Chapter 11 - Structural Repairs

SECTION 09

PIPE AND CULVERT LINING (SR-PCL)

GENERAL NOTES

Specifications: - SHA Specifications dated May 2017.
- 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 recommedations. 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: Use Standard No.

Work Required: (List items of work)

Note to Designer, (Delete before final printing):

(a) HDPE pipe in accordance with ASTM F 714, maximum DR 32.5.

(b) HDPE pipe in accordance with ASTM D 3350 cell classification 345464C.

(c) HDPE pipe in accordance with ASTM F 894 open profile, Class RSC 100 or RSC 160.

(d) PVC pipe in accordance with ASTM F 949, except that the PVC pipe and fittings shall be made of a PVC compound having a minimum cell classification of 12454B, in accordance with ASTM D 1784. The joining method for PVC pipe shall be by elastomeric material in accordance with ASTM F 949.

(e) Aluminum pipe in accordance with ASTM B 745.

(f) Spiral wound liner in accordance with ASTM F 1698 and F 1741.

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Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 08/11/2017
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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

LINING OF EXISTING CULVERT
GENERAL NOTES

DETAIL NO. SR-PCL-101 SHEET 1 OF 1

STRUCTURAL REPAIRS

NOTES

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.
7. ——B—— Denotes limit of buffer.
8. —ROW— Denotes limits of right-of-way.
9. (0.0) 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.

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Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	LINING OF EXISTING CULVERT CONSTRUCTION NOTES
VERSION 1.0	DETAIL NO. SR-PCL-102 SHEET 1 OF 1

STRUCTURAL REPAIRS

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.

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Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	LINING OF EXISTING CULVERT NOTICE TO CONTRACTORS
VERSION 1.0	DETAIL NO. SR-PCL-103 SHEET 1 OF 1

STRUCTURAL REPAIRS

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.

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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

LINING OF EXISTING CULVERT
SEQUENCE OF CONSTRUCTION
USING EXISTING PIPES FOR STREAM DIVERSION

DETAIL NO. SR-PCL-201 SHEET 1 OF 1

STRUCTURAL REPAIRS

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 throughtout 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.

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Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	LINING OF EXISTING CULVERT SEQUENCE OF CONSTRUCTION USING TRENCH IN PAVEMENT FOR STREAM DIVERSION
VERSION	
1.0	DETAIL NO. SR-PCL-202 SHEET 1 OF 1

STRUCTURAL REPAIRS

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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Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	LINING OF EXISTING CULVERT SEQUENCE OF CONSTRUCTION USING HOSE IN PIPE LINER FOR STREAM DIVERSION
VERSION	
1.0	DETAIL NO. SR-PCL-203 SHEET 1 OF 1

STRUCTURAL REPAIRS

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 the stream to an adjacent waterway on either apporach 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.

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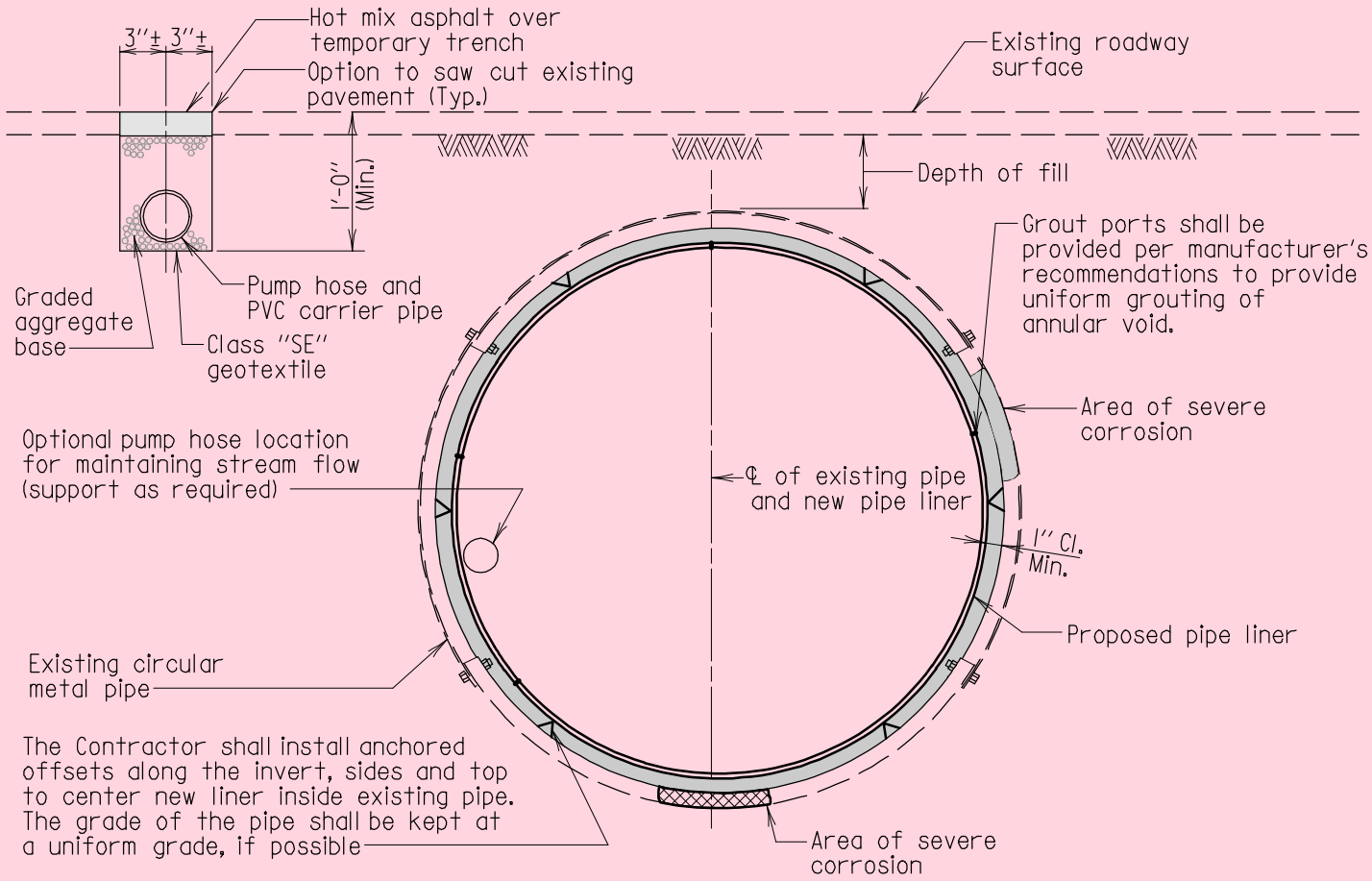
Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	LINING OF EXISTING CULVERT SEQUENCE OF CONSTRUCTION USING ADJACENT STREAM FOR STREAM DIVERSION
VERSION	
1.0	DETAIL NO. SR-PCL-204 SHEET 1 OF 1

STRUCTURAL REPAIRS



TYPICAL SECTION (CIRCULAR PIPE)

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

Structure No.	
# of pipes to be inserted	
Length of individual pipes to be inserted	
Diameter of existing pipe	
Depth of fill	
Manning's ''n'' Value (Max.) of proposed liner	
Internal diameter of liner (Min.)	

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.

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 a another method, the Contractor shall get approval from the Maryland Department of the Environment, MDE.

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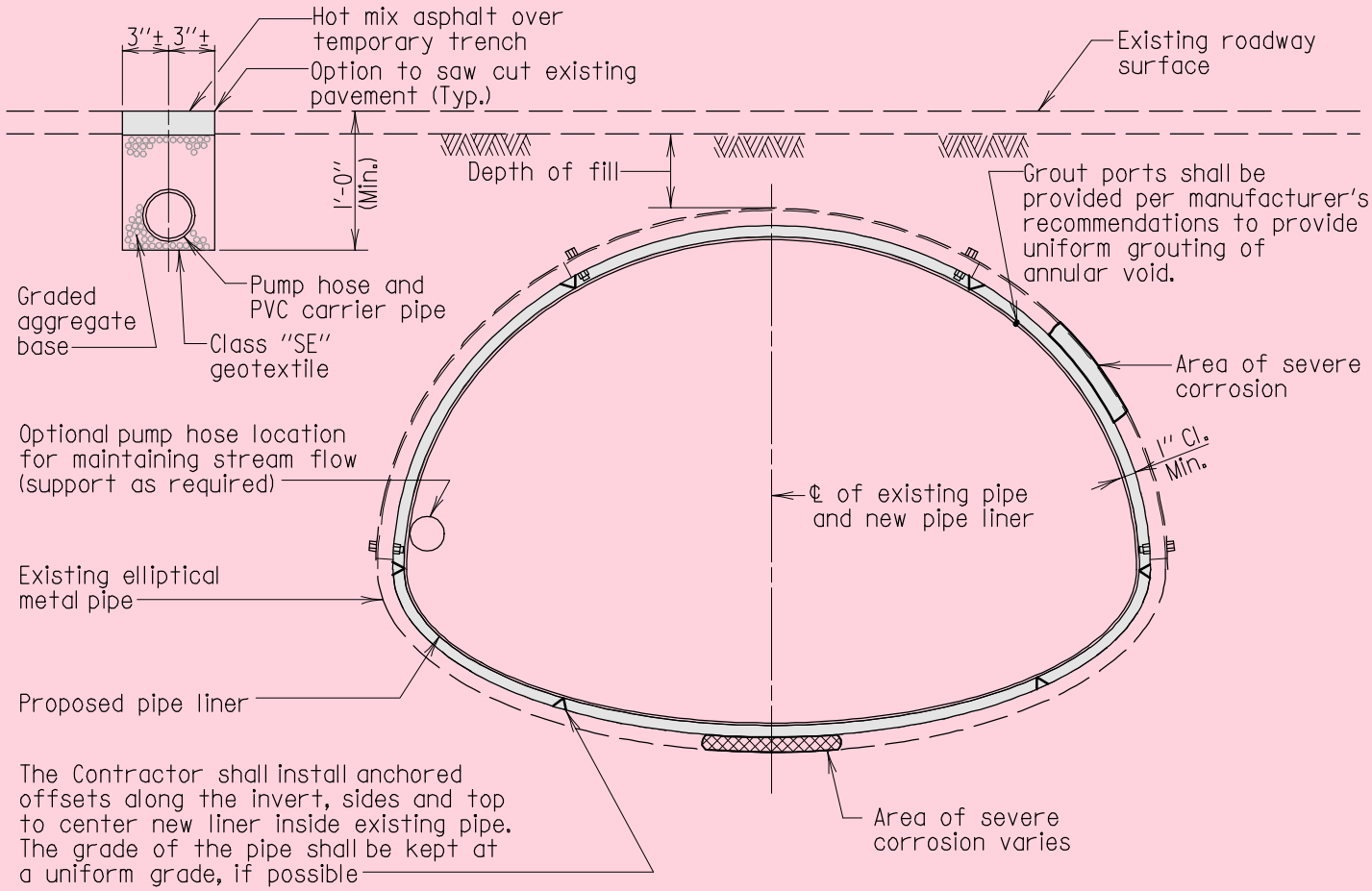
LINING OF EXISTING CULVERT
CIRCULAR METAL PIPE

DETAIL NO. SR-PCL-301 SHEET 1 OF 1

STRUCTURAL REPAIRS



TYPICAL SECTION (PIPE ARCH)

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

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.

Structure No.	
# of pipes to be inserted	
Length of individual pipes to be inserted	
Diameter of existing pipe	
Depth of fill	
Manning's "n" Value (Max.) of proposed liner	
Internal diameter of liner (Min.)	

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 a another method, the Contractor shall get approval from the Maryland Department of the Environment, MDE.

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LINING OF EXISTING CULVERT METAL PIPE ARCH

DETAIL NO. SR-PCL-302 SHEET 1 OF 1

STRUCTURAL REPAIRS