

**SECTION 611
WATER SYSTEMS**

611.01 **DESCRIPTION** – Add the following to this subsection:

This work also consists of the following:

- a. Adjustment, relocation or replacement/reconstruction of existing water system-related facilities including, but not limited to, waterlines, manholes, valve boxes, water meters with boxes, gate valve with boxes, and air relief valves with boxes,
- b. Removal and/or relocation of existing fire hydrants,
- c. Providing and placing flowable fill in lieu of the conventional compacted subbase or base course backfill for waterlines location within the road pavement, to protect the existing waterline that may be exposed or shallow backfill during road obliteration and compaction of base material.

611.02 **MATERIAL** – Amend and revise the following to read as:

Bedding Material – Furnish sand or selected sandy soil free of excess moisture, muck, roots, sod, or other deleterious material and conforming to the following.

- a. Material passing a 3/8-inch sieve, AASHTO T 127 100%
- b. Material passing a No. 200 sieve, 10% (max)
AASHTO T 127 and T 11

Concrete – Concrete and concrete related works shall conform with Section 601.

Flowable Fill Concrete – Design strength for flowable fill shall be a compressive strength of not less than 500 psi at 28 days. Chemical admixtures may also be used in flowable fill to modify performance properties of strength, flow, set and permeability.

Polyvinyl Chloride (PVC) Pipe and Fittings – For 3” and smaller, use PVC pipe for water distribution system conforming to ASTM D 1784. The pipe shall be manufactured in strict compliance to ASTM D 1785. Wall thickness of the pipe shall be Schedule 80. Fittings shall be PVC Schedule 80 slip on, glue or threaded ASTM D 2467-04e1 and ASTM F-439, Standard Specification for PVC Plastic Fittings, Schedule 80.

For pipes 4” and larger, use PVC conforming to AWWA C900. C900 PVC shall be DR18, Pressure Class 235. PVC Shall be push-on conforming to ASTM D3139.

Add the following:

All material for waterlines and appurtenances shall meet the requirements of the Commonwealth Utilities Corporation (CUC) standard for water system planning, materials and construction.

Other materials for the water system shall be as follows:

Gate Valves – Gate valves shall be of cast iron body construction, bronze mounted, solid wedge, resilient seal, with 2-inch square operating nut, 200 psi operating pressure, with 400 psi test pressure certification, non-rising stems and conform to AWWA Specification C500.

Valve Boxes – Each gate valve on buried piping shall be provided with an adjustable cast iron box of a size suitable for the valve on which it is to be used. The head shall be round and the lid shall have the word “WATER” cast on it. The least diameter of the shaft of the box shall be 10.25 inches for waterline greater than 6 inches I diameter and 5.25 inches for waterlines 6 inches or less in diameter. Each box shall be given a heavy coat of bituminous paint.

Detectable Warning Tape – Warning tape shall be acid and alkali-resistant polyethylene film, 6-inches wide with minimum thickness of 0.004 inches. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi cross-wise. The tape shall be manufactured with integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be a type specifically manufactured for marking and locating underground utilities, BLUE color. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion.

Ductile Iron Pipe and Fittings – Conforming to AWWA C 151 for the designed size and strength. The Pipe shall be cement mortared lined according to AWWA C 104. Ductile iron fittings shall conform to AWWA C 110 with a minimum rated pressure of 250 psi. For flanged fittings with working pressures and maximum hydraulic gradients of 200 psi and less, use fittings conforming to AWWA C 110 and ANSI B 16.42, Class 150. For flange fittings with working pressures and maximum hydraulic gradient of greater than 200 psi but not less than 300 psi, use fitting conforming to ANSI B 16.42, Class 300.

Backfill - Aggregate subbase material conforming to Section 301.

CONSTRUCTION REQUIREMENTS

611.03 **GENERAL** – The first paragraph of this Subsection is supplemented as follows:

Coordinate with Commonwealth Utilities Corporation (CUC) prior to start of work on water system to ensure minimum water service interruption to users affected by the operations. When required, provide temporary water service to users who will be affected by prolonged water outages more than 8 hours.

Add the following to this Subsection:

Location of existing waterline shown on the drawings are approximate and for information only. Explore actual location and depth of existing waterline to fully determine actual depth of covering and to determine the scheme to be used by means of manual digging and/or suitable equipment as approved by the CO. Space exploration holes every 100 feet or as

directed by the CO. When required, backfill exploration holes as specified herein.

Repair all waterline leaks or breakage that occurs during the construction of the highway until the Government officially accepted the project. Make necessary repairs immediately after discovery of leaks or breakages. Repairs are subject to inspection and approval.

The Contractor shall be responsible for repairing all waterline leaks or breakages that occur from the construction work within the project limits at no extra cost to the contract during the construction of this project. All repairs shall be made as soon as possible after discovery of leaks or breakage and shall be subject to inspection by the Contracting Officer or his Authorized Representative and shall be subject to approval of the duly authorized representative of the Commonwealth Utilities Corporation or the appropriate utility agency owning the facility before officially accepting the repair work as satisfactory.

611.04 **LAYING WATERLINE** – Add the following to the text of this subsection:

Waterline Pipe Diversion – When an existing waterline is encountered and is required to be diverted around a sewer or storm drain line, upon the approval of the Contracting Officer divert the waterline and encase with reinforced concrete as detailed on the plans and as specified in this section. The additional pipe and fittings to divert the existing waterline segment shall be of new ductile iron pipe, and fittings meeting the material specifications herein. Notify CUC prior to construction or interruption of water service. The total length of the line segment for each diversion around a sewer or storm drain shall not be less than 40 feet, unless otherwise approved by the Contracting Officer.

Adjustment of existing waterline – When an existing waterline segment is encountered and is located within the road construction limit and road excavation depth limit, upon the approval of the Contracting Officer, relocate the waterline segment to a deeper depth per plan details. The existing pipe of the line segment to be relocated shall be reused. Provide new ductile iron fittings and ductile iron pipe extension to facilitate its reconnection to the existing water distribution / transmission system.

Adjustment of Water Utility Manholes or Valve Box – When an existing water utility valve box or manhole is encountered within the project right-of-way and the top elevation of the box or manhole is required to be adjusted to match the finished grade, then upon the approval of the Contracting Officer, adjust the valve box or manhole cover as detailed on the plans. Re-use the existing valve box frame and cover. Provide new matching coupling and extension to facilitate the required elevation adjustment and construct a new concrete collar.

611.06 **BACKFILLING** – Delete and revised the paragraphs to read as follows:

Backfill according to section 209, except hand place the first backfill layer to 12 inches over the top of the pipe's bedding material. Remove all rocks and hard lumps from the hand-placed layer. Compact and test in-place densities as indicated in subsection 301.05.

During backfilling, place the detectable warning tape approximately 18 inches above the pipe.

Flowable concrete backfill shall be 12 inches depth x 24 inches wide above the pipe’s sand bedding material and shall not extend below the asphalt pavement.

611.08 **MEASUREMENT** – Delete and revised the second paragraph to read as follows:

- a. Adjustment of existing water manholes and valve boxes shall be measured by the each, including excavation, backfilling, concrete and required waterline fittings and hardware to complete the work.
- b. Relocation of water meters and boxes shall be measured by the each including excavation, backfilling, and required waterline fitting and hardware to complete the work.
- c. Diversion of existing waterline pipe around a drainage or sewer line shall be measured by the each for each diversion, including pipe material and fittings, excavation, concrete work, and backfilling, with each diversion having a total pipe length of no less than 40 feet.
- d. Construction of new waterlines, relocation or adjustment of existing waterlines, including new pipes, fittings, valves, etc., shall be measured by the linear foot, installed, with no deduction for the length through tees, bends, valves, or other fixtures. Include trench excavation and backfilling work.
- e. Removal and relocation of fire hydrant assembly and gate valve assembly shall be measured per each, including excavation, concrete, new pipe and fittings, valves, and other required appurtenances for a complete installation.
- f. Measure flowable concrete fill in cubic yard when placed.

611.09 **PAYMENT** – Delete and revised the second paragraph to read as follows:

Payment will be made under:

Pay Item No.	Pay item	Pay Unit
61102(A)	Water Valve Box Cover Adjustment, complete-in-place	Each
61102(B)	Water Manhole Cover Adjustment, complete-in-place	Each
61104(A)	Relocate/Adjustment of Existing Water Meter to match with Finish Grade, Complete-in-place	Each
61104(B)	Waterline Pipe Diversion, including fittings and concrete encasement, complete-in-place	Each

61104(C)	Re-alignment of existing 2-inch waterline complete-in-place	Linear Foot
61104(D)	Relocate / adjust existing Fire hydrant, complete-in-place	Each

END OF SECTION 611