Chapter 11 - Structural Repairs

SECTION 09

PIPE AND CULVERT LINING (SR-PCL)
**GENERAL NOTES**

               - Revisions thereof and additions thereto and Special Provisions
                 for Materials and Construction.

Grout:  Refer to Section 486.

Existing Structure:  All dimensions affected by the geometrics, and/or location of the
                     existing structure shall be checked by the Contractor, before any
                     work is done, and before any material is ordered or fabricated. It
                     shall be the responsibility of the Contractor to supply the Engineer
                     with all field dimensions required to check all detail drawings. The
                     (+) marks shown with dimensions do not indicate any degree of
                     precision. These marks (+) indicate existing dimensions that may vary
                     and do require field verification by the Contractor.

                     Existing structure shown in dashed lines.

                     Finished slope of the new liner shall match the existing.

Liner:  The liner shall be installed according to the manufacturer's recommendations.
        The liner shall be designed by the manufacturer based on AASTO LRFD
        Section 12 with sufficient wall thickness to support all fluid and earth
        pressures and an HS 25 live load, neglecting any contributions from the
        existing pipe to be lined.

        Use the following culvert liner:

        All liner materials shall be joined into continuous lengths without
        decreasing the inner diameter of the liner. All joints must be
        water tight to 25 feet of head per ASTM D 3212.

        All liner materials, including fittings shall be furnished by a
        single manufacturer.

Maintenance
of Traffic:

Work Required:  (List items of work)
1. Size and location of water pump to be determined by contractor.

2. Denotes annular void to be filled with grout.

3. Denotes limits of undermined area to be filled with grout.

4. LOD Denotes limit of disturbance.

5. LOA Denotes limits of access. LOA is the designated area where only foot traffic and work requiring hand held equipment is allowed. No heavy machinery is permitted to be driven or stored within this area. All access disturbances shall be minimal and any disturbance shall be stabilized at the end of each work day. No work is to be conducted outside of the limits of access or disturbance, unless expressed in writing by the MDE Compliance Inspector prior to the change. In addition, the engineer shall contact EPD and MDE at the initiation and completion of this project for compliance.

6. WET Denotes limit of wetland.


8. ROW Denotes limits of right-of-way.

9. Number shown circled are field measurements of stream depth in feet, as taken on [insert date].

10. The discharge from any construction dewatering area shall be passed through an approved sediment control device. This device may be bypassed if the water being pumped is clear and there is a stabilized outfall. The engineer shall be the sole judge if the sediment control device can be bypassed.
NOTES

1. The Contractor is advised that even small amounts of precipitation can cause flash flooding at any time. The Contractor shall obtain updated weather reports each morning and afternoon, and more often when precipitation is in the forecast or appears eminent in the area of work or any surrounding area that the runoff may have an adverse affect on the project site. Prior to beginning work at each jobsite, the Contractor shall establish an emergency plan of action with all personnel to evacuate the area should there be any flash flood warnings.

2. If existing structure has been previously lined with asphalt paving, Contractor shall completely remove asphalt paving in entire area to be lined. See Note 6 Sequence of Construction.

3. The Contractor may have to temporarily remove and reset a portion of the existing w-beam traffic barrier daily to accommodate staging needs, if applicable.

4. No heavy equipment shall be used in the area of the stream or floodplain due to the presence of adjacent wetlands.

5. The Contractor shall provide the proper ventilation in the structure in conformance with TC-3.04 and the latest OSHA regulations.
SEQUENCE OF CONSTRUCTION

1. Set up sediment and erosion control devices.
2. Install sediment bag. Sediment bag shall be placed outside of 25’ buffer zone, whenever possible. Install pump hose across existing roadway, whenever applicable.
3. Place upstream and downstream diversion dikes at locations specified by the Engineer. Diversion dike to be built to a height 1’ above the normal water level using sand bags, concrete barrier wrapped in polyvinyl plastic, or a Portadam system, or a combination of these. Install a stable velocity dissipater made of riprap or sand bags at the hose outfall before initiating pumping.
4. Divert water according to plans.
5. Place pump and hose at proper locations and initiate pumping.
6. The stream diversion shall ensure that a reasonably dry work area is continuously maintained during construction of the project and that excess sediment is contained within the limits of disturbance.
7. Water blast clean the entire area to be lined, (minimum pressure of 4000 psi at the nozzle, using a rotary nozzle). All debris, rust layers, asphalt coating, etc. in area of repair shall be removed and properly disposed of at an approved site.
8. After area to be lined is clean and dry, install liner and fill with grout the annular void to limits shown. See details on drawing on Sheet 2. Let grout cure for 36 hours from the end of the last pour before permitting water to flow through it.
9. Remove the entire pump hose and PVC carrier pipe and restore the asphalt pavement “in-kind” and to original line and grade.
10. Remove the sediment and erosion control devices and return construction area to preconstruction conditions or better.
SEQUENCE OF CONSTRUCTION

1. Set up sediment and erosion control devices.

2. Install sediment bag. Sediment bag shall be placed outside of 25' buffer zone, whenever possible. Install pump hose across existing roadway, whenever applicable.

3. Place upstream and downstream diversion dikes at locations specified by the Engineer. Diversion dike to be built to a height 1' above the normal water level using sand bags, concrete barrier wrapped in polyvinyl plastic, or a Portadam system, or a combination of these. Install a stable velocity dissipater made of riprap or sand bags at the hose outfall before initiating pumping.

4. Saw cut existing pavement and dig out a temporary trench as shown on Sheet 2 of 5. The location of the trench shall be determined by the Contractor. The Contractor shall maintain a smooth riding surface to the satisfaction of the Engineer throughout the duration of construction.

5. Place pump and hose at proper locations place graded aggregate base in and hot mix asphalt over temporary trench and initiate pumping.

6. The stream diversion shall ensure that a reasonably dry work area is continuously maintained during construction of the project and that excess sediment is contained within the limits of disturbance.

7. Water blast clean the entire area to be lined, minimum pressure of 4000 psi at the nozzle, using a rotary nozzle. All debris, rust layers, asphalt coating, etc. in area of repair shall be removed and properly disposed of at an approved site.

8. After area to be lined is clean and dry, install liner and fill with grout the annular void to limits shown. See details on drawing on Sheet 2. Let grout cure for 36 hours from the end of the last pour before permitting water to flow through it.

9. Remove the entire pump hose and PVC carrier pipe and restore the asphalt pavement "in-kind" and to original line and grade.

10. Remove the sediment and erosion control devices and return construction area to preconstruction conditions or better.
SEQUENCE OF CONSTRUCTION

1. Set up sediment and erosion control devices.

2. Install sediment bag. Sediment bag shall be placed outside of 25’ buffer zone, whenever possible. Install pump hose across existing roadway, whenever applicable.

3. Place upstream and downstream diversion dikes at locations specified by the Engineer. Diversion dike to be built to a height 1’ above the normal water level using sand bags, concrete barrier wrapped in polyvinyl plastic, or a Portadam system, or a combination of these. Install a stable velocity dissipater made of riprap or sand bags at the hose outfall before initiating pumping.

4. Install the stream diversion hose through the new liner.

5. Place pump and hose at proper locations and initiate pumping.

6. The stream diversion shall ensure that a reasonably dry work area is continuously maintained during construction of the project and that excess sediment is contained within the limits of disturbance.

7. Water blast clean the entire area to be lined, (minimum pressure of 4000 psi at the nozzle, using a rotary nozzle). All debris, rust layers, asphalt coating, etc. in area of repair shall be removed and properly disposed of at an approved site.

8. After area to be lined is clean and dry, install liner and fill with grout the annular void to limits shown. See details on drawing on Sheet 2. Let grout cure for 36 hours from the end of the last pour before permitting water to flow through it.

9. Remove the entire pump hose and PVC carrier pipe.

10. Remove the sediment and erosion control devices and return construction area to preconstruction conditions or better.
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1. Set up sediment and erosion control devices.

2. Install sediment bag. Sediment bag shall be placed outside of 25' buffer zone, whenever possible. Install pump hose across existing roadway, whenever applicable.

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4. Divert the stream to an adjacent waterway on either approach side of the pipe to be lined.

5. Place pump and hose at proper locations and initiate pumping.

6. The stream diversion shall ensure that a reasonably dry work area is continuously maintained during construction of the project and that excess sediment is contained within the limits of disturbance.

7. Water blast clean the entire area to be lined, (minimum pressure of 4000 psi at the nozzle, using a rotary nozzle). All debris, rust layers, asphalt coating, etc. in area of repair shall be removed and properly disposed of at an approved site.

8. After area to be lined is clean and dry, install liner and fill with grout the annular void to limits shown. See details on drawing on Sheet 2. Let grout cure for 36 hours from the end of the last pour before permitting water to flow through it.

9. Remove the entire pump hose and PVC carrier pipe and restore the asphalt pavement "in-kind" and to original line and grade.

10. Remove the sediment and erosion control devices and return construction area to preconstruction conditions or better.
# Typical Section (Circular Pipe)

**Scale:** 1/2" = 1'-0"

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<tr>
<th>Structure No.</th>
<th># of pipes to be inserted</th>
<th>Length of individual pipes to be inserted</th>
<th>Diameter of existing pipe</th>
<th>Depth of fill</th>
<th>Manning's &quot;n&quot; Value (Max.) of proposed liner</th>
<th>Internal diameter of liner (Min.)</th>
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**Note:**
The Contractor shall install the new liner as low as possible within the existing pipe, while still maintaining minimum clearances. The contractor may be required to install additional bracing in the annular void (not shown) to prevent floating of the insert.

**Notes:**
1. If a minimum of 1" clearance cannot be maintained along the liner length between the liner outer diameter and the existing pipe inner diameter, then contact the Office of Structures.
2. See Sequence of Construction Note 4 for approved method of stream diversion. If the Contractor wishes to use another method, the Contractor shall get approval from the Maryland Department of the Environment, MDE.

**Note:**
A utility location survey shall be performed prior to installing the "pump around hose" in the roadway or drilling holes in the pavement to provide access ports to be used to fill the annular space with grout.
**Typical Section (Pipe Arch)**

Scale: 1/2" = 1'-0"

**Structural Requirements**

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**Length of Individual Pipes to be Inserted**

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**Diameter of Existing Pipe**

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**Depth of Fill**

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**Manning's 'n' Value (Max.) of Proposed Liner**

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**Area of Severe Corrosion**

Area of severe corrosion varies

**Note:**

A utility location survey shall be performed prior to installing the "pump around hose" in the roadway or drilling holes in the pavement to provide access ports to be used to fill the annular space with grout.

**Note:**

The Contractor shall install the new liner as low as possible within the existing pipe, while still maintaining minimum clearances. The contractor may be required to install additional bracing in the annular void (not shown) to prevent floating of the insert.

**Area of Severe Corrosion**

Area of severe corrosion varies

**Graphical Representation:**

- Hot mix asphalt over temporary trench
- Option to saw cut existing pavement (Typ.)
- Graded aggregate base
- Pump hose and PVC carrier pipe
- Class "SE" geotextile
- Optional pump hose location for maintaining stream flow (support as required)
- Existing elliptical metal pipe
- Proposed pipe liner
- Depth of fill
- Grout ports shall be provided per manufacturer's recommendations to provide uniform grouting of annular void.

**Class "SE" Geotextile**

Class "SE" geotextile

**Proposed Pipe Liner**

The Contractor shall install anchored offsets along the invert, sides and top to center new liner inside existing pipe. The grade of the pipe shall be kept at a uniform grade, if possible.

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