

SECTION 334000 – STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

- A. Provide all labor, materials and equipment as necessary to complete all work as indicated on the Drawings and specified herein.
- B. This section includes storm drainage systems.
- C. Related sections include the following:
 - 1. Division 01 Section “General Requirements - Temporary Facilities and Controls.”
 - 2. Division 31 Section “Earthwork.”

1.3 DESCRIPTION

- A. Storm and sanitary sewers shall be 2 separate systems.
- B. New manholes and catch basins shall be precast construction except for bases.
- C. Surface drainage shall be to catch basins; no storm water shall pass into a storm sewer without first passing through a catch basin.
- D. Concrete storm sewer pipe shall use a rubber "O" ring joint.
- E. Manholes and catch basins shall be constructed as specified herein and indicated on Drawings.

1.4 REFERENCES

- A. Except as herein specified or as indicated on the Drawings the work of this section shall comply with the following:
 - 1. AASHTO Standards M36 – Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
 - 2. M218 – Sheet Steel, Zinc-Coated (Galvanized) for Corrugated Steel Pipe.
 - 3. MDOT:
 - a. 2012 MDOT Standard Specifications for Construction.
 - b. MDOT Standard Plans.

1.5 SUBMITTALS

- A. Before commencing work, the Contractor shall provide an affidavit from the material manufacturers, that their materials meet the Specifications.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE SECTIONS

- A. ASTM C-478: Cone section shall be eccentric to allow for a straight vertical ladder.

2.2 STRUCTURE BLOCK AND BRICK

- A. Block: ASTM C-139.
- B. Brick: ASTM C-139.

2.3 COVERS AND GRATES:

- A. As specified on Drawings, or as indicated below:
 - 1. Curb Inlet: EJIW 7045, M1 grate.
 - 2. Square Inlet: EJIW 5105, M1 grate (for valley gutter pans).
 - 3. Round Inlet – Light Duty: EJIW 1130, M3 grate.
 - 4. Round Inlet – Heavy Duty: EJIW 1040, M1 grate for parking lots, M3 grate for walks – ADA compliant.
 - 5. Manhole Structure: EJIW 1040, Type B – Vented cover.
 - 6. Rolled Curb: EJIW 7065, M1 grate.

2.4 TRENCH DRAIN

- A. Klassik Drain by Acodrain KS1005; or approved equal.
 - 1. Drains: Part Number K1 through K3 sloped channels.
 - 2. Universal Plastic Coatings: Part Number 96825.
 - 3. Grates: ADA stainless grate DIN 19580 Class A.
- B. Square Inlet: EJIW 5105, M1 grate (for valley gutter pans).

2.5 ADJUSTING RINGS

- A. The inside diameter shall not be less than the diameter of the casting for which it is used.
- B. Allowable types include:

1. Precast Reinforced Concrete: Without cracks. 2-inch to 6-inch thick, minimum 3000 psi. Reinforcement rod shall not be visible on the surface.

2.6 MANHOLE STEPS

- A. EJIW 8500.

2.7 PORTLAND CEMENT

- A. ASTM C150 Type 1.

2.8 HYDRATED LIME

- A. ASTM C207.

2.9 SAND AND GRAVEL AGGREGATE

- A. ASTM C33.

2.10 CONCRETE

- A. Refer to Division 32 Section "Concrete Pavement."

2.11 MASONRY CEMENT

- A. ASTM C91.

2.12 CORRUGATED PERFORATED POLYETHYLENE DRAIN TILE

- A. ASTM F405 with heavy sock.

2.13 PVC GASKETED DRAIN PIPE

- A. Storm sewer up to and including 12-inch diameter and for pipe leading from catch basins.
 1. SDR 35, ASTM D2729.
 2. Other products as specified.
 3. Rubber boot to connect pipe to structure.

2.14 REINFORCED CONCRETE PIPE

- A. Storm Sewer 12-inch Diameter and Larger: ASTM C76.

2.15 CORRUGATED METAL PIPE

- A. Manufacturers: Contec, Republic; or approved equal.

B. Pipe Material:

1. Galvanized (AASHTO M36) Zinc Coated Sheets (AASHTO M218).
2. Corrugations: Helical corrugations for shall form a minimum 45 degree angle with the longitudinal axis.
3. Pitch and Depth: 2-2/3-inch x 1/2-inch.
4. Wall Thickness: MDOT Class B.
5. Coupling Bands: Coating and wall thickness shall match pipes being connected. Type options:
 - a. Corrugated band with sleeve gasket.
 - b. Semi-corrugated band with O-ring.
 - c. Flat band with O-ring.
6. End Section: Flared end section.

NOTE: Delete if pollutant separator is not part of the project.

2.16 POLLUTANT SEPARATOR

A. Model STC with oil/grease baffle and absorbant material.

1. CDS Technologies, 1035 S. Semoran Blvd, Winter Park, FL 32792; 800-848-9955, 407-681-9955, fax 407-681-4916; Sales Rep. Greg Sterchi, 708-482-8550.
2. Model and size as indicated on the Drawings.

NOTE: Verify SESC plan has specified this technique as part of the plan. If not specified in the SESC plan, then delete.

2.17 INLET STRUCTURE SILT SCREEN

A. Silt-Saver sold by Price and Company, Inc. 425 36th St., SW, Wyoming, MI 49548; 800-248-8230, 616-530-8230; or approved equal.

1. SS-100A: Fits round structures to 48-inch ID.
2. SS-200A: Fits square structures to 60-inch OD.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Connections and changes in direction or grade shall be made in manholes.

- B. Structure bases shall be cast-in-place concrete, transit mixed with minimum compressive strength of 3000 psi at 28 days, formed and finished level. Precast bases may be used with written approval of the Project Representative and where required by extremely difficult site conditions. Base slab shall be fully cured before precast portions are set.
- C. Precast concrete shall be used to construct structures. Only when precast sections are not manufactured in the size and shape required will block constructed structures be permitted. The Project Representative shall be notified prior to construction of block structures. Set precast sections in full mortar bed.
- D. Trench drains shall be constructed so that they sit on a foundation of a minimum depth of 42 inches, measured from finish grade to bottom of structure.
- E. Adjustment to Casting Elevations:
 - 1. Concrete rings shall be used wherever possible to adjust casting elevations. Rings shall be set in full mortar bed. Use a maximum of 3 rings.
- F. Tile shall be laid through the manhole and 3000 psi concrete shall be placed around the tile up to half of the diameter. The concrete shall slope from the walls of the manhole to the sewer. When there is a change in grade, direction, or pipe size, the flow channel shall be built from bricks and 3000 psi concrete to make a uniform, smooth change in grade, direction or pipe size.
- G. Vertical elevation of the invert shall be within plus or minus 0.04 foot (1/2-inch) of required elevation. Horizontal alignment must meet the same tolerance.
- H. Pipe Connections to Structures:
 - 1. Connections with existing sewers shall be made at points and in a manner indicated on the Drawings and approved by the Project Representative.
 - 2. Sewers being disconnected shall be sealed off with concrete.
 - 3. If PVC pipe connects to an existing or new structure, the pipe shall connect with an appropriately sized rubber boot.
- I. Catch basin sump shall extend 2 feet below the pipe outlet invert.
- J. Construct a peripheral sub-drainage system for catch basins.
 - 1. Install 4-inch diameter perforated polyethylene corrugated drain pipe with a heavy duty sock covering around each new structure and existing structure, if at least 4 vertical feet is exposed or the outlet pipe is exposed.
 - 2. Pipe shall enter catch basin with a tee connector, 2 inches above and directly opposite the outlet invert.

3. The peripheral drain pipe shall be positioned at 1/4-inch to provide positive drainage to the catch basin. The peripheral drain pipe shall be placed over the outlet pipe. Do not cut and cap the drain pipe at the outlet pipe.
4. Backfill the drain pipe with properly compacted Class II sand to the finish subgrade.

NOTE: Delete the following two items if culvert pipe is not part of the project.

K. Connection method for culvert pipe:

1. Put coupling band into position at the end of pipe last laid with band open to receive next section.
2. Bring next section into position within approximately 1-inch of last section laid.
3. Clean the interior of band and exterior of pipe of all dirt, stone and debris.
4. Pipes shall cleanly meet to allow for proper band pipe connections.
5. Insert bolts and tighten, positioning the coupling band joint on the top half of pipe.

L. Treatment of field welds and damaged galvanized steel surfaces of culvert pipe:

1. Clean with wire brush.
2. Two coats of zinc-rich paint, conforming to Federal Specifications ML-P-21035.

3.2 TESTING AND INSPECTION

A. Internal Television Inspection of Storm Sewers:

1. General:
 - a. Inspect sanitary sewers using a closed-circuit color television camera.
 - b. Provide Engineer with videos DVD format and written logs to document the internal television inspection:
 - 1) Written logs shall note the location of sewer laterals and pipe deficiencies by distance from the upstream manhole.
 - 2) The video tape shall include audio commentary regarding the sewer condition.
 - c. Engineer will review the videos and written logs to verify that the storm sewers were constructed in accordance with the Contract Documents.
 - d. The videos shall verify that the storm sewers are clean and free of sediment and debris to the satisfaction of Engineer. Storm sewers not satisfactorily cleaned shall be promptly cleaned and reinspected by closed-circuit color television camera.

- e. Television inspection shall be completed, documentation of television inspection shall be provided and Engineer shall determine that the sewers were constructed in accordance with the Contract Documents before payment for completed sections of sanitary sewer will be recommended to Owner.
2. Performance Requirements:
 - a. Inspection procedures and equipment shall meet the applicable standards as presented in the National Association of Sewer Service Companies (NASSCO) Recommended Specifications for Sewer Collection System Rehabilitation.
 - b. Each section of sanitary sewer between manholes shall be television inspected separately utilizing a video camera and related equipment specifically designed for the purpose of internal sewer inspection.
 - c. The camera speed shall not exceed 30 feet per minute.
 - d. The camera shall be stopped for no less than 10 seconds at the entrance manhole, each service lateral, exit manhole, and at points where the sewer is damaged or deficient.
 - e. Lighting for the camera shall be adequate to allow a clear picture of the entire periphery of the sewer and shall be varied as required to be effective for all pipe diameters inspected.
 - f. Cables and equipment used to propel the camera shall not obstruct the camera view or interfere with the documentation of the sewer conditions.
 - g. The video recording shall be continuous video file.
 - h. The mobile recording studio shall have adequate space to accommodate up to 3 persons for the purpose of viewing the video monitor while the inspection is in progress.
 - i. Whenever possible, the camera shall move in a downstream direction.
 - j. The location of the camera in the sewer shall be monitored by an accurate measuring system which records the distance traveled from the upstream manhole on the video.
 - k. Video DVDs and written logs shall be clearly labeled with the Project name and location identification.
 - l. If sewer has dirt and debris which prohibits video inspection, the sewer shall be cleaned and re-televised at no expense to Owner.

END OF SECTION 334000