

## SECTION 02645

# PRECAST CONCRETE BOX CULVERT

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Material and procedures for fabricating and installing single cell precast concrete box culverts.

#### 1.2 RELATED SECTIONS

- A. Section 02056: Common Fill
- B. Section 02317: Structural Excavation
- C. Section 02324: Compaction
- D. Section 03055: Portland Cement Concrete
- E. Section 03211: Reinforcing Steel and Welded Wire
- F. Section 03390: Concrete Curing

#### 1.3 REFERENCES

- A. AASHTO M 198: Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
- B. AASHTO M 259: Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
- C. AASHTO M 273: Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 Feet Of Cover Subjected to Highway Loadings
- D. UDOT Quality Management Plan

## **1.4 SUBMITTALS**

- A. Shop Drawings: Furnish to the Engineer.
  - 1. Shop drawings: 1 full-size 24 inch by 36 inch, and 4 half-size 11½ inch by 17 inch sheets with a 1½ inch blank margin on the left-hand edge.
  - 2. Place the State project designation data in the lower right-hand corner of each sheet.
  - 3. Prepare shop drawings under seal of a Professional Engineer.
- B. Department rejects units fabricated prior to written approval.

## **1.5 ACCEPTANCE**

- A. A. Precast concrete box culverts may be accepted at a reduced price when the concrete strength is below that specified.
  - 1. Price adjustment pay factor following Section 03310.

## **PART 2 PRODUCTS**

### **2.1 CONCRETE**

- A. Wet Cast Concrete: Class 4A(AE). Follow Section 03055.
- B. Dry Cast Concrete:
  - 1. Minimum cement content: 564 lb/yd<sup>3</sup> of concrete
  - 2. Maximum Water/cement Ratio: 0.15 gal/lb
  - 3. Mix Design: Submit for approval

### **2.2 REINFORCING STEEL AND WELDED WIRE**

- A. Refer to Section 03211.
- B. Meet AASHTO M 259, and AASHTO M 273.

### **2.3 FLEXIBLE GASKET**

- A. Meet AASHTO M 198.
- B. 1 inch minimum initial thickness.
- C. 2 square inches minimum in cross section.

## **2.4 QUALITY ASSURANCE**

- A. Department pre-qualifies manufacturers of pre-cast concrete box culvert sections as a supplier of pre-cast concrete products in accordance with Quality Management Plan: Pre-cast/Prestressed Concrete Structures.
- B. Permanently mark each precast unit with date of casting and identification number supplied by the inspector. Stamp markings in fresh concrete.
- C. Prevent cracking or damage during handling and storage of precast units.
- D. Replace cracked or damaged precast units at no additional cost to the Department.

## **PART 3 EXECUTION**

### **3.1 MANUFACTURE**

- A. Meet AASHTO M 259, and AASHTO M 273.
  - 1. Multiply steel reinforcement requirements shown in table by 1.25.
  - 2. Minimum reinforcing steel spacing 4 inches around circumference and 8 inches longitudinal.
  - 3. 1 inch minimum concrete cover to reinforcing steel.
- B. Portland Cement Concrete: Follow Section 03055.
- C. Concrete Curing: Follow Section 03390.

### **3.2 INSTALLATION**

- A. Installation with 2 ft or less cover, follow AASHTO M 273.
- B. Installation with greater than 2 ft of cover, follow AASHTO M 259.

### **3.3 STEEL REINFORCEMENT**

- A. Follow Section 03211.

### **3.4 JOINTS**

- A. Make joint opening between box sections less than 1 inch measured face to face of the concrete.
  - 1. Reject box sections when the installation tolerance cannot be met due to casting variations.
  - 2. Prevent soil from being forced into the joint as the box sections are placed.
- B. Provide shear transfer devices for box culvert sections with less than 2 feet of cover. Device or method must be capable of transferring a minimum shear load of 3,000 lbs/ft of joint width through top slab of adjacent units. When using individual devices, space closer than 2.5 ft center to center with a minimum of two per joint.

### **3.5 LIFTING HOLES**

- A. Provide a maximum of four lifting holes in the top slab, each having a maximum diameter of 3 inches.
- B. Locate holes to avoid interference with the reinforcing steel.
- C. Plug holes with a 1/1 sand to cement grout.

### **3.6 CONNECTION TO CAST-IN-PLACE CONCRETE**

- A. Where precast box sections join cast-in-place concrete, project the reinforcing steel a minimum of 12 inches out of the precast box section and square off the concrete face.

### **3.7 REPAIRS**

- A. Box sections may be repaired as allowed in the referenced specification only when approved in advance by the Engineer.
- B. Making repairs in advance of approval will be cause for rejection.

### **3.8 MINIMUM LENGTH**

- A. Individual standard box segment: None less than 5 feet.

### **3.9 BEDDING AND BACKFILL**

- A. Excavate the material under the box location in compliance with Section 02317 to a minimum depth of 4 inches.
- B. Backfill with granular backfill borrow as specified in Section 02056.
- C. Compact following Section 02324.

END OF SECTION