**V-Groove Design Notes**

**Sheet 1 of 4**

**MULTIPLE BARRELS**

**SINGLE BARREL**

**DESCRIPTION:**

Type B Boxes only

- Longitudinal joint
- Length at exterior
- Filter fabric (full exterior wrap)

- 6" Min. for Wall/Slab transition

**PICTORIAL VIEW OF EXTERIOR WALL/SLAB TRANSITION**

- Existing box are equal opening in new and existing box are equal

**ISOMETRIC VIEW OF PRECAST CONCRETE BOX CULVERT**

- Double barrel culvert shown, single or multiple barrel culvert similar

**EXPLODED VIEW OF CONNECTIONS AT END OF CULVERT**

- Double barrel culvert shown, single or multiple barrel culvert similar

**GENERAL NOTES:**

1. **Specifications:**
   - General: FDOT Standard Specifications for Road and Bridge Construction, Section 410 (current edition and supplements thereto). Concrete (Precast):
     - Class (IV) (5,500 psi) for moderately to extremely aggressive environments.
     - Class (IV) (5,500 psi) for moderately to extremely aggressive environments.

2. **Work this Index with the Cast-In-Place Concrete Box Culvert Details and Data Tables shown in the plans, Index 400-289 and the Precast Concrete Box Culverts shown in the shop drawings.**

3. **All joints between precast sections must be tongue & groove and joint sealant. Joints between cast-in-place & precast sections shall have longitudinal reinforcing extending from top and bottom & both side slabs of the precast box tied to the cast-in-place reinforcing. Single barrel culverts may have precast headwalls cast integrally with the end segment when approved by the Engineer.**

4. **Extension of existing multiple barrel box culverts with multiple single cell precast box culverts is not permitted unless approved by the District Structures Engineer. Full transition details must be shown in the shop drawings when approved.**

5. **Culverts larger than the specified size may be substituted with no additional payment to the Contractor. Substitution must be approved by the Engineer, minimum earth cover and invert elevations shown in the Contract Documents must be maintained.**

**PERMITTED PRECAST ALTERNATE BOX SECTIONS**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DESCRIPTION</th>
<th>SINGLE BARREL</th>
<th>MULTIPLE BARRELS</th>
<th>DESIGN NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Single Cell Monolithic (Four Sided)</td>
<td><img src="icon.png" alt="Icon" /></td>
<td><img src="icon.png" alt="Icon" /></td>
<td>Index 400-292 or Contractor Design</td>
</tr>
<tr>
<td>B</td>
<td>Single Cell Two-Piece (Four Sided)</td>
<td><img src="icon.png" alt="Icon" /></td>
<td><img src="icon.png" alt="Icon" /></td>
<td>Contractor Design</td>
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<td>C</td>
<td>Multicell Monolithic</td>
<td><img src="icon.png" alt="Icon" /></td>
<td><img src="icon.png" alt="Icon" /></td>
<td>Not Applicable</td>
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</tbody>
</table>

**DETAIL E**

- Pictorial view of exterior wall/slab transition

**INDEX 400-291 SHEET 1 of 5**

**FY 2021-22 STANDARD PLANS**

**CONTRACTOR DESIGN**

- Permitted precast alternate box sections

- Details and Data Tables shown in the plans, Index 400-292 and the Precast Concrete Box Culverts shown in the shop drawings.
SECTION C-C
C-I-P HEADWALL DETAILS AND CONNECTION TO PRECAST BOX

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

SECTION E-E
EXTERIOR WALL/SLAB TRANSITION DETAIL FOR PRECAST EXTENSION

TYPE B BOX LONGITUDINAL JOINTS
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.
**DIFFERENTIAL SETTLEMENT COUNTERMEASURES FOR PRECAST BOX CULVERTS**

**LINK SLAB NOTES:**
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 1/2".

\[
\Delta Y = \frac{11Y}{760} \times R \times W
\]

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.

**NOTES:**
1. All bar dimensions are out to out.
2. Lap splice length for Bars 4M is 1'-4" minimum.

**ESTIMATED LINK SLAB QUANTITIES**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II or IV Concrete (Culvert)</td>
<td>CY/SF</td>
<td>0.0216</td>
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<tr>
<td>Reinforcing Steel (Roadway)</td>
<td>Lb./SF</td>
<td>1.32</td>
</tr>
</tbody>
</table>

**REINFORCING STEEL BENDING DIAGRAMS**

**Dowel Bars 4L**

**NOTE:** Estimated quantities are based on the plan 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.

**DESIGN NOTE:**
1. Link Slab required when joint openings from differential settlement exceed 1/2" as determined in Link Slab Note 1.