How to Prevent and Repair Lane Separations on Concrete Pavements

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Outline

• Importance of Tying Lanes Together
• Potential Causes of Lane Separation
• Construction Inspection Items
• Repair of Lane Separation
Importance of Tying Lanes Together
Effect of Shoulder Type on Edge Deflections

Deflections (mils)

Concrete Shoulder

Asphalt Shoul

Modulus of Subgrade Reaction [psi/in]

Deflections at 9,000 lb [mil]
Potential Causes of Lane Separation

- Poor quality tie bar installations
- Improper tie bar/transverse steel design
- Unstable base or subgrade volume changes
Poor quality tie bar installations
Improper tie bar/transverse steel design
Unstable base or subgrade volume changes
Construction Inspection Items

- Tie Bars
- Tie bar spacing
- Single-piece tie bars
- Multi-piece tie bars
2. **Tie Bars.** Provide straight deformed steel tie bars. Provide either multiple-piece tie bars or single-piece tie bars as shown on the plans. Provide multiple-piece tie bars composed of 2 pieces of deformed reinforcing steel with a coupling capable of developing a minimum tensile strength of 125% of the design yield strength of the deformed steel when tensile-tested in the assembled configuration. Provide a minimum length of 33 diameters of the deformed steel in each piece. Use multiple-piece tie bars from the list of “Prequalified Multiple Piece Tie Bar Producers” maintained by the Construction Division, or submit samples for testing in accordance with Tex-711-I.
Tie-bar spacing

<table>
<thead>
<tr>
<th>SLAB THICKNESS (IN.)</th>
<th>TRANSVERSE STEEL</th>
<th>TIE BARS AT LONGITUDINAL CONTRACTION JOINT</th>
<th>TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>BAR SIZE</td>
<td>SPACING (IN.)</td>
<td>BAR SIZE</td>
</tr>
<tr>
<td>6.0 - 7.5</td>
<td>#5</td>
<td>48</td>
<td>#5</td>
</tr>
<tr>
<td>8.0 - 13.0</td>
<td>#5</td>
<td>48</td>
<td>#6</td>
</tr>
</tbody>
</table>
* TIE BARS MAY BE IN SAME
PLANE AS TRANSVERSE BARS

L = 50"

JOINT SEALING MATERIAL
METHOD A OR B

L/2

* TIE BARS FOR
BOTH STEEL MATS

MIN. CLEAR

2

T

T1

T2

LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y

LONGITUDINAL BARS

TRANSVERSE BARS
Single-piece Tie Bars

7. WHEN APPROVED BY THE ENGINEER, SINGLE PIECE TIE BARS MAY BE USED BY INSERTING INTO PLASTIC CONCRETE AT LONGITUDINAL CONSTRUCTION JOINTS.
Multi-piece Tie Bars
Repair of Lane Separation

• Cross Stitching
• Slot Stitching
Cross Stitching

• Drill holes at an angle so that they intersect the longitudinal crack or joint at about mid-depth.

• Select a drill that minimizes damage to the concrete surface, such as a hydraulic powered drill. Select a drill diameter no more than 0.375 in larger than the tiebar diameter.
Cross Stitching

- Airblow the holes to remove dust and debris after drilling.
- Inject epoxy into the hole, leaving some volume for the bar to occupy the hole.
- Insert the tiebar into hole, leaving about 1 in. from top of the bar to pavement surface.
- Remove excess epoxy and finish flush with the pavement surface.
Slot Stitching

• Cut slots approximately perpendicular to the longitudinal joint or crack using a slot cutting machine.

• Prepare the slots by removing the concrete and cleaning the slot. If the slabs have separated, consider using a joint reformer and caulking the joint or crack to prevent backfill materials from flowing into the area between the slabs.
Slot Stitching

- Place deformed bars in the slot.
- Place backfill material into the slot and vibrate it so it thoroughly encases the bar. Select a backfill material that has very low shrinkage characteristic.
- Finish flush with the surface and cure.
Summary

• Longitudinal joints with good load transfer is essential to the good performance of PCC pavement.

• Proper design and construction of tie bars at longitudinal joints will provide good load transfer.

• For sections with lane separations, or failed tie bars, restore load transfer and prevent further lane separations by cross or slot stitching.