SECTION 615
SANITARY SEWER PIPE CONDUITS

615.01. DESCRIPTION.

This work shall consist of the construction of sanitary sewer pipe conduits of the type shown on the Plans in accordance with these and other applicable Specifications and in reasonably close conformity with the lines and grades shown on the Plans or established by the Engineer.

This Specification sets forth the general requirements for this type of work and provides a basis of payment for the required work. Additional specifications will be found in the Oklahoma State Department of Health (OSDH) Regulations, Manufacturers' recommendations, ASTM, ANSI, AWWA, and the Public Utility for whom the work is to be performed. The Special Provisions, Plans, Public Utility Specifications, Supplemental, or Standard Specification shall govern over the OSDH minimum regulations.

615.02 . MATERIALS.

Materials shall be in accordance with Section 726, with the following exceptions: all pipe shall be marked with the appropriate Specification number, such as AASHTO, ASTM, ANSI, NSF, AWWA, etc.

(a) **Pipe.** Concrete pipe shall be subjected to an in-plant hydrostatic test of 10 psi (70kPa) in accordance with ANSI/ASTM C 497, prior to delivery to the jobsite. All concrete pipe used for sanitary sewer pipe shall be coated inside with two coats, minimum of 16 mils (0.40 mm), of a coal tar base paint, Koppers Super Service Black, or equal, with a 24-hour drying period between coats.

Plastic pipe shall bear the seal of the National Sanitation Foundation (NSF), and have a Standard Dimension Ratio (SDR) not exceeding 35.

Cast-in-place reinforced concrete boxes may be used in sanitary sewer installations. If precast concrete boxes are used, they must be capable of passing the hydrostatic test covered above.

(b) **Joints.** Joints shall be in accordance with Section 726, with the following exceptions: joints shall be made with a single natural rubber or neoprene gasket or 'O' ring, in accordance with the manufacturer's recommendations.

- Reinforced concrete pipe joints shall be in accordance with ANSI/ASTM C443, with a 1:1 cement mortar collar formed by a diaper.
- Vitrified clay pipe joints shall be in accordance with ANSI/ASTM C 425.
- PVC pipe, fittings, and in-line tees shall dimensionally conform to ASTM D 3034, with an SDR of 35.

615.03. SUPPLEMENTAL DRAWINGS.

Supplemental drawings shall be furnished in accordance with Subsection 105.02.

615.04. CONSTRUCTION METHODS.

(a) **General.** Begin the construction of all pipe conduits at the outlet or the low point of the line. When the construction involves the building of main or submain pipe conduit having one or more laterals or tributaries, do not start the construction of tributary lines until the main or submain pipe conduit has been completed to the point where the tributary or laterals discharge into it.

During construction, make adequate provision for the sewerage of the system.

Connect sanitary sewers or sewer appurtenances to other sanitary sewers or to sewer appurtenances in accordance with the Plans or with the approval of the Engineer. Do the work in such a way as not to damage any of the structures involved. Do not allow sewer pipe to project beyond the inside wall line of other sewers or of sewer appurtenances.

Setting Grade Lines. The grade line shown on the Plans or supplemental drawings or as established by the Engineer is the elevation of the invert or flow line of the sewer. Accurately establish the grade line and alignment through the use of batterboards and a top line. Maintain a top line over a span of three-grade stakes when laying pipe. As each batterboard is erected, sight the top line to assure the accuracy of the grade stakes and the batterboards setting. Any error, discrepancies, or displacement of grade stakes shall be called to the attention of the Inspector for correction.

Using a Laser Device. As a rule, accurately establish the batterboards at intervals of not more than 25 feet (10 meters). However, a laser device may be used to establish line and grade, in which case the batterboard interval may be increased to 50 feet (15 meters), except that the first batterboard shall be set at 25 feet (10 meters) when laying out a manhole or appurtenance.

Accommodating Water Mains. Maintain horizontal and vertical separation of sanitary sewers and water mains as specified in the OSDH regulations. Whenever possible, locate a sewer at least 10 feet (3 meters) horizontally from any existing or proposed water main and 50 feet (15 meters) horizontally from any potable water well.

When sewers cross water mains, lay them so as to provide a minimum vertical distance of 2 feet (0.60 meters) between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. Where a water main crosses under a sewer, provide adequate structural support for the sewer to prevent damage to the water main. Whenever possible, locate sewer pipe joints at least 10 feet (3 meters) from any water line. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, design and construct the sewer equal to water pipe, and pressure test it to assure watertightness prior to backfilling.

Closing Dead Ends. When construction is stopped at the end of each day's work or for any other cause, close dead ends of all sewers, wyes, tees, etc. with approved stoppers securely cemented in place. Securely place tight-fitting watertight stoppers or bulkheads in or across the end of all sanitary sewer lines.

(b) **Excavation.** Excavate in accordance with Subsection 613.04(b).

(c) **Bedding.** Construct bedding in accordance with Subsection 613.04(c).

(d) **Laying Pipe.** Lay pipe in accordance with Subsection 613.04(d).

(e) **Joining Pipe Conduit.** Construct joints in accordance with the Manufacturer's recommendations.

Prior to making pipe joints, clean and dry all surfaces of the portion of the pipe to be jointed. Keep trenches water free during jointing and for a sufficient period thereafter to allow the joint to become fully set and completely resistant to water penetration.

NOTE: There shall be no realignment of the pipe after the joint is completed unless the pipe is removed and a completely new joint constructed.

(f) **Backfilling.** Backfill in accordance with Subsection 613.04(f).

(g) **Field Testing.** Leakage tests may include appropriate water or low pressure air testing. The leakage outward or inward (exfiltration or infiltration) shall not exceed 200 gallons per inch of pipe diameter per mile (1860 liters per 100 mm of pipe diameter per kilometer) per day for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of 2 feet (0.60 meters).

Perform deflection tests performed on all flexible pipe, conducting the test after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection of 5 percent. Make the deflection test with a rigid ball or mandrel that has a diameter equal to 95 percent of the inside diameter of the pipe, and without the use of mechanical pulling devices.

Perform lamping in the presence of the Inspector. Provide a mechanical method of exchanging the air within the sewer line, and use explosion-proof devices as required by applicable OSHA regulations. If in the opinion of the Engineer any deviation in grade or alignment is excessive, then correct the pipe alignment for no additional charge. In general, a full 3/4 of the barrel of the pipe shall be visible from manhole to manhole or appurtenance.

NOTE: All of the before-mentioned testing shall be conducted by the Contractor, and all cost shall be included in the price bid for other items of work. The Contractor shall inform the Engineer, in writing, 24 hours in advance of any testing.

(h) **Inspection.** The public utility for whom the work is to be performed will assign a utilities representative to the project, for the purpose of coordinating compliance with the Specifications during construction. The utilities representative will be directly responsible to the Oklahoma Department of Transportation's Engineer. All negotiations, decisions, instructions, interpretations of applicable Specifications, and other matters influencing the work shall be directed to the ODOT Engineer.

615.05. METHOD OF MEASUREMENT.

Pipe conduit will be measured by the linear foot (meter) along the centerline of the conduit actually laid. Conduit with sloped or skewed ends will be measured along the invert. Standard bedding material will be measured by the cubic yard (cubic meter) in accordance with Subsection 613.05. Trench excavation will be measured by the cubic yard (cubic meter) in accordance with Subsection 613.05. The following will not be measured for payment:

- That length of line within manholes and special structures.
- Vertical pipe or fittings required for drop manholes.

- Earth backfill, sheeting, and shoring.
- Concrete cradles, unless otherwise provided.

615.06. BASIS OF PAYMENT.

Accepted quantities of pipe conduit of the types and sizes specified, measured as provided above, will be paid for at the contract unit price as follows:

(A)	REINFORCED CONCRETE PIPE, ROUND	LINEAR FOOT (METER)
(B)	VITRIFIED CLAY PIPE	LINEAR FOOT (METER)
(C)	POLYVINYL CHLORIDE (PVC) PIPE	LINEAR FOOT (METER)
(D)	SANITARY SEWER SERVICE CONNECTION*	EACH
(E)	SANITARY SEWER SERVICE LINE**	LINEAR FOOT (METER)
(F)	TRENCH EXCAVATION	CUBIC YARD (CUBIC METER)
(G)	STANDARD BEDDING MATERIAL	CUBIC YARD (CUBIC METER)

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

* *Includes the cost of installing an in-line tee and bracing for riser pipe.*

** *Riser pipe will be measured for payment; cost includes all fittings and adaptors to connect service to the existing line.*

SECTION 616
WATER PIPE AND FITTINGS

616.01. DESCRIPTION.

This work shall consist of the construction of waterlines and service lines of the type shown on the Plans in accordance with these and other applicable Specifications and in reasonably close conformity with the lines and grades shown on the Plans or established by the Engineer.

These Specifications set forth the general requirement for this type of work and provide a basis of payment for the required work. Additional specifications will be found in the Oklahoma State Department of Health (OSDH) Regulations, Manufacturers' recommendations, AASHTO, ASTM, ANSI, AWWA and the Public Utility for whom the work is to be performed. The Special Provisions, Plans, Public Utility Specifications, Supplemental or Standard Specifications shall govern over the OSDH minimum regulations.

616.02. MATERIALS.

Materials shall be in accordance with Section 733.

(a) **Pipe.** Pipe shall be of the kind specified on the Plans and shall be identified in the project specifications with appropriate AASHTO, ASTM, ANSI or AWWA specifications numbers for both quality control (dimensions, tolerances, etc.) and installation (bedding, backfill, etc.).

In no case shall pipe or fittings with a pressure rating of less than 200 psi (1.4MPa) be used. Whenever plastic pipe is used, it shall bear the seal of the National Sanitation Foundation (NSF), have a Standard Dimension Ratio (SDR) not exceeding 14, and shall have an outside