

1. CONCRETE INVERT LINING

A. Description. Furnish all materials, equipment, and labor necessary for placement of concrete liner at the locations specified in the plans.

B. Materials.

- 1) Class General Concrete. Furnish concrete meeting requirements of Section 551.
- 2) Angle Iron. Furnish angle iron to the thickness and dimension shown in the plans.
- 3) Wire Mesh. Furnish 10 gage welded wire mesh to the dimension shown in the plans.

C. Construction Requirements.

- 1) Throughout the construction process, use means and methods that do not damage the existing culvert wall.
- 2) Remove standing water from the culvert. Clean the culvert invert of all loose debris, including the corrugation valleys. Remove loose bituminous coating. Bituminous coating that is intact on the culvert wall below the invert liner may be removed or left in place, except the bituminous coating must be removed at weld locations.
- 3) By-Passing. When required, provide for the flow of water around the structure or structures that are to be lined. Use a pump and bypass lines of adequate capacity to handle the flow. Payment for the by-passing drainage during construction operation by approved measures will not be paid for directly but will be subsidiary to bid items of the Contract.
 - a) For the culvert crossing located at Station 267+82, remove the existing baffles from the culvert prior to installation of the invert paving.
- 4) After preparing the culvert invert, place the welded wire mesh on top of the corrugations with a minimum 6-inch overlap between reinforcement sections. Connect the mesh to the culvert by mechanical fastening or welding at 24-inch centers (maximum, both directions). Place the angle iron as shown and weld the angle iron sufficiently to hold it in place during and after concrete placement. Spot welds or tack welds may be used.
- 5) Install concrete paving to the depth shown in the plans. Maintain positive grade along the culvert length, sloping from inlet to outlet. Concrete depths may vary up to 1 inch to maintain grade.
- 6) Once the invert is prepared, pour the concrete liner in a controlled manner. Prevent the welded wire mesh and angle iron from dislodging during concrete placement and finishing. Place the liner to the dimensions shown in the plans. Smooth trowel the concrete to the required thickness. Tie all edges of the liner to the corrugated steel in a manner to prevent the ponding of water at the liner/plate interface and to prevent undermining of the liner. Provide a minimum 3/4-inch chamfer or fillet along the top edge of the concrete liner at the pipe ends.
- 7) Within 18 hours after finishing, protect the surface of the concrete with a membrane curing compound meeting the requirements of Subsection 551.03.7(B) and 501.02.6. The curing compound must be water soluble. Apply the curing compound to the entire exposed concrete surface.
- 8) Once the concrete has cured sufficiently to allow access without damaging the finished surface, apply a bituminous coating meeting requirements of AASHTO M 190 or an epoxy emulsion meeting requirements of AASHTO M 235 along all edges of the liner to prevent the migration of water underneath the liner. Seal corrugation valleys along the angle iron and any other gaps. Apply the sealant to an adequate thickness to prevent erosion of the sealant by flowing water and debris.
- 9) Allow the concrete and edge emulsion to cure a minimum of 48 hours before water is permitted to flow over the invert.

The preceding steps are a general installation guideline. Any variation to the recommended procedure must be approved by the Project Manager.

D. Method of Measurement and Basis of Payment. Concrete invert liner will be measured lump sum and include Culvert-Liner Concrete, which is shown in the plans as invert paving for the culvert lining at Station 267+82. The payment is included in the item "Miscellaneous Items C – LS". Angle iron, wire mesh, and other items incidental to concrete invert lining are not measured for payment. Payment is full compensation for all resources necessary to complete the work.