SECTION 15292 – POLYVINYL CHLORIDE (PVC) PRESSURE PIPE FOR POTABLE WATER (C900 AND C905)

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes materials, installation, and testing of PVC pressure pipe conforming to AWWA C900, size range 4" – 12", and AWWA C905, 14" – 24".

1.2 RELATED WORK SPECIFIED ELSEWHERE

1. Section 01047 – Connection to Existing Facilities
2. Section 01300 – Record Drawings and Submittals
3. Section 02223 – Trenching, Backfilling, and Compaction
4. Section 09800 – Painting and Coating
5. Section 15000 – General Piping System and Appurtenances
6. Section 15056 – Ductile Iron Fittings
7. Section 15300 – Tracer Wire for Nonmetallic Pipe
8. City of Oceanside Water, Wastewater, and Recycled Water Design and Construction Manual (Water Utilities Manual)

1.3 SUBMITTALS

A. Submit shop drawings in accordance with the standard specifications.

B. Provide affidavit of compliance with AWWA C900 or C905.

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 the project pipe:

1. Quick-burst strength of pipe and couplings.
2. Flattening resistance of pipe.
3. Impact resistance of pipe
4. Acetone-immersion test of pipe material
5. Internal pressure and vacuum tests of joints per ASTM D 3139
6. Laboratory tests of gaskets per ASTM F 477
7. Record of additional tests after test sample failure.

E. Submit manufacturer's literature on 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 a minimum safety factor of three times the rated working pressure as described in AWWA C153, Section 5.5.

F. Submit manufacturer's catalog data and descriptive literature for high deflection couplings, repair couplings, service saddles, restrained joints, tracer wire, marking tape, and miscellaneous piping materials.

1.4 INSPECTION AND FIELD VERIFICATION

A. Where new pipelines are to be connected to existing pipelines of the AGENCY, the CONTRACTOR shall verify in the field the location, elevation, pipe material, pipe outside diameter, and any other characteristics of the existing pipeline before proceeding with the pipe installation. This field verification shall be performed in the presence of the AGENCY. Adjust and align the new piping as necessary to meet the field conditions and provide all required material, labor, and equipment to make the connection.

PART 2 - MATERIALS

2.1 PVC PIPE

A. PVC pipe shall be provided in accordance with the Water Utilities Manual and these specifications.

B. Pipe shall be made from unplasticized PVC compounds having a minimum cell classification of 12454 as defined in ASTM D1784. The compound shall qualify for Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4-degrees Fahrenheit, in accordance with the requirements of ASTM D2837.

C. Provide pipe in standard 20-foot laying lengths, unless noted otherwise. Random lengths will not be permitted.

D. Pipe shall incorporate an integral bell joint system using Rubber Gasket System technology and a single rubber gasket conforming to ASTM F477. Joints shall be designed to meet the zero leakage test requirements of ASTM D3139.

E. Pipe shall meet the requirements of ANSI/NSF 61 Drinking Water System Components—Health Effects.

2.2 HIGH DEFLECTION COUPLINGS

A. For C900 PVC pipe, PVC couplings shall be in accordance with the Water Utilities Manual.

B. Provide CertainTeed High Deflection (HD) Stop Couplings, or AGENCY approved equal.

2.3 CLOSURE/REPAIR COUPLINGS

A. For C900 PVC pipe, PVC couplings shall be in accordance with the Water Utilities Manual.

B. Provide couplings for cast iron equivalent outside diameter with working pressure rating to match adjoining pipe.

C. Provide CertainTeed High Deflection (HD) Closure/Repair Couplings, or AGENCY approved equal.

2.4 FITTINGS

A. Ductile iron (DI) fittings shall be provided in accordance with the Water Utilities Manual and the standard specifications.

B. All DI fittings shall have the interior lined with double cement mortar.

C. Provide exterior coating in accordance with the Water Utilities Manual and the standard specifications.

D. All DI fittings shall have concrete thrust blocks as shown on the Plans.

2.5 FLANGES

A. Flanges on ductile iron fittings shall be in accordance with the Water Utilities Manual.

2.6 BOLTS, NUTS AND GASKETS FOR FLANGES

A. Bolts, nuts, and gaskets shall be in accordance with the Water Utilities Manual, except that gaskets for sewer force main DI flanges shall be Garlock 3000, or AGENCY approved equal.

2.7 POLYETHYLENE (PE) ENCASEMENT AND WAX TAPE COATING

A. PE encasement and wax tape coating shall be in accordance with Water Utilities Manual.

2.8 TRACER WIRE

A. Tracer wire shall be in accordance with the Water Utilities Manual and the standard specifications.

2.9 MARKING TAPE

A. Marking tape shall be in accordance with the Water Utilities Manual.

PART 3 - EXECUTION

3.1 PRODUCT MARKING

A. Legibly mark pipe in blue at 5-foot intervals and on each coupling to identify the nominal pipe size, OD base, PVC, dimension ratio number and pressure class, AWWA C900 or C905, manufacturer's name or trademark and production record code, and the seal of the testing agency that verified the suitability of the material for potable water service where applicable.

3.2 DELIVERY AND TEMPORARY STORAGE OF PIPE

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

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

C. Do not install pipe contaminated with a petroleum product (inside or outside).

D. Do not install any pipe that shows evidence of exposure to sunlight, age, surface deterioration, or other physical damage. The decision of the AGENCY shall be final as to the acceptability of the pipe to be installed.

3.3 HANDLING OF PIPE

A. Lift pipes with mechanical equipment using wide belt slings or a continuous fiber rope which avoids scratching the pipe. Do not use cable slings or chains. 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 can be lifted by hand.

3.4 SANITATION OF PIPE INTERIOR

A. During laying operations, do not place tools, clothing, or other materials in the pipe.

B. When pipe laying is not in progress, including the noon hour, close the ends of the installed pipe with a plug to deter entry of vermin, persons, dirt, storm water, or foreign material.

3.5 PIPE LAYOUT FOR STRAIGHT AND CURVED ALIGNMENTS

A. Deflections at the joint are not allowed. Deflections shall be made only with the use of high deflection couplings in accordance with the Water Utilities Manual and this specification section.

3.6 INSTALLING PIPE IN TRENCH

A. See the standard specifications for trenching, backfilling, and compaction requirements.

B. Inspect each pipe and fitting before lowering into the trench. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying pipe.

C. Handle pipe in a manner to avoid any damage to the pipe. Do not drag pipe over the ground, drop it onto the ground, or drop objects on it. Do not drop or allow pipe to fall into trenches.

D. Laying tolerances for the installed pipe shall not vary greater than 0.1-foot horizontally, or greater than 0.1-foot vertically from the alignment and elevations shown on the Drawings.

E. Grade the bottom of the trench to the line and grade to which the pipe is to be laid. Remove hard spots that would prevent a uniform thickness of pipe base material (imported sand). Before laying each section of the pipe, check the grade and correct any irregularities found. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of pipe handling slings.

F. At the location of each joint, dig bell holes in the bottom of the trench and at the sides to permit visual inspection of the entire joint and to prevent the pipe from being supported by the bell end or fitting.

G. Keep the trench in a dewatered condition during pipelaying.

3.7 ASSEMBLING PIPE JOINTS

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

B. Clean the groove of the bell or coupling of all foreign materials. If the gasket groove is dirty or contains debris, carefully remove the gasket and clean the groove. Insert the gasket back into the groove of the bell or coupling prior to installation. Observe the correct direction of the shaped gasket. Feel that the gasket is completely and evenly seated in the groove.

C. Mark the full insertion depth on the spigot end of the pipe. This mark indicates when the pipe is fully inserted into the bell or coupling. Lubricate the exposed gasket surface and the beveled spigot up to the full insertion mark with the lubricant supplied by the pipe manufacturer. For repair couplings, lubricate pipe for the entire distance the coupling will travel on the pipe. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant.

D. Insert the spigot into the bell or coupling and force it slowly into position. Do not over insert the spigot into the bell.

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

3.8 INSTALLING BURIED FITTINGS

A. The AGENCY will inspect all fittings prior to installation for damage to the interior protective coatings. Coating shall be holiday free on interior surfaces. Patch damaged areas in the field with material similar to the shop applied original.

B. For push-on joint fittings, clean the bell ends of the fitting of all foreign material and dirt. Insert the gasket in the groove of the bell and make sure the gasket faces the correct direction. Feel that the gasket is completely and evenly seated in the groove. When pipe is cut in the field, bevel the plain end prior to installation. Lubricate the exposed gasket surface and the beveled pipe spigot with the same lubricant supplied by the pipe manufacturer.

Insert the spigot into the bell and force it slowly into position. Keep the joint straight while pushing the spigot into the bell.

C. When necessary to deflect pipe from a straight line in either the horizontal or vertical plane, use a high deflection coupling in accordance with the Water Utilities Manual and this specification section.

3.9 INSTALLING FLANGED JOINTS

A. See the standard specifications for installation requirements.

3.10 INSTALLING RESTRAINED JOINTS

A. Follow the manufacturer's installation instructions for the restrained joint system. Tighten the clamping bolts on the restraint rings to the recommended torque. Do not over-tighten the retaining nuts behind the restrainer ears.

B. Wrap restrained joint including bolts and nuts with wax tape coating in accordance with th Water Utilities Manual.

3.11 INSTALLING FLANGE COUPLING ADAPTERS

A. Install flange coupling adapters in accordance with the standard specifications.

3.12 INSTALLING POLYETHYLENE ENCASEMENT AND WAX TAPE COATING

A. Wrap buried service saddles, fittings, flanged joints, and restrained joints with two layers of polyethylene (PE) material and wax tape in accordance with the Water Utilities Manual.

3.13 INSTALLING TRACER WIRE

A. Prior to backfill, install tracer wire on top of pipe and secure in place with ties or hitches at maximum 10-foot intervals in accordance with the Water Utilities Manual. Run tracer wire continuously along pipe and terminate in access points. Only adjacent valve boxes or assembly boxes are acceptable access points. Where buried splices occur, use an electrical splicing kit 3M Brand DBR Direct Bury Splice Kit, or AGENCY approved equal. Provide no less than 24 inches of coiled wire at access points for attachment of pipe locating equipment. Each installed run of pipe shall be capable of being located using the tracer wire. Protect wire insulation from damage during installation and backfilling. Wire insulation that is broken, cut, or damaged shall be replaced.

3.14 INSTALLING MARKING TAPE

A. Install in accordance with the Water Utilities Manual. Run tape continuously along the trench and tie ends of tape together.

3.15 PRESSURE TESTING

A. Upon completion of accepted backfill and temporary pavement placement, but prior to permanent pavement placement, perform hydrostatic pressure test for potable water mains in accordance with the Water Utilities Manual, except that hydrostatic test pressure shall be 1.5 times pressure class of the pipe.

3.16 CONNECTIONSTO EXISTING FACILITIES

A. Connections to existing facilities shall be per the standard specifications.

****END OF SECTION****