

TECHNICAL SPECIFICATION

ITEM 00470 BRICK MANHOLES

470.1 Description. This item shall govern for the construction of brick manholes on sanitary sewer lines or storm sewers, 72-inch in diameter or smaller including the materials used therein and the furnishing of frame, rings and covers. Manholes for pipe sized greater than 72-inch, use precast concrete manholes.

470.2 Materials. Reinforcing steel shall conform to the Item, "Reinforcing Steel". Concrete shall conform to the Item, "Structural Concrete". Mortar shall conform to ASTM C270, Type M, using Portland Cement. Aggregate for Mortar shall conform to ASTM C144.

Cast iron shall conform to ASTM A48, Class No. 30 - Cast iron manhole frames and covers shall be manufactured to the dimensions shown on the attached drawing. Casting shall be free from sand or blow holes and other defects. Holes in cover to be free from plugs and burrs. The machined bearing surfaces of manhole frames and covers shall obtain even bearing. Cast wording "Sanitary Sewer" or "Storm Sewer", as applicable. Thirty-two (32) inch manhole covers will be used on all manholes.

Concrete brick shall be in accordance with ASTM C55, Grade A. Concrete brick is not allowed for the construction of sanitary sewer manholes.

Bricks shall be of first quality, sound, hard-burned perfectly shaped brick. Shale bricks, if used, shall be homogeneous thoroughly and uniformly burned. Bricks shall not absorb more than 16-percent of water by weight when submerged in water for 24-hours, having been in a completely dry state prior to placing in water. Clay brick shall conform to the requirements of ASTM Designation C32, Grade NA, except that not more than 16% maximum individual brick absorption will be permitted.

470.3 Construction Methods. Manholes shall be constructed on concrete foundations of the shape and size indicated for the type of manhole required. Unless otherwise indicated on the drawings, use a standard manhole. The foundation shall be a minimum of 8-inches in thickness. The foundation shall be placed as soon as practicable after the sewer line is completed through the manhole location.

One-half inch mortar joints shall be used in brick work. Joints shall be stuck flush on inside of manhole. The outside of brick manholes shall be plastered with one-half inch mortar cover. This mortar cover shall be carried up with the brick work. All mortar shall consist of one part cement and three parts clean, durable, sharp sand meeting the specifications for fine aggregate for concrete as set out elsewhere herein. All mortar joints shall be a minimum of 1/2" and where possible shall be "shoved" joints. Where inlet leads, main or lateral pipe sewers enter manholes, pipes shall be cut off flush with inside of manhole and any irregularities shall be pointed up with mortar. Brick shall be thoroughly wet immediately before using.

After the masonry work has been completed to the proper elevation the cast iron manhole cover frame shall be set in a full mortar bed and adjusted to the elevation established by the Engineer.

The inverts of the sewer line or several sewer lines entering the manhole at or near the flow line elevation of the manhole shall be shaped and routed across the floor of the manhole using mortar to obtain the proper contour.

Where the main sewer (lowest line) passes straight through the manhole or the degrees of deflection of the main sewer is less than 5-degrees, and no other line or stub out is shown entering the manhole below the centerline of the main sewer, lay the sewer continuously through the manhole. After the manhole walls have been completed above the top of the sewer, breakout and remove the top half of the barrel of the sewer pipe that was previously laid through the manhole. Use concrete with a 1-inch mortar topping and construct the invert as shown in the attached drawing.

Where the main sewer (lowest line) alignment deflects greater than 5- degrees at manhole or where another sewer or stub out enters at or below the centerline of the main sewer, terminate main sewer pipe, by laying it in such a manner that pipe ends flush at the inside of the manhole. Construct the invert with concrete and top with 1-inch of mortar. Shape invert for smooth flow across floor of manhole and slope the side as shown to obtain proper contour.

Where the depth of manhole exceeds 8-feet, measured from flow line to top of cast iron casting, construct that portion of manhole wall below 8- feet depth, 12- inches in thickness. Construct manhole walls less than 8-feet in depth, 8-inches in thickness. Lay every fifth course of brick in such a manner as to effect ties to the course immediately thereunder. In general, make long axis of tie course perpendicular to the long axis of the preceding four courses. Use 1/2-inch thick mortar joints and strike flush on the inside of manhole. Plastered and buttered joints will not be permitted.

Stub outs shall be installed, where shown, to the lines and grades. Use one full joint of pipe, of the size indicated, for stub out. Seal stub out with plug. Install the plug in such a manner as to prevent seepage or leakage through stub outs. The plugs shall be installed so that they may be easily removed in the future, without damaging the end of the stub out. When inlet leads, lateral sewer pipe, stub outs and drop connections enter manholes, cut off ends of protruding pipe flush with inside of manhole wall. Point up any irregularities with mortar. Plaster outside of brick manholes with 1/2-inch mortar cover, except concrete which encases drop connection.

After masonry work for manholes exceeding 4-feet in depth has been completed to proper elevation, set cast iron manhole frames in full mortar bed and just to required elevation. After the masonry work for manholes less than 4-feet in depth (shallow manhole) has been completed to proper elevation, set precast manhole cover slab in full mortar bed and adjust to the required elevation. Unless otherwise shown on the drawings, the top of cast iron casting is to be flush with adjacent finished surface.

Where drop connections into manholes are required, construct drops of 6-inch pipe for 6-inch sewer lines, of 8-inch pipe for sewers 8-inch in diameter through 15-inches in diameter, and of 12-inch pipe for all larger sizes of sewer lines. Drop connections consist of tee in sewer line faced vertical down, riser stack, 90 degree cut elbow at base of stack and joint of pipe from elbow in manhole. Encase entire drop connection in Class "B" concrete extending at least 4-inches outside of bells on 3 sides away from manhole wall and extending to face of manhole wall on side adjacent to manhole. Join entire drop connection with wall of manhole in solid mass of concrete. Construct drop connection at the time manhole is constructed. If material is not to be immediately connected into drop connections, plug outer end of tee in the same manner as specified for plugging stub outs.

The Contractor shall prepare a hole large enough to accommodate the outside dimensions of the manhole. Prior to setting, the Contractor shall provide a base of 12-inch thickness, Type "C" concrete with reinforcement, suitable to receive the manhole.

Backfill around manholes and drop connections shall be placed immediately after mortar and concrete has set. Where proposed sewer lines connect to existing manholes at grade, reshape invert of existing manhole, so that no turbulence is created in the manhole as a result of the connection.

470.4 Measurement.

- A. Manhole depths shall be measured by the linear foot of vertical distance from flow line of manhole to top of manhole casting and shall be classified as follows:
 - 1. Shallow manhole - a manhole with depth less than 4-feet.
 - 2. Standard manhole - a manhole with depth less than or equal to 8-feet but greater than or equal to 4-feet.
 - 3. Extra depth manhole – a manhole with a depth of greater than 8 feet.
- B. Drop connection - measure depth of drop connection by the linear foot of vertical distance from flow line of horizontal portion of tee in main line to flow line of manhole and classify as follows:
 - 1. Standard Drop Connection - each drop connection with depth up to, but not greater than 3 feet.
 - 2. Extra depth Drop Connection - drop connection with a depth in excess of 3 feet.

470.5 Payment. Payment for "Shallow Manhole", "Standard Manhole", "Extra Depth Manhole", "Standard Drop Connection" and "Extra Depth Drop Connection" shall be made at the contract unit price indicated for each type measured complete and in-place.