions, costs, expenses, liens, and compensation on account of or in any way growing out of the construction, installation, and work of those certain water system facilities described in the Conveyance Agreement dated \_\_\_\_\_, 20\_\_, by and between SOUTH FEATHER WATER AND POWER AGENCY and the Developer named above; the project being known as ww, (filed in Agency's office as "xx").

INDIVIDUAL OR FIRM

\_\_\_\_\_  
(Print Name)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(City)

\_\_\_\_\_  
(State)

\_\_\_\_\_  
(Zip)

By \_\_\_\_\_

(Signature)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Date)

Note: All blanks must be completed properly, otherwise the South Feather Water and Power Agency will not accept the release.

EXHIBIT E  
LABOR AND MATERIAL PAYMENT BOND

By this Agreement \_\_\_\_\_  
of \_\_\_\_\_, hereinafter referred to as  
"Principal", and \_\_\_\_\_ of \_\_\_\_\_

\_\_\_\_\_ (a corporation certified as a corporation admitted to do business in the State of California as a surety insurer), hereinafter referred to as "Surety" are held and firmly bound to SOUTH FEATHER WATER AND POWER AGENCY, hereinafter referred to as "Agency", and to any and all persons who perform labor upon, or furnish material to be used in, or furnish appliances, trucks, or power contributing to the work to be performed under an agreement (filed in Agency's office as "xx"), hereinafter specifically described in the amounts of \_\_\_\_\_ (\$ \_\_\_\_\_), for the payment of which Principal and Surety hereby bind themselves, their heirs, legal representatives, successors, and assigns, jointly and severally.

On the date of \_\_\_\_\_, 20\_\_\_\_, Principal entered into an agreement with Agency for the principal purposes of constructing or providing for the construction of certain water-system improvements, together with appurtenances thereto, to which agreement references are made for further particulars. A copy of the Agreement is attached hereto labeled Exhibit "A" and made a part hereof.

The condition of this obligation is that if the Principal shall promptly and faithfully make payment to all persons, firms, subcontractors, and corporations furnishing material for or performing labor thereof including all amounts due for materials, lubricants, labor, in the prosecution of the work provided for in the Agreement attached hereto as Exhibit "A" and any authorized extension or modification thereof including all amounts due for materials, lubricants, oil, gasoline, power, repairs on machinery, equipment, and tools consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all other labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise this obligation shall remain in full force and effect.

FOR VALUE RECEIVED, the Surety hereby agrees that no change, extension of time, alteration, or addition to the terms of the Agreement attached hereto as Exhibit "A" or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect the Surety's obligation on this Bond, and said Surety does hereby waive notice of any such change, extension of time, alteration, or addition or modification to the terms of the Agreement or to the work to be performed or to the specifications.

The lien claimants to whom the provisions of this Bond inure shall have a right of action to recover hereon in any suit brought to foreclose liens as provided by the Mechanics Lien Laws and Public Work Lien Laws of the State of California, or in a separate suit brought hereon. No final settlement or compromise between the Agency and the Developer shall abridge the right of any beneficiary hereunder to pursue such remedies as may be provided such beneficiary by California Law.

IN WITNESS WHEREOF, this Labor and Material Payment Bond is executed on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ in the City of \_\_\_\_\_, County of \_\_\_\_\_, State of California.

[Seal]

\_\_\_\_\_

“PRINCIPAL”

\_\_\_\_\_

[Seal]

\_\_\_\_\_

“SURETY”

State of California }  
County of \_\_\_\_\_ } ss

Subscribed and sworn to before me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, at \_\_\_\_\_, California.

\_\_\_\_\_

Notary Public

1) No \_\_\_\_\_

EXHIBIT F

MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we, (2) \_\_\_\_\_ hereinafter called "Principal", and (3) \_\_\_\_\_ of \_\_\_\_\_, hereinafter called "Surety", are held and firmly bound unto the South Feather Water and Power Agency, Post Office Box 581, Oroville, California 95965, hereinafter called "Obligee", in the sum of (5) \_\_\_\_\_ Dollars, (6)(\$\_\_\_\_\_) for the payment of which, well and truly to be made, the said Principal and Surety bind themselves, jointly, severally, and firmly by these presents together with their heirs, executors, administrators, successors, and assigns.

The condition of this obligation is such that whereas, the said Principal has entered into a certain Agreement with the Obligee (filed in Agency's office as "xx") dated (7)\_\_\_\_\_, this Maintenance Bond being Exhibit "F" of that Agreement, for the construction and the installation of water-system improvements and all appurtenances thereto, the conditions of said Agreement being made a part hereof, wherein Principal agrees to repair, maintain, and remedy the water-system improvements and all appurtenances for a period of one year following the date of Obligee's acceptance of the conveyance of the water-system improvements and appurtenances.

NOW, THEREFORE, if the Principal shall maintain and remedy said work free from defects in materials and workmanship for a period of one year following the date on which the Board of Directors of the Obligee formally accepts conveyance of work described herein, then this obligation shall be void; otherwise, it shall remain in full force and effect.

IN WITNESS WHEREOF, this Maintenance Bond is executed on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, in the City of \_\_\_\_\_, County of \_\_\_\_\_, State of California.

(Seal)  
(If Applicable)

(8) \_\_\_\_\_

(9) By \_\_\_\_\_  
"PRINCIPAL"

(Seal)

(10) \_\_\_\_\_

(11) By \_\_\_\_\_  
"SURETY"

(12) Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



State of California                                }  
   }  
County of \_\_\_\_\_ } ss

Subscribed and sworn to before me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, at \_\_\_\_\_,  
California.

\_\_\_\_\_  
Notary Public

- (1) Surety's Bond number for reference.
- (2) Same as "Developer" in Conveyance Agreement.
- (3) Full name of Surety Company.
- (4) State in which it was duly organized.
- (5) Amount as agreed to by Agency Engineer - spell out.
- (6) Numerical dollar amount.
- (7) Date of Agreement with the Agency.
- (8) Type or print Principals (correct) Corporate, Partnership, or individual's name, as the case may be.
- (9) Signature and seal, if applicable, must be witnessed and notarized.
- (10) Type or print Surety's corporate name.
- (11) Signature and seal must be witnessed and notarized. If signator for Surety is Attorney-in-fact, attach the proper Power of Attorney.
- (12) Enter mailing address of Surety for purposes of giving any notice pursuant to this Maintenance Bond.

EXHIBIT G  
PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we (1) \_\_\_\_\_

\_\_\_\_\_ a (2) \_\_\_\_\_

hereinafter called "Principal" and (3 \_\_\_\_\_

of \_\_\_\_\_ State of \_\_\_\_\_ hereinafter called the "Surety", are held and firmly bound unto South Feather Water and Power Agency, hereinafter called "Owner", in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS such that WHEREAS, the Principal entered into a certain agreement with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of the \_\_\_\_\_, including all appurtenances thereto, all as set forth in the attached agreement.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said agreement during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such agreement, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the agreement or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the agreement or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the developer shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

Performance Bond  
ZZ

IN WITNESS WHEREOF, this instrument is executed in two (2) counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

(Seal)

\_\_\_\_\_  
(Witness as to Principal)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Principal

By \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
(Address)

ATTEST:

\_\_\_\_\_  
(Surety) Secretary

(Seal)

\_\_\_\_\_  
(Witness as to Surety)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Surety

By \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)

NOTE: Date of Bond must not be prior to date of Agreement.

- 1) Correct name of Developer.
- 2) A Corporation, A Partnership, or an Individual, as case may be.
- 3) Correct name of Surety.
- 4) If Principal is a Partnership, all partners must execute bond.