

SECTION 02605
PIPE, JOINTS, FITTINGS AND APPURTENANCES

PART 1 GENERAL

WORK INCLUDED

The work shall include providing all equipment, materials, labor and services required to provide all piping, joints, fittings and appurtenances specified and indicated.

PART 2 PRODUCTS

PIPE SELECTIONS

The Contractor shall install only one (1) type of pipe between structures except where ductile iron pipe is specified or indicated. Where existing pipe is to be replaced or extended the same type of pipe shall be installed, unless specified or indicated otherwise. All piping shall be installed in strict accordance with the recommendations of the manufacturer.

Water pipe shall be ductile cast iron.

Chemical feed lines shall be polyethylene tubing.

Ductile iron pipe shall conform with AWWA C 151/ANSI 21.51 and fittings shall conform with ANSI/AWWA C 110, or C153 (compact fittings). The pipe and fittings shall be asphalt coated and cement lined in accordance with AWWA C 104/ANSI 21.40. The pipe thickness shall conform with AWWA C 150/ANSI 21.50 and shall be Class 250, as a minimum, through the 12" size unless specified or indicated otherwise. Fittings for water pipe shall be mechanical or push-on joint. Fittings shall be either ductile iron or gray iron. For larger diameter pipe, pipe pressure class shall be 250. Polyethylene tubing shall conform to AWWA C 901 and shall be PE 2306 code designation. Tubing shall be the size indicated with a DR of 11.5.

JOINTS AND COUPLINGS

Ductile iron pipe and fittings for buried service shall be either mechanical or bell and spigot type joints as specified or indicated. Joints shall be made with a single watertight rubber gasket manufactured in accordance with AWWA C 111/ANSI 21.11. The joints shall be made in strict accordance with the recommendations of the pipe manufacturer. Joints for above ground or in-vault service shall be flanged joints in accordance with AWWA C115. Joints for polyethylene tubing shall be couplings manufactured by Ford Meter Box Company, Mueller, McDonald or equal.

WATER SYSTEM APPURTENANCES

Gate Valves and Blowoff Valves:

Gate valves shall be compression resilient seated valves conforming to AWWA C509. The valve shall be designed so that no sliding or shear on the resilient seating surface is present when compressed to a drop tight shut off. Valve shall seal equally well in either direction. Valve shall provide fully open waterway. Valve shall have O-ring sealing and a fusion bonded epoxy coating inside and out. Valve shall be permanently lubricated. Valve shall have a manganese bronze stem and nut with anti-thrust washers. Operating nut shall be 2 inch square. The valves shall be AFC-2500 by American Flow Control, Ken-Seal Fig. 4571, by Kennedy Valve, or F-6100 by Clow Corporation.

Each gate valve shall be provided with a valve box constructed of cast iron with a round base. The valve box shall be the sliding (screw) type with a five inch shaft and the cover shall be slotted for easy removal. Covers shall have the word "WATER" cast into them. The valve box shall be Tyler Model 562-S, Clow Model F-2454, or similar models as manufactured by Richard Foundry Corporation.

Restrained joints (harnessing assemblies) shall be provided where specified, and shall be suitable for a 150 psi working pressure and a 200 psi water hammer. Harnessing of joints shall be accomplished with friction clamps on each pipe and at least two tie bolts extending across the joint connecting the friction clamps, or with a bent bar strap extending around the fitting and across the fitting joint to a friction clamp on the adjacent length of pipe. Tie bolts and bent bar straps shall conform to ASTM A 193, grade B8M and shall be a minimum size of 5/8" diameter. All clamps, washers, tie bolts, and straps shall be galvanized steel, and shall comply with the requirements of the National Fire Protection Association Standard NFPA-24 for Outside Protection. The restraint devices shall be manufactured by ITI-Grinnell Corporation, Star Industries or equal. The LOK-FAST joint, as manufactured by American Cast Iron Pipe Company, the Megalug by Ebba Iron Inc., or equal, is an acceptable alternative to the tie bolt systems.

Tapping sleeves shall be manufactured from gray iron, meeting or exceeding ASTM A126 Grade B, or ductile iron, meeting ASTM A536 Grade 65-45-12. As an alternative, tapping sleeves can be all stainless steel (18-8 Type 304) style FAST as manufactured by Ford Meter Box Co. or equal. Tapping sleeves shall have mechanical joint ends and flanged outlets conforming to Class 125, ANSI B16.1. Outside coating of iron sleeves shall be asphaltic coating. Tapping valves shall meet the requirements of ANSI/AWWA C500. Tapping sleeves and tapping valves shall be supplied by the same manufacturer. Tapping sleeves shall be Mueller H-615, ADB4MJ Tapping Sleeve by American, or Fig. 920 or 921 by Kennedy. Tapping valves shall be Mueller H-667, American 665, or Fig 950X by Kennedy.

PART 3 EXECUTION - Not Used

SECTION 02841

WELL PUMP INSTALLATION

PRODUCTS

RISER PIPE

Galvanized steel pipe. Joints shall be threaded. Provided one check valve at the first joint in the riser pipe above the pump.

LEVEL DETECTION SYSTEM

System shall include 1/4 inch copper pipe extending 4 feet above the top of pump and attached securely to the well cap. Mounted above the well cap shall be a tire valve and pressure gauge. Pressure gauge shall be altitude type gauge reading directly in feet of water. All joints and fittings shall be made airtight. System shall be installed such that when air is applied at valve, gauge reads feet of water above pump.

EXECUTION

PUMP INSTALLATION

Contractor shall install pump, motor, discharge pipe, level detection system, discharge head, controls, wiring, piping, pitless adapter, sanitary well cap, and all other items for a complete, working installation.

DISINFECTION

The well shall be disinfected in accordance with ANSI/AWWA C 654 and Virginia Department of Health requirements following installation of the final pumping equipment. The method of chlorination shall be sodium hypochlorite. Disposal of chlorinated water shall be done in compliance with laws, regulations and ANSI/AWWA C654. If bacteriological tests fail or coliform is in any sample, follow procedures in ANSI/AWWA C654.

TESTING AND FINAL ACCEPTANCE

Completed well pump installation shall be operated under normal operating conditions. Installation, operation, and quality of water shall be acceptable to the Virginia Department of Health, and the Engineer. All defects shall be corrected by the Contractor at no cost to the Owner.

END OF SECTION

SECTION 02841

WATER SYSTEM INSTALLATION

PART 1 GENERAL

WORK INCLUDED

The work shall include the providing of all proper materials, equipment, tools, accessories, labor and services required to install the water system, complete-in-place, using sound standard engineering techniques and construction practices. QUALITY ASSURANCE

The water system installation shall conform to AWWA C600, latest revision, the manufacturer's recommendations, and the State Department of Health. Any equipment, tool or accessory found to be defective or not in a fit condition to accomplish the work continuously and expeditiously shall be promptly replaced with satisfactory equipment.

Include the expense of procuring the field services of experienced and qualified manufacturer representatives for the approved materials. The representative shall instruct the Contractor's employees as to the proper installation procedure for the particular material.

Comply with all codes, laws, ordinances and regulations of governmental authorities including, but not limited to, local municipalities having jurisdiction over this part of the work.

WORKING PRESSURE

The working pressure in the City system is 125 psi, depending on location.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

ADJUSTMENTS

Before the start of the construction, dig test pits on all crossings of and connections to determine existing system location, size and piping material. Based on the location and the elevation of the pipe in each test pit, the horizontal and vertical alignment of the new pipe shall be adjusted to avoid sharp changes in direction or localized high points.

LAYING PIPE AND INSTALLING APPURTENANCES

Proper implements, tools and facilities as approved by the Engineer shall be provided and used. All pipes, fittings, valves and appurtenances shall be lowered carefully into the trenches by means of derricks, ropes or other suitable equipment. Under no circumstances shall water system materials be dropped or dumped into the trenches. All pipe shall be installed with the bell ends facing the direction of laying or flow and in accordance with the recommendations of the pipe manufacturers and as directed by the Engineer.

The water pipe shall be laid and maintained at the required lines and grades with fittings and valves at the required locations. The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe, so as to leave a smooth end at right angles to the axis of the pipe. Care shall be taken to avoid damaging the lining. Flame cutting of pipe with oxyacetylene torch will not be permitted.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that a heavy, tightly woven canvas bag of suitable size be placed over each end of the pipe before lowering the pipe into the trench and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or other means approved by the Engineer. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Before joints are made the pipe shall be well bedded on a firm foundation and no pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. Any defects due to settlement shall be made good by the Contractor at his expense. Bell holes shall be dug sufficiently large to insure the making of proper joints.

All tees, bends, plugs and abrupt change in direction of the water lines three (3) inches and larger in diameter shall be either harnessed or provided with thrust blocks.

The trench may be curved to change direction or to avoid obstructions within the limits of the curvature of the pipe (joint deflections) as recommended by the pipe manufacturer. Where necessary, to maintain the required curvature, short sections of pipe or fittings shall be provided. Restraint shall be provided for these short sections of pipe or where fittings are provided for the water pipe.

H.All fittings and valves shall be supported by concrete independently of the pipe. All bends, tees, and changes in direction or changes in pipe size shall be provided with harnessing. Joints between the pipe and the mechanical joint fittings shall be made in accordance with the pipe manufacturer's requirements with a lubricant supplied by the pipe manufacturer. All nuts shall be tightened to the torque listed below:

BOLT SIZE - INCHES TORQUE - FT. LBS.

5/8	40 - 60
3/4	60 - 90
70 -100	1

Nuts shall be tightened on alternate sides of the gland until the pressure on the gland is equally distributed.

Valves shall be installed in accordance with ANSI/AWWA C 600 with the operator's stems in the vertical plane through the pipe axis and perpendicular to the pipe axis. Valves shall be located where shown on the drawings and shall be supported on a concrete cradle so that no load transfers to the pipe. Valves shall be thoroughly cleaned before installation and shall be checked for satisfactory operation. All underground valves shall be equipped with valve boxes. Valve boxes shall be set in alignment with the valve stem centered on the valve nut, and shall be set to prevent transmitting shock or stress to the valve. The cover shall be set flush with the finished ground surface or pavement.

CONNECTIONS TO EXISTING SYSTEM

Provide the connections to the existing system under a pressure condition as indicated, complying with the Owner's requirements for the time of day such work can be done. The tapping sleeves and valves shall be as specified in Section 02605. The Contractor shall pay all costs associated with the connections unless indicated otherwise.

DISINFECTION

All pipe shall be disinfected, tested and flushed in accordance with AWWA Standard C651 (latest revision). Water required for sterilization, testing and flushing shall be provided to the project site by the Owner, after the Contractor constructs the connecting water line.

Provide all materials, equipment, necessary taps and perform all work required for the sterilization, testing and flushing of the water main. All tests shall be performed only by an approved independent laboratory, paid for by the Contractor.

No tested section of water line shall be approved to deliver water service until a favorable laboratory report has been achieved. Any tested section of water line failing to meet the requirements specified shall be repaired by the Contractor and retested until the results are within the limits specified.

The water main or valved off section that has been completed shall be filled, tested and flushed. Test locations shall be subject to the discretion of the Engineer and as valves and blow-offs permit.

A chlorine-bearing compound (calcium Hypochlorite) shall be used to disinfect all water mains. The compound shall be manufactured in accordance with AWWA Standard B300 (latest revision) and shall be in 5 gram tablet form. After each length of pipe has been cleaned of debris and finally set and before installing the next length of pipe, place the chlorine-bearing tablet in the top of the pipe to provide a minimum concentration of 50 parts per million of free chlorine when the pipe line is filled with water.

The chlorine-bearing compound shall be placed within the pipe in 5 gram tablets in each 18 foot joint of pipe; and one tablet per hydrant, hydrant branch and other appurtenances. The tablets shall be placed in the following numbers per size of pipe: 3" & 4" one tablet; 6" - two tablets; 8" - four tablets; 10" - five tablets; 12" - seven tablets; 16" - thirteen tablets. The tablets shall be attached to the top of the pipe with Permatex No. 2 adhesive.

As soon as the main or valved off section has been laid and sufficiently backfilled for safety, water shall be turned on and the main allowed to fill slowly. The water flowing into the section shall not have a velocity greater than one foot per second. Care shall be exercised not to flush the main at this time. Air only shall be allowed to escape.

During the disinfection process, valves shall be manipulated to prevent the treatment dosage from falling back into the line supplying the water. The application shall not cease until the entire section is filled with the chlorine solution. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the system shall be operated in order to disinfect the appurtenances. At the end of this 24 hour period, the treated water shall be tested and shown to contain no less than 10 milligrams per liter of available chlorine throughout the section.

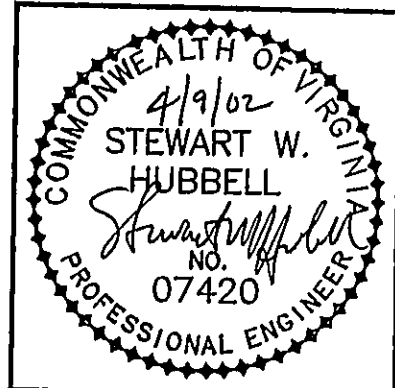
After the retention period, the heavily chlorinated water shall be flushed from the system until the chlorine concentration in the water leaving the system is no higher than that generally prevailing in the system, or less than one milligram per liter. The heavily chlorinated water shall not be allowed to flow into adjacent natural waterways. The chlorine residual determinations shall be made to ascertain that the heavily chlorinated water has been removed from the system. The disposal of the heavily chlorinated water shall be in accordance with Section 6 (and Appendix B) of AWWA C651.

After final flushing, and before the water system is placed in service, at least two consecutive bacteriologically satisfactory samples shall be collected from the end of the section and from each appurtenance. In no case shall the interval between bacteriological stations exceed 1000 feet. The samples shall be collected at least 24 hours apart. The samples shall be analyzed by a certified laboratory. Samples shall be tested for bacteriological quality and shall show the absence of coliform organisms. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. The Contractor shall arrange for and pay for all sampling and testing.

The Contractor, upon his request, will be provided with a copy of AWWA C651, standard for disinfecting water mains.

All water mains shall be hydrostatically tested.

END OF SECTION



Date									
Revisions									

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