

SECTION 2

STANDARD SPECIFICATIONS FOR CONSTRUCTION OF

WATER MAINS

**CITY OF SEBASTOPOL
SONOMA COUNTY, CALIFORNIA
JULY 1998**

**To be used with City of Sebastopol Water Standards dated July, 1998 and State of California
Department of Transportation Standard Specifications, latest edition.**

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SECTION 2 - CONCRETE

2.01. SCOPE OF WORK:

1. Anchors, supports, and bases for pipe lines and hydrants.
2. Replacement of damaged or removed concrete curbs, gutters, sidewalks, and pavements.

2.02. GENERAL:

Portland cement concrete shall conform to the requirements of Section 90 of the Standard Specifications and as herein specified.

2.03. MATERIALS:

The concrete shall be Class "B" containing five (5) sacks of Portland cement per cubic yard of concrete. The grading of the combined aggregate shall conform to the requirements for the 1 1/2 inch maximum size. The consistency of the fresh concrete shall be such that the slump does not exceed four (4) inches as determined by Test Method No. Calif. 520.

Reinforcement shall be deformed, intermediate grade steel conforming to the specifications of ASTM Designation A15.

2.04. CONSTRUCTION:

Ground against which concrete is to be placed shall be moistened prior to placing so that it will not absorb excessive moisture from the fresh concrete. Forms, if required, shall be smooth, mortar tight and of sufficient strength to maintain shape during the placing of the concrete. Placing methods shall be such that the concrete shall be rodded and spaded to insure smooth surfaces along form lines and to eliminate rock pockets.

Reinforcing bars, if required, shall be cleaned of all loose mill and rust scale, mortar, oil, dirt, or other foreign substances; shall be accurately bent to prescribed dimensions; and shall be placed accurately to the dimensions shown on the drawings. Where bars are spliced they shall be lapped at least 25 diameters.

Anchors shall be constructed to obtain full bearing, opposed to axial and lateral thrusts, against solid undisturbed material.

Concrete shall not be placed in free water on foundations or elsewhere. Pumping from the interior of any foundation enclosures shall be done in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of concrete or for a period of 24 hours thereafter, unless it is done from a suitable

sump separated from the concrete. Water shall not be allowed to rise on any concrete until the concrete has attained its initial set.

SECTION 3 - PIPING AND PIPELINES

3.01. SCOPE OF WORK:

The work shall include all labor and materials to complete all work as shown on the Plans and herein specified, including the following:

1. Water Mains.
2. All necessary supports, anchors, fittings and special appurtenances to make the work complete and operable.

3.02. MATERIALS:

1. GENERAL: Water Mains shall be Ductile Iron (D.I.) pipe, unless otherwise designated on the drawings and approved by the City Engineer.

2. DUCTILE IRON PIPE: Shall be rated at 150 psi working pressure. Pipe shall be furnished with a nominal laying length of 18 feet. Ductile Iron Pipe shall meet requirements of AWWA C151-65. The pipe shall be cement mortar lined in accordance with AWWA C104-64, with standard bituminous inside seal coat and outside coating. Minimum thickness of cement mortar linings shall be in accordance with Section 4-10.1 of AWWA C104-64.

Cast iron fittings shall be rated at 150 psi or greater and conform to the requirements of AWWA C-110-64. Fittings shall have a cement mortar lining and bituminous lining and outside coating equal to the cast iron pipe.

All D.I. pipe and fittings shall be furnished with rubber ring push on type joints except as shown on the drawings. Rubber rings shall be in accordance with AWWA C111-64.

The pressure rating, metal thickness, class, net weight of pipe without lining, length of pipe and name of manufacturer shall be clearly marked on each length of pipe.

3. FLEXIBLE COUPLINGS: Shall be cast sleeve type, with the stop removed in the middle ring, equal to Smith-Blair type 431 for cast iron or asbestos-cement mains of Type 433 for transition from cast iron to asbestos-cement. When connecting to existing steel mains, couplings shall be galvanized, fabricated steel, Type 411.

Flanged coupling adaptors shall be Smith-Blair Type 916 or cast adaptors, Type 913 for fabricated steel or an approved equal. Fabricated steel adaptors shall be galvanized.

Couplings and adaptors located underground shall be furnished with high tensile strength ductile iron bolts.

3.03. INSTALLATION OF PIPELINES:

1. **GENERAL:** All pipe shall be laid true to line and grade as shown on the Plans or as directed by the Engineer to pass existing obstructions. Before any pipe is laid, it shall be carefully inspected for defects. No pipe or other material which is cracked or shows other defects shall be placed.

Each section of pipe and each fitting shall be thoroughly cleaned out before it is installed. All pipe, fittings, valves, etc., shall be carefully lowered into the trench by suitable tools or equipment in such a manner as to prevent damage to the pipe, lining, coating, fitting, or other appurtenances.

Pipe must be given a solid uniform bearing in the bottom of the trench. Blocking or supporting pipe on earth mounds will not be permitted.

Whenever pipe laying is discontinued for short periods, the maximum deflection at any joint shall not exceed 1/2 the manufacturer's recommendation for the type of pipe and joint being used.

Whenever it is necessary to use a short length of pipe at a fitting or valve, the minimum length shall be thirty-two (32) inches. If it is necessary to cut pipe, said cut shall be made with an approved pipe cutter. The use of hammer and chisel for pipe cutting will not be permitted.

2. **INSTALLATION OF DUCTILE IRON PIPE:**

a. **Joints for D.I. Pipe.** Joints shall be an approved single rubber gasket type, except where flanged joints are shown on the drawings. The assembly of the joint shall be made as recommended by the manufacturer. The joint shall be thoroughly cleaned before assembly and shall provide a secure, water tight joint.

Before installing gaskets in flanged joints, the faces of the flanges shall be perfectly clean. Bolts for flanged joints shall be of sufficient length to give a full nut when the joint is made. In bolting flanges together, the bolt shall be tightened in such a way that the flanges in the completed joint will be parallel and free from unequal stresses. Care shall be taken to prevent damage to the bolt heads, nuts or thread, and if any such damage is done, the damaged material shall be replaced.

If leakage occurs at a flanged joint, such leakage shall be stopped by cleaning flanges, replacement of gaskets or adjustment of tension on the bolts. No other method will be permitted. After the flanged connection has been tested and inspected by the Engineer, the Contractor shall apply a coating of an asphalt or bitumastic paint (approved by the Engineer) on all exposed metal surfaces of the flange connection and bolts.

b. Protective Coatings. When shown on the drawings, underground ductile iron surfaces shall be enclosed in a minimum of one sheet of 8-mil thick polyethylene to form a continuous and all-encompassing layer or polyethylene between all ductile iron surfaces and the surrounding earth or backfill material. All polyethylene shall be carefully secured with Scotch-wrap 10-mil thick tape, or an approved equal.

Polyethylene tubes shall be installed over pipes in the following manner: (1) Enclosed pipe in tube, (2) pull tube upward so that the polyethylene is snug against the bottom one-half of the pipe, (3) fold remaining polyethylene so that folded area extends equally over the pipe, and (4) tape completely and securely around pipe and polyethylene at 4 foot intervals.

Polyethylene sheets shall be installed around pipe fittings in a manner similar to that stated above. There shall be a minimum of one foot overlap between adjacent polyethylene sheets or tubes.

Care shall be exercised by the Contractor to prevent damage to polyethylene during installation, after installation prior to backfill, and during backfill operations. Broken areas shall be covered with another layer of polyethylene and securely taped.

3.04. THRUST BLOCKS AND ANCHORS:

Concrete thrust blocks and anchors shall be constructed at all fittings, and dead-ends as shown on the drawings and at all other locations as directed by the Engineer. Thrust blocks will be required at all changes in horizontal and vertical alignment greater than 10 degrees.

Trenches at thrust block and anchor locations shall be carefully handshaped from the standard trench so that thrust blocks and anchors can be poured against undisturbed earth. Concrete for thrust blocks and anchors shall be Class B.

3.05. CONNECTION TO EXISTING MAINS:

Connections to existing mains shall be made as shown on the Plans and as specified. However, the Contractor may submit details of alternate methods for approval.

The Contractor shall notify the Engineer at least 48 hours before any connection shall be made to an existing main. The Contractor shall indicate the expected period required for the shutdown and the time of which he desires the shutdown.

In general, shutdowns shall be made at times when there will be at least interference with normal water service. The Contractor shall notify all users who will be temporarily out of service indicating date and times. Connections shall be made only after complete and satisfactory preparation for the work has been made, including testing of the new main, in order that the shutdown may be as short as possible. The Engineer shall be the sole judge of the adequacy of the preparation.

Under no circumstances shall anyone other than an authorized representative of the City open or close any valve in the city-operated water system.

In certain circumstances as determined by the Engineer, it may be necessary to make a connection to an existing main at other than normal working hours. For this purpose, normal working hours are defined as 7:30 a.m. through 4:30 p.m., Monday through Thursday, and 7:30 a.m. to 4:30 p.m. alternate Fridays.

Connections to existing mains outside normal working hours shown or specified in the contract documents shall be made at no additional compensation over the bid price. Should such a connection be required by the Engineer that was not shown as specified in the contract documents, the premium labor costs shall be paid by the City. Premium labor costs shall be computed on the basis of the difference between the applicable straight time and premium time rates. No additional compensation for connections outside normal working hours will be allowed.

3.06. PROTECTIVE COATINGS:

1. GENERAL: All buried surfaces shall be given protective coatings for protection from corrosion as provided in the various sections of these Specifications or as shown on the drawings. Where protective coatings for particular elements have not been specified in detail, the provisions of this section shall be followed.

2. PROTECTION OF PIPE:

a. D.I. pipe. When shown on the plans ductile iron mains shall be protected with a polyethylene wrap as herein specified.

b. Tie rods. All buried parts of relatively thin cross section (for example: tie rods, leak clamps, bolts, etc.) shall be coated with a mastic coating or as otherwise specified.

3. APPLICATION OF PROTECTIVE COATINGS:

Coatings shall be continuous and unbroken. Insulating coatings shall be free of pinholes and holidays. Protective coatings shall be applied over a properly prepared surface in the specified number of coats and in the required thickness. All protective coatings shall be applied according to these specifications. If there are no application provision for the coating specified, the applicable AWWA Specification or the manufacturer's instructions shall be followed.

a. Mastic Coating: Apply one coat, 1/8 inch thick. Mastic shall be Bitumastic 505 by the Koppers Co., or an approved equal.

b. Polyethylene Wrapping. Shall be applied in accordance with the requirements in section entitled, "Installation of Ductile Iron Pipe."

3.07. CLEANING, TESTING AND DISINFECTION OF WATER LINES:

When the pipe line has been installed, it shall be cleaned of all dirt and construction debris before backfilling.

After the trench has been completely backfilled, the newly laid pipe or any valve section thereof, shall be subjected to a hydrostatic pressure as specified herein.

The Contractor shall furnish all equipment for making tests including a suitable gauge for measuring the applied line pressure. The tank containing the water to maintain line pressure shall be of such a design that the volume of water used may be accurately measured.

Each section of the pipe to be tested shall be slowly filled with water, and all air shall be expelled from the pipe. The release of the air can be accomplished by opening hydrants and service line cocks at the high points of the system and the blowoffs at all dead ends. The valve controlling the admission of water into the section of pipe to be tested should be opened wide before shutting the hydrants or blowoffs. After the system has been filled with water and air expelled, all the valves controlling the section to be tested shall be closed, and the line be allowed to set for a period of not less than 24 hours.

The pipe shall then be refilled, if necessary, and subjected to a pressure of not less than 150 pounds per square inch or the service pressure plus 50 pounds, whichever is greater, for a period of four hours.

The allowable leakage in the test section shall not exceed 15 gallons per mile, per day, per inch diameter of pipe tested.

If defects are found or the line does not meet the allowable leakage rate, the Contractor shall locate the leaks, make the necessary repairs at his own expense, backfill and repeat the pressure and leakage tests in the presence of the Engineer as specified above. No pipeline section shall be accepted until the leakage is within the specified allowance.

At the proper time, the system should be thoroughly flushed out and disinfected in accordance with the "procedure for Disinfecting Water Mains", AWWA Specifications C 601-54.

3.08. ABANDONING WATER MAINS:

At each location where an existing water line is cut it shall be sealed with a cap or plug suitable for the type of pipe in question, in accordance with Standard Drawing. Romac EC501 or Rockwell 482 Cast End Cap Coupling or approved equal shall be used.

Where shown on the drawings valves shall be removed from the existing lines and the line capped at each side.

All other valves in lines to be abandoned, including hydrant valves, shall be closed, the valve box removed, backfilled with Class II A.B. and the area repaved with appropriate thickness of surfacing.

All valves, pipes, fittings, and other appurtenances removed during the course of the work, unless otherwise specified or indicated on the drawings, shall remain the property of the City, and shall be delivered to the Corporation Yard.

Section 4 - VALVES, HYDRANTS, AND APPURTENANCES

4.01. SCOPE OF WORK:

The work shall include all labor and materials for furnishing, installing and testing all valves, hydrants and appurtenances as shown on the Plans and herein specified.

4.02. VALVES:

1. **GENERAL:** Shutoff valves installed in the main run of pipelines and hydrant runs shall be either gate valves or rubber-seated butterfly valves as shown on the plans.

2. **GATE VALVES:** Shall be modified wedge disc with back side flat which travels along a machined surface in the valve body. Solid guide lugs shall travel within channels cast in the side of the valve. Front sides shall have an angular mounted resilient rubber seat ring. Valves shall have non-rising stems, or rubber gasket type ends, as required, cast iron body and stems of bronze. When valves are open, the area of the opening shall be at least equal to the adjacent pipe. Valves shall open counterclockwise and have standard AWWA type opening nuts. Stuffing boxes shall be bolted and constructed so as to permit removal of parts for repair. "O" ring type seals are required on all gate valves. Valves shall conform in material of construction, quality and performance to AWWA C500-61 and shall be tested at not less than 300 psi hydrostatic pressure.

Gate Valves shall be Mueller, Resilient Seat, or equal.

3. **BUTTERFLY VALVES:** Shall be rubber seated, flanged, Class 150 conforming to AWWA Standard C504-66. Valves shall have a stainless steel body seat ring that "floats" in the body over a resilient "O" ring seal, a rubber disc seat ring molded to stainless retaining ring, secured by self-locking stainless steel hex head screws.

Valve operators shall be worm gear type mounted on the valve and equipped with a standard AWWA operating nut. Valve and operator shall be suitable for buried service. Valve operators shall turn counter-clockwise to open, shall be suitable to operate the valve at a line pressure of 150 psi and shall be capable of holding the valve in any position between open and closed without creeping and flutter.

Valves shall be Mueller "Lineseal" III or equal.

4. CHECK VALVES: Shall be flanged, iron body, bronze mounted, swing check with outside level end weight. Flanges shall be faced and drilled in accordance with the 125 lb. ASA American Standard.

Check valves shall be Walworth No. LS 928 and LWM 928 (for vertical mounting), Mueller Co., A-2600, or an approved equal.

4.03. HYDRANTS:

Hydrants shall be wet barrel, California Type, conforming to the requirements of AWWA C503-59. Hydrants shall be rated at 150 psi working pressure. As shown on the Plans, hydrants shall be either Type I or Type II as follows:

Type I - One 2 1/2" outlet and one 4 1/2" outlet.

Type II - Two 2 1/2" outlets and one 4 1/2" outlet.

Hydrants shall be Rich, Model 950 or 960 equal.

All outlets shall have National Standard Threads. Nozzle caps shall be equipment with a chain. Hydrant valves shall open counter-clockwise.

All hydrants shall be equipped with break-off risers. Where shown on the Plans, hydrants shall also be equipped with break-off check valve assemblies.

Burys shall be a minimum of 6 inches in diameter and be equipped with rubber gasket joints for connection to ductile iron hydrant runs.

The above ground portions of hydrants shall be painted in accordance with AWWA 503-59 with a color determined by the Engineer.

4.04. INSTALLATION OF VALVES AND HYDRANTS:

Immediately before installation, each valve and hydrant shall be operated through one complete open-close cycle and visually checked for proper operation.

Valves shall be set plumb, supported on a wood block and properly fitted to the adjacent sections of the main. Typical valve installations are shown in the City Standard Drawings.

Fire hydrants and fire hydrant connections shall be installed where indicated on the plans except where the Engineer directs that they be relocated to avoid an obstruction. The Contractor shall make such relocations at the time of construction and without additional compensation. Hydrants

shall be installed in accordance with City Standard Drawings. Break-off check valves shall be installed at all locations shown on the plans.

4.05. HYDRANT REMOVAL:

At each location where an existing hydrant is removed, the riser and bury shall be removed to a distance of not less than 12 inches from the surface and the line capped. The excavation shall then be backfilled with sand the proper paving, concrete, or planting shall be replaced.

4.06. VALVE BOXES:

Valve Boxes: Valve Boxes shall be furnished and installed on all underground valves. They shall be of concrete or enamelled cast iron adjustable to grade, and shall be installed vertically, centered on and covering the upper portions of the valves. The top of each valve box shall be placed flushed with finished grade unless otherwise directed. Valves boxes shall be Christy G5 with traffic lid or approval equal. A Concrete collar shall be placed around each valve box.

4.07. AIR RELEASE AND BLOW-OFF ASSEMBLIES:

Air release or blow-off assemblies shall be installed at high, low or terminal point of the main as shown on the plans. They shall be manual type conforming to City Standard Drawing.

4.08. VALVE BOX EXTENSION:

Shall fit tight inside the valve box, shall be in one piece from top of valve to valve box. If space occurs between riser and box, the Contractor shall caulk the annular space with mastic.

SECTION 5 - SERVICES

5.01. SCOPE OF WORK:

The work shall include all labor and materials for furnishing, installing and testing all house laterals and service lines as shown on the Plans and herein specified.

5.02. GENERAL:

House laterals and services shall consist of components between the water main through and including the water meter. Component parts include service clamp, corporation stops, service piping and fittings, service shut-off valve, meters and meter boxes.

5.03. CORPORATION STOPS:

Corporation stops shall be bronze for use with copper service pipe and shall have standard

corporation stop threads as specified in AWA C800-66.

Corporation stops shall be equal to Mueller NO. H-15000.

5.04. SERVICE CLAMPS:

Service clamps shall be two strap as shown in the Standard Drawings. Clamps shall be bronze with "O" ring seal cemented in place and shall have I.P. thread. Service clamps shall be Mueller or equal.

5.05. SERVICE PIPING:

Service piping shall be Type K soft copper tubing conforming to the requirements of AWWA C800-66. Compression type fittings may be used for service lines.

5.06. SERVICE SHUT-OFF VALVE:

Service shut-off valves shall be Ford Product in accord with Standard Detail or equal.

5.07. METERS:

Meters will be furnished by the City.

5.08. METER BOXES:

Meter boxes shall be equal to Christy.

1. 2" Service - Box B-48 with M-85 cover, or when installed in driveways, a 62G85 cover.
2. 1 1/2" Service - Box B-40 with M-75 cover or, when installed in driveways, a GA675.
3. 1" Service - Box B-16 with B16G cover, or when installed in driveways, a B16C cover.
4. 3/4" Service 0 Box B-9 wit B90 cover, or in driveways a BPc cover.

5.09. INSTALLATION OF SERVICES:

1. **GENERAL:** Service lines shall be installed in accordance with these specifications and the City Standard Drawings.
2. **CORPORATION STOP INSTALLATION:** The water main shall be topped at a position perpendicular to the axis of the main and 30 degrees to the horizontal at a location as nearly opposite of the curb stop as possible.

The main shall be tapped with an approved type combination drilling and tapping machine equipped with an I.P. thread. The drill and tap shall be properly lubricated during the drilling and tapping process to insure true, clean-cut threads.

The corporation stop shall be turned to a final position which will prevent any leakage or weeping and which will locate the operating key above the horizontal.

3. **INSTALLATION OF COPPER TUBING:** Copper tubing shall be installed beneath all sidewalk, curb, gutter and roadway areas by means of boring. In the event that excavation of any sidewalk, curb, gutter or roadway area becomes necessary, all such excavation shall be backfilled with sand, or other approved granular material, and thoroughly water tamped. The use of excavated material for backfill will not be permitted.

The copper tubing shall be a minimum of 36" below the pavement surface at the water main and a minimum of 24" below the flow line at the curb face. Where there is no existing curb, the service line shall be a minimum of 24" below the surface of the ground at the edge of the right-of-way.

Between the side of the water main trench and the corporation stop at an "S" type curve shall be introduced into the tubing in order to provide flexibility between the service and the water main. Extreme care shall be exercise in the bending operation to prevent kinking or flattening the tubing.

The copper tubing shall be cut to such a length as will locate the curb stop back of the sidewalk, or back of the curb if sidewalks are not adjacent to the curb. When the curb stop has been connected, the operating key shall be upright and the axis through the stop perpendicular to the edge of the sidewalk.

4. **FLUSHING AND ADJUSTING:** When the service has been completely connected, water from the main shall be flushed through the service with the operating key on the corporation and curb stops in a maximum open position.

All connections shall be thoroughly inspected and wiped clean of any dirt or mud in order that any "weeping" may be detected. Any and all leaks must be completely stopped and the Inspector notified before backfilling either end of the service.