

SECTION 02710 – POTABLE WATER SYSTEM PIPING AND ACCESSORIES

CONTENTS:

Part 1- General 1

 1.01 Work Included..... 1

 1.02 Related Work 1

 1.03 Reference Standards..... 1

 1.04 Quality Assurance 2

 1.05 Measurement And Payment 2

 1.06 Submittals 5

 1.07 Potholing (Checking On Utility Locations) 6

Part 2 - Products..... 7

 2.01 General..... 7

 2.02 Pipeline Material..... 7

 2.03 Fire Hydrants..... 8

 2.04 Valves 9

 2.05 Valve Boxes 11

 2.06 Raising Rings For Traffic Valve Boxes 12

 2.07 Backfill Materials..... 12

 2.08 Concrete For Thrust Blocks 12

 2.09 Water Service (2" Or Less)..... 12

 2.10 Water Service (3" And Larger) 13

 2.11 Fire Service And Backflow Device..... 13

 2.12 Combination Air Release Valves..... 14

 2.13 Bolted (Sleeve-Type) Couplings..... 14

 2.14 Tapping Sleeve..... 14

 2.15 Full Circle Repair Clamps 15

TABLE OF CONTENTS continued:

2.16	Valve Stem Extensions	15
2.17	Appurtenances.....	15
2.18	Saddles	16
2.19	Flanged Coupling Adaptor.....	16
2.20	Items Furnished By The City	16
2.21	Meter Boxes And Vaults.....	17
2.22	Specialty Items	17
Part 3	– Execution.....	17
3.01	Trench Excavation And Backfill.....	17
3.02	Trench Excavation	17
3.03	Trench Backfill	18
3.04	Compaction.....	20
3.05	Utility And Water Pipe Clearances	20
3.06	Pipe Laying	21
3.07	Water Main Tapping.....	21
3.08	Water Service.....	22
3.09	Service Replacement.....	22
3.10	Combination Air Release Valves.....	23
3.11	Hydrostatic Testing	23
3.12	Flushing and Chlorinating.....	25
3.13	Construction Procedure, Connections And Water System Shutdowns.....	28
3.14	Pavement Replacement.....	29
3.15	Valve Boxes	30
3.16	Abandonment of Existing Facilities.....	30
3.17	Repair/Restoration of Property	31
3.18	Pipe Abandonment.....	31
3.19	As-Built Drawings	32

SECTION 02710 – POTABLE WATER SYSTEM PIPING AND ACCESSORIES

PART 1- GENERAL

1.01 WORK INCLUDED

- A. This work shall include furnishing of all labor, materials, equipment, and incidentals required to construct and complete all the work including all appurtenances necessary for the water system improvements and ready for connection to the City's potable water system network as designated on the plans and these specifications in compliance with all applicable codes and regulations.
- B. Contractor, when installing new services, shall be responsible for bringing the house line at meter connection to grade, as per applicable City Standard Drawings.
- C. Stormwater Pollution Prevention Requirements - The contractor shall comply with the City's NPDES Stormwater Waste Discharge permit #CA0029921 for discharges to the storm drain system, including adherence to all applicable Best Management Practices to prevent pollutants, including sediment, from entering the storm drains.

The developer/contractor shall provide an adequate Stormwater Pollution Prevention Plan (SWPPP) for all applicable projects prior to commencing any phase of construction. The SWPPP shall comply with the current General Permit for Construction Activity from the California Regional Water Quality Control Board and/or the current San Mateo Countywide Water Pollution Prevention Program permit.

1.02 RELATED WORK

- A. Section 01340, "*Submittals*"
- B. Section 02221, "*Trench Excavation and Backfill*"
- C. Section 02500, "*Paving and Surfacing*"

1.03 REFERENCE STANDARDS

- A. American Water Works Association (AWWA)
- B. American Society for Testing and Materials (ASTM)
- C. State Specifications
- D. Materials Manual, State of California, Highway Transportation Manual

- E. National Fire Protection Association (NFPA)
- F. Uniform Plumbing Code (UPC)
- G. Uniform Building Code (UBC)

1.04 QUALITY ASSURANCE

- A. All materials and equipment furnished under this Section shall:
 - 1. Be of a manufacturer who has been regularly engaged in the design and manufacture of the materials and equipment for at least five (5) years meeting the standards of the American Water Works Association; and
 - 2. Be demonstrated to the satisfaction of the City's Project Inspector that the quality is equal to the materials and equipment made by those manufacturers specifically named herein, if an alternate product manufacturer is proposed. The City's Project Inspector shall obtain the required submittal reviews, inspections, and approvals from the DWR Representative.
- B. The Contractor's attention is directed to Article 8 of the City's General Conditions (Section 00700). To validate that specified final elevations have been provided, the Contractor shall provide to the City applicable grade certificates as required by Article 8. No separate payment will be made for providing such certification. All costs therefore shall be included in the various work item(s) requiring certification.

1.05 MEASUREMENT AND PAYMENT

- A. Pipe
 - 1. The quantity of pipe to be paid for will be the length placed (including fittings) and accepted by the City's Project Inspector, measured to the nearest foot, except that no payment will be allowed for pipe placed in excess of the length specified or shown on the plans.
 - 2. The price per linear foot of pipe shall constitute full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in furnishing and installing the pipe, complete in place, as specified and shown on the plans, including probing and locating other utilities, excavation, mechanical restraint systems and thrust blocks, connecting rods, elbows, tees, crosses, valve boxes for identification of horizontal bends, backfill, base aggregate, pavement restoration, sidewalk restoration, sheeting and shoring, ditching, diking, pumping, bailing, draining, testing, inspection, disinfection, furnishing and maintaining all traffic barricades, signs, lights, and all other work and materials required but not included in other bid items.

B. Fire Hydrants

1. Fire hydrants will be paid for at the unit price bid per hydrant assembly including bury, hydrant extension, valve, hydrant, hydrant caps, thrust block, pipe, bollards, connection to the main, replacement of pavement, sidewalk, curb and gutter, and landscaping.
2. Payment will constitute full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in furnishing and installing the pipe, complete in place, as specified and shown on the plans, including probing and locating other utilities, valve, valve box and cover, valve tube, hydrant, hydrant bury, break-off riser, excavation and backfill thrust blocks,

connecting rods, elbows, tee, backfill, base aggregate, pavement restoration, sidewalk restoration, sheeting and shoring, ditching, diking, pumping, bailing, draining, testing, inspection, disinfection, furnishing and maintaining all traffic barricades, signs, lights, and all other work and materials required but not included in other bid items to complete the work as per applicable City Standard Drawings and these specifications.

C. Water Services

1. The number of water services will be measured and paid for at the unit price bid per service including pipe, fittings, corporation stop, connection to main, curb stop, saddle, bypass valve and piping, pavement, sidewalk, curb and gutter, driveway replacement, and landscaping.
2. Payment will constitute full compensation for furnishing all labor, materials, tools, and equipment, and doing all work involved in furnishing and installing the pipe, complete in place, as specified and shown on the plans, including probing and locating other utilities, excavation and backfill, thrust blocks, connecting rods, lead joint repair clamps, elbows, tees, adjustment of house lines with approved materials per the City's Project Inspector's direction if necessary, crosses, backfill, base aggregate, pavement restoration, sidewalk restoration, sheeting and shoring, ditching, diking, pumping, bailing, draining, testing, inspection, disinfection, furnishing and maintaining all traffic barricades, signs, lights, and all other work and materials required but not included in other bid items to complete the work in accordance with the Project Plans & Specifications and the City's Standard Drawings and these Specifications.
3. If not otherwise specified, when used to describe water services, the term "long" will refer to services crossing the street centerline, and the term "short" will mean services not crossing the street centerline.

D. Fire Services

1. The number of fire services will be measured and paid for at the unit price bid per service including supply backflow assembly (including valves), pipe, fittings, valves, valve boxes, saddles, connection to main, bypass valve and piping, detector check, box with extension or vault, and required meter trim, pavement, sidewalk, curb and gutter, driveway replacement, and landscaping.
2. Payment will constitute full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in furnishing and installing the pipe, complete in place, as specified and shown on the plans, including probing and locating other utilities, excavation, thrust blocks, connecting rods, elbows, tees, crosses, backfill, base aggregate, pavement restoration, sidewalk restoration, sheeting and shoring, ditching, diking, pumping, bailing, draining, testing, inspection, disinfection, furnishing and maintaining all traffic barricades, signs, lights, and all other work and materials required (but not included in other bid items) to complete the work as per applicable City Standard Drawings and these specifications.

E. Valves and Valve Boxes

1. Payment for each valve will constitute full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in furnishing and installing the specified valve type, including valve box and cover, valve tube and valve stem extension, if necessary, complete in place, as specified and shown on the plans, including probing and locating other utilities, excavation, removal of existing valve(s), pipe line, appurtenances, thrust blocks, connecting rods, backfill, base aggregate, pavement restoration, sidewalk restoration, sheeting and shoring, ditching, diking, pumping, bailing, draining, testing, inspection, disinfection, furnishing and maintaining all traffic barricades, signs, lights, and all other work and materials required (but not included in other bid items) to complete the work as per applicable City Standard Drawings and these specifications.

F. Tapping Sleeves and Tapping Gate Valves

1. Full compensation will be considered included in other bid prices if the Special Provisions have no specific bid item for tapping sleeves and tapping gate valves.

G. Blow-Off

1. This installation will be measured and paid for at the unit bid price for complete installation, including connection to and/or tapping of the main, valve boxes, pipe saddle, valve and all necessary appurtenances, complete in place.

2. Payment will constitute full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in furnishing and installing the pipe, complete in place, as specified and shown on the plans, including probing and locating other utilities, excavation, thrust blocks, connecting rods, elbows, valve or meter boxes, valve stem extensions, if necessary, backfill, base aggregate, pavement restoration, sidewalk restoration, sheeting and shoring, ditching, diking, pumping, bailing, draining, testing, inspection, disinfection, furnishing and maintaining all traffic barricades, signs, lights, and all other work and materials required but not included in other bid items to complete the work as per applicable City Standard Drawings and these specifications.

H. Combination Air Release Valve

1. This installation will be measured and paid for at the unit bid price for a complete installation, including the tapping of the main, service and fittings, valve, valve box, and all appurtenances.
2. Payment will constitute full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in furnishing and installing the pipe, complete in place, as specified and shown on the plans, including probing and locating other utilities, excavation, thrust blocks, connecting rods, elbows, specified valve, tapping of the main, meter box, pipe saddle, backfill, base aggregate, pavement restoration, sidewalk restoration, sheeting and shoring, ditching, diking, pumping, bailing, draining, testing, inspection, disinfection, furnishing and maintaining all traffic barricades, signs, lights, and all other work and materials required but not included in other bid items to complete the work as per applicable City Standard Drawings and these specifications.

I. Abandoning of Existing Facilities

1. This work will be measured and paid for as stated in the bid schedule either for each location or lump sum for the total job; with payment including all necessary salvage, excavation, backfill, surface restoration, removal of old tap, valve, tee, installation of new pipe, clamp couplings and all appurtenances and incidental work necessary to complete the work as specified and shown.

1.06 SUBMITTALS

A. Shop Drawings

1. Layouts and Schematics: Contractor shall submit detailed installation drawings to the City's Project Inspector of all piping and connected equipment for pump stations, valve pits, reservoirs and tanks. The drawings shall include each pipe, all fittings, valves, and other appurtenances.

2. Layouts for all main connections after verification of field conditions and utility locations. USA notifications must be submitted.

B. Shutdowns and Connections

1. Contractor shall submit to the City's Project Inspector a list and schematics of all required water system connections and shutdowns for the project. This data shall be submitted during the first five (5) working days.
2. Shutdown Schedule as described in Section 3.09, G.
3. For all shutdowns, the Fire Department shall receive 48-hour (minimum) prior notice.

C. Compliance

1. Submit data and affidavits to show that each water system component conforms to the specification requirements.
2. Submit certified test reports as required by these specifications.
3. Disinfection Schedule and Procedures including:
 - a. Disinfection schedule, including number and type of services and length of disruption of service.
 - b. Procedures to be followed, including list of equipment to be used and disinfecting agent to be used.

D. Manuals

1. The Contractor shall furnish manufacturer's installation and operation manuals, bulletins, and spare parts lists for all operating components of the water system project, including:
 - a. All valves
 - b. Air release valves

E. Materials

1. Submittals shall be approved before the installation of the materials.

1.07 POTHOLING (CHECKING ON UTILITY LOCATIONS)

- A. The shop drawings shall be completed only after the locations of all utilities in a particular section of pipeline have been verified by potholing by the Contractor. Potholing is to be done by hand or vacuum type equipment. The final order for materials shall be completed after approval of the shop drawings by the Engineer.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Pipe and valve sizes are nominal inside diameter unless otherwise noted.
- B. All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class, and other appropriate data such as thickness for piping. All materials shall be properly and safely stored to protect from damage, vandalism and contamination.
- C. Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the completed product. Acceptance of installed piping systems shall be based on inspection and leakage and bacteriological tests as specified hereinafter.
- D. Regardless of the provisions of Paragraph 38, "OR EQUAL CLAUSE" of Section 00700 of these specifications, only the products listed under the specified material for hydrants, and buried iron-body gate valves or butterfly valves will be accepted.

2.02 PIPELINE MATERIAL

- A. Water mains shall be ductile-iron pipe. Under special circumstances, other materials may be used as alternates when specifically approved in writing by the City's Project Inspector.
- B. Ductile iron pipe, four inch (4") and larger, shall be in conformance with **AWWA C 151**. Pressure Class 350, meeting AWWA C 150, "Thickness Design of Ductile-Iron Pipe," and shall be furnished with mechanical joints or push-on joints. Pipe shall be cement-lined conforming to AWWA C 104, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water." All pipes shall be tested according to ANSI/AWWA specifications. The pressure class, net weight of pipe without lining, length of pipe, and name of manufacturer shall be clearly marked on each length of pipe and shall conform to AWWA C 151, "Ductile-Iron Pipe, Centrifugally Cast for Water and Other Liquids," and AWWA C 104, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water".
 - 1. Joints: Pipe shall be mechanical joint or "Tyton" joint furnished according to ANSI A 21.11 (AWWA C 111), "Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings, three (3) inch through forty eight (48) inch for Water and Other Liquids," or equal, and furnished with complete accessories. "Tyton" joints shall be bell and spigot with "push-on" rubber gaskets conforming to Section 11-2.3 of ANSI A 21.11. Rubber gaskets shall be "Field LOCK Gasket" type or approved equal.

2. Fittings: Fittings shall be mechanical or flanged joints, Class 125, conforming to AWWA C 110, "Ductile-Iron and Gray-Iron three (3) inch through forty eight (48) inch for Water and Other Liquids," or AWWA C 153 "Ductile-Iron Compact Fittings, three (3) inch through twenty four (24) inch for water and other liquids," and AWWA C 104, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water." All fittings shall be marked in accordance with Section 10-11 of AWWA C 110.
 - a. Flanged bolts and hexnuts shall be of low-carbon steel, 60,000-psi tensile strength, and conform to AWWA C 115.
 - b. Mechanical joint T-bolts and hexnuts shall be of corrosion resistant, low-alloy, high-strength steel ("Cor-Ten" or equal) having a minimum yield strength of 45,000 psi and conforming to AWWA C 111.
 - c. All mechanical joint fittings shall be restrained with an approved joint restraint system, "Megalug" by EBBA, "AQUAGRIP" by Mueller or approved equal that has a pressure rating suitable for the thickness of pipe specified by the manufacturer.
 - d. In addition, to provision of mechanical joint restraints, all fittings and bends shall be restrained by poured in-place concrete thrust blocks.
3. Polyethylene Encasement (to be used only when required): Pipe, fittings, and valve encasements shall be polyethylene film conforming to AWWA C 105 "Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids".

2.03 FIRE HYDRANTS

Hydrants shall be wet-barrel with a cast-iron body with one four and one half (4-1/2) inch outlet and one two and one half (2-1/2) inch outlet, unless otherwise specified on the drawings or in the Special Provisions, and shall conform to applicable sections of AWWA C 503, "Wet-Barrel Fire Hydrants". Hydrants shall have the proper color-coded caps to conform to NFPA Standard 291. Cap manufacturer information can be requested from the project engineer. Hydrants are to be painted per drawings W-5 and 6 after final installation.

A. Cast-Iron Body

1. Residential Applications
 - a. Clow Model No.425, One two and one half (2-1/2) inch Outlet and One four and one half (4-1/2) inch Outlet
2. Commercial Applications
 - a. Clow Model No.430, Two -two and one half (2-1/2) inch Outlets and One four and one half (4-1/2) inch Outlet

- B. If bronze body hydrants are required (instead of cast-iron), they shall have a polished finish, and shall be protected with a transparent coating to prevent corrosion. They shall not be painted. Submittals must be reviewed for acceptance prior to installation.

2.04 VALVES

A. General

- 1. All valves, shall be non-rising stem (NRS), opening left (counter-clockwise), and the stem shall be fitted with a two-inch (2") square operating wrench nut. The operating nut shall be within eighteen inches (18") to twenty-four inches (24") below the final grade utilizing stem extensions, as required.
- 2. Valves in pump stations and other special facilities shall be equipped with handwheels.
- 3. Each valve shall have the maker's initials, pressure rating, and year of manufacture cast on the body. Furnish affidavit of compliance.
- 4. Bolts, nuts and T-bolts for connecting valves to pipe shall be the same as for pipe and fittings.
- 5. In addition to thrust blocks, all mechanical joint fittings shall be restrained with an approved joint restraint device, "Megalug" by EBBA or approved equal, that has a pressure rating suitable for the thickness of pipe specified.

B. Buried Iron-Body Gate Valves (Sizes from four (4) inch to eight (8) inch):

- 1. Gate valves shall be conforming to all applicable requirements of AWWA C 509 "Resilient Seated Gate Valves for Water Supply Service".
- 2. Gate valves shall have iron body with fusion epoxy coated interior and exterior surfaces of a nominal thickness of ten mils (0.010") meeting the applicable requirements of AWWA C 550 "Protective Epoxy Interior Coatings for Valves and Hydrants."
- 3. Gate valves shall have a minimum working pressure of 250 psig.
- 4. The following "Resilient Wedge" gate valve models are the only acceptable valves:
 - a. Sizes less than four (4) inch:

Mueller A-2360-6	Flange x Flange
Mueller A-2360-8	Threaded x Threaded
US Pipe 5150	Flange x Flange

b. Sizes four (4) inch to eight (8) inch:

Mueller A-2360-6	Flange x Flange
Mueller A-2360-16	Flange x Mechanical Joint
Mueller A-2360-20	Mechanical Joint x Mechanical Joint

c. Tapping valves sizes four (4) inch to eight (8) inch:

Mueller T-2360-16	Flange x Mechanical Joint
-------------------	---------------------------

C. Butterfly Valves, sizes greater than eight (8) inch ":

1. Butterfly valves shall conform to AWWA C 504, "Rubber-Seated Butterfly Valves," Class 150B (maximum flow of sixteen (16) feet per second – one hundred fifty (150) psig upstream/150 psig downstream) rated for a minimum working pressure of one hundred fifty (150) psig. Valve shall be short-body type of cast iron with an epoxy coating on the interior waterway, including the disc, of at least ten (10) mils (0.010"). Disc shall be of cast iron, and it shall have a rubber seat provided on the valve body. Valve shaft shall be Type 304 stainless steel. Actuator must be rated for minimum foot-pound torque rating in AWWA C 504 - Table 4.

2. Butterfly valves shall be the following:

Mueller B-3211 - 16	Flanged
Mueller B-3211 - 19	Flange x M.J.
Mueller B-3211 - 23	M.J. x M.J.
M & H Series 450 (12")	Flanged or M.J.
M & H Series 4500 (14" up)	Flanged or M.J.
Pratt 2F11	Flanged or M.J.

D. Meter Bypass Valves

Shall Be:

Sizes less than four (4) inch:

Mueller A-2360-6	Flange x Flange
Mueller A-2360-8	Threaded x Threaded
US Pipe 5150	Flange x Flange

Sizes four (4) inch to eight (8) inch ":

Mueller A-2360-6	Flange x Flange
Mueller A-2360-16	Flange x Mechanical Joint
Mueller A-2360-20	Mechanical Joint x Mechanical Joint

E. Backflow Devices

1. Backflow devices for City of Daly City projects shall be Wilkins "Reduced Pressure Principle Type" or equivalent and approved through submittal to the DWWR before installation. All backflows to be owned by the City of Daly City must be caged. If chain link is to be used # nine (9) green epoxy coated mesh fabric shall be used. All posts and hardware shall be hot dipped galvanized finish.

F. Check Valves

1. Swing-type, gravity-operated check valves shall comply with the applicable parts of AWWA C 508, "Swing-Check Valves for Waterworks Service, two (2) inch Through twenty four (24) inch NPS". Check valves shall have bronze disc facing, iron body, bronze mounted, and O-ring sealed stuffing box. Valves two and one half (2-1/2) inch through twelve (12) inch shall be rated for one hundred seventy five (175)-psig minimum working pressure, have flanged ends, and be installed only in a horizontal position.

2. Check valves shall be the following:

Manufacturer	Size in Inches
Mueller #A-2600-6	2-1/2 to 16
Stockham #931	2 to 16
American-Darling #52SC	2 to 16

G. PRV Valves

1. Pressure reducing/regulating/relief valves shall be approved through the submittal process and will be addressed on a case by case basis.

H. Air/Vacuum Relief Valves

1. Air/vacuum relief valves shall be approved through the submittal process and will be addressed on a case by case basis.

2.05 VALVE BOXES

- A. Each valve shall be equipped with a valve box, complete with cover. Boxes shall be extension type with a slide type adjustment. The word "WATER" shall be cast on the cover. The boxes shall be adapted without full extension to the depth of cover required over the pipe at the valve location. Christy #G-5 traffic valve box shall be used in streets and sidewalks and #FL8 curb valve box with #FL8C "Concrete" lid shall be used in other locations. Valve boxes and valve box lids shall be of matching brand, type and model. Water valve and angle marker lids shall be cleaned, primer-painted and coated with Dunn-Edwards "Precaution Blue #22", or matching permanent blue paint and hydrant valve lids shall be cleaned, primer-painted and coated with Dunn- Edwards "Safety Red #221", or matching permanent red paint.

- B. Valve boxes for identification of horizontal alignment changes (bends) shall be 10 ¼" inside diameter with triangular cover. The word "RECYCLED WATER" shall be cast on the cover. The cover shall be cleaned, primer-painted and coated with permanent magenta paint. The boxes shall be adapted with full extension to the depth required over the pipe at an elbow location. Boxes shall be Brooks Products, Inc. #4-TT Series or Christy Products, Inc. #G-4.
- C. Sleeves or tubes for all valve and valve box identifications shall be eight (8) inch PVC, Schedule 40, one piece and shall rise to six inches (6") below street, sidewalk or finish grade.

2.06 RAISING RINGS FOR TRAFFIC VALVE BOXES

- A. Adjusting rings shall not be used. Valve boxes must be raised to grade. Risers are to be replaced if and when necessary to comply with section 2.05, C, above.

2.07 BACKFILL MATERIALS

- A. Shall be as specified under Section 02221 of these Specifications and applicable City Standard Drawings.
- B. Initial backfill material in ground saturated by water shall be granular material, clean and free of clay, silt or organic matter, and shall be Class 1, Type B, conforming to the requirements of Section (68-1.025, "Permeable Material," of the State Specifications.

2.08 CONCRETE FOR THRUST BLOCKS

- A. Concrete for thrust blocks shall conform to Section 03300, "Minor Concrete," of these specifications.
- B. Concrete for thrust blocks shall not be hand mixed.

2.09 WATER SERVICE (TWO (2) INCH OR LESS)

- A. Connections to existing mains shall be by the hot-tap method.
- B. Water service assembly shall include pipe, fittings, corporation stops, service saddle, curb stops, and meter boxes conforming to City Standard Drawings Nos. W-1, W-2 and W-3. Copper, two inch (2") either shall be Type K (soft) or Type L rigid copper, conforming to the requirements of ASTM B 88, "Specification for Seamless Copper Water Tube." Copper tubing shall be continuous with no joints.
- C. Commercial water services two (2) inches and greater shall incorporate Mueller A-2360 resilient wedge type gate valve at the connection to the main.

- D. Customer's pipe shall be adjusted, relocated and/or realigned at least six inches (6") beyond the new meter box (customer's side) in order to set the water meter at the proper depth with only the following materials:
 - 1. Brass pipe and nipples (ASTM B 43) bronze fittings.
 - 2. Copper tubing and fittings (ASTM B 88).
- E. Compression fittings for copper pipe and tubing shall have complete full-circle type compression nuts and one-piece companion ring-seal. Setscrew, and/or adjusting screw type of compression fitting nuts are not acceptable. Compression fittings shall be Mueller #110 series, Ridgid Pro Press or equal.
- F. Commercial and multi-story buildings shall incorporate a Reduced Pressure Principle backflow device in the water service design. Additional requirements may be necessary upon review by the City's Project Inspector. The backflow device shall be installed immediately after the water meter or as instructed by the City's Project Inspector.

2.10 WATER SERVICE (THREE (3) INCHES AND LARGER)

- A. Connections to existing mains shall be by the hot-tap method using tapping sleeves. Service piping shall be ductile iron; copper pipe may be used with prior approval of the Engineer. New service pipe and existing mainline pipe shall not be of similar size. A tee must be cut into the line and the work performed during a scheduled shut down. In some cases additional valves may be required and installation will be at the cost of the applicant.
- B. Commercial buildings shall incorporate a Reduced Pressure Principle backflow device in the water service design. The backflow device shall be installed immediately after the water meter or as instructed by the City's Project Inspector.

2.11 FIRE SERVICE AND BACKFLOW DEVICE

- A. Fire service shall include fittings, service tap, gate valve(s), valve box with extension, backflow device and protective cage, if required. Detector meter connection shall be plumbed for three quarter (3/4) inch size and adapted for a meter purchased through the City. Backflow device shall be epoxy coated in accordance with AWWA C550, "Protective Epoxy Interior Coatings for Valves and Hydrants". Meter trim shall be in copper or brass/bronze and meter set to dimensions for residential services.
- B. Approved backflow devices for city owned projects only:
 - 1. Wilkins Models 375 DA or 475 DA RPD or equivalent.

- C. Commercial and multi-story (multi-family residential) buildings shall incorporate a Reduced Pressure Principle Detector Assembly type backflow device in the fire service design. The backflow device shall be installed immediately after the water meter or as instructed by the City's Project Inspector.
- D. Fire systems are to be designed based on a public water main supply pressure not greater than sixty five (65) psi, regardless of static pressures found to be greater. In cases where a fire flow is performed and the static pressures are found to be lower than sixty five (65) psi then the lower pressure shall be used in the design of the fire system. DWWR, in consultation with the Fire Department, shall review designs not in keeping with this section.

2.12 COMBINATION AIR RELEASE VALVES

- A. Combination air release valves with 1" iron pipe thread inlet.
 - 1. Materials: Cast-iron body, epoxy coated, Buna-N set, and stainless steel float
 - 2. Operating Pressure: Under one hundred fifty (150) psig, or as specified on the Plans
 - 3. APCO #143C, Crispin #UL10 or ValMatic #201C, or equal

2.13 BOLTED (SLEEVE-TYPE) COUPLINGS

- A. Couplings shall conform to AWWA C 219, "Bolted, Sleeve-Type Couplings for Plain-end Pipe," and to AWWA C 111, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings"
- B. Couplings shall be made of ductile iron conforming to ASTM A536. Gasket shall be of virgin compounded rubber. Couplings shall have low-alloy steel bolts with hexagonal nuts supplied by manufacturer.
- C. Couplings shall be - Tyler/Union Ductile Iron C153 Full Body Mechanical Joint Solid Sleeve or equal and shall incorporate an approved restraint.

2.14 TAPPING SLEEVE

- A. Tapping sleeve shall have a stainless steel body with a flat-faced flanged outlet recessed for a standard tapping valve, conforming to AWWA C 207, "Steel Pipe Flanges for Waterworks Service - Sizes four (4) inch through one hundred forty four (144) inch," Class D (150-175 psig). Drilling boltholes shall straddle the pipe centerline. For tap sizes, fourteen (14) inch and above, flange shall accommodate the valve requirements.
- B. Sleeve shall have a 3/4" N.P.T. test plug, and a roll-resistant gasket resistant to oil, water and most hydrocarbon fluids.

- C. Sleeve shall be with Type 304 stainless steel bolts and nuts.
- D. Sleeves shall be Smith-Blair #663, Ford #FAST, Romac #SST or #FTS epoxy coated or equal.

2.15 FULL CIRCLE REPAIR CLAMPS

- A. Repair clamps for repair and/or abandonment shall be full-circle type and have the following stainless-steel components: band, lugs, bridge-late, and manufacturers' standard high-strength, low-alloy steel nuts and bolts. The inner gasket shall be compounded rubber of all new materials and gridded for greater bonding to the main.
- B. Clamps shall be:

Manufacturer	Model	Minimum Length	Size
Smith-Blair	#226	7-1/2"	Up to 2-1/2"
Smith-Blair	#227	7-1/2"	3" to 12"
Smith-Blair	#228	10"	16"
Ford	#F1	7-1/2"	Up to 2-1/2"
Ford	#F2	7-1/2"	4" to 12"
Ford	#F3	10"	14" to 16"
Romac	#CL1	7-1/2"	Up to 2-1/2"
Romac	#CL2	7-1/2"	4" to 14"
Romac	#CL3	10"	16"

2.16 VALVE STEM EXTENSIONS

- A. Stem extensions shall be "Fiberplas" series #FPT200 with accessories as manufactured by Pipeline Products of San Marcos, CA. Minimum effective length of the three (3)-piece extension shall be eight (8) inches.

2.17 APPURTENANCES

- A. Provide all necessary assembly bolts, washers and nuts, thrust blocks, supports, gaskets, flanges, and all other appurtenant items shown on the drawings, specified or required for the proper installation and operation of the piping, and devices included in or on the piping, equipment, and piping accessories.

2.18 SADDLES

- A. Service saddles shall be cast bronze ASTM B 584, 85-5-5-5 with Buna-N gasket. The straps shall be flattened silicon and the nuts shall be silicon bronze. Saddles shall conform to applicable parts of AWWA C 800, "Underground Service Line Valves and Fittings," and for a working pressure of 200 psig.
- B. Saddles shall be double-strapped (continuous U-bolt style) with FIPT outlet:

Smith-Blair	#323	(3" to 16")
Ford	#202B	(4" to 16")
Mueller	BR2B Series	(4" to 12")
Jones	#J-979	(3" to 16")
Romac	#202B	(2" to 12")

2.19 FLANGED COUPLING ADAPTOR

- A. Underground installations: Adaptor shall be ductile iron with flange and mechanical joint ends.
- B. Above ground installations: Body and follower shall be of ASTM A 536 ductile iron with standard compounded rubber gasket, grade 30, and O-ring, grade 60. Adaptor shall have manufacturers' standard steel bolts and nuts:

Smith-Blair	#912	(3" to 12")
Smith-Blair	#913	(14" to 16")
Smith-Blair	#916	(3" to 16") asbestos cement pipe
Romac	#FCA 501	(3" to 16")

2.20 ITEMS FURNISHED BY THE CITY

The following items will be furnished to the Contractor upon payment of the applicable fees to the City:

- A. Water meters - all sizes
- B. Water meter boxes for meters up to two (2) inch applications
- C. Detector check water meters – three quarter (¾) inch

2.21 METER BOXES AND VAULTS

- A. The following items will be furnished to the Contractor upon payment of the applicable fee for water meters(s) to the City.

Water Meter Size (in inches)	Meter Box Type	Drawing No.
3/4	Christy FL 9	W-01
3/4 to 1	Christy FL-30	W-02
1-1/2	Christy FL 36	W-03
2	Christy FL 36	W-03

- B. Meter boxes for other meters and specialty valves shall be approved in advance by the Engineer and shall be furnished by the Contractor.
- C. Vaults for large meters or specialty valves furnished by the Contractor shall be approved in advance by the City's Project Inspector.

2.22 SPECIALTY ITEMS

- A. Specialty items such as, but not limited to, blow offs, pressure reducing valves, pressure relief valves, altitude valves, and automatically operated valves shall be approved in advance through the submittal process by the City's Project Inspector.

PART 3 – EXECUTION

3.01 TRENCH EXCAVATION AND BACKFILL

GENERAL

Trench excavation and backfill shall be in accordance with Section 02221, "Trench Excavation and Backfill", with the exception of the sieve sizes enumerated in 2.02 A, all other applicable City Standard Drawings and Specifications, and the provisions of these sub-sections.

3.02 TRENCH EXCAVATION

- A. All pipe materials and accessories shall be on site prior to excavation. Unless otherwise specifically approved by the City's Project Inspector, the length of open trench shall not exceed one hundred (100) feet ahead of pipelaying and no more than twenty five (25) feet of excavated trench shall remain unbackfilled at end of day.

Excavations in public streets shall be coordinated so as to minimize traffic interference. Trenching in paved areas shall be saw cut or scored and broken ahead of trenching operations and shall be cut or trimmed to a neat edge after backfilling.

Any pavement damaged outside of the cut line shall be re-saw cut to include the damaged portion and restored prior to final paving.

- B. Roots four inches (4") or greater found during excavation shall be exposed but not severed and shall be wrapped in burlap to protect them while exposed. Roots two to four inches (2"-4") in diameter that are severed in the course of construction shall be neatly trimmed and coated with a heavy coat of tree seal. In the event major roots of smaller trees are damaged or severed the engineer may require the contractor to consult with a qualified arborist to determine the proper method to protect the trees.

Trenches must be kept free from water while the pipe or structures are being installed, concrete is setting and until backfill has progressed to a sufficient height to anchor the work against possible flotation or leakage.

- C. Trench Width

Trenches shall be excavated to the widths shown in plans with full depth vertical sides where possible.

- D. Shoring

Shoring shall be removed only during backfill operations and shall be done without causing movement to the surrounding ground, piping or structure. Shoring can be left in place with the approval of the City's Project Inspector.

Excavated Material

Excavated materials suitable for use as backfill shall be placed at a minimum of three (3) feet away from the edge of trench to prevent trench collapse or materials spilling back into trench. A shoring plan shall be required in project submittals to the DWWR.

Excavated (native material) may only be used as subsequent backfill if it is free from organic material and does not contain rocks, concrete or asphalt, larger than two (2) inches. Use of excavated (native) material may only be approved if authorized by the City's Project Inspector.

Any excavated material found unsuitable by the City's Project Inspector for subsequent backfill or any excess material shall be properly disposed of and at the cost of the contractor.

3.03 TRENCH BACKFILL

- A. Bedding

Bedding shall be specified and used for the construction of all water system pipelines.

There shall be no less than six (6) inches of bedding under any pipeline. Bedding material shall be worked under the sides of the pipe haunches to ensure side support. Bedding material shall extend to the haunches of the pipe (springline).

1. Water Main Pipe

a. Ductile Iron Pipe

Bedding and haunching shall be clean sand. Washed beach sand shall be tested and must have a ph of less the 6.5 and a resistivity of less than 2000 ohm-centimeters. Jetting may be required.

2. Recycled Water

PVC and PE Pipe

a. Less than twelve (12) inches

Bedding and haunching shall conform to ASTM D448-7

Sieve Sizes	Percent Passing
-------------	-----------------

3/4	100
1/2	90 – 100
3/8	40 - 70
No. 4	0 – 15
No. 8	0 – 5

b. Less than thirty (30) inches

Bedding and haunching shall conform to ASTM D448-6

Sieve Sizes	Percent Passing
-------------	-----------------

1	100
¾	90 – 100
½	20 - 55
3/8	0 – 15
No.4	0 – 5

- B. Cover on water mains shall not be less than thirty inches (30") nor greater than sixty inches (60"), unless on plans or if approved by the City's Project Inspector.

3.04 COMPACTION

Mechanical tampers, vibration or jetting may be used to achieve required compaction results. Jetting may be allowed only if, in the written opinion of a Contractor- hired Geotechnical Engineer, the backfill and surrounding ground material will not be over-saturated nor will its properties be compromised by the application of water. Jetting shall be allowed only in conjunction with mechanical compaction equipment to obtain the level of compaction required. When approved by a Geotechnical Engineer, jetting shall be performed as follows: Water is to be introduced into the backfill by means of at least a 1 inch jet pipe.

The pipe shall extend to within fifteen (15) inches of the top of the pipe.

The source of the water shall be a properly metered hydrant or water tank with a minimum pressure of not less than sixty (60) psi.

"Bridges" in backfill are to be completely broken down during the jetting process without flooding.

Jet points along the line shall be staggered from side to side and shall not exceed six (6) feet or as necessary to ensure the proper results.

Backfill is to be done in no more than two (2) foot lifts.

3.05 UTILITY AND WATER PIPE CLEARANCES

- A. The minimum clear horizontal separation between water and sewer mains shall be ten feet (10'). Minimum vertical clearances shall be twelve inches (12") unless additional separation is required by the City. Where the stipulated clearances are unachievable, written approval from the State Health Department shall be required.
- B. The minimum clear distances between the water pipe bell or flange and other utility pipes, ducts, and/or structures shall be as follows for water pipe 4" and greater:
 - 1. A. Thirty inches (30") for adjacent or parallel utilities.
 - B. Sixty inches (60") for high-risk utilities as defined in Section 00700, subsection 29h.
 - 2. A. Twelve inches (12") for perpendicular or crossing utilities.
 - B. Thirty inches (30") for high-risk utilities as defined in Section 00700, subsection 29h.

3.06 PIPE LAYING

- A. Pipe delivery, handling and laying shall be in accordance with AWWA C 600, "Installation of Ductile-Iron Water Mains and Their Appurtenances."
- B. The interior of the pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or by other approved methods. The full length of each section of pipe shall rest solidly upon the pipe bed with recesses excavated to accommodate the joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and replaced. Before installation, the pipe shall be inspected for defects. Any defective pipe shall be set aside and marked.
- C. Except where necessary in making connections with other lines, or as authorized by the Engineer, pipe shall be laid with the bells facing the direction of laying.
- D. Poured-in-place concrete thrust block shall be provided at all fittings wherein a change of direction occurs, where a pipe dead ends, and at other places shown on the plans. The thrust blocks shall be poured between the fittings and firm undisturbed soil in the trench wall and shall be as shown on the applicable City Standard Drawings or as approved by the Engineer. Concrete shall be placed in a manner which will not prevent bolts and nuts from being removed or replaced.
- E. Polyethylene encasement shall be in accordance with Method A of AWWA C 105, "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids".
- F. New and existing fire hydrants not in service shall be wrapped or sacked with burlap to indicate their non-availability for service. Upon being placed in service, hydrants are to be flushed per NFPA 24.

3.07 WATER MAIN TAPPING

- A. A certified distribution system operator must be present for all hydrostatic testing, chlorination, flushing, bacteria testing and connections to the existing system per California Department of Health Services, Operator Certification Regulations, Section 63770. The Engineer must receive the request for the certified Operators to be present for these operations in writing no less than six (6) working days prior to the anticipated date of work.
- B. A water main shall be tapped using a full diameter pressure tap connector and only by persons having experience and skill in that type of work, and approved by the City's Project Inspector. Tapping shall be done only in the presence of DWR and City Project Inspector.
- C. The tapping tool to be used shall be one specifically designed for hot tapping potable water mains. Acceptable brands of tapping machines are Mueller, Romac and Reed. Improvised tapping machines shall not be allowed for use to tap potable water mains.

- D. The minimum distance between the tap and the pipe bell coupling shall be eighteen inches (18"); and between services shall be twenty-four inches (24").
- E. The minimum distance between a tap and adjacent taps shall be twenty-four inches (24").
- F. Service taps on ductile-iron mains encased in polyethylene may be accomplished by making an X-shaped cut in the polyethylene and temporarily folding back the film or by tapping directly through the polyethylene. After the tap has been completed, cuts in the polyethylene and any other areas of damage to the film shall be repaired with tape as described in AWWA C 105, "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids." Service lines of dissimilar metals also shall be wrapped with polyethylene or a suitable dielectric tape for a minimum clear distance of three (3) feet. (0.9 m) away from the ductile-iron main.
- G. All tools and materials used to perform the tapping operation shall be disinfected by a twelve and one half percent (12.5%) solution of sodium hypochlorite approved for use in potable water supply systems.

3.08 WATER SERVICE

- A. There shall be a minimum one service per lot, and each unit on the lot shall have a separate water meter. The service shall be sized to accommodate domestic and fire flows. No service shall be located in a driveway.
- B. Location of all water service laterals shall be permanently marked by imprinting or chiseling the letter "w" four inches (4") in height on top of the curb above the lateral.
- C. The Engineer and the Contractor shall accurately document meter numbers with building addresses, and the Engineer shall forward these numbers to the Department of Water and Wastewater Resources (DWWR) office. Subsequently, DWWR will forward the meter numbers to the City's Utility Billing Office for their records.
- D. Water meters shall be located in landscaped areas. DWWR will review other locations on a case by case basis

3.09 SERVICE REPLACEMENT

- A. Contractor shall install new water services parallel to the existing ones that are to be replaced. Following the inspection, testing of the pipe, flushing, disinfection etc., as described in the specifications, the Contractor shall connect the new mains to the existing ones shown on the plans. After that, the old services may be

disconnected and the new copper service laterals shall be connected to the meters and the meter boxes. The service on the property side of the meter may need to be adjusted, if necessary, with the use of approved materials. New meters and meterboxes will be provided by the City. After all services in a street have been transferred to the new system, the old pipe shall be disconnected by closing the respective valves. The old pipe shall then be cut and abandoned. Contractor shall schedule with the Engineer a time to receive the meter boxes and lids. The Contractor shall set the new boxes in the location of the existing boxes and connect the new meter in place of the old meter. As part of this work, the Contractor shall be responsible for the proper setting and installation of both City furnished meter and meter box; and the Contractor shall install the connection from the “touch-read” meter to the box cover.

3.10 COMBINATION AIR RELEASE VALVES

- A. Installation shall conform to Standard Drawing No. W-06.

3.11 HYDROSTATIC TESTING

A. General

1. A certified Distribution System Operator must be present for all hydrostatic testing, chlorination, flushing, bacteria testing and connections to the existing system per California Department of Health Services, Operator Certification Regulations, Section 63770. The Engineer must receive the request for the certified Operators to be present for these operations in writing no less than six (6) working days prior to the anticipated date of work.
2. The Contractor shall give a minimum of six (6) working days written notice to both the Engineer and the City Fire Department to schedule filling and testing of the pipeline. Testing shall conform to NFPA 24.
3. Hydrostatic pressure and leakage test procedure is composed of two parts with all points in the pipeline being tested shall be subjected to a minimum pressure of:
 - a. Two hundred twenty-five pounds per square inch gauge (225 psig) for Pressure Class 350 ductile-iron pipe without services,
- and -
 - b. All services from the main to the curb stop shall be hydrostatically tested to one hundred seventy-five pounds per square inch gauge (175 psig),

B. Before Testing

1. The interior of the pipeline shall be thoroughly cleaned, and the trench backfill, except permanent pavement, shall be completed.
2. The concrete thrust or reaction blocks shall be cured for at least seven (7) calendar days.
3. Testing shall not be performed against closed valves.

C. Test Equipment Set-Up

1. Contractor shall furnish hoses, pumps, pressure gauges, leakage-measuring device, connections, relief valves, other necessary apparatus, and personnel required for making the tests.
2. The pressure gauge shall register pressure in pounds per square inch gauge (psig). The range of the gauge shall be from zero to three hundred pounds per square inch gauge (0-300 psig). The gauge face shall have a five (5) psig increment inscribed. The gauge shall have been calibrated within forty-five (45) calendar days of the hydrostatic test and the calibration tag shall be affixed to the gauge.
3. The gauge assembly shall be equipped with three-quarter inch (3/4") IPT nipple and isolation valve to allow the Engineer to install a second gauge.
4. The City may test pressure gauges for accuracy.

D. Filling the Pipeline

1. All air vents shall be open during the filling of the pipeline with water.
2. After a test section is completely filled and air vents closed, the pipeline shall be allowed to stand under pressure for a minimum of twenty-four (24) hours, to allow the lining to absorb water and permit the escape of air.
3. During this period, valves and exposed connections shall be examined for leaks, and all visible leakage shall be repaired.

E. Hydrostatic Pressure and Leakage Test

1. After filling the pipe, the filling apparatus shall be either disconnected or physically isolated from the pipeline.
2. Raise the pipeline pressure to the test pressure by means of a pump connected to the pipe in a manner satisfactory to the Engineer.

3. Maintain pressure within least ten (10) psig above the test pressure specified for thirty (30) minutes. Then reduce pressure to the test pressure.
4. Maintain test pressure within ten (10) psig of the test pressure specified for two (2) hours minimum. At the end of the test period, bring pressure back to the test pressure to determine total leakage.
5. An inspection for leaks along the pipeline shall be made by the Contractor while pipe is under pressure.
6. Any leaks found shall be recorded by the Contractor and the record provided to the City.
7. Use of sound level meter ("leak detector") and results will not relieve Contractor of responsibilities for furnishing a pipeline, which will pass the leakage test.
8. Measured leakage for the pipe is the total quantity of water required to be pumped into the pipeline to maintain the test pressure specified during the two-hour test and to bring pressure back to the test pressure less the measured leakage through the bulkheads and exposed connections.
9. For successful completion of the test, the measured leakage shall not exceed one-quarter (1/4) gallon per inch of diameter per one thousand feet (1,000') per two (2) hours.

F. Repairs and Retests

1. Repair all known leaks and retest the pipe until the hydrostatic pressure and leakage test is successfully completed.
2. Any damage to the protective lining and coating of the pipe and to the jointing material after the testing shall be repaired.
3. Repairs shall be made subject to the approval of the Engineer.
4. Excavate where required to locate and repair leaks or other defects that develop under the test.
 - a. Remove backfill and paving already placed.
 - b. After repairs, backfill and pave in same manner as initial work.

3.12 FLUSHING AND CHLORINATING

- A. A certified Distribution System Operator must be present for all hydrostatic testing, chlorination, flushing, bacteria testing and connections to the existing system per

California Department of Health Services, Operator Certification Regulations, Section 63770. The Engineer must receive the request for the certified Operators to be present for these operations in writing no less than six (6) working days prior to the anticipated date of work.

B. Flushing and chlorinating shall be conducted only after the successful completion of the hydrostatic pressure and leakage test. Flushing from the City's water system shall only be performed by using an approved Reduced Pressure (RP) type backflow device with current certification.

C. Contractor shall:

1. Give a minimum of six (6) working days written notice to both the Engineer and the City Fire Department to schedule flushing and chlorinating operations. Schedule shall allow delivery of samples to the approved laboratory before 2:00 p.m., Monday through Friday, the same day samples are taken. All procedures shall conform to applicable requirements of NFPA 24.

2. Make necessary piping connections.

a. Install chlorinating taps at locations designated by the Engineer.

b. Install temporary blow-offs at locations designated by the Engineer.

c. Temporary blow-offs shall permit adequate flushing of the main. The minimum size of blow-offs and minimum number of outlets shall be:

Main Diameter (in inches)	Blow-Off Diameter (in inches)	Outlets Required
2"	2"	1
4"	2"	1
6"	2"	1
8"	4"	2
12"	4"	3
16"	6"	4
20"	6"	8

Use two and one-half inch (2-1/2") fire hose and dissipator on each outlet. Chlorine must be removed before water enters storm system.

d. All sample taps shall be copper to FIP smooth bore.

e. Remove temporary flushing assemblies when test results are satisfactory to the Engineer.

3. Flush and chlorinate the pipeline in accordance with AWWA C 651, "Disinfecting Water Mains." Chlorination shall be performed only by personnel certified to perform that operation.

- a. Use Sodium Hypochlorite per Section 2.2 of AWWA C 651. Available chlorine shall be twelve and one-half percent (12-1/2%) to thirteen percent (13%) by volume. Chlorine tablets shall not be used. Chlorine shall be of the type approved for the purpose of disinfection of potable water supply systems. Chlorine for use in swimming pools shall not be allowed.
 - b. Use Continuous Feed Method of Section 5.2 of AWWA C 651, except the maximum allowable volume of water available for the preliminary flushing shall not exceed twice the volume of pipe to be flushed. Chlorine shall be fed through an approved flow regulated chlorine injection machine. The contractor shall, at the request of the City's Project Inspector, provide calculations showing the amount of chlorine introduced.
 - c. Document flushing and chlorination in a manner acceptable to the Engineer. Chlorine must be removed before water enters the storm system.
4. Connect to water source, convey to piping, and dispose of water during flushing without flooding, inundating or damaging any property, or harming the environment with the chlorinated water. Discharge shall be made by a hose into a sanitary sewer.
 5. Provide personnel on the job at all time during flushing, chlorinating, and sampling.
 6. Operate valves, under City direction, and provide other necessary assistance to the City.
- D. Upon completion of disinfection, the flushed section of main shall remain isolated from the existing water system and allowed to sit undisturbed for a minimum of twenty-four (24) hours prior to sampling for bacteriological contamination.
- E. Water samples shall be taken by a State-certified laboratory for bacterial examination. Such samples shall be taken, examined, and reported on by a recognized laboratory accustomed to this work. Examination shall be conducted according to the latest edition of "Standard Methods for the Examination of Water and Wastewater", American Public Health Association. Test results shall conform to the latest edition of U. S. Public Health Service Drinking Water Standards, and so attested by the examining laboratory prior to acceptance of the water line. Costs for the above tests shall be included in the contract bid prices.
- F. The above tests shall apply to each unit or branch of the water main and all of its services up to the curb stops.
- G. The bacteriologically treated unit or batch may be put into service only after written City approval of test results.

- H. Neutralized disinfection water shall be disposed in the City's sanitary sewer system, provided forty-eight (48) hours prior written notice has been given to the Engineer. As required, the Contractor shall provide pumping facilities for this disposal.

3.13 CONSTRUCTION PROCEDURE, CONNECTIONS AND WATER SYSTEM SHUTDOWNS

- A. A certified Distribution System Operator must be present for all hydrostatic testing, chlorination, flushing, bacteria testing and connections to the existing system per California Department of Health Services, Operator Certification Regulations, Section 63770. The Engineer must receive the request for the certified Operators to be present for these operations in writing no less than 6 working days prior to the anticipated date of work.
- B. Construction involves expansion and/or modification of the existing water system with the minimum possible service interruption during construction.
- C. Connections and utility changes must be programmed to provide the least possible interruption of service. Prior to any shutdown, all labor, materials, fittings, supports, equipment and tools needed for the scheduled work as well as emergency work shall be on the site.
- D. The Contractor shall not cause any contamination of the existing water system.
- E. Following testing and disinfection, the pipeline shall be connected to existing mains as indicated on the drawing. Each connection shall be made at a time and in a manner that will result in the least interruption of service.
- F. The Contractor shall not operate any valve controlling the flow of water in the City's existing system.
- G. All connections involving shutdown of City's existing facilities shall be done in the presence of the Engineer and the Certified Distribution System Operator. The Contractor shall complete the connection work without interruption.
- H. Planned Shutdowns:
 - 1. Shutdowns are subject to the following scheduling constraints:
 - a. Shutdowns shall not be performed on a Monday, Friday nor on the first workday following a City holiday. (It is preferred that shutdowns also not be performed on the day preceding a City holiday, if possible.)
 - b. Under special circumstances, and only upon approval by the city, shutdowns may be scheduled on a weekend or during non-working hours.
 - c. No more than two shutdowns will be performed in any two consecutive workdays.

- d. All shutdowns shall be scheduled to be performed between the hours of 9:00 a.m. and 3:00 p.m., inclusive, unless prior approval for deviation from these hours has been granted by DWWR. Shutdowns are scheduled for four (4) hour durations. Additional time may be granted on a case by case basis.
 - e. Prior to the start of any construction, Contractor shall submit a schedule of all planned shutdowns required for completion of project and shall indicate anticipated date, work to be performed, and estimated duration of work. In any case, the Fire Department will receive a minimum of 48 hours prior notice before a shut down.
2. The Engineer must receive the water shutdown request in writing from the Contractor at least six (6) working days prior to the anticipated date of the water shutdown. The Engineer shall forward the request together with the necessary paperwork to the DWWR for review and scheduling.
 3. The City will review the request to ensure that the Contractor will have all materials available and complies with all provisions of the City's procedures, including the submission of required information and scheduling requirements.
 4. Upon completion of the City's review of the shutdown request, the City will prepare the required number of door hanger notices and distribute the notices. Completed door hangers must be posted forty-eight (48) hours prior to scheduled shutdown in order to proceed.
 5. All excavations required to make the connection must be completed and approved at least twelve (12) hours prior to the scheduled shutdown. The City will not perform the actual shutdown until the Contractor is on-site and ready to work. If the Contractor is not on-site and ready to proceed within sixty (60) minutes of the scheduled start, the shutdown will be canceled. The Contractor will be billed for the City's work on a time and materials basis.
 6. If the shutdown is canceled or cannot be performed, the Contractor will notify the Engineer at least twenty-four (24) hours in advance of the requested shutdown date. If the new date of shutdown is known and the area remains the same, notice of new date can be given at this time followed by written confirmation by Contractor. Re-notification to the public must be performed by the City per Paragraph 4 above.
 7. Upon completion and approval of the work, the Contractor shall notify the Engineer to reactivate the water system.

3.14 PAVEMENT REPLACEMENT

- A. See Section 02500, "Paving and Surfacing," of these specifications.

3.15 VALVE BOXES

- A. Valve boxes in the street shall be set in a poured concrete collar, at least nine inches (9") wide by six inches (6") deep. The top of the concrete shall be covered by one and one-half inches (1-1/2") of asphalt concrete.
- B. Extension tubes are to be centered over the operating nut and brought to 6 inches of final grade.
- C. Set boxes to grade within five (5) working days after paving of streets. Boxes are to be set flush with the road surface
- D. Valve stem extensions shall be assembled and installed as per manufacturer's recommendation.
- E. For valve boxes indicating horizontal alignment changes, the "arrow" on box shall be oriented to point in direction of flow.
- F. All new and adjusted valve box covers for isolation of fire hydrants shall be primer-painted and coated with Dunn-Edwards "Safety Red #221" or matching permanent red paint.
- G. Paving Around Valve Boxes

The City's Project Inspector shall be notified no less than ten (10) working days prior to the start of resurfacing roadways, parking lots or private streets. The City's Project Inspector shall determine whether any valve boxes and covers are in need of replacement. If any valve boxes and covers are determined to be in need of replacement by the DWR, DWR will supply a new box and cover. The contractor shall install the new box and cover per these specifications. This section shall apply to all types of asphalt overlay as well as grind and pave work.

3.16 ABANDONMENT OF EXISTING FACILITIES

- A. Valve Boxes
 - 1. Planted areas: Remove box and cover. Fill any hole or depression with similar type of dirt at the specific location.
 - 2. Sidewalk areas: Remove box. Remove full flag of affected sidewalk. Pour concrete and finish to match that of the existing sidewalk.
 - 3. Street areas (AC): Remove box. Neatly sawcut appropriate area that shall be determined by the engineer in the field. Restore subgrade, base and pavement according to City specifications.
- B. Two-Inch (2") and Three-Inch (3") Steel Pipes as Local Feeders/Services
 - 1. Remove old fittings, pipe, and saddle at main pipe or fitting.

2. Install specified full circle clamp coupling over former tap on pipe, or install new plugs in tapped tee or cross.
 3. Restore street and/or sidewalk to its former condition or better.
- C. Four-Inch (4") and Larger Connections
1. Remove tee from existing main and replace it with same diameter ductile-iron pipe, two feet longer than existing tee. Use specified restrained sleeve type couplings.
 2. Removal may include an adjacent in-line valve, which the Contractor shall replace with a City-furnished valve.
 3. Restore street and/or sidewalk to its former condition or better.
- D. Fire Hydrants
1. Remove hydrant and bury. Plug remaining pipe with concrete.
 2. Remove tee from existing main and replace it with same diameter ductile iron pipe, two-feet longer than existing tee. Use specified restrained sleeve type couplings, or approved equal.

3.17 REPAIR/RESTORATION OF PROPERTY

- A. Any repair or restoration work resulting from Contractor's activity shall be completed within twenty-four (24) hours. Contractor may use the sod saved from the existing lawn or use new sod/seed to match existing lawn. Any concrete or other repair shall match existing. Contractor shall maintain the new planting for a minimum thirty (30) day period.
- B. All new or relocated fire hydrants shall be provided with one new finish coat of paint prior to the Contractor making a request for "punch list" preparation by the City.

3.18 PIPE ABANDONMENT

- A. Where an existing line is to be abandoned, pipe shall be cut and pipe ends shall be plugged with concrete. If portions of the line to be abandoned are depressurized only by the closure of a valve or valves then the line shall be capped with appropriate sized restrained MJ caps and a thrust block shall be poured.

3.19 AS-BUILT DRAWINGS

- A. As-built drawings for all city projects shall be updated daily and shall be made available to the project inspector upon request. Location of all valves and other water system appurtenances, as specified by the City's Project Inspector, shall be verified by a licensed surveyor and shall be incorporated into the as-builts at the expense of the contractor. At the completion of the project, the as-built drawings shall be submitted to the Engineer together with an electronic copy of the as-builts in a form acceptable to the City of Daly City Public Works Department/Engineering Division.

End of Section