**SECTION A-A (2" Cover - Thin Wall Detail)**

- **Outside Face**
  - 3" Min. Tongue length (8° to 15° bevel)
  - 1" Min. cover inside at joint
- **4" x 4" ~ W4.0 x W4.0 WWR (Min. 10" Wide & 3 Cross wires)**
  - 1" Min. cover inside at joint
- **Joint Sealant**
  - 1" Min. cover inside at joint

**SECTION A-A (2" Cover - Thick Wall Detail)**

- **Outside Face**
  - 3" Min. Tongue length (8° to 15° bevel)
  - 1" Min. cover inside at joint
- **4" x 4" ~ W4.0 x W4.0 WWR (Min. 10" Wide & 3 Cross wires)**
  - 1" Min. cover inside at joint
- **Joint Sealant**
  - 1" Min. cover inside at joint

**NOTE:**

Bottom Slab Joints in Type B Boxes may be single tongue & groove joints as shown in Section A-A when the Top Slab Joints are oriented as shown in Schematic "A".

---

**ALTERNATE BOTTOM SLAB TRANSVERSE JOINT TYPICAL SECTION (DOUBLE-SIDED TONGUE & GROOVE JOINT) (All reinforcing not shown for clarity)**

**SECTION A-A (3" Cover - Thick Wall Detail)**

- **Outside Face**
  - 3" Min. Tongue length (8° to 15° bevel)
  - 1" Min. cover inside at joint
- **4" x 4" ~ W4.0 x W4.0 WWR (Min. 10" Wide & 3 Cross wires)**
  - 1" Min. cover inside at joint
- **Joint Sealant**
  - 1" Min. cover inside at joint

---

**SCHEMATIC "A"**

**TYPE B BOX SECTION PLACEMENT FOR SINGLE TONGUE & GROOVE JOINTS**

**PRECAST SEGMENT TO SEGMENT TONGUE & GROOVE TRANSVERSE JOINTS**

**SUPPLEMENTAL DETAILS FOR PRECAST CONCRETE BOX CULVERTS**

**INDEX NO. 291**

**2016 DESIGN STANDARDS**

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**SECTION B-B**

**TOP SLAB TO WALL JOINT**

*(KEYED JOINT)*

- **Type B Box Longitudinal Joints**
- **Variety of**
- **Provide adequate width to satisfy shear strength requirements at joint**

**SECTION C-C**

**C-I-P HEADWALL DETAILS AND CONNECTION TO PRECAST BOX**

- **Face of Precast End Segment & Construction Joint**
- **1'-0" Min. Lap**
- **Splice (when reqd.)**
- **Mechanical couplers or 1'-6" Min. bar extension (full length bar extension or adhesive bonded dowel bars with 1'-0" embedment permitted)**
- **Thickness of C-I-P bottom slab in plans (Tb)**
- **Circumferential bottom slab reinforcing**
- **Cutoff wall reinforcing (Typ.)**
- **(See C-I-P design in plans)**

**SECTION D-D**

**C-I-P TOE SLAB & CUTOFF WALL DETAILS AND CONNECTION TO PRECAST BOX**

- **Provide additional 6" depth of cutoff wall at no additional cost.**
- **See Index 289 for C-I-P Transition details**
- **Equivalent reinforcing to C-I-P design shown in plans**
- **Mechanical couplers or 2'-0" extension of precast box reinforcing**
- **Longitudinal reinforcing**

**SECTION E-E**

**EXTERIOR WALL/SLAB TRANSITION DETAIL FOR PRECAST EXTENSION**

*(Type I Connection shown, Type II Connection similar)*

- **Section of Existing Box Culvert to be removed and replaced, for Type I Connection.**
- **Filter Fabric wrapped around construction joint**
PIPE BLOCKOUT NOTES:
1. Cut box culvert reinforcement as required to maintain 2" cover.
2. For Precast Sections construct opening a minimum of 1'-6" away from any box to box joint, except opening may be a minimum of 1'-0" away from joint when at least 2'-0" of clearance to the box to box joint is provided on the opposite side of the pipe opening.
3. Pipe blockout diameter to be 6" greater than pipe outside diameter.
4. See Drainage Plans for size, placement, and invert elevation.

SECTION I-I
(Showing additional blockout reinforcing only)

Provide 50% of vertical reinforcing cut by blockout on each side of pipe at each face (Typ.)

SECTION H-H

Provide 50% of vertical reinforcing cut by blockout on each side of pipe at each face (Typ.)

VIEW G-G

(Headwall, Toe Slab and Cutoff Wall Reinforcing not shown for clarity)

C-I-P END CAP DETAILS AND CONNECTION TO PRECAST BOX

SUPPLEMENTAL DETAILS FOR PRECAST CONCRETE BOX CULVERTS

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DIFFERENTIAL SETTLEMENT COUNTERMEASURES FOR PRECAST BOX CULVERTS

**LEVEL 2 DESIGN STANDARDS FOR PRECAST BOX CULVERTS**

**DESCRIPTION:**

1. Provide a Cast-In-Place Link Slab to ensure uniform joint opening of precast box culverts when the differential settlement shown in the plans exceeds the following limits, except that a Link Slab is not required for differential settlements less than \( \frac{1}{2} \)".

\[
\Delta Y \leq \frac{114}{760} x R x W
\]

Where:
- \( \Delta Y \) = Maximum Long-Term Differential Settlement (ft.)
- \( R \) = Exterior height of Box Culvert (ft.)
- \( W \) = Length of Box Culvert Segments (ft.)
- \( L \) = Effective length for single curvature deflection (ft.)

2. Extend Link Slab to back face of headwalls and to limits of existing box culverts for extensions.

**NOTE:** Estimated quantities are based on the area of precast box slabs, and are provided for information only. No additional payment will be made for Link Slabs where these are required for the precast box culverts.

**NOTES:**

1. All bar dimensions are out to out.
2. Lap splice length for Bars 4M is 1'-4" minimum.
3. Install dowels with an Adhesive Bonding Material System in accordance with Specification Section 416. The Contractor may substitute mechanical couplers in lieu of adhesive bonded dowels. Shift dowels to clear box culvert reinforcing.

**BILL OF REINFORCING STEEL**

<table>
<thead>
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<th>MARK</th>
<th>SIZE</th>
<th>NO. REQ'D</th>
<th>LENGTH</th>
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</thead>
<tbody>
<tr>
<td>L</td>
<td>4</td>
<td>2 per Barrel/ft.</td>
<td>1'-3&quot;</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>As Req'd</td>
<td>As Req'd</td>
</tr>
</tbody>
</table>

**REINFORCING STEEL BENDING DIAGRAMS**

**NOTE:**

1. Link Slab required when joint openings from differential settlement exceed \( \frac{1}{2} \)" as determined in Link Slab Note 1.