

AIR RELEASE, CLEANOUT, AND SEWER MANHOLES

****From Hartford IM BLDG(10)**

- xx. DESCRIPTION. This work shall consist of the construction of air release, cleanout, and sanitary sewer manholes; and the furnishing and placing of cast iron or precast concrete covers.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 604 of the Standard Specifications.

- xx. MATERIALS. Materials shall meet the requirements of the following Subsections:

Crushed Gravel for Subbase.....704.05

Crushed gravel used for bedding material beneath structures shall meet the gradation requirements of Table 704.05A - Fine.

- xx. GENERAL CONSTRUCTION REQUIREMENTS. For construction of manholes, the bricks used on top of the concrete to adjust the top to the correct elevation shall meet the requirements of Subsection 705.01(c). Precast concrete grade rings may be used in lieu of bricks.

Channels, inverts, and floor areas for sewer manholes shall be constructed of brick and mortar or Class A concrete conforming to Section 541. Inverts shall have the exact shape of the sewer to which they are connected and any change in size or direction shall be gradual and even. All construction of sewer manholes must be carried out to ensure watertight work. Any leaks in manholes shall be repaired to the satisfaction of the Engineer, or the entire structure shall be removed and rebuilt. Leakage testing shall be performed in accordance with CONSTRUCTION OF MANHOLES, part (b) Sanitary Sewer Manhole of this Section.

Manholes shall be placed on a level, uniformly compacted base of crushed gravel bedding to the extent shown on the Plans or as ordered by the Engineer.

Unless otherwise specified in the Contract, all precast sections shall be rated for H-20 loading in accordance with the current AASHTO Standard Specifications for Highway Bridges.

- xx. CONSTRUCTION OF MANHOLES.
 - (a) Precast Reinforced Manhole. The cast iron frame shall be placed in a full mortar bed on the brick masonry and the cast iron cover or grate shall be placed on top of the frame. Precast concrete grade rings may be used in lieu of bricks.
 - (b) Sanitary Sewer Manhole. The cast iron frame shall be placed in a full mortar bed on the brick masonry and the cast iron cover or grate shall be placed on top of the

frame. Precast concrete grade rings may be used in lieu of bricks.

Leakage tests shall be made by the Contractor and observed by the Engineer on each sanitary sewer manhole. The leakage test shall be a vacuum test or water test made as described below.

The Contractor shall provide all necessary equipment and instrumentation required for proper completion of the testing. All tests shall be made in the presence of the Engineer. Preliminary tests made by the Contractor without being observed by the Engineer will not be accepted. The Engineer will be notified at least eight hours before any work is to be inspected or tested.

All defects shall be corrected and retested until acceptable to the Engineer. Repairs shall be made to the standard of quality specified for the entire system. Any defects that may develop in a manhole previously tested and accepted shall be promptly corrected and retested.

Test data shall be recorded on a form acceptable to the Engineer. A copy of all test data shall be submitted to the Engineer at the completion of testing.

- (1) Vacuum Test. The vacuum test shall be performed on manholes, completely constructed, with inlet and outlet pipes in place. Test shall be conducted before any backfilling begins. Any material around the base section shall be removed to expose the entire side of the manhole. Plug pinholes and horizontal seams with a non-shrinking concrete grout.

Brace the inlet and outlet pipes/plugs to prevent movement during the test. Use air inflated plugs in good condition.

The vacuum test shall be performed using equipment acceptable to the Engineer. The equipment shall be in good operating condition. All gauges shall not have any broken glass or other visible abnormalities. The test shall be performed by trained personnel familiar with the equipment and the test.

The test shall have a minimum duration of two minutes. The vacuum shall be pumped down to 10 inches of mercury on an acceptable gauge, and held. At the time the removal of air is stopped, the test time shall begin.

Any manhole that has a vacuum drop to nine inches of mercury or less, within the following time intervals, shall have failed the test.

- 0 - 10 ft. deep: less than 2 minutes.
- 10 - 15 ft. deep: less than 2-1/2 minutes.

15 - 20 ft. deep: less than 3 minutes.
over 20 ft. deep: less than T.

Calculations for manholes deeper than 20 feet:

$$T = 0.085 [DK/Q]$$

T = Time of pressure drop in seconds.
K = 0.000419 DL; but not less than 1.0.
Q = 0.0015 ft³/min/ft² of area.
D = Nominal manhole diameter in inches.
L = Depth of manhole in feet.

- (2) Water Test. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blowout.

The manhole shall then be filled with water to the top of the cone section. With the approval of the Engineer, a period of time may be permitted to allow for absorption. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and the measuring time of at least four hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be converted to liters per vertical meter of depth per 24-hour day (gallons per vertical foot of depth per 24-hour day). The leakage for each manhole shall not exceed 10 L/m/day (1 gallon/foot/day). If leakage exceeds the allowable rate, repairs shall be made as approved by the Engineer and the manhole retested.

- (c) Air Release and Cleanout Manholes. Air release and cleanout manholes shall meet the requirements of Subsection 604.04(h), except as modified herein.

- (1) Sewage Combination Air Valves. Shall be Apco series 440 or approved equal. Sewage combination air valves shall be single body, dual orifice to allow large amounts of air to escape or enter through the large diameter orifice when filling or draining the pipeline. When the pipeline is filled and pressurized the large air/vacuum orifice shall stay closed but the smaller diameter air release orifice shall remain operative and allow small pockets of air accumulation to escape automatically and independently of the large orifice. The large air/vacuum orifice shall shut off when the free floating center guided plug is raised into the orifice by the lifting force of the concave bottom float. The large orifice shut-off shall be without spilling. The Buna-N seat must be fastened to the valve cover, without distortion, for drop-tight shutoff. Materials of construction shall be as follows:

Body and cover	cast iron	ASTM A126 GR. B
Float	stainless steel	ASTM A240 T304
Stem	stainless steel	Series T300
Needle and seat	Buna-N	Nitrile rubber
Plug	Brass	ASTM B124
Leverage frame	Delrin	ASTM D1233
Exterior Paint	Universal metal primer FDA approved for potable water	

- (2) Plug Valves. Shall be of the non-lubricated, eccentric, nut operator type and shall be for a working pressure of 175 psi. Valves shall have round ports with diameters that are a minimum 82% of the valve line size. Valve bodies shall meet ASTM A126, Class B requirements. Resilient plug facing shall be BUNA-N. Flanges shall be 125-lb standard. Plug valves shall be furnished with a sprayed epoxy overlay of 5-mil minimum thickness for all surfaces contacting the plug face. Bearings shall be replaceable 316 SS for upper and lower journals. Shaft seals shall be BUNA-N replaceable without removing valve shaft bonnet.
- (3) Ductile Iron Pipe.
- a. Conform to ANSI Specification A21.51 (AWWA C151 and AWWA C115). Pipe and fittings shall be cement lined and seal coated inside and out in accordance with A21.4/AWWA C104.
 - b. Flanged pipe with threaded flanges shall conform to ANSI A21.15 (AWWA C115).
 1. Flanges shall be ductile iron and conform to ANSI B16.1 Class 125.
 2. Bolts shall conform to ANSI B18.2.1.
 3. Nuts shall conform to ANSI B18.2.2.
 4. Bolts and nuts shall conform to ASTM A307 Grade B Low carbon steel.
 - c. Fittings shall conform to ANSI Specification A21.10, (AWWA C110 or ANSI B16.1) 250-pound working pressure for gray iron and ductile iron fittings.
 - d. Flanges shall conform to ANSI B16.1.
 - e. All interior pipe and fittings which are to be painted shall have no outside coating of coal tar pitch varnish. Machined surfaces shall be cleaned and coated with a suitable rust preventive coating at the shop immediately after being machined. All interior pipe and fittings shall be prime coated at the shop.

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(4) Vented covers shall be provided on air release manholes.

xx. METHOD OF MEASUREMENT. The quantities of Special Provision (Air Release Manhole), Special Provision (Cleanout Manhole), and Special Provision (Sewer Manhole) of the size specified to be measured for payment will be the number of units of the respective types used in the complete and accepted work. Cast Iron Cover with Frames and Vented Covers with Frames will be included for the appropriate Contract items.

xx. BASIS OF PAYMENT. The accepted quantities of Special Provision (Air Release Manhole), Special Provision (Cleanout Manhole), and Special Provision (Sewer Manhole) of the size specified will be paid at the Contract unit price per each. Payment will be full compensation for furnishing, transporting, handling, testing, and placing the materials specified, including excavation, crushed gravel bedding, backfilling, concrete, concrete risers, top sections, reinforcing steel, steps, all interior piping, valves, and pipe supports; vitrified clay tile pipe, mortar, brick, frames, covers, coatings, pipe stubs, weep holes, underdrain ends, curb board, and bituminous fillets; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Excavation for Special Provision (Air Release Manhole), Special Provision (Cleanout Manhole) and Special Provision (Sanitary Sewer Manhole) will not be paid for separately, but will be considered incidental to the appropriate Contract items.

The Contract items Special Provision (Air Release Manhole), Special Provision (Cleanout Manhole) and Special Provision (Sanitary Sewer Manhole) are mutually exclusive. Only one of these Contract items will be paid at any designated location.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Air Release Manhole) (<input checked="" type="checkbox"/> M (<input checked="" type="checkbox"/> ') I.D.)	Each
900.620 Special Provision (Cleanout Manhole) (<input checked="" type="checkbox"/> M (') I.D.)	Each
900.620 Special Provision (Sewer Manhole) (<input checked="" type="checkbox"/> M (<input checked="" type="checkbox"/> ') I.D.)	Each