Section 02618 - CONCRETE SEWER PIPE

1. SCOPE. This section covers bar-cage reinforced concrete pipe with O-ring rubber gasketed concrete joints to be furnished on 30-inch diameter and larger sanitary sewer lines.

Pipe shall be furnished complete with all jointing materials and other necessary appurtenances.

Pipe shall be installed and tested in accordance with the sewer pipe installation and testing section.

Pipe trenching, bedding, and backfill are covered in the earthwork section.

2. GOVERNING STANDARDS. Except as modified or supplemented herein, concrete sewer pipe shall comply with ASTM C76 and C655.

3. DESIGN. Concrete sewer pipe shall be Class IV RCP and shall have circular reinforcement (only), equal to the requirements for Wall B reinforcement. The reinforcement shall be placed within the C wall (only) required distance from the outside surface of the pipe for a pipe having Wall B thickness.

The absorption of concrete sewer pipe shall not exceed 8.5 percent.

The minimum concrete cover over circumferential reinforcement, except under the spigot groove of pipe with concrete spigots, shall be not less than 3/4 inch for 54-inch and smaller pipe or one inch for 60-inch and larger pipe.

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

Fine Aggregate	ASTM C33.
Cement	ASTM C150, Type I or II. Tricalcium-aluminate content shall not exceed 8 percent.
Gaskets	ASTM C361, Section 6.9.1, standard gasket; hardness shall be 40 Type A durometer; polymer shall be synthetic rubber. Natural rubber will not be acceptable.
Joint Lubricant	Vegetable base lubricant; petroleum or animal base lubricants will not be

	acceptable.
Rubber Joint Filler	Synthetic.
Hardness	40 plus or minus 5 when measured by ASTM D2240, Type A durometer.
Tensile Strength	1,200 psi min.

5. LENGTH. Except for fittings and closure pieces, each piece of pipe shall be not less than 7 feet 6 inches long.

6. JOINTS. Except as modified herein, joints shall conform to the requirements of Section 8 of ASTM C361 and shall consist of a formed concrete bell and spigot and a rubber gasket. Gaskets shall have a circular cross section and shall be confined in a groove in the pipe spigot. Pipe with collars in lieu of integral bells will not be acceptable.

Each concrete pipe joint shall be designed to withstand, without cracking, the gasket compression plus a differential load across the joint equal to 4,000 pounds per foot of internal diameter.

Pipe sections connecting to manholes shall have a joint in each line within 2 feet of the outside face of each manhole or other structure.

7. REINFORCEMENT. 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 the pipe. Longitudinal steel shall be spaced uniformly around the pipe and shall consist of at least eight continuous or lap spliced (20 bar diameters for deformed bars or 40 bar diameters for smooth bars) wires or bars in each cage; splices shall not be welded.

At least three circumferential bars shall be provided in each pipe bell. The bars shall be placed within 1-1/2 times the socket depth from the end of the pipe and shall be equal in area to an equivalent length of the outside cage in the pipe barrel. The end circumferential bar shall be placed one inch from the face of the bell. The inside cage (or the single cage) in the pipe barrel shall be extended to within one inch of the end of the spigot on 24 inch or larger pipe and to within 1/2 inch of the gasket groove on pipe smaller than 24-inch size.

8. PRELIMINARY TESTS. All preliminary tests shall be made at the Contractor's expense. Reports covering the following tests on each size of pipe shall be submitted for review:

Joint Leakage	ASTM C443, Section 10.

Joint Shear	Suitable arrangement to apply the specified loads.
Cement	Mill test report showing tricalcium aluminate content.
Three-Edge Bearing	ASTM C497, indicating load required for 0.01 inch crack.
Absorption	ASTM C497.

9. CONTROL TESTS. Control tests shall be made during the manufacture of the pipe to determine strength and absorption. Control tests shall be made by an independent testing laboratory at the expense of the Contractor.

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

Absorption tests shall be made on cores taken from the pipe barrel. Cores shall be made with a diamond drill and shall be not smaller than 2 inches in diameter. One core shall be tested from each of the first three lengths of pipe of each size and class. Thereafter, cores shall be tested from 5 percent of the pipe produced, but not less than one from each day's production.

Core holes shall be repaired by cementing a properly shaped concrete plug in place with epoxy cement or by other methods acceptable to the Engineer.

The Owner 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.

10. DELIVERY. Prior to delivery to the site, concrete pipe and fittings shall be cured in the manufacturer's facilities until concrete control cylinders representing such pipe have attained a compressive strength of at least 80 percent of the specified minimum 28-day strength.

11. HANDLING. 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.

12. JOINTING. Joints shall be installed in accordance with the pipe manufacturer's recommendations. Immediately before the pipes are joined, all spigot and bell surfaces shall be thoroughly cleaned and bell surfaces shall be coated with joint lubricant. The gasket shall be lubricated and positioned in the spigot groove so that the gasket is

distributed uniformly around the circumference. After each joint is completed, the position of the gasket shall be checked using a feeler gauge. If the gasket is not in the proper position, the joint shall be pulled apart, the gasket removed and discarded, and the joint reassembled using a new, properly lubricated gasket.

Joint lubricant shall be stored in closed containers and shall be kept clean. When installing pipe in cold weather, the joint surfaces and gaskets shall be kept warm and the joint lubricant shall be prevented from freezing.

The maximum joint opening used shall not exceed 3/8 inch.

13. DRAWINGS AND DATA. 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 submittals section. The drawings and data shall include, but shall not necessarily be limited to, the following for each size of pipe:

Data on reinforcement.

Details of joints.

Details of fittings and specials.

Test reports.

Laying schedule.

End of Section