

STORM SEWERS

1.00 GENERAL

1.01 Summary

A. Section Includes: Storm sewers of the size and character shown on the drawings and specified herein, including the furnishing and installing of the pipe and appurtenances and necessary testing.

1.02 References

A. Reference Specifications: As herein noted, the work shall comply with requirements of:

1. The current American Society of Testing Materials series of Standard Specifications, referred to as ASTM.
2. The current American Association of State Highway and Transportation Officials, referred to as AASHTO.
3. The Michigan Department of Transportation "Standard Specifications for Construction," 2003 edition, referred to as MDOT.

B. All work is to be installed per City of Marshall (herein referred to as the sewer authority) standards and specifications. In case of a discrepancy(ies) between sewer authority standards and the technical specifications outlined in this section, the sewer authority's standards shall prevail.

1.03 Quality Control

A. Testing: Sewers will be required to be tested for infiltration/exfiltration, and a final visual inspection will be performed with the sewer authority inspector and/or the Owner's representative to note any defects, dips, or other problems that must be repaired by the Contractor prior to final acceptance and payment.

B. All new storm sewers will be required to be television inspected at the completion of the construction prior to final acceptance. This testing and inspection work is considered incidental to the cost of construction. The televised inspection will be performed on all mainline runs that are 12 inch or greater in diameter and 20 foot or more in length.

B. Certification of Pipe: All pipe delivered to the job site shall be accompanied by certification papers showing that the pipe has been tested in accordance with applicable specifications and that the pipe meets the specifications for this project.

2.00 MATERIAL

2.01 Sewer pipe

A. General

1. The locations of the various types of pipe are shown on the drawings.
2. All sewer pipe used in this work shall meet the requirements of the referenced standard specifications. Sewer pipe shall be of the following types as noted on the drawings.

B. PVC Pipe

1. Polyvinyl Chloride Pipe (PVC) Sewer Pipe shall be ASTM D3034, SDR 35.
2. Joints in polyvinyl chloride pipe shall be bell and spigot type meeting ASTM standards. Each joint shall consist of a spigot and a formed bell complete with a factory-installed flexible elastomeric gasket meeting ASTM standards. Joints in all polyvinyl chloride tee branches, wyes, fittings, riser pipes, and service laterals shall conform to joints furnished for the polyvinyl chloride sewer pipe. All joints shall be made using lubricant as supplied and as directed by the pipe manufacturer. When necessary to field cut a standard length of pipe, the new spigot end shall be prepared as recommended by the pipe manufacturer.

2.02 Structures

A. General: Manholes and other storm structures shall be of precast reinforced concrete to the dimensions and profiles shown on the drawings. Provide metal frames, covers or gratings, and fixed steps as shown.

B. Precast Concrete Structures

1. Precast concrete structures shall comply with AASHTO M199.
2. All precast concrete structures shall conform to details on plans or MDOT standard plans R-1-D. Sumps shall be constructed as shown on plans.
3. Precast manhole joints may be plain tongue and groove with cold mastic sealer. All precast manhole joints shall also be pointed inside and outside. Lifting holes shall be plugged and mortared to a smooth surface finish.
4. Secure the engineers approval for the design of units for the tops of the structures.

C. Leveling Brick or Block

1. Concrete brick for use in manhole construction shall conform to the requirements of ASTM specification for "Concrete Building Brick," C55, Grade S-11.
2. Concrete block for use in manhole construction shall conform to the requirements of ASTM specification for "Concrete Masonry Units for Construction of Catch Basins and Manholes," C139. These blocks shall be at least 8 inches thick and shaped so as to conform with the inside radius of the structure.

D. Mortar for Leveling Brick

1. Mortar for laying brick shall comply with ASTM specification C 91, Type M.

2. Mortar shall be composed of one part Portland cement and two-and-one-half parts natural or manufactured sand. Sand shall comply with ASTM specification, "Aggregate for Masonry Mortar," C 144.

3. All brick and concrete work shall be properly cured and protected from freezing for a minimum of 72 hours. When the temperature is 40 degrees F., and falling, brick mortar and concrete shall be heated to a minimum temperature of 70 degrees F.

E. Concrete: Any concrete used in the construction of storm structures, bedding, backfill, cradles, and encasements shall be MDOT Grade S2.

F. Castings

1. Cast iron manhole steps shall be castings meeting the requirements of AASHTO M 105 class No. 35B. Steps in precast manhole sections shall be cast in place at the plant.

2. Cast iron manhole frames and covers shall conform to the requirements of AASHTO M 105, Class No. 35B. Frames and covers shall follow types and sizes shown on the plans.

3. Manhole shall be EJIW 1000 Type A or similar approved in writing and inlet shall be EJIW 7020 M1 – T1 or similar approved in writing.

3.00 EXECUTION

3.01 Inspection

A. Before any sewer work is started, the Contractor shall uncover the existing sewer at each point of connection and shall determine the actual location and elevation of the sewer.

B. If the actual location and elevation of the sewer is not as shown on the drawings, the Owner's representative shall be notified by letter prior to beginning any sewer work.

C. Sewer work shall be corrected at the expense of the Contractor in compliance with instructions by the Owner's representative when the installed work is in error due to deviations between the drawings and actual sewer location and elevation, and the Contractor has not acted in compliance with the above procedure.

D. Pipe shall be inspected prior to use, and any pipe which is damaged shall be rejected from use in the work and shall be immediately removed from the site by the Contractor. Any pipe or manhole found to have dirt, concrete, asphalt or foreign matter shall be cleaned prior to acceptance.

3.02 Excavation and Bedding

A. Pipe Trench: Excavation shall be in accordance with "Earthwork." Trench excavation shall be of sufficient depth and width to provide adequate room for construction and installation of the work, except that the width of a

trench from the pipe invert to a point 12 inches above the top of the sewer pipe shall not be greater than the pipe width plus 12 inches.

B. Structures: Excavation for structures such as manholes, catch basins and inlets shall be made to the depth required for placing the base slab. Whenever possible, the base shall rest on undisturbed soil with a minimum amount of compacted sand-cement mixture to be used for leveling. In no case will more than 3 inches of sand-cement mixture be permitted under a base slab. If ground conditions or excess excavation causes need for more than 3 inches of fill or leveling course, an approved aggregate fill, compacted in place, will be required.

C. Pipe bedding shall be in accordance with "Earthwork".

D. Pavement Cuts: When the trench must be cut through pavement, driveway, or sidewalk, particular care shall be taken not to unnecessarily damage the adjoining areas of the pavement, driveway, or sidewalks. All cuts through existing surfaces shall be made with a concrete saw, sawing deep enough to allow a straight cut parallel with longitudinal and transverse construction or contraction joints.

3.03 Pipe Installation

A. Construction shall begin at the outlet end and precede upgrade with the spigot ends pointing in the direction of flow.

B. The Contractor shall use laser-aligning equipment for the laying of sewers to the specified lines and grades. Competent, trained operators shall operate the equipment. The laser beam projector is to be rigidly mounted to its support platforms to ensure that all ground equipment vibrations will be kept to a minimum and will permit the laser beam to be projected coaxially through the center of the pipe. All units shall be furnished with equipment to control atmospheric conditions in the pipe that could affect the acceptable standard of construction.

C. The inside of pipe and outside of the tongue shall be cleaned of any dirt or foreign matter. Joint materials shall be placed as recommended by the manufacturer. The pipe shall be centered in the grooves and pushed tight together to form a smooth and continuous invert. Mechanical means shall be used for pulling the pipe in place. The finished work shall be straight and shall be sighted through between manholes.

3.04 Structure Installation

A. Structures shall be constructed of the type and in compliance with the details and at the locations shown. All necessary metal frames and covers shall be furnished and installed. Covers shall be set at the required final elevation, 1/4 inch to 3/8 inch below flush with pavement or flush with lawn elevations so subsequent adjustment shall not be necessary.

B. Leveling Brick Work: Leveling brick for manhole frame and cover shall be laid radially in courses in a full bed of mortar with interior joints not more than 1/4 inch in width. Whole bricks only shall be used except to affect closures and to fill in the outside portion of radial joints. All bricks shall be moist prior to laying. Brick and block leveling courses shall be completely mortared to a thickness of at least 1/2 inch on the exterior surface.

3.05 Allowance Tolerance in Sewer Grade

A. Sewers shall be constructed and laid to the alignment and grade indicated on the drawings. A variation of 1/4 inch from this will be deemed sufficient reason to cause the work to be rejected and re-laid.

3.06 Backfill

A. Place and compact backfill around completed structures. Soil excavated from the site may be reused at the direction of the engineer.

B. Do not backfill against any structure until it has cured sufficiently.

C. Place backfill material in 12-inch layers and compact each layer to 95 percent the maximum unit weight.

D. The use of flow-able fill will be used as directed by the engineer.

3.07 Testing

A. Gravity Sewers: A final visual inspection will be performed with the city and/or the Owner's representative to note any defects, dips, or other problems.

B. All corrective work shall be completed and additional testing performed. This testing and inspection work is considered incidental to the cost of construction.