403.01 Description. Adjust, construct, or temporarily lower drainage structures. Clean existing drainage structures and leads as directed by the Engineer. Drainage structure refers to manholes, catch basins, leaching basins, inlets and drop inlets. Drainage structures are designated as follows.

A. Drainage Structure. Consists of concrete footing, or precast sump, and the drainage structure, used for access to new or existing sewers with diameters up to 48 inches.

B. Precast Manhole Tee and Manhole Riser. Used for access to new sewers with diameters 42 inches and greater.

C. Manhole Base, Type 1 or 2 and Manhole Riser. Used for access to new or existing sewers with diameters 48 inches and greater. Manhole base Type 1 may be substituted for precast manhole tees.

403.02 Materials. Use materials meeting the following.

- Concrete, Grade S3 ................................ 701
- Mortar Type R-2 .................................. 702
- Granular Material Class II, III ..................... 902
- Steel Reinforcement ................................ 905
- Miscellaneous Metal Products ..................... 908
- Castings ........................................ 908
- Culvert, Sewer Pipe, and Box Sections ............ 909
- Geosynthetics ..................................... 910
- Masonry Units ................................... 913

Use cast-in-place or precast concrete construction for manholes for sanitary sewers.

Use structural steel plate with a minimum thickness of $\frac{1}{2}$ inch for temporary lowering of drainage structures that span 72 inches or less. Plates must cover the entire drainage structure with a minimum bearing surface of 12 inches. Submit, for approval, structural calculations prepared by a Professional Engineer licensed in the State of Michigan for plates that span greater than 72 inches.

Use leveling course hot mix asphalt (HMA) for patching during the temporary lowering operations, or HMA mixture as approved by the Engineer.
403.03 Construction.

A. Constructing, Adjusting, and Temporary Lowering of Drainage Structures, Precast Manhole Tees, Manhole Bases, and Manhole Risers.

1. **Excavation.** Excavate according to subsection 206.03.A.

2. **Concrete Construction.** Construct concrete portions of drainage structures according to subsection 706.03. Do not cast when the concrete temperature is above 90 °F.

3. **Placing Brick and Block Masonry.** Do not place masonry with mortar when the temperature is 36 °F or less. Remove and replace work damaged by frost. Apply a \(\frac{1}{2}\) inch thick plaster coat of mortar to the outer surface of all structures, and to the inner surface below the outlet flow line on all catch basins with traps or sumps. Place the first set of bricks or blocks on a full bed of mortar. Lay brick or block in courses with uniform mortar joints \(\frac{1}{2}\) inch thick \(\pm\) \(\frac{1}{8}\) inch. Break joints by half the length of the brick or block on adjoining courses. Place courses level except where otherwise required. Strike and point joints so that the exposed surface is true and smooth. Rake joints and wet brick or block before placing the plaster coat. Allow the brick or block surface to dry sufficiently to provide for proper bonding of the plaster coat.

**Brick.** Thoroughly wet all brick. Allow the brick surface to dry only sufficiently to prevent slipping on the mortar. Do not use broken or chipped brick on the faces of the structure. Provide a course made of headers a minimum of every seventh course. Make closures with brick lengths not less than the width of a whole brick.

4. **Precast Reinforced Concrete Units.** Construct precast reinforced concrete units according to Standard Plan R-1, 2 and 3 Series or as detailed on the project plans. Seal the joints with mortar according to subsection 403.03.A.3. Butyl rubber sealant meeting AASHTO M 198 is acceptable if approved by the Engineer. Use poured-in-place or precast concrete footings. Support precast concrete footings on a 6-inch subbase of compacted granular material Class II.

5. **Steel Reinforcement.** Install steel reinforcement according to subsection 706.03.
6. **Inlet and Outlet Pipes.** Place and compact backfill around the manhole base or sump to provide proper bedding for inlet and outlet pipes. Extend inlets and outlets through the outside wall surface a sufficient length to allow for pipe connections. Carefully construct masonry around pipes and seal with mortar to prevent leakage. Wrap the connection with geotextile blanket as detailed in the standard plan. Construct flow channels in manholes according to the standard plans.

7. **Backfilling.** Backfill according to subsection 401.03.F. Backfilling may be staged to follow the construction progress of the structure.

8. **Temporary Lowering of Drainage Structures.** Lower drainage structures before milling the pavement. Removal of pavement to lower the structure is included in Drainage Structure Cover, Adjust, Case 1.

Record the location of the structure so that each cover can be reinstalled at its original location. Remove the existing frames and covers and match mark them for later identification and placement. Salvage and safely store the frames and covers. Repair the existing structure as needed to allow uniform contact of the steel plate to the top of the structure. The repairs are included in the work of adjusting drainage structures. Place and compact the HMA according to subsection 503.03.

**B. Drainage Structure Covers.** Furnish and install new covers, including frames and grates, on new or existing structures according to the contract documents. Place castings on a full mortar bed.

**C. Adjusting Drainage Structure Covers.** Make final adjustment of drainage structures within the HMA pavement section immediately before placement of the top course or overlay if only one course is applied. Adjusting a cover applies when the elevation of the cover is changed up or down 6 inches or less. Adjust the cover to the required elevation by supporting it on one of the following:

1. A metal ring adjustor
2. A concrete collar
3. Masonry in a full mortar bed
4. An alternate adjustor selected from the Qualified Product List
Hold adjusted covers firmly in place. Remove and replace the adjacent pavement, curb, or curb and gutter to match the existing grades or to the required elevations.

D. Additional Depth of Adjusting Drainage Structures. Applies when a drainage structure cover is adjusted more than 6 inches from the existing cover elevation due to a change in elevation of the roadway or when alterations to the drainage structure exceed 6 inches regardless of the change in cover elevation. Remove damaged or unsound portions of the structure, if required, and adjust to the required elevation.

E. Drainage Structure Taps. Make connections to existing drainage structures owned by counties, municipalities, or drain commissions according to the regulations of the owner and the contract documents. If a conflict exists between the owner’s regulations and these specifications, the owner’s requirements will take precedence.

When tapping an existing drainage structure, cut a minimum opening equal to the outside diameter of the inlet pipe plus 6 inches into the receiving structure. Pack a minimum 3-inch mortar layer completely around the inlet pipe and strike smooth with the inner wall of the structure. Repair or replace any existing drainage structure damaged by the Contractor during the tapping operation. The cost of this repair or replacement is the responsibility of the Contractor.

Tap directly to a sewer or culvert according to subsection 402.03.D.

F. Cleanout. Maintain all catch basins, manholes, leaching basins and inlets installed on the project. All installed catch basins, manholes, leaching basins and inlets must be free of silt, debris, and other foreign matter at the time of final acceptance.

G. Cleaning Existing Drainage Structures and Leads. This work will be done at locations in the area of the project identified by the Engineer. The Engineer will determine the condition and necessity for cleaning, before cleanout. Hauling and disposing of the waste generated is included in each item.

Clean the downstream drainage structure nearest the trunk sewer first and place a temporary bulkhead so the trunk sewer is not infiltrated. Upstream drainage structures and leads may then be cleaned.

Clean the drainage structure(s) and/or lead(s) of sand, silt, and all debris. Prevent all sand, silt, or debris from going farther into the leads.
Dispose of the waste generated from the drainage structure or drainage structure lead clean out operation using one of the following methods. Anytime the waste generated is suspected of being hazardous, notify the Engineer. If material tests hazardous as defined by Part 111, of the Natural Resources and Environmental Act, Act 451, of 1994, immediately notify the Engineer. Payment for disposal of hazardous material will be according to subsection 109.07.

1. **Disposal Alternate A.**

   a. **Solid Waste Phase.** Solid is defined as having no releasable liquids. Dispose of the solid waste at a Type II landfill. The landfill may require testing before accepting the waste. Provide disposal documentation from the Type II landfill to the Engineer.

   b. **Liquid Waste Phase.** Dispose of the liquid waste by one of the following three methods (options).

      **Option 1** - Evaporate the liquid waste.

      **Option 2** - Place liquid waste in a sanitary sewer system with the approval of the owner of the system. Provide a copy of the owner’s approval to the Engineer.

      **Option 3** - Place liquid waste into a portable tank or container and allow enough time for the sediment and suspended solids to settle out. After the settling has occurred, discharge only the clear liquid phase into a storm sewer, well above a receiving stream, creek, drain, etc. Monitor this disposal option carefully to ensure that contaminants or sediments are not placed back into the sewer system. Manage the remaining solid/liquid phase as a waste and dispose of using Disposal Alternate B or using Disposal Alternate A with Options 1 or 2.

2. **Disposal Alternate B.**

   Use a Licensed Liquid Waste Hauler to transport the waste generated and dispose of it according to Part 121, Liquid Industrial Waste, of the Natural Resources and Environmental Protection Act, Act 451, of 1994. Provide the Engineer a copy of the transport manifest.
403.04 Measurement and Payment.

<table>
<thead>
<tr>
<th>Contract Item (Pay Item)</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Structure, __ inch dia</td>
<td>Each</td>
</tr>
<tr>
<td>Dr Structure, Add Depth of __ inch dia, 8 feet to 15 feet</td>
<td>Foot</td>
</tr>
<tr>
<td>Dr Structure, Add Depth of __ inch dia, more than 15 feet</td>
<td>Foot</td>
</tr>
<tr>
<td>Drop Inlet, Type __</td>
<td>Each</td>
</tr>
<tr>
<td>Mh, Precast Tee, CL, __ inch</td>
<td>Each</td>
</tr>
<tr>
<td>Mh Base, __ inch, Type __</td>
<td>Each</td>
</tr>
<tr>
<td>Mh Riser</td>
<td>Foot</td>
</tr>
<tr>
<td>Dr Structure Cover</td>
<td>Pound</td>
</tr>
<tr>
<td>Dr Structure Cover, Adj, Case __</td>
<td>Each</td>
</tr>
<tr>
<td>Dr Structure, Adj, Add Depth</td>
<td>Foot</td>
</tr>
<tr>
<td>Dr Structure, Tap, __ inch</td>
<td>Each</td>
</tr>
<tr>
<td>Dr Structure, Temp Lowering</td>
<td>Each</td>
</tr>
<tr>
<td>Dr Structure, Cleaning</td>
<td>Each</td>
</tr>
<tr>
<td>Dr Structure Lead, Cleaning, __ inch</td>
<td>Foot</td>
</tr>
</tbody>
</table>

A. **Drainage (Dr) Structures Excluding Drop Inlets.** Depth of drainage structures, with the exception of drop inlets, will be measured vertically from the top of the masonry to the top of the concrete footing. Payment is based on this measured depth as follows.

1. **Dr Structure, __ inch dia**, of the diameter specified includes the concrete footing and up to 8 feet of drainage structure depth.

2. **Dr Structure, Add Depth __ of inch dia, 8 feet to 15 feet**, of the diameter specified, includes that portion of a drainage structure which is deeper than 8 feet but not deeper than 15 feet.

3. **Dr Structure, Add Depth __ of inch dia, more than 15 feet**, of the diameter specified, includes that portion of a drainage structure which is deeper than 15 feet.

B. **Drop Inlets.** Drop inlets of the type specified will be measured as units regardless of depth. Pipe leading from the drop inlet to a sewer or catch basin will be paid for separately. Pipe from drop inlet, Type 1 will be paid as a sewer. Pipe from drop inlet, Type 2 will be paid as encased sewer. A sewer tap or drainage structure tap will be paid only when tapping the sewer or encased sewer into an existing drainage system.

C. **Manhole (Mh) Base and Riser.** The riser above the collar of the Mh, Precast Tee will be measured as Mh Riser.
The riser above the **Mh Base** will be measured as **Mh Riser**. Payment for **Mh Base, Type 1** includes cutting the access hole into the sewer. Where a **Mh Base, Type 1** is used in place of **Precast Mh, Precast Tee** and the contract does not include the item **Mh Base, Type 1**, the work will be paid for as **Mh, Precast Tee**.

**Mh Riser** will be measured vertically from the top of the manhole base or precast tee to the top of the riser, regardless of depth.

**D. Drainage Structure Covers** will be measured in pounds using the nominal weights in the following table.

<table>
<thead>
<tr>
<th>Table 403-1 Nominal Weight of Drainage Structure Covers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cover</strong></td>
</tr>
<tr>
<td>Weight, lbs</td>
</tr>
</tbody>
</table>

| **Cover** | **L** | **M** | **Q** | **R** | **RX** | **W** | **V** | **VG** |
| Weight, lbs | 500 | 500 | 350 | 550 | 550 | 370 | 710 | 610 |

Placement of new covers on existing structures also requires payment for **Dr Structure Cover, Adj, Case** ___.

Payment for **Dr Structure Cover, Adj, Case 1** includes sawcutting existing pavement, curb, and curb and gutter, where required, and adjusting the cover up or down, a maximum of 6 inches, to the required elevation. Removing and replacing pavement adjacent to the adjusted cover is included in the item **Dr Structure Cover, Adj, Case 1**. Removing and replacing curb and gutter adjacent to the adjusted structure is not included in adjusting the structure and will be paid for separately.

**Dr Structure Cover, Adj, Case 2** applies only to structures located outside existing pavement, curb, and curb and gutter or within the existing pavement at locations where the pavement is shown to be removed in accordance with subsection 204.03. Repairs needed to allow uniform contact of temporary steel plate to top of structure is included in **Dr Structure Cover, Adj, Case** ___.

**Dr Structure, Adj, Add Depth** will be measured beginning 6 inches from the level of the existing structure (in the direction of adjustment) to the limit of the additional depth of adjustment. Payment for **Dr**
Structure, Adj, Add Depth also requires payment for Dr Structure Cover, Adj, Case ____. Payment for Dr Structure, Adj, Add Depth includes drainage structure taps within the limits of the adjustment. Dr Structure, Tap will be paid only for the taps to existing drainage structures outside the limits of adjustment. Taps to existing sewers will be paid for as Sewer Taps according to subsection 402.04.

E. Dr Structure, Temp Lowering will be measured as units. Payment includes match marking; removing, salvaging, and transporting castings to and from site; storing the existing structure castings; plating the structure; and HMA patching. This pay item includes removing the plate and HMA patching materials at the time of final adjustment. Final adjustment of the drainage structure will be paid for separately.

F. Cleaning Existing Drainage Structures and Leads. Drainage structures to be cleaned will be measured as units. Dr Structure, Cleaning includes all equipment and labor to clean each structure and hauling, testing if required for disposal, and disposing of all waste generated.

Dr Structure Lead, Cleaning, ___ inch includes all equipment and labor to clean storm sewers and hauling, testing if required for disposal, and disposing of all waste generated. Placement and removal of temporary bulkheads are included in this item of work.

Clean-out of existing sewers plugged by the operation of the Contractor will not be paid for separately, but will be considered as included in the unit prices bid for other contract items.

G. Cleanout, temporary lowering and adjusting of new drainage structures due to the Contractor’s construction schedule are included in payment for new structures.