

## SECTION 02618 - REINFORCED CONCRETE PRESSURE PIPE

### City of San Diego, CWP Guidelines

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NTS: The reinforced concrete pressure pipe, non-cylinder type, covered by this Section 02618, which conforms to AWWA C302's rational design method and joint design, is primarily intended for pressure applications of up to 43 psi where a very limited amounts of leakage is acceptable. This pipe is normally furnished with a Carnegie bell and spigot steel joint or a raised or flush bell concrete joint with a single rubber gasket. For subaqueous installations, pipelines installed below the water table and tunnel liner applications, the double rubber gasket feature is preferred, which should be clearly shown or defined in paragraph 2.4 below.

This Section is coordinated with Section 02600 such that it requires inclusion of that Section in the Contract Document.

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#### PART 1 -- GENERAL

##### 1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing reinforced concrete pressure pipe, non-cylinder type.

##### 1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
  - 1. Section 02140 Dewatering
  - 2. Section 02200 Earthwork
  - 3. Section 02600 Pipeline Construction
  - 4. Section 02653 Fabricated Steel Pipe and Specials
  - 5. Section 02666 Water Pipeline Testing and Disinfection
  - 6. Section 03300 Cast-in-Place Structural Concrete

##### 1.3 STANDARD SPECIFICATIONS

- A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

##### 1.4 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ASTM C 33 Specifications for Concrete Aggregates
2. ASTM C 150 Specification for Portland Cement
3. ASTM C 497 Testing concrete Pipe, Sections, or Tile
4. AWWA C302 Reinforced Concrete Pressure Pipe, Noncylinder Type, for Water and Other Liquids

#### 1.5 SHOP DRAWINGS AND SAMPLES

A The following shall be submitted in compliance with Section 01300:

1. Fabrication Drawings: Manufacturer's drawings shall illustrate details including wall thickness, pipe joint, joint gasket, and reinforcement. Reinforcement details shall include the type of cage, the location of the cages in the pipe wall, the size and spacing of circumferential and longitudinal reinforcing steel, and the cross-sectional area of reinforcing steel in each cage per lineal foot of pipe. The gasket details shall include the diameter of the cross section and the circumferential length.
2. Manufacturer's instructions for installation of pipe.
3. Tabulated Layout Schedule: A tabulated layout schedule in accordance with AWWA C302 shall be provided.
4. Test Results: Provide results of concrete compression, D-load, and hydrostatic tests as indicated herein.

#### 1.6 FACTORY INSPECTION AND TESTING

A The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for [two] OWNER-designated inspectors for [ ] days required to complete such inspections or observations exclusive of travel days, if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400.

B. Inspection and testing at the manufacturer's plant shall be in accordance with AWWA C302 and the following supplemental requirements:

1. **General:** The CONSTRUCTION MANAGER shall be notified of the place and time of testing two weeks prior to the commencement of testing. The CONSTRUCTION MANAGER will witness all testing conducted by the CONTRACTOR; provided, that the CONTRACTOR's schedule is not delayed for the convenience of the CONSTRUCTION MANAGER.
2. **Concrete Compression Tests:** Compression tests shall comply with AWWA C302.
3. **D-Load Tests:** Pipe shall be tested in accordance with ASTM C 497. Loads used for testing shall be the load to produce the 0.01-inch crack or the design test load, whichever is less. One percent of the total number of pipes, with a minimum of three pipe lengths, and at least one of each size and class shall be tested.

- [4. **Hydrostatic Tests:** Pipe and joints shall be tested in accordance with AWWA C302. The number of pipe sections to be tested shall be not more than 1 percent of the total number of sections of each size and class, except that at least one test of each size and class of pipe shall be made.]

## 1.7 FIELD TESTING

- A. Field testing shall conform to the requirements of Section 02666.

## PART 2 -- PRODUCTS

### 2.1 REINFORCED CONCRETE PIPE

- A. **General:** Reinforced concrete pressure pipe shall conform to Subsection 207-5 of SSPWC, AWWA C302 and the following provisions. Pipe shall have bell and spigot type joints with single rubber gaskets. Except where shorter lengths or special sections are required, pipe sections shall have a minimum length of 8 feet. The maximum lengths shall be in accordance with AWWA C302.
- B. **Pipe Design:** Pipe shall be designed for an internal pressure of not less than [ ] feet of water, and an external load of [ ] (D-load).
- C. **Marking of Pipe:** Each pipe section shall be plainly marked in accordance with AWWA C302 and shall contain the following supplementary information:
1. Name of manufacturer
  2. Date of manufacture

### 2.2 PIPE MATERIALS AND FABRICATION

- A. Materials used in the fabrication of reinforced concrete pressure pipe shall conform to the following requirements:
1. Cement: Cement shall conform to ASTM C 150, Type [II] [V].
  2. Aggregate: Fine and coarse aggregates shall conform to the requirements of ASTM C33.
  3. Rubber Gasket: Rubber gaskets for use with bell and spigot pipe shall conform to AWWA C302.
  4. Steel for reinforcement, joint rings and fittings shall conform to the requirements of AWWA C302.

### 2.3 PIPE FITTINGS AND SPECIALS

- A. Unless otherwise indicated, pipe fittings and specials for reinforced concrete pressure pipe shall meet the requirements of Section 02653.
- B. Specials include bends, reducers, wyes, tees, crosses, outlets, and manifolds wherever located, and all piping above ground or in structures.

NTS: The Specifier shall add special considerations and criteria for joint design, for information of the pipe manufacturer, to withstand any anticipated: future settlement in soft ground; liquefaction induced by seismic activity; joint rotation which may be necessary to accommodate changes in line and grade; and other special project-specific features.

In areas where differential settlement or liquefaction may occur, specify only raised bell joints and limit pipe length. Consider including or modifying Standard Detail C-195.

## 2.4 JOINT DESIGN

- A. Joint assembly design shall be either a Carnegie bell and spigot steel joint or a raised for flush bell concrete joint with a single rubber gasket and as shown. [ For special application only, such as subaqueous installations or pipelines installed below the water table, the CONTRACTOR shall provide double rubber gaskets for the Carnegie bell and spigot steel joint or the raised or flush bell concrete joint and as shown.]

## PART 3 -- EXECUTION

### 3.1 PIPE HANDLING AND LAYOUT

- A. **General:** Laying, jointing and testing for defects and for leakage under pressure shall be performed in the presence of the CONSTRUCTION MANAGER.

### 3.2 INSTALLATION OF PIPING

- A. **General:** Pipe shall be installed in accordance with the pipe manufacturer's recommendations and in accordance with the applicable provisions of SSPWC, Subsection 306-1.2 and the requirements stated herein. Where pipe support details are indicated, the supports shall conform thereto and shall be placed as indicated; provided, that the support for all exposed piping shall be complete and adequate regardless of whether or not supporting devices are specifically shown.
- B. **Pipe Smaller than 24 Inches:** For pipe smaller than 24 inches in diameter, before the spigot is inserted into the bell, the bell shall be daubed with mortar containing 1 part of a non-shrink, non-metallic cement to 2 parts sand. The spigot end then shall be forced to the bottom of the bell and excess mortar on the inside of the joint shall be swabbed out.
- C. **Pipe Larger than 24 Inches:** For pipe 24 inches in diameter and larger, joints shall be pointed on the inside with mortar as specified above after the backfill has been placed.

\*\* END OF SECTION \*\*