

SECTION 703 SEWER STRUCTURES

703.01 SCOPE OF WORK. This work shall consist of furnishing all labor and materials required for the construction of manholes, concrete cradles, concrete encasement and other structures and appurtenances.

703.02 MATERIALS.

- (a) **CONCRETE.** All concrete and concrete work shall be in accordance with Section 401 of these specifications. Concrete shall have a minimum compressive strength of 3000 psi at 28 days unless noted otherwise.
- (b) **MORTAR.** Mortar shall consist of one part Type II Portland cement and two parts clean sand with only enough water for work ability.
- (c) **WATER STOPS.** Water stops shall be made of elastomeric PVC and shall be Fernco Concrete Manhole Adapters (CMA's) or Large-Diameter Waterstops or approved equal.
- (d) **CASTINGS.** Manhole frames and covers shall be made of iron and shall conform to ASTM A 48-76 Class 30. Manhole covers shall be 23 ½ inches in diameter; frame height shall be six inches. All casting shall be free from crack, holes and swells. Frames and covers shall have machined bearing surfaces to prevent rocking of the cover. Manhole covers and frames shall be of heavy duty type as manufactured by East Jordan Iron Works 1348-1, Deeter Foundry 1266 or approved equal.

Bolt-down manhole frames and covers shall include a gasket and shall be threaded to receive a minimum of four (4), machined stainless steel bolts to hold the cover in place. Bolt-down manhole frames and covers shall be East Jordan Iron Works 280008 or approved equal.

- (e) **PRECAST MANHOLES.** Precast reinforced concrete manholes shall be of the concentric or eccentric cone type as shown on the plans and shall conform to ASTM C478M, latest revision. Joints and o-ring gaskets shall conform to ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets. All Pipe entrances through manhole wall shall utilize a water stop conforming to ASTM C-923. The water stop shall be A-LOK as manufactured by A-LOK Products Inc. or an approved equal.
- (f) **ADAPTERS AND COUPLINGS.** Adapters and couplings for connecting dissimilar pipe materials shall be similar and equal to Fernco, Inc.
- (7) **SEALING MATERIAL.** Sealing material for manhole frames and adjusting rings shall be Infi-shield manufactured by sealing Systems, Inc. or Wrapidseal manufactured by Canusa or an approved equal.
- (8) **MANHOLE LINER MATERIAL.** Manhole Liner Material shall be a fiber-reinforced, spray-applied, cementitious mortar and shall be Strong-Seal High Performance Mix or an approved equal.

703.03 EXCAVATION AND BACKFILLING.

GENERAL. Trench excavation, bedding, encasement, casing, and backfilling are covered in Section 205 of these Specifications.

Unauthorized excavation below the grades shown on the drawings shall be filled with concrete as directed by the Engineer.

703.04 MANHOLES. Manholes will be constructed at the locations shown on the plans and of the type and depth indicated thereon. Detailed drawings of the various types of manholes to be employed in the work are included in the plans and each manhole shall be constructed in strict accordance with these detailed drawings. Manholes may be constructed of pre-cast concrete or cast in place concrete.

The concrete foundation for manholes shall be placed as soon as practicable after the sewer is complete through the manhole location. This base shall be of the shape and size required for the particular type manhole.

In manholes where the sewer does not change direction, the invert through the manhole shall be of split pipe, or the pipe may be laid through and the upper half removed after the manhole has been completed. In manholes where the sewer changes direction of two or more sewers join, the inverts shall be formed out of concrete, care being taken to make the inverts smooth and on regular curves. A 0.1 foot drop from the inlet invert to the outlet invert of each manhole shall be maintained.

A water stop shall be used at all pipe to manhole connections.

All concrete shall be free of honeycomb or other defects. The Contractor shall correct all defective areas as directed by the Engineer.

The Contractor shall furnish and set in place on all manholes cast iron covers conforming to the plans and specifications. A concrete grout cap shall be placed around all covers as shown on the drawings. In paved areas the top of the frame and cover shall match the slope of the paved surface.

Where precast manholes are used and sloping of the frame and cover is required, a cast-in-place grade adjusting ring shall be used. All manhole frames and concrete adjusting rings shall be externally sealed to the cone section of the manhole using a preformed or shrink wrap sealing material.

Pipe stub-outs for future lines shall be installed where designated on the plans. Unless otherwise noted, stub outs shall consist of a section of sewer pipe installed in the manhole wall and projecting a minimum of twelve inches outside of the wall. A standard cap or plug shall be glued on the exterior end of the stub-out.

Where noted on the plans or specified in the Special Conditions, a concrete liner shall be applied to the interior wall surfaces of the manholes. All surface preparation and method and rate of application shall be in accordance with the liner manufacturer's instructions.

703.05 MANHOLE DROPS. Manhole drops shall be constructed at all manholes where a lateral or main sewer enters a manhole at a depth greater than two feet above the invert of the manhole. Drops shall be constructed in accordance with the details shown on the plans. The vertical pipe shall have a diameter equal in size to the sewer line. Fittings used in the drop shall be of the type and size compatible with the sewer

pipe.

703.06 CONNECTIONS TO EXISTING LINES. Connections to existing manholes shall be made at the locations shown on the plans. An opening shall be cut in the wall of the manhole and shall be of sufficient size to permit installation of the pipe at the designated elevation. The invert of the existing manhole shall be removed and a new invert constructed. The end of the pipe shall be flush with the inside wall of the manhole and shall be sealed in the wall with water stop and mortar to provide a water tight joint.

Manholes installed on existing lines shall be constructed in a manner which will not disturb the alignment and grade of the existing pipe except for required alterations. Existing pipe within the manhole shall be removed as required to permit construction of the manhole invert. When authorized by the Engineer, the manhole may be constructed with the sewer pipe in place and the upper half of the pipe removed after the invert has been placed. Temporary plugging of lines and bypass pumping of sewage shall be required when replacement of the invert is necessary.

Connection of dissimilar pipe materials shall be made with the specified adapter couplings.

703.07 CONCRETE ENCASEMENT. Sewers shall be encased or cradled in concrete where shown on the plans or as directed by the Engineer. Unless otherwise noted on the plans, concrete encasement shall encircle the pipe and shall be a minimum thickness of four inches in all dimensions.

703.08 ABANDONED LINES. Lines designated to be abandoned shall be plugged at the locations shown on the plans. Plugging of lines shall consist of placing concrete or mortar inside the line to form a watertight plug.

Manholes designated to be removed shall be removed in their entirety including foundation or base unless otherwise noted on the plans or directed by the Engineer.

Manholes designated to be abandoned shall consist of the following: Contractor shall removed the manhole frame and cover and deliver it to the Fort Smith Utility Department located at to 3900 Kelley Highway. The top portion of the manhole shall be removed to a depth of three feet below the adjacent surface. All lines entering the manhole shall be plugged with concrete or mortar. The remaining portion of the manhole shall be filled with sand compacted by means of vibratory equipment. On-site material shall be used to complete backfilling or the excavation, except where special backfill is noted. Restoration of pavements shall be as specified in other sections of these specifications.

703.09 CONCRETE STRUCTURES. All reinforced concrete structures shall be constructed as shown on the plans and in accordance with Section 401 of these specifications.

703.10 TESTING OF NEW MANHOLES. Each new manhole shall be tested prior to acceptance. Manholes shall be tested after connections have been made and prior to backfilling. Tests shall be conducted in accordance with ASTM C1244, "Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test". Plug all inverts using suitable sized pneumatic or mechanical plugs. Apply a reduced pressure condition equal to 10" of mercury. The manhole shall be considered adequate if the pressure does not drop the equivalence of 1? of mercury within the following time limitations:

<u>MH Depth</u>	<u>48" Diameter</u>	<u>60" Diameter</u>	<u>72" Diameter</u>
4'	10 seconds	13 seconds	16 seconds
8'	20 seconds	26 seconds	33 seconds
12'	30 seconds	39 seconds	49 seconds
16'	40 seconds	52 seconds	67 seconds
20'	50 seconds	65 seconds	81 seconds
24'	59 seconds	78 seconds	97 seconds
+	To be determined by the ENGINEER		

The CONTRACTOR shall provide all vacuum pumps, gauges, testing equipment and plugs necessary for the testing of manholes. The ENGINEER'S representative must be present for all testing to be approved. Any manholes which do not pass shall be repaired and/or resealed and shall be retested.

703.11 BASIS OF PAYMENT. Measurement of all standard manholes will be made from the top of the frame to the invert of the manhole. Payment for manholes shall constitute full compensation for the structure complete including excavation and backfill, concrete work, coating, casting, frames, covers and connections and related work. Payment for manholes will be made as follows:

- (a) Standard manholes six feet and less in depth will be paid for at the unit price bid for each manhole.
- (b) Additional depth in standard manholes will be paid for at the unit price bid for each foot of additional depth.
- (c) Manhole drops will be paid for at the unit price per foot of drop. Unit price shall include tee, bend, pipe, water stops, and concrete. The drop will be measured from the invert of the upper pipe down to the invert of the lower pipe.
- (4) Abandoned manholes will be measured by the unit. Payment at the contract unit price per each shall be full compensation for demolition, backfill materials, concrete and related work.

No separate payment will be made for connection of sewer lines to existing manholes.

No separate payment will be made for stub-outs.

No separate payment will be made for removal of existing manholes.

No separate payment will be made for plugging sewer lines to be abandoned.

Concrete encasement and cradle will be measured and payment made under Section 205. The measurement and payment for pavement replacement and related items is specified in other sections of these specifications.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Standard Depth Manhole 6 foot and less	EA

Additional Depth Manhole

LF

Manhole Drops

LF

Abandon Manhole

EA

**** END OF SECTION 703 ****