SECTION 15068

PVC FORCE MAIN

PART 1- GENERAL

1.01 DESCRIPTION

This section includes materials, installation, and testing of PVC force main conforming to AWWA C900. Size range is 4 through 12 inches.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Painting and Coating: 09900.

B. Disinfection of Mains: UC-175.

C. Piping and Fittings: 15060

D. Cleaning and Testing Mains: UC-170.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the General Provisions.

B. Provide affidavit of compliance with AWWA C900.

C. Submit fully dimensioned cross-section of the bell and barrel of the pipe. Show the bell maximum outside diameter in the pressurized area and its minimum wall thickness at the same location.

D. Submit copies of the following manufacturer-required tests conducted on project pipe:

1. Quick-burst strength of pipe and couplings.

2. Flattening resistance of pipe.

3. Record of additional tests after test sample failure.

E. Submit manufacturer's literature of gray iron and ductile-iron fittings including dimensions, thickness, weight, coating, lining, and a statement of inspection and compliance with the acceptance tests of AWWA C110 or C153. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate that the minimum safety factor described in AWWA C153 is met.

F. Submit outline drawings and materials description of service connection saddles, corporation stops, and pipe plugs.

G. Submit test results for the restrained joint system to be used certified by an independent test laboratory demonstrating compliance with these specifications for each size and pressure rating.

H. Submit restrained joint system installation instructions. Include bolt torque limitations and assembly tolerances.

1.04 MANUFACTURER'S SERVICE

Provide pipe manufacturer's services at the jobsite for the following minimum labor days, travel time excluded: One labor-day to instruct the Contractor's personnel in the preparation and execution of rubber-gasket and solvent-welded joints for the sizes of pipes to be installed in the project.

1.05 MEASUREMENT AND PAYMENT

Payment for the work in this section will be by the linear foot of each size of pipe (including fittings) of each pressure class measured horizontally.

PART 2 - PRODUCTS

2.01 PIPE

A. Pipe 4-inches through 12 inches shall conform to AWWA C900, rubber-ring gasket bell end or plain end with elastomeric gasket coupling, DR 18 or as shown in the drawings, cast iron equivalent outside diameter, material cell classification 12454 per ASTM D1784, latest revision.

2.02 FITTINGS

A. Fittings shall conform to AWWA C153, latest revision or AWWA C110, latest revision.

2.03 LINING AND COATING FOR FITTINGS

Line and coat fittings with fusion-bonded epoxy.

2.04 FLANGES

A. Flanges on outlets of fittings shall be Class 250 per ASME B16.1.

B. PVC flanges shall be of the one-piece solid socket design and shall be made of the same material as the pipe. Manufacturer’s pressure rating shall be at least 250 psi at a temperature of 73°F. Minimum burst pressure shall be 500 psi. Flanges shall match the dimensions of ASME B16.5, Class 250, steel flanges for outside diameter, bolt circle, and bolt holes. Do not use Van Stone flanges.

2.05 OUTLETS AND NOZZLES

A. For outlets larger than 2 inches, use a Ductile Iron tee with a flanged or MJ outlet.

2.06 RESTRAINED JOINTS

Provide restrained joints where indicated in the drawings. Restrained joints shall be provided by restraining systems that incorporate a wedge restraints on the restraint ring to provide positive restraint.

A. Restraint devices for bell-and-spigot joints shall consist of a split restraint ring installed on the spigot, connected to a solid backup ring seated behind the bell.

B. Restraining Glands shall be EBAA Iron Series 2000 and 1600 or approved equal.

C. The ASTM A536 ductile iron casting of the restrained gland shall be bonded powder coated. The wedge and wedge assembly shall have a bonded liquid polymer coating applied for corrosion protection. The gland shall utilize torque limiting twist off wedge actuation screws.

D. T-bolts, studs, and connecting hardware shall be high-strength, low alloy material in accordance with AWWA C111.

E. Design restraining devices to have a 2:1 safety factor based on the design strength of the pipe.

2.07 FLANGED COUPLING ADAPTERS

See Section 15065.

2.08 WYE STRAINERS

PVC wye strainers shall be manufactured of the same material as the pipe, with 30-mesh screens and Viton seals. Connecting ends shall be the socket type, solvent welded. Provide one spare screen for each strainer.

PART 3 - EXECUTION

3.01 PRODUCT MARKING

Legibly mark pipe at 5-foot intervals and each coupling to identify the nominal diameter, the outside diameter base, that is, cast-iron or steel pipe (IPS), the material code for pipe and couplings, the dimension ratio number, AWWA C900, and the seal of the testing agency that verified the suitability of the material for potable water service (NSF).

3.02 DELIVERY AND TEMPORARY STORAGE OF PIPE

A. Ship, store, and place pipe at the installation site, supporting the pipe uniformly. Avoid scratching the pipe surface. Do not stack higher than 4 feet or with weight on bells. Cover to protect from sunlight.

B. Do not drag PVC pipe over the ground, drop it onto the ground, or drop objects on it.

C. Store loose pipes on racks with a maximum support spacing of 3 feet. Provide shades for pipe stored outdoors or installed outdoors until the pipe is filled with water. Store fittings indoors in their original cartons.

D. Store solvent cement indoors or, if outdoors, shade from direct sunlight exposure. Do not use solvent cements that have exceeded the shelf life marked on the storage container.

3.03 HANDLING PIPE

Hoist pipe with mechanical equipment using a cloth belt sling or a continuous fiber rope that avoids scratching the pipe. Do not use a chain. Pipes up to 12 inches in diameter may be lowered by rolling on two ropes controlled by snubbing. Pipes up to 6 inches in diameter may be lifted by hand.

3.04 INSTALLING BURIED PIPING

A. Bedding material and backfill to 1 foot above the pipe for PVC shall be Type 1 backfill with a max rock size of ¾-inch compacted in 6-inch lifts. The minimum trench width shall be the pipe width plus 24-inches (12-inches on each side).

B. Before installation, check pipe and fittings for cuts, scratches, gouges, buckling, kinking, or splitting on pipe ends. Remove any pipe section containing defects by cutting out the damaged section of pipe.

C. Do not install PVC pipe when the temperature is below 40°F or above 90°F.

D. Do not install pipe that is gouged or scratched forming a clear depression.

E. Install in accordance with AWWA C605, and as follows.

1. When installing pipe in trenches, do not deviate more than 1 inch from line or 1/4 inch from grade. Measure for grade at the pipe invert.

2. Backfill materials in the pipe zone shall be imported sand per Section 02315. Do not add successive layers unless the previous layer is compacted to 90% relative compaction per ASTM D1557.

3. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.

4. Compact trench backfill to the specified relative compaction. Do not float pipe. Do not use high-impact hammer-type equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe.

3.05 PIPE LAYOUT FOR CURVED ALIGNMENT

Complete curves using straight pipe, and effecting deflection at the joint. Pipe lengths may not be bent for curved alignment.

3.06 ASSEMBLY OF RUBBER-GASKET PIPE JOINT

A. The spigot and bell or bell coupling shall be dirt free and slide together without displacing the rubber ring. Lay the pipe section with the bell coupling facing the direction of laying.

B. Insert the rubber ring into the groove in the bell in the trench just before joining the pipes. First clean the groove. Observe the correct direction of the shaped ring. Feel that the ring is completely seated.

C. Lubricate the spigot over the taper and up to the full insertion mark with the lubricant supplied by the pipe manufacturer. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant.

D. Insert the spigot into the bell and force it slowly into position.

E. Check that the rubber ring has not left the groove during assembly by passing a feeler gauge around the completed joint.

3.07 FIELD HYDROSTATIC TESTING

Test pressures are shown in Section UC-170. Test in accordance with Section UC-170.

END OF SECTION