SECTION 15000 – GENERAL PIPING SYSTEMS AND APPURTENANCES

PART 1 – GENERAL

1.1 DESCRIPTION

A. The CONTRACTOR shall furnish and install all piping systems shown and specified, in accordance with the requirements of the approved plans and standard specifications. Each system shall be complete with all necessary fittings, hangers, supports, anchors, seismic restraints, expansion joints, flexible connectors, valves, accessories, tracing, insulation, lining and coating, testing, excavation, backfill and encasement, to provide a functional installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Record Drawings and Submittals

B. Section 01600 – Materials and Equipment

C. Section 02140 – Dewatering

D. Section 02222 – Protecting Existing Underground Utilities

E. Section 01223 – Trenching, Backfilling and Compacting

F. Section 09800 – Painting and Coating

G. City of Oceanside Water, Wastewater, and Recycled Water Design and Construction Manual (Water Utilities Manual)

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Uniform Mechanical Code

B. Uniform Plumbing Code

C. Uniform Fire Code

D. Commercial Standards: All equipment, products, and their installation shall be in accordance with the following standards, as applicable, and as indicated in each Section:

1. American Society for Testing and Materials (ASTM)

2. American National Standards Institute (ANSI)

3. American Society of Mechanical Engineers (ASME)

4. American Water Works Association (AWWA)

5. American Welding Society (AWS)

6. American Iron and Steel Institute (AISI)

7. National Fire Protection Association (NFPA)

E. The following standards have been referenced in this Section:

ANSI B16.1	Gray Iron Pipe Flanges and Flanged Fittings
ANSI B16.5	Pipe Flanges and Flanged Fittings, NPS ½ through NPS 24
ANSI/AWWA C207	Steel Pipe Flanges for Water Works Service, Sizes 4 in through 144 in
ANSI/AWS D1.1	Structural Welding Code – Steel
ASTM A 193	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM A 307	Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength
ASTM A 325	Specification for High-Strength Bolts for Structural Steel Joints
ASTM A 563	Specification for Carbon and Alloy Steel Nuts
ASTM/AWWA C219	Bolted, Sleeve-Type Couplings for Plain-End Pipe
AWWA Manual M11	Steel Pipe – A Guide for Design and Installation

1.4 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems for review by the AGENCY in accordance with the standard specifications, and as indicated in the individual piping sections. The shop drawings shall include dimensions and details on pipe joints, fittings, fitting specials, harnessed joints, valves, and appurtenances, and shall include design calculations and material lists. The submittals shall include detailed layout, spool, or fabrication drawings which show all pipe spools, spacers, adapters, connectors, fittings, and pipe supports and seismic restraints necessary to accommodate the equipment and valves provided in a complete and functional system.

B. Where new pipelines connect to existing pipelines, submit individual details for each connection point of the layout, including fabrication drawings which show all pipe spools, spacers, adapters, connectors, closure pieces, fittings, and pipe supports, thrust blocks and seismic restraints necessary to accommodate the equipment and valves provided in a complete and functional system.

C. The CONTRACTOR shall submit information containing the following:

1. Manufacturer’s product data.

2. Manufacturer’s installation instructions.

3. Manufacturer's certification of compliance.

1.5 QUALITY ASSURANCE

A. Inspection: All pipe shall be subject to inspection at the place of manufacture. The CONTRACTOR shall notify the AGENCY in writing of the date for the start of each phase of pipe production and the dates for the proof of design tests. The notification shall be given at least 15 days prior to the start of the pipe manufacture. During the manufacture of the pipe, the AGENCY shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with the standard specifications.

B. Tests: Except where otherwise indicated, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards. Welds shall be tested as indicated. The CONTRACTOR shall perform all tests. All costs for testing shall be borne by the CONTRACTOR. Copies of all test reports shall be submitted to the AGENCY.

1.6 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Where the assistance of a manufacturer's service representative is advisable in order to obtain the specified pipe joints, supports, or special connections, the CONTRACTOR shall furnish such assistance at no additional cost to the AGENCY.

1.7 MATERIAL DELIVERY, STORAGE, AND PROTECTION

A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and shall be stored off the ground to provide protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials.

1.8 CLEANUP

A. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site by the CONTRACTOR. The entire piping system shall be handed over to the AGENCY in a clean and functional condition.

PART 2 – MATERIALS

2.1 GENERAL

A. All pipes, fittings, and appurtenances shall be furnished in accordance with the requirements of the approved plans and the Water Utilities Manual.

B. Pressure Rating: All piping systems shall be designed for a minimum pressure of 250 psi.

C. Alternative pipe materials including but not limited to Fusible Polyvinyl Chloride (PVC) and High Density Polyethylene (HDPE) pipe with require AGENCY approval prior to design and construction.

2.2 PIPE FLANGES

A. Flanges: Flanges on ductile iron pipe and fittings shall conform to the Water Utilities Manual. All flanges shall be flat faced.

B. Flange coating shall be in accordance with the Water Utilities Manual.

C. Flange Nuts and Bolts: All bolts and nuts shall conform to the Water Utilities Manual. Studs and bolts shall extend through the nuts a minimum of 1/2-inch. All-thread studs shall be used on all valve flange connections, where space restrictions preclude the use of regular bolts.

D. Flange Gaskets: Gaskets shall be in accordance with the Water Utilities Manual.

E. Insulating Flanges: Insulated flanges bolt holes shall be drilled oversize by an amount equal to two times the insulating sleeve thickness to maintain the same minimum clearance for bolts.

F. Insulating Flange Sets: Insulating flange sets shall be provided where shown on the approved drawings. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers and a steel washer. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2 inches or smaller and shall be made of acetyl resin. For bolt diameters larger than 1-1/2 inches, insulating sleeves and washers shall be two-piece and shall be made of polyethylene or phenolic. Steel washers shall be in accordance with ASTM A325. Insulating gaskets shall be full-face.

G. Insulating Flange Manufacturers, or approved equal:

1. Calpico, Inc.

2. Farwest

3. PSI Products, Inc., Gardena, California.

2.3 THREADED INSULATING CONNECTIONS

A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other nonconductive materials, and shall have ratings and properties to suit the service and loading conditions.

C. Manufacturers: Isojoint or approved equal.

2.4 PIPE THREADS

A. All pipe threads shall be in accordance with ANSI/ASME B1.20.1

2.5 FLEXIBLE PIPE COUPLINGS FOR PLAIN END DUCTILE IRON PIPE, PVC PRESSURE PIPE, OR PVC DISTRIBUTION PIPE

A. Flexible pipe couplings for ductile iron pipe, PVC pressure pipe, or PVC distribution are not allowed. See Water Utilities Manual.

2.6 TRANSITION COUPLINGS

A. Transition couplings for connecting different pipes having different outside diameters shall be steel: Dresser Style 62 or 162, Smith-Blair Series 413 or 415, Baker Series 212 or 220, or approved equal.

2.7 FLANGED COUPLING ADAPTERS FOR DUCTILE IRON PIPE, PVC PRESSURE PIPE, OR PVC DISTRIBUTION PIPE

A. Flanged coupling adapters for ductile iron pipe, PVC pressure pipe, or PVC distribution pipe shall be cast iron, ductile iron, or steel: Dresser Style 127 or 128, Smith-Blair Type 912 or 913, Baker Series 601 or 602, or approved equal. Flange ends shall match the flange of the connecting pipe.

2.8 FLANGED COUPLING ADAPTERS FOR EXISTING ASBESTOS CEMENT PIPE

A. Flanged coupling adapters for existing asbestos cement pipe shall be cast iron or ductile iron: Dresser Style 127 or 128, Smith-Blair Series 912, or AGENCY approved equal. Flange ends shall match the flange of the connecting pipe. Verify in the field the actual outside diameter of the existing pipe to be connected.

2.9 LINING AND COATING FOR COUPLINGS

A. Coat interior and exterior ferrous surfaces of flexible pipe couplings, transition couplings, and flanged coupling adapters with epoxy in accordance with the standard specifications. Coating shall be holiday free on interior surfaces. Buried couplings shall be wax tap coated in accordance with Water Utilities Manual.

2.10 SERVICE SADDLES

A. Service saddle shall be in accordance with the Water Utilities Manual.

PART 3 - EXECUTION

3.1 GENERAL

A. All pipes, fittings, and appurtenances shall be installed in accordance with the requirements of these standard specifications and approved plans.

B. Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction to avoid damage to embedded raceways and rebar.

3.2 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, children, dirt, storm water, or foreign material.

3.3 INSTALLING COUPLINGS

A. Clean oil, grease, scale, and dirt from pipe ends. Repair any damage or holidays in the shop applied coating before installing couplings. Clean gaskets in flexible pipe couplings, transition couplings, and flanged coupling adapters before installing.

B. Clean sleeve bolts and nuts by wire brushing before installing in follower rings. Lubricate threads of bolts and nuts with oil or graphite prior to installation. Tighten nuts uniformly and in a progressive diametrically opposite sequence, and torque with a calibrated torque wrench.

C. If couplings leak under pressure testing, loosen or remove the nuts and sleeve bolts, reset or replace the gaskets, reinstall or retighten the bolts and nuts, and retest the coupling. Couplings shall be watertight.

D. After testing, wrap sleeve bolts and nuts of buried couplings with wax tape coating in accordance with Water Utilities Manual.

3.4 INSTALLING SERVICE SADDLES

A. Place the service saddle on the pipe and hand tighten the nuts while positioning the saddle in its final location. Uniformly tighten the nuts in a progressive diametrically opposite sequence and torque with a calibrated torque wrench to the saddle manufacturer’s recommended values.

B. Connect a corporation stop to the saddle. Apply Teflon joint compound or tape to the male threads before installing the corporation stop. Make joints watertight.

C. Mount a tapping machine on the corporation stop to cut a hole in the pipe with a shell type cutter made specifically for PVC pipe. Do not use other devices or hand equipment to bore through the pipe wall.

D. Submit method for tapping other pipe materials to AGENCY prior to installation.

3.5 INSTALLING FLANGED PIPING

A. Flanges shall be coated in accordance with the Water Utilities Manual.

B. Set pipe with the flange bolt holes straddling the pipe horizontal and vertical centerline. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment. Before bolting up, align flange faces to the design plane within 1/16-inch per foot measured across any diameter. Align flange bolt holes within 1/8-inch maximum offset.

C. Clean bolts, nuts, washers and flange faces by wire brushing before installing gasket and adjoining flange. Inspect gasket seating surfaces, gasket, each bolt, nut, washer, and facing on which the nuts will rotate. Replace any damaged item.

D. Lubricate threads in accordance with the Water Utilities Manual. Assemble all bolts, nuts, and washers in the flange, and then tighten nuts in a progressive diametrically opposite sequence, and torque with a calibrated torque wrench. All clamping torque shall be applied to the nuts only.

E. Bolt lengths shall extend a minimum of ½" through their nuts.

F. Do not use more than one gasket between contact faces in assembling a flanged joint.

G. Place washers under all nuts. Place washers under bolt heads where the flanges have been epoxy coated. Do not damage coated surfaces during installation.

H. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight. Replace galled, cracked, or distorted bolts and nuts.

3.6 INSTALLING BLIND FLANGES

A. At outlets not indicated to be connected to valves or to other pipes and to complete the installed pipeline hydrostatic test, provide blind flanges with bolts, nuts, washers, and gaskets.

B. Blind flanges shall be coated in accordance with the Water Utilities Manual.

3.7 INSTALLING POLYETHYLENE ENCASEMENT

A. Wrap buried couplings and adapters with polyethylene material in accordance with Water Utilities Manual.

3.8 PAINTING AND COATING

A. Coat flexible pipe couplings, transition couplings, flanged coupling adapters and joint harnesses located aboveground, or in vaults and structures, the same as the adjacent pipes and in accordance with the standard specifications. Apply finish coats in the field. Color of finish coat shall match color of the adjacent piping.

3.9 INSTALLING MARKING TAPE

A. After the pipe zone has been backfilled and compacted, place the marking tape on the compacted pipe zone material and center over the pipe. Run tape continuously along the trench and tie ends of tape together.

3.10 PRESSURE TESTING

A. Test couplings and adapters at the same time that the connecting pipelines are pressure tested in accordance with Water Utilities Manual and standard specifications.

****END OF SECTION****