

SECTION 02612**REINFORCED CONCRETE PIPE****PART 1 GENERAL****1.01 SUMMARY**

- A. This section covers furnishing bar-cage reinforced concrete pipe with rubber O-ring gaskets, for the lines indicated on the Contract Drawings.
- B. Pipe shall be furnished complete with all fittings, specials, jointing materials, and other necessary appurtenances.
- C. Pipe trenching, bedding, and backfill are covered in Section 02200 - Earthwork.

1.02 RELATED SECTIONS

- A. Section 01300 - Submittals
- B. Section 02440 – Auger Boring
- C. Section 03302 - Miscellaneous Cast-in-Place Concrete
- D. Section 03450 – Precast Structures

1.03 CODES AND STANDARDS

- A. Except as modified or supplemented herein, the manufacture of reinforced concrete pipe shall be governed by ASTM C76.

1.04 SUBMITTALS

- A. Drawings and Data
 - 1. Drawings, specifications, schedules, and other data showing complete details of the fabrication and construction of pipe and fittings, together with complete data covering all materials proposed for use, shall be submitted in accordance with the Section 01300 - Submittals. The drawings and data shall include, but shall not be limited to, the following for each size and class of pipe:
 - a. Data on reinforcement.
 - b. Details of joints.
 - c. Details of fittings and specials.

d. Test reports.

1.05 QUALITY ASSURANCE (NOT USED)

1.06 QUALIFICATIONS (NOT USED)

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section.
- B. Reinforced concrete pipe shall not be delivered to the Site until concrete control cylinders representing such pipe shall have attained a compressive strength of at least 80 percent of the specified minimum 28-day strength.
- C. Concrete pipe and fittings shall be handled carefully and shall not be bumped or dropped. Hooks shall not be permitted to come in contact with joint surfaces. Use of lifting holes will not be permitted.

1.08 PROJECT/SITE CONDITIONS (NOT USED)

1.09 DEFINITIONS (NOT USED)

1.10 TOLERANCE

- A. An installation tolerance of one (1) inch above or below the proposed grade will be allowed, provided that this one (1) inch above or below grade is not maintained for a distance longer than 50 feet and that the required crown is maintained.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN

- A. The wall thickness of reinforced concrete pipe shall be not less than ASTM C76, Wall B.
- B. Reinforced concrete pipe shall be Class III.
- C. The absorption of concrete pipe shall not exceed 5.5 percent.

2.02 MATERIALS

- A. Unless otherwise specified herein, all materials used in the manufacture of pipe, fittings, and accessories shall conform to ASTM C76.

MATERIALS	
Cement	ASTM C150, Type II
Gaskets	ASTM C443. The polymer shall be synthetic rubber; natural rubber will not be acceptable.
Flexible Joint Sealant	Preformed butyl rubber sealant: Hamilton-Kent "Kent-Seal No. 2"; Press-Seal Gasket "E-Z Stik"; K.T. Snyder "RUB'R-NEK"; or Concrete Sealants "Conseal CS102" or "CS202"; or equal.
Mastic	Trowel grade sewer sealing compound; Grahn "Anchor-Tite Plastic Mastic"; J.P. Petroleum Products "Tex-Mastic 726"; Blackhawk "5401 Pipe Joint Mastic"; or equal.
Rubber Joint Filler	Synthetic.
Hardness	40 plus or minus 5 when measured by ASTM D2240, Type A durometer.
Tensile Strength	1,200 psi min.

2.03 LENGTH

- A. Except for fittings and closure pieces, each piece of pipe shall have a minimum length of eight (8) ft.

2.04 JOINTS

- A. Joints shall conform to ASTM C76, and rubber-gasketed joints shall also conform to ASTM C443. Joint design shall be suitable for the joint sealing material to be used.

2.05 REINFORCEMENT

- A. Circumferential reinforcement shall be full-circle type. Elliptical or part-circle reinforcement will not be acceptable. The total area of longitudinal steel shall be not less than 0.2 percent of the concrete cross-sectional area of Wall B. Longitudinal bars shall be spaced uniformly around the pipe and shall be continuous in each cage. For pipe larger than 72 inches in diameter, longitudinal bars shall not be spaced more than 30 inches apart.

2.06 FITTINGS AND SPECIALS

- A. All bends, tees, closure pieces, wall fittings, and other fittings which are indicated on the Contract Drawings or necessary to complete the Work shall be furnished. Except as modified or otherwise provided herein, the design and manufacture of fittings shall be governed by the same requirements as the connecting piping.
- B. Bends
 - 1. Bends for reinforced concrete pipe shall be fabricated in accordance with this paragraph and shall be provided at the locations indicated on the Contract Drawings. At the option of Contractor, bends shall be fabricated from segments of a steel cylinder, with concrete or mortar lining and reinforced concrete exterior covering, or from segments of concrete pipe miter-cut while the pipe is still green. The deflection angle between adjacent segments shall not exceed 30 degrees.
 - 2. Steel cylinders for bends shall be at least USS 10 gauge thick and shall be lined with at least 3/4 inch of concrete or mortar. Bends fabricated from steel cylinders shall be designed for the same three-edge bearing loads as the adjacent piping.
 - 3. On bends fabricated from miter-cut segments of green concrete pipe, the concrete shall be removed from around the reinforcing steel as necessary, the steel shall be welded, and the bend shall be re-covered with concrete. After installation, the entire bend shall be encased in concrete. Concrete encasement shall be at least eight (8) inches thick all around the pipe and shall extend the full length of the bend.
- C. Wall Fittings
 - 1. Wall fittings shall be bell type, and shall be provided at the locations indicated on the Contract Drawings. Wall fittings shall be of the required length, with bells to match the joints on the concrete pipe.
- D. Outlets
 - 1. Outlets shall be provided as indicated on the Contract Drawings.
- E. Closure Pieces
 - 1. Shop fabricated closure pieces are not required. Closure pieces will be cut in the field after all pipe, fittings, and specials indicated on the Contract Drawings have been installed. The alignment indicated on the Contract Drawings will be maintained by deflecting joints and by adding fittings if necessary. The length between structures and PI locations will be adjusted in the field if required.
 - 2. Closure pieces will be field cut from full-length pipe sections. At the option of the Contractor, field cuts may be made with a masonry saw, or may be chiseled and

neatly trimmed. Field-cut ends will be encased in reinforced collars at least eight (8) inches thick and extending 18 inches on each side of the field cuts.

2.07 MARKING

- A. Each pipe or fitting shall have plainly and permanently marked thereon:
1. Pipe class.
 2. Date of manufacture.
 3. Manufacturer's name or trademark.
 4. On bends, the angle turned thereby.
 5. Identification of specials to show the location in the line.
- B. Markings shall be indented in the pipe or painted thereon with waterproof paint.

2.08 PRELIMINARY TESTS

- A. All preliminary tests shall be made at Contractor's expense. Reports covering the following tests on each size and class of pipe shall be submitted to the Authority for review:

PRELIMINARY TESTS	
Cement	Mill test report showing tricalcium aluminate content, when a limit is specified herein.
Three-Edge Bearing	ASTM C497, indicating load required for the 0.01 inch crack.
Absorption	ASTM C497.

- B. The three-edge bearing test is for proof of design only. It is not required that a test be made on pipe manufactured specifically for this contract. Reports covering tests made on other pipes of the same size, class, and design as specified herein, and manufactured from materials of equivalent type and quality, may be acceptable.

2.09 CONTROL TESTS

- A. Control tests to determine strength and absorption shall be made during the manufacture of the pipe.
- B. The tests shall be made by an independent testing laboratory at the expense of the

Contractor. At the option of Contractor, strength tests may be made on cores or on standard concrete cylinders. A set of two (2) cores or four (4) cylinders shall be taken from each day's production and each time the concrete mix is changed. One-half of the samples shall be tested at seven (7) days or earlier to determine when the pipe has attained sufficient strength for delivery. The remainder shall be tested at 28 days.

- C. Absorption tests shall be made on cores taken from the pipe barrel. Cores shall be at least two (2) inches in diameter and shall be taken with a diamond drill. One core shall be tested from each day's production and each time the concrete mix is changed.
- D. Core holes shall be filled using concrete plugs cemented in place with an epoxy adhesive or by other methods acceptable to the Authority.
- E. The Authority reserves the right to sample and test any pipe after delivery and to reject all pipe represented by any sample which fails to comply with the specified requirements.
- F. The tests will be conducted by representatives of the Authority and at the expense of the Authority. Contractor shall provide suitable testing facilities and space.
- G. Strength and absorption tests will be made on cores taken from the pipe barrel. Contractor shall take the cores at the location on the pipe barrel designated by Authority. Cores shall be at least two (2) inches in diameter and shall be taken with a diamond drill. Two (2) cores shall be taken from each of the first three (3) lengths of pipe of each size and class. Additional cores shall be made from at least 5 percent (5%) of the pipe produced, but not less than two (2) from each day's production. Strength tests to determine when the pipe has attained sufficient strength for delivery shall be made by and at the expense of Contractor.
- H. Inspection by Authority, or failure to provide inspection, shall not relieve Contractor of responsibility to provide materials and to perform the Work in accordance with the Contract Documents.

PART 3 EXECUTION

3.01 INSTALLATION AND TESTING

A. General

1. Utility locations are approximate and need to be verified in the field. Maintaining utilities in service during excavation and backfill is required at all times. Some utilities may not be shown on the Contract Drawings. The Contractor is responsible for notifying all utilities prior to performing any excavation work. The DIG SAFE telephone number is 811.

2. Determine the location or absence of all underground utilities and plan and conduct work operations to ensure that those utilities shall not be damaged.
3. Assume full responsibility for the protection of all buildings, structures, public and private utilities, services to buildings, utility poles, signs, mail boxes, and all other surface furniture whether on private or public property. Also assume full responsibility for the protection of public and private trees, bushes and other landscaping features.
4. Any damage resulting from the Contractor's operations shall be repaired at the Contractor's expense.

B. Cleaning Lines

1. Upon completion, all dirt and foreign material shall be removed from pipelines and appurtenant construction. No excess material shall be left at joints to impede normal flow. Legal disposal of cleaning debris shall be the responsibility of the Contractor.

3.02 TESTING

- A. Television inspection shall be required by the Contractor. A NASSCO-certified inspection report shall be submitted to the Authority. Any defects identified by the inspection shall be repaired/remedied by the Contractor at no additional cost to the Authority.
- B. To the extent possible, all work that can be visually inspected shall be so inspected after the work is completed.

3.03 CCTV INSPECTION

- A. Once all proposed pipelines have been installed and backfilled, inspect the infrastructure per NASSCO Requirements. Any defects found shall be corrected by the Contractor at its expense. Inspection results and data shall be made available to the Authority within 14 days of inspection.

3.04 RECORD PLAN INFORMATION

- A. Furnish assistance to the Authority in securing ties, depths, distances and/or other reference dimensions for all pipelines, manholes, wye branches, service connections and markers to facilitate the Authority's development of RECORD PLAN DATA. Any pipeline or appurtenance that is backfilled prior to obtaining the aforementioned information shall be uncovered by the Contractor at its own expense.

**** END OF SECTION ****