



CALAMBA WATER DISTRICT

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SCOPE OF WORKS AND SPECIFICATIONS

Project : Installation of New Fire Hydrants

Date: August 21, 2018

I. SCOPE OF WORKS

The supplier is responsible for the supply and delivery of labor and materials for the installation of new fire hydrants and other appurtenances.

Earthworks

1. *Removal of Existing Pavement:* All concrete pavement surfaces to be removed shall be scored with concrete sawing equipment; provided, that any Portland cement concrete base under asphaltic mix surface will not be required to be scored by sawing. Asphaltic concrete pavement shall be removed to clean straight lines.

The width and length of the pavement area required to be removed for the installation of valves; valve chambers shall not exceed the maximum linear dimensions of such structures by more than 0.30 meters on each side.

Concrete sidewalks, curbs and gutter required to be removed shall be cut to the nearest score marks.

2. *Excavation:* Excavation for pipelines shall be open-cut trenches. Excavate trenches with even bottoms, uniform width and vertical sides. The bottom of the trench, including any shoring shall have a minimum width of 0.20 m and a maximum width of 0.40 m. The maximum amount of open trench permitted at any one time and in one location shall be 300 meters, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater.

When excavating in rock or shale, dig trench 10 – 15 cm below the desired pipe bottom and backfill with compacted sand to proper grade.

3. *Disposal of excess Excavated Material:* Remove and dispose all excess excavated material in manner approved by Engineer.
4. *Excavation in Lawn Areas:* The sod shall be carefully removed and stockpiled to preserve it for replacement. Excavated material from the trench may be placed on the lawn provided a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of back filling and testing of the pipeline, the sod shall be replaced in a manner so as to restore the lawn as near as possible to its original condition.

5. *Excavation in Vicinity of Trees:* Except where trees are shown on the drawing to be removed, trees shall be protected from injury during construction operations and no tree is removed without written permission from Engineer. Trees shall be supported during excavation.

Backfill/Restoration

1. A newly laid pipe shall be backfilled at least 150mm (6in) above the top of the pipe at the end of each day with selected material obtained from the excavation. Materials used for backfill shall be selected, free from grass, roots, brush or other vegetation, or rocks having maximum dimensions larger than 150mm (6 in). If in opinion of the Engineer, said material is unsuitable for backfill purposes, borrow material having the sand equivalent value of not less than twenty (20) (ASTM – D2419) shall be used for this portion of the trench backfill. Selected material shall first be brought up to mid – diameter of the pipe and compacted; then the remainder of the backfill to 150mm (6in) above the pipe maybe placed and compacted. Such material shall be compacted to ninety five percent (95%) of max. density where the trench is located under proposed structures and ninety percent (90%) of max. density elsewhere. Compaction shall be obtained by tamping it not more than 150mm (6in) layers or by using excess water and passing a concrete vibrator between the pipe and the side of the trench. Obtain and complete (IR) inspection request form prior to backfilling; the works may proceed upon approval of the Supervising Engineer. Remainder of the trench shall be backfilled not later than the following day.

Barricades and warning lights satisfactory to the Engineer shall be provided and maintain for all in which case of heavy steel plates, adequately braced bridges or other type of crossing capable of supporting vehicular traffic shall be furnished.

2. Concrete pavement shall be replaced with the same kind or better material in conformance with the latest specifications, rules and regulation, and subject to the inspection and approval of the agency having jurisdiction.

HYDROTESTING

Prior to permanent resurfacing after the trench is backfilled, but with joints exposed, all pipes, slowly with water and has been completely filled; it shall be allowed to stand under a slight pressure for a minimum of 48 hours. The test pressure shall be 100 psi and leakage shall not be less than 0.0777 Li per mm per kilometer of length per hour.

All new domestic water mains or extensions to existing systems, or valve section of such extension or any replacement in the existing water system shall be disinfected with chlorine. Disinfections shall be completed not more than 3 days prior to placing the pipeline into service unless otherwise approved by the Engineer and care shall be taken to prevent recontamination of the pipeline.

II. TECHNICAL SPECIFICATIONS

Fire Hydrants

1. Fire hydrants heads shall be cast iron body conforming to the requirements of AWWA C503 (WET-BARREL FIRE HYDRANTS) with bronze working parts.
2. Fire hydrants shall be designed for a minimum pressure of 1.0MPa (150 psi) and have a 100mm (4") flanged inlet and two (2) 63mm (2½") fire hose outlet.
3. The outlets shall have National Standard Hose Threads with hose caps and chains.
4. The stem shall be provided with at least two (2) O-rings.
5. Hydrant valves shall open counter clockwise.
6. Breakable piece and extension elbow shall be provided.
7. Epoxy lining and coatings for valves shall conform to AWWA C550 (PROTECTIVE EPOXY INTERIOR COATINGS FOR VALVES AND HYDRANTS).
8. *Certification:* The manufacturer shall furnish a sworn statement that the inspection and metallurgical and pressure tests have been results thereof comply with the requirements of the applicable Standard(s) herein specified. A copy of the Certification shall be submitted to Calamba Water District.

Cast Iron Fittings

1. *Fitting Description:* Cast iron fitting shall conform to the requirements of AWWA C110 (American standard for cast iron and ductile iron fittings, 2-in through 48-in., for water and other liquids) or is r13 (cast iron pipes, special casting and cast iron parts for pressure mainlines).

Fitting shall have a wall thickness of not less than that of the pipe with which they are used and the ends shall have the ends suitable for making watertight joints.

2. *Fitting Construction:* Fittings are manufactured of ductile iron grade 70-50-05 (minimum tensile strength: 70,000psi; minimum yield strength: 50,000; minimum elongation: 5%) as specified in AWWA C110 or C153. The flanges can be tapped for studs when specified. Unless otherwise specified flanges will have bolt holes straddling centerline, bolt hole drilling can be rotated when so specified.

Fittings shall be furnished with mechanical or flanged joints.

- a. *Mechanical Joints:* All mechanical joint fittings will be Bell and Bell unless otherwise specified. Mechanical joint fittings shall be rated for 350 psi working pressure for sizes 4" – 24".

- b. *Flanges:* All flanges are plain without projections and are furnished smooth or with shallow serrations. The flanges can be tapped for studs when specified. Unless otherwise specified flanges will have bolt holes straddling centerline. Bolt hole drilling can be rotated when so specified. Flanged fittings shall be rated for 250 psi working pressure for sizes 4" – 64".
 - c. *Bolts, Studs and Nuts:* Bolts are hex head machine bolts with regular or heavy hex nuts as specified. Studs with one hex nut each are required for tapped flanges. Bolts, studs and nuts are low-carbon steel per ASTM A307 Grade B; threads are ANSI B1.1 Coarse Thread Series, Class 2A external and Class 2B internal. Recommended studs are the same length as corresponding bolt length with "tap end" threaded approximately the same length as flange thickness.
3. *Coating:* All fittings shall be epoxy coated internally and externally in accordance to AWWA C116 (protective fusion-bonded epoxy coatings for the interior and exterior surfaces of ductile-iron and gray-iron fittings for water supply service).
 4. *Testing:* For every 100 pcs of any size of fittings, at least 3 pcs. shall be chosen at random and subject to a pressure of 1.1 MPa (160 psi). If any sample tested cracks or leaks, the lot represented will be rejected. The manufacturer shall furnish one certified copy of the reports to the Calamba Water District.
 5. *Certification:* The manufacturer shall furnish a sworn statement that the inspection and metallurgical and pressure tests have been results thereof comply with the requirements of the applicable Standard(s) herein specified. A copy of the Certification shall be submitted to Calamba Water District.

Gate Valves

1. Valve Description

All valves shall conform to the AWWA Specifications C509 (STANDARD FOR RESILIENT SEATED GATE VALVES). Component parts are constructed of heavy, rugged proportions for extra strength to withstand pipe strain and possible shifting in underground service. Gate valves shall be flange or mechanical joint where the pipelines design pressure is 1.0MPa (150 psi) or less be designed for minimum water working pressure of 1.0 MPa (150 psi).

2. Valve Construction

The body shall be cast iron.

The gate valve shall be flanged and mechanical joint. Flanges and drilling shall conform to ISO 7005 – 2

All the resilient gate valves have a full bore with same nominal diameter as the pipeline. The full bore ensures minimum pressure loss, as the valve does not cause any reduction in the flow path, other great advantages are that the full bore allows drilling and facilitates pipe pigging to ensure high quality potable water.

The ductile iron core is full vulcanized with EPDM rubber internally and externally. No iron parts are exposed to the medium and the excellent rubber vulcanization prevents creeping corrosion underneath the rubber.

The fixed integral wedge nut reduces the number of moveable valve parts and risk of malfunction.

The valve shall be non-rising stem with a minimum two “O” ring seals (at least one above the stem collar), or rising stem.

The valve shall have 50mm (2 in) square operating nut with cast arrow showing direction in which the nut is to be turned open the valve.

The body and cover bolts and nuts shall meet specifications of ASTM A-307 (rust roofed).

The valve shall be encapsulated and shall conform to the following dimensions:

Nominal Size, in	2	3	4	6	8	10
Nominal Diameter, mm	50	75	100	150	200	250
Length (Face to Face)	178-180	203-205	221-229	267-268	292-295	330-335
Height (above Centerline)	241-326	297-318	334-345	443-448	544-562	627-750
Weight	13-18	20-23	26-33	51-53	83	128-132

3. Coatings

All valve casting to be shot blasted prior to epoxy coating. Epoxy coating shall conform to AWWA Specifications C550 (PROTECTIVE EPOXY INTERIOR COATINGS FOR VALVES AND HYDRANTS). Body and bonnet are coated internally and externally. Layer thickness shall be 250-400 microns on flat and pressurized parts and 150-300 microns on convex outer edge.

4. Testing

For every size and type of wedging mechanism, two sample gate valves representing each lot of one hundred (100) pieces or less shall be tested for reliability of operation. This test is in addition to those required under section 28.2 and 28.3 of AWWA C500. The shell and seat should be tested equal to 1.5 MPa and 1.1 MPa respectively. The manufacturer shall furnish one certified copy of the test reports to the Calamba Water District.

5. Certification

The manufacturer shall furnish a sworn statement that the inspection and metallurgical test and pressure test have been results thereof comply with the requirements of the applicable Standard(s) herein specified. A copy of the Certification including compliance with NSF/ANSI 61 shall be submitted to Calamba Water District.

Unplasticized Polyvinyl Chloride Pipe

1. *Pipe Description:* Pipes and fittings shall conform to the requirements of AWWA C900 or PNS 65 and shall be pressure Class 150 (Series 8).
2. *Pipe and Fitting Construction:* The pipe and fittings shall have steel pipe equivalent or cast iron equivalent outside dimensions. Rating as indicated with integral push-on bell with elastomeric gasket seal on one end and plain beveled on the other end. PVC Pipes and fittings shall be made from clean, blue-pigmented, virgin, NSF approved Class 12454-A or 12454-B PVC compound conforming to the requirements of ASTM D1784. All pipes shall be furnished in lengths of 6 meters.
3. *Pipe Dimensions:* Pipe shall conform to the following dimensions:

Nominal Pipe Size, in	2	3	4	6	8	10	12
Nominal Diameter, mm	50	75	100	150	200	250	300
Outside Diameter, mm							
min	63	90	110	160	225	280	315
max	63.3	90.3	110.4	160.5	225.7	280.9	316.0
Wall Thickness, mm							
min	3.6	5.2	6.3	9.2	12.9	16.0	18.0
max	4.16	5.92	7.13	10.32	14.39	17.80	20.00

4. *Random Testing:* For every size, two (2) sample pipes representing each lot of one hundred (100) pieces or less shall be tested for compliance with this specification. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting the entire order.
5. *Certification:* The manufacturer shall furnish a sworn statement that the inspection and metallurgical and pressure tests have been results thereof comply with the requirements of the applicable Standard(s) herein specified. A copy of the Certification shall be submitted to Calamba Water District.

Concrete

1. *Portland cement:* Cement shall conform to the Standard Specifications for READY MIXED CONCRETE, ASTM C-94. An air-entraining admixture, conforming to ASTM C-260, shall be added to Type I, Type II or Type III Portland Cement.
2. *Aggregates:* All aggregates used for concreting shall conform to ASTM-33 and shall be checked daily for any variances in moisture current. Said variances shall be corrected and/or taken into consideration for each batch.
 - a. *Coarse Aggregates:* Shall be uniformly and evenly graded for each application in accordance A.C.I. Standard 318. Unless otherwise approved, aggregate shall be

sound, crushed, angular granitic stone. Smooth or rounded stone (river rock) shall not be acceptable.

- b. *Fine Aggregates*: Shall consist of natural sand, manufactured sand or a combination thereof.

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