

## **735 - PRECAST REINFORCED CONCRETE BOX CULVERT**

### **735.1 DESCRIPTION**

The Contractor may, at the same bid price as precast, construct the culverts using cast-in-place reinforced concrete box barrels. Wing wall and soil savers shall be cast-in-place. Precast reinforced concrete box barrels shall be furnished in accordance with the requirements of ASTM C 1433.

The minimum design shall be based on AASHTO HS-20 loading and a 28 day compressive strength of 5,000 p.s.i. and additionally all barrels shall be designed to accommodate the construction loads. In addition, specific design requirements for R.C.B. barrels shall be as indicated on the plans. Reinforcing steel shall be Grade 60 in accordance with Section 711 of the Standard Specifications. Concrete and reinforcing steel shall meet the requirements of these specifications as described in Section 401 "Concrete Construction", and Section 711 "Reinforcing Steel". Shop drawings and design calculations sealed by a registered professional engineer shall be required for precast sections.

### **735.2 CONSTRUCTION REQUIREMENTS**

A minimum length section of the R.C.B. adjacent to the wing walls shall be poured in place with hub guards and toe walls shown on the plans. This section length shall be as indicated on the plans or as determined by the project engineer. The end barrel segments of the precast R.C.B. will be constructed with a key and tie steel of an adequate length and bar size for a lap with the hub guard and toe wall reinforcing steel in the poured in place section.

Pipe and structure blockouts shall be cast into the R.C.B. barrel sections at the locations shown on the plans, with the reinforcing steel running through the blockout to be cut out in the field. Extra reinforcement as per the plans or as designated by the precast design shall be installed around the blockout and shall be so indicated on the shop drawings. The Contractor may elect to saw blockouts in the field as allowed or required by the design.

Embedded lifting inserts shall provide a watertight lift point, which does not require patching or grouting. The insert type, size, and location shall be shown on the shop drawings. Inserts and their accessories shall be supplied by the same manufacturer. Rigging and installation guidelines shall be based on the insert manufacturer's recommendations.

Excavation and backfill for precast culverts shall be in accordance with the requirements of these specifications as described in section "Excavation", and in accordance with the Section 204 of the Standard Specifications. A granular bedding of the thickness indicated on the plans shall be placed to provide an even surface of uniform density. The placing of precast barrel segments shall be started at the outlet end, with barrel segments placed with ends tightly abutting and true to line and grade. Barrel segments shall be match cast to each other or shall be otherwise formed at the joints with such precision as to limit joint openings in the installed position to not more than 3/4 inches wide. Designed joint pulls to achieve the required line and grade shall be limited to 1 1/2 inches. The completed barrel shall form a smooth uniform invert. The space between parallel segments in a multiple R.C.B. shall be filled with flowable fill, grout or aggregate backfill as indicated on the plans. All precast barrel joints shall be wrapped in an external sealing band meeting the requirements of ASTM C 877 latest revision and installed in accordance with the manufacturers requirements.

Mastic joints will be required for all precast sections. Mastic joints shall be constructed on the lower half of the structure to attain a watertight joint. Sufficient mastic will be applied so as to completely fill any space between the spigot end of one section and the bell end of the adjoining section.

Equalization blockouts between parallel barrel segments shall be as indicated in the plans. The Contractor may utilize alternate methods of constructing the connection between barrels of parallel segments, including cast in place construction, as approved by the Engineer.

Weepholes shall be placed in the midpoint of each box section. Weepole design shall be as indicated on the plans or as approved by the Engineer.

Handrails along the wing walls and head walls shall be fabricated steel handrail and guard fence shall be hot dip zinc coated in accordance with the latest edition of ASTM A 123. Hardware for handrail and guard fence shall be hot dip zinc coated in accordance with the latest edition of ASTM A 123.

### **735.3 MEASUREMENT AND PAYMENT**

The Engineer will measure the reinforced concrete box by linear foot. Cast-in-place end sections, toe walls, hubguards, transitions, and wing walls will be measured by the cubic yard of KCMMB 5K concrete.

Payment for “Reinforced Concrete Box” and “KCMMB 5K Concrete (R.C.B.)” at the contract unit prices bid is full compensation for the specified work.