CITY OF DETROIT

SPECIAL PROVISION
FOR
DRAINAGE STRUCTURES, MODIFIED

DET:MCS **Revised: 05-20-09**
05-14-08

DESCRIPTION:

This work consists of constructing all manholes, and catch basins to the size, type, special design, and type of backfill as shown on the plans. Manholes and catch basins shall be constructed to the line and elevation of final grade or as otherwise shown on the plans. The work includes maintenance of sewer service where manholes are built over existing sewers and shall be in accordance with Section 403 of the 2003 MDOT Standard Specifications for Construction except as otherwise specified.

MATERIALS:

Manhole Frames and Covers - Round:

Round manhole frames and covers shall conform to the Detroit Water and Sewerage Department (DWSD) standard unit, as detailed on the project Drawings. Both the frame and cover shall be castings conforming to the requirements of A.S.T.M. Specification, "Gray Iron Castings," A48, Class 30B. The castings shall have the following weights:

Frame	262 pounds
Cover-Perforated	147 pounds
Cover-Blank	157 pounds
AD 1	409 pounds
AD 2	419 pounds

Perforated covers shall be used unless otherwise indicated on the project Drawings.

Castings shall be sound, true to form and thickness, clean and neatly finished. The seating face on the cover and the corresponding seat on the frame shall be machine finished so that there will be even bearing at all points with no rocking or tilting.

When a sufficient supply is available, the frames and covers may be purchased from the Sewer Maintenance and Construction Division of the Detroit Water and Sewerage Department.

Catch Basin Frames and Covers

The physical requirements for Catch Basin Frame and Covers will be in accordance with the requirements for manhole frames and covers. The castings for Catch Basin A and B shall be as follows.

Cover	115 pounds
Frame	Neenah Catalog No. R-3448-C, East Jordan Catalog No. 5080 or Equal by Bibby Saint Croix or approved equal

Shop drawings for the Catch Basin Frames and covers detailing all dimensions shall be submitted to the Engineer for approval. No frames except those manufactured in conformance with the approved shop plans will be permitted to be used on the project.

Frames and covers for all other catch basins shall be in accordance with details shown on the plans.

Manhole Steps:

Manhole steps shall be of aluminum alloy conforming to the requirements for "Aluminum Alloy Extruded Bars, Rods, Shapes and Tubes," A.S.T.M. B221, alloy 6061, and temper T6. The shape and dimensions of each step shall conform to the details shown on the drawings at the end of this section.

A certificate by the manufacturer shall be submitted to the Engineer prior to installation of any step, that the materials meets the requirement of the A.S.T.M. Specification.

Brick:

All brick shall be rectangular in shape with reasonably sharp corners and edges. The standard size shall be 2¼ inches to 2½ inches by 3¾ inches by 8 inches. The dimensions of the brick shall not vary over 1/8 inch in either transverse dimensions and ¼ inch in length. All brick shall be frogged or cored, unless otherwise approved.

Brick shall be free from cracks and flaws and otherwise conform to current ASTM Specifications for "Sewer and Manhole Brick," C32 or "Concrete Building Brick," C55 as is applicable.

Brick shall be sampled and tested in accordance with applicable ASTM Specification for "Sampling and Testing Brick," C67 or "Concrete Masonry Units, Sampling and Testing" C140.

MAXIMUM ABSORPTION (By Weight)

Clay or Shale Brick:	
5 Hour Boiling Test	
Average of 5 Brick	16%
Individual Brick	18%
Concrete Brick:	
24 Hour Immersion	
Average of 5 Brick	8%
Individual Brick	10%

COMPRESSION
STRENGTH All brick shall meet the same compressive strength requirements:

Average of 5 Brick	3,500 p.s.i..
Individual Brick	3,000 p.s.i.

The use of lime, in any form, as a major constituent of brick shall not be permitted.

Concrete Block:

Concrete block, for use in manhole construction, shall conform to the requirements of A.S.T.M. Specification for "Concrete Masonry Units for Construction of Catch Basins and Manhole," C139. The size and shape of the block shall be in accordance with the details on the Drawings.

Precast Concrete Manhole Sections:

Precast reinforced concrete sections for 4 ft. diameter manhole construction shall conform to the requirements of A.S.T.M. Specification, "Precast Reinforced Concrete Manhole Sections," C478 with the following exceptions and additions:

The required manhole steps shall be cast in place with the required spacing and alignment. The top or dome section shall be an eccentric cone with a minimum height of 32 inches The smaller upper opening shall be designed to accommodate the manhole frame. Where a watertight frame is to be provided, the anchor bolts or stud inserts for the frame shall be cast in place with the required spacing and alignment.

The minimum shell thickness shall be one-twelfth of the internal diameter in inches of the riser or largest cone diameter plus one (1) inch.

No holes for inlet or outlet pipes shall be made in precast units at the site of the work. All necessary openings shall be formed into the precast manhole section as part of the casting operation.

Precast Manhole Bases:

Precast manhole bases for 48-inch diameter manholes shall be reinforced concrete using 3,000 pound concrete. The minimum diameter of the base shall be equivalent to the outside diameter of the manhole. The slab shall be a minimum of 8 inches thick and reinforced two ways with a minimum of 0.14 square inches of steel reinforcing per foot of diameter in each direction placed in the center of the precast circumference of a 48-inch diameter circle shall be provided.

Where the bottom section of the manhole is cast integrally with the base, the base portion shall conform to the requirements stated above.

Mortar:

Mortar for brick or masonry work shall be mixed by volume in the proportions of one part Portland cement to two parts sand. Mortar shall be highly plastic with high water retentivity. A bag of cement 94 pounds shall be considered one cubic foot.

The cement and sand shall first be mixed dry to a uniform color in a batch mixer or a tight mortar box, and then mixed thoroughly with water which shall be added gradually until the required consistency is obtained. Mortar shall be mixed in batches of such sizes as will be used immediately and any mortar which has set sufficiently to require retempering shall not be used.

Catch Basins A, Catch Basins B and Catch Basins B with Trap

Catch Basins A, B and Catch Basins B with Trap shall be constructed in accordance with details shown on the Plans and/or as directed by the Engineer. The materials for Catch Basins shall be in accordance with the materials for "Manholes."

Catch Basins 18 inch x 12 inch, Special “Y”

Catch Basins 18 inch x 12 inch, Special “Y” shall be constructed of standard strength vitrified sewer pipe encased in 6 inches of Grade “A” concrete, extra strength vitrified sewer pipe, or concrete sewer pipe.

The pipe joints shall be on cement mortar complying with the applicable requirements for sewers.

Catch Basin “L”

Catch basin “L” shall be constructed of standard strength vitrified sewer pipe encased in 6 inches of Grade “A” concrete, extra strength vitrified sewer pipe, or concrete sewer pipe.

CONSTRUCTION METHODS:

Manholes

Manholes may be constructed of brick, block or precast reinforced concrete manhole sections, in accordance with the respective details shown on the Drawings, unless a specific type is called for on the Drawings.

Brick or blocks used in manhole construction shall be laid with full mortar joints. All available bearing areas shall be covered with mortar spread in an even layer without splitting or furrowing, and all vertical and interior joints solidly filled with mortar. The courses shall be laid even except where otherwise required. Manholes shall be constructed to be as plumb as is practical.

Brick, where used, shall be laid radially from the inner circumference of the manhole, with the interior joints not more than 5/8 inches wide. Whole brick only shall be used except to affect closures and to fill the outer portion of the radial joints. Each seventh course shall be laid as stretchers with intervening courses laid as headers. Vertical joints in adjacent courses shall be staggered. The upper portion of the manhole as detailed on the Drawings, shall be "domed" by drawing the brick courses equally and evenly to the diameter of the opening at the top required to fit the manhole frame opening. All interior mortar joints shall be finished flush. A 1/2 inch thick plaster coat shall be applied to the outer surface of the manhole.

Concrete block, where used, shall be laid in courses of whole blocks only by using units of the proper size. The joints between individual blocks and between courses shall be uniform. Vertical joints in adjacent courses shall be staggered. The upper portion of the manhole shall be "domed" in the manner specified above for a brick manhole. Such doming may be by blocks, provided whole units of such sizes are used to evenly effect the doming. Otherwise, brick, as above specified, shall be used for such sections. All interior mortar joints shall be finished flush. A 1/2 inch thick mortar coat shall be applied to the outer surface of the manhole.

Precast reinforced concrete manhole sections, where used, shall be placed in accordance with the details shown on the Drawings. Such manhole sections shall rest on an integral bottom section and base or brick or concrete block masonry laid up from the manhole base slab. Bottom section or masonry units shall be installed to such a height that when whole manhole sections are used, including the upper dome section, the top of the manhole will be at the proper elevation to accommodate the manhole frame and cover at the required finished grade. When the alternate manhole bottom construction is used, the length of the risers and the dome section shall be adjusted so that the top of the manhole will be at proper elevation to accommodate the manhole frame and cover at the required finished grade.

The joints between the pipe sections in the field shall be synthetic rubber gaskets as specified under "Sewers".

Where precast manhole bases or integral bottom sections are used, they shall be placed on a 3-inch layer of sand. After placing the sand, it shall be leveled to provide a uniform bearing surface for the slab and a level foundation on which to start construction of the manhole.

A manhole built over a brick or pipe sewer shall be thoroughly bonded to the sewer barrel and all connections made without projections or voids. Manholes, when completed, shall be cleared of all scaffolds and thoroughly cleaned of surplus mortar, building materials and all foreign matter.

Where a connection of an existing sewer to a proposed manhole is indicated on the plans, the portion of the sewer removed shall be replaced, beyond the limits of the manhole, with an equivalent size of circular pipe and of the strength approved by the Engineer. This work shall be considered as included in the construction of the manhole and will not be paid for separately.

Manhole Steps:

Manhole steps shall be firmly embedded in the manhole wall or structure in true vertical alignment, spaced as shown on the Drawings, and shall project uniformly 6½ inches from the face of the wall to the outside edge of the step.

The portion of the step to be embedded in concrete manhole sections or concrete structures shall be wire brushed or otherwise roughened and then covered with one coat of "Bitumastic Super Service Black", as manufactured by Koppers Company, Tnemcol No. 450 heavy, as manufactured by Tnemco Co., or "Bitumastic Super Service Black", as manufactured by Somay Products Inc.. The coating shall be applied and allowed to dry in accordance with the manufacturer's recommendations.

The coating shall extend beyond the embedment at least one inch.

The steps shall not be 'muddied-in' pipe sections, but shall be inserted in the 'green' concrete prior to initial set of the concrete.

Steps to be placed in existing concrete shall be placed in drilled holes and the void space packed with non-shrink grout, using "Embeco", "Groutex", "Ferrolith-G", or approved equal. The mixing and installation of the non-shrink grout shall follow the procedure recommended by the manufacturer of the grout

Manhole Frame and Cover:

The standard round manhole frame shall be set in a full bed of mortar on the top of the manhole wall at such elevation that when the manhole cover is set in place the complete unit of frame and cover will be at the required finish or final surface grade. The cover shall so fit the frame that no rattling occurs under traffic loadings. If rattling does occur, the frame and/or cover shall be machined so as to eliminate the rattling.

Backfilling Around Manholes:

Backfilling adjacent to manhole walls shall be done in such a manner as to simultaneously raise the level of the fill uniformly on all sides of the manhole, compacted as noted below.

No backfilling shall be done around manhole walls within less than 48 hours after the plaster coat has been applied to the outside of the manhole walls.

During the operation of backfilling of an excavation that is sheeted and braced, earth supports shall not be removed in such a manner as to permit earth bank or adjacent streets to give way. Sheeting and bracing may be left in place during backfilling and pulled when backfilling is completed. Sheeting and bracing impossible to remove may be left in place, provided it is cut off 5 feet below ground surface.

Pipes entering a manhole above the bottom of the structure shall be supported with Grade "X" concrete or a masonry pier down to undisturbed earth as indicated on the plans. Grade "X" concrete shall consist of three sacks of cement per cubic yard of concrete and shall be included in the construction of the Manholes.

The backfilling shall be placed and compacted as specified under the City of Detroit Special Provision for Sewers.

Bulkheads:

Brick bulkheads, as required, shall be built of common brick. The surface of contact of the sewer wall with the bulkhead shall be cleaned and then roughened by bush-hammering or chiseling just prior to the bulkhead construction. Such bulkheads shall be vertical, of the thickness shown on the Drawings with alternate header and stretcher courses laid in mortar in the manner specified for "Manholes." The joints shall be 5/8 inch thick and finished flush.

Removal of bulkheads shall be done in a careful manner that will avoid damage to the sewer. The surface of contact of the sewer wall with the bulkhead shall be cleaned of all brick and mortar and the wall surface left as smooth as possible without mortar patching. The materials from the removed bulkhead shall be promptly removed from the sewer and not left to accumulate.

Unless otherwise specified, the building or removing of bulkheads are included in manhole or sewer construction and will not be paid for separately.

Separate payment will be made only for bulkhead built in 18-inch diameter sewers and larger, or the equivalent size in an egg shape sewer.

Catch Basins A, Catch Basins B and Catch Basins B with Trap

Catch Basins A, Catch Basins B and Catch Basins B with Trap shall be constructed in accordance with details shown on the Plans and/or as directed by the Engineer. The constructions methods for Catch Basins A and B shall be in accordance with the construction methods for "Manholes."

Catch Basins 18 inch x 12inch, Special “Y”

Catch Basins 18 inch x 12inch, Special “Y” shall be constructed in accordance with the Plans and/or as directed by the Engineer.

The pipe joints shall be on cement mortar complying with the applicable requirements for sewers.

Catch Basin “L”

Catch basin “L” shall be used “only” when directed by the Field Engineer or when called for on drawings instead of the standard “Y” basin. Contractor shall construct a standard half trap if directed to do so by the Field Engineer.

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METHOD OF MEASUREMENT

"Manholes" of the size, type and special design called for will be measured as units.

Catch Basins, as detailed on the Plans, will be measured as units, regardless of the depth of the structure.

BASIS OF PAYMENT

Manhole of the size, type and special design called for will be paid for at the contract unit price each, which shall be payment in full for furnishing the material including required covers and fittings and constructing the structure complete. The contract unit price shall include the cost of maintaining existing sewer service. Excavation, all backfill and disposal of waste excavated material are included in the manhole items without separate payment therefor.

Pavement, curb, and sidewalk removal and replacement will be paid for separately.

Catch Basin A, Catch Basin B, Catch Basin B with Trap, and Catch Basin 18" X 12" Special "Y", Catch Basin "L", Modified will be paid for at the contract unit price each, which shall be payment in full for furnishing the materials including required frames, covers, fittings, traps and constructing the structure complete. The contract unit price shall include the cost of maintaining existing sewer service. Excavation, all backfill and disposal of waste excavated material are included in the catch basin items without separate payment.

Pavement, curb, sidewalk removal and replacement will be paid for separately.

Pay Item	Pay Unit
Catch Basin A, Modified	Each
Catch Basin B, Modified	Each
Catch Basin BT, Modified	Each
Catch Basin 18 inch x 12 inch, Special 'Y', Modified	Each
Manhole, 4 foot, Standard, Modified	Each