

SECTION 58

CONCRETE BOX CULVERT

58.1 DESCRIPTION

A. General: This work consists of furnishing and installing Concrete Box Culverts.

B. Related Work:

Section 12	Roadway and Drainage Excavation and Embankment
Section 50	Precast Concrete
Section 51	Structure Excavation
Section 54	Drainage Pipe Installation
Section 55	Cast in Place Concrete Structures
Section 108	Concrete Curing Materials
Section 200	Controlled Low Strength Material
Section 202	Geosynthetics for Roadways
Section 203	Submittals

58.2 MATERIALS

A. Precast Concrete Box Culvert and End Sections: Shall conform to the requirements of Section 50.

B. Cast in Place Box Culvert and End Sections: Shall conform to the requirements of Section 55.

C. Box Culvert Undercut:

- 1. Backfill Material:** Material for backfilling the undercut areas shall be installed at the thickness specified in plans and consist of stable material free of organic matter. Material shall conform to the following:

Sieve	% Passing
1 1/2 inch	100
1 inch	95 - 100
#4	0 - 75
#200	0 - 18.0

If undercut depth exceeds 3 feet below the bottom of the box culvert and stable material is not encountered, oversized rock or foundation material may be used up to the bottom of the undercut limits shown on the plans.

- 2. Bedding Material for Precast Concrete Box Culverts:** Shall be installed at the

thickness specified in plans and shall be sand or selected sandy soil conforming to the following:

Sieve	% Passing
3/8 inch	100
#200	0 - 10.0

- D. **Joint Wrap:** Shall be MarMac SealWrap, or approved equal.
- E. **Polyethylene Sheeting:** Shall conform to the requirements of Section 108.
- F. **Steel Wire Bar Supports:** In contact with the casting forms, shall be stainless steel, hot dipped galvanized, or plastic tipped extending at least one-half (1/2) inch from the form surface.

58.3 CONSTRUCTION REQUIREMENTS

- A. **Design:** Shall conform to the AASHTO design requirements for the depth of fill, including surfacing, etc., as well as live load or loading indicated on the plans. The specified live load shall apply to all barrel sections.
- B. **Excavation, Box Culvert:** Excavation for box culverts shall be per Section 51.
- C. **Box Culvert Undercut:** Undercut dimensions shall be to the minimum dimensions shown on the plans, unless otherwise directed by the Engineer. If the Engineer determines field conditions warrant change, the plan limits of the undercutting may be increased, decreased, or eliminated. The excavated material shall be used for backfill and embankment or disposed of as directed by the Engineer.

Backfill shall be compacted in accordance with Section 12 in horizontal layers not to exceed 6 inches loose depth.

- D. **Installation:** Box culvert installation will conform to the shop drawings and the following:
 1. **Foundation:** Foundation preparation shall be in accordance with Section 51. The foundation shall be shaped to provide a satisfactory template section and density.
 2. **Transverse Joints:** All joints in the box culvert shall be sealed. MarMac SealWrap shall be installed on the outside surface of the joint along the top and side walls of the box, to provide a minimum of 12 inches of material centered on the joint. Inside the box culvert, floor joints shall have flexible butyl joint sealant installed along the floor to the top of the floor haunches. The maximum allowable gap at any point between adjacent sections of box culvert shall be 1 inch.
 3. **Lift Holes:** Shall be covered with MarMac SealPlugs, or approved equal.

4. **Joint Ties:** Each section will be tied to adjacent sections with joint ties as shown on the shop plans.
5. **Backfilling:** Backfill shall be compacted in accordance with Section 12. Backfill placed around box culverts shall be deposited equally on both sides of the structure. Backfill shall be satisfactorily compacted in horizontal layers not to exceed six (6) inches. Hand compaction methods or use of flowable fill may be required for satisfactory compaction under and adjacent to corners with radius and between culverts on multiple installations.

E. Inspection:

1. **General:** All new box culverts shall pass a visual inspection and/or a television inspection a condition of acceptance by the City. The Engineer shall determine if the inspection is visual, television, or both. All inspections shall be performed after backfill is complete but prior to any surface restoration.

The visual and/or television inspection shall consist of viewing the inside of all box culverts installed to determine proper alignment, grade, joining, etc. The Contractor shall correct, at his own expense, any defects discovered from the visual and/or televising inspection. The inspection will be conducted by the Engineer unless otherwise specified.

The expense of the initial visual and/or television inspection and one additional reinspection will be borne entirely by the City. If defective workmanship of material or construction is noted, the Contractor at no expense to the City, shall correct the deficiency. The City will perform additional visual and/or television inspections to review if the repairs were made properly and in accordance with the specifications. The expense of any additional visual and/or television inspections beyond the initial inspection and one additional reinspection will be borne entirely by the Contractor. The Contractor shall be responsible for all related costs, including concrete or asphalt resurfacing if the street has been surfaced. The Contractor shall be required to repair all deficiencies. The City may cause to take any actions necessary for any items not completed or repaired in a timely manner and may charge the contractor one and a half (1½) times the costs incurred.

It is the Contractors responsibilities to notify the Engineer that the box culvert is ready for inspection. From the time initial notification that the box culvert is ready to be inspected the Contractor shall allow the City at least two (2) weeks to perform the visual and/or television inspections. Any surfacing started prior to visual and/or televising the box culvert and said box culvert being accepted is at the Contractors own risk.

2. **Pre-Cleaning:** Prior to inspection of newly installed box culverts the Contractor shall remove all accumulated construction debris, rock, gravel, sand, silt, and other foreign matter from the box culvert.

The Contractor shall be responsible for all work necessary to make the precast concrete box culvert acceptable for usage including removal of all mud, silt, rocks, or blockages.

In the event that the box culvert is not acceptable for visual inspection or televising, due to the Contractor's operations, the Contractor will be notified. It will be the Contractor's responsibility to arrange to clean the box culvert and make it acceptable for the visual inspection or television work. If not cleaned in a timely manner, the City may cause to take any actions necessary and charge the Contractor one and a half (1½) times the cost incurred.

58.4 METHOD OF MEASUREMENT

- A. Box Culvert Undercut:** Measurement for box culvert undercut will not be made. Plans quantity shall be used for payment. Quantity shall be to the nearest cubic yard. When additional or less depth of undercut is directed by the Engineer, adjustment to the plans quantity shall be made to reflect the addition or reduction in work.
- B. Precast Box Culvert:** Measurement for precast box culverts will not be made. Plans quantity shall be used for payment. Quantity shall be to the nearest linear foot along centerline of the box culvert.
- C. Cast in Place Box Culvert:** Measurement for cast in place box culverts will not be made. Plans quantity shall be used for payment. Quantity shall be measured along centerline of the box culvert.
- D. Precast Box Culvert End Sections:** Precast box culvert end sections will be measured per each. One end section will be considered to be all of the individual pieces required to construct one end of the box culvert.
- E. Cast in Place Box Culvert End Sections:** Cast in place box culvert end sections will be measured per each. One end section will be considered to be all of the individual pieces required to construct one end of the box culvert.

58.5 BASIS OF PAYMENT

- A. Box Culvert Undercut:** Payment for box culvert undercut will be at the contract unit price per cubic yard. Payment will be full compensation for equipment, labor, tools and incidentals required for undercutting and for furnishing, placing, watering and compacting backfill material, including bedding material when specified on the plans.
- B. Precast Box Culvert:** Precast box culvert will be paid for at the contract unit price per foot. Payment will be full compensation for the foundation preparation, fabricating, installation, joint seal mastic, drainage fabric, joint ties, backfilling, and all other incidentals.
- C. Cast in Place Box Culvert:** Cast in place box culvert will be paid for at the contract unit price per foot. Payment will be full compensation for the foundation preparation,

reinforcement, forming, pouring, finishing, joint seal mastic, drainage fabric, joint ties, backfilling, and all other incidentals.

- D. Precast Box Culvert End Sections:** Precast box culvert end sections will be paid for at the contract unit price per each. Payment will be full compensation for the foundation preparation, fabricating, installation, joint seal mastic, drainage fabric, joint ties, backfilling, and all other incidentals.
- E. Cast in Place Box Culvert End Sections:** Payment for box culvert end sections will be at the contract unit price per each. Payment will be full compensation for the foundation preparation, reinforcement, forming, pouring, finishing, joint seal mastic, drainage fabric, joint ties, backfilling, and all other incidentals.

END OF SECTION