

# How to Prevent and Repair Lane Separations on Concrete Pavements

TxDOT Implementation Project 5-9045-05-P2

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# *Outline*

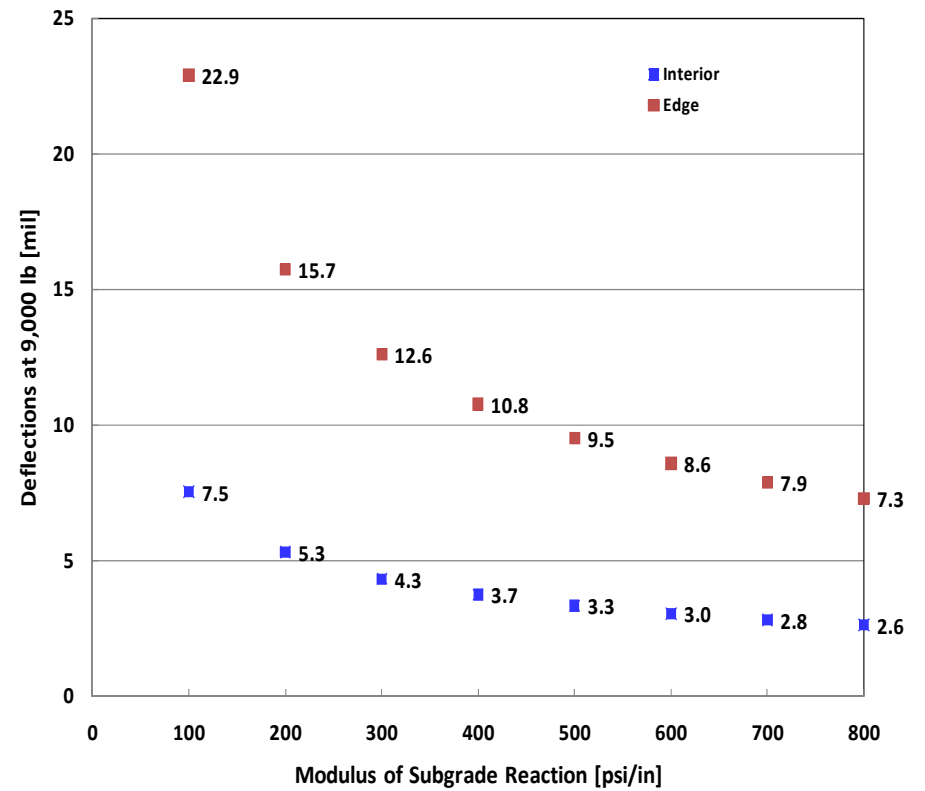
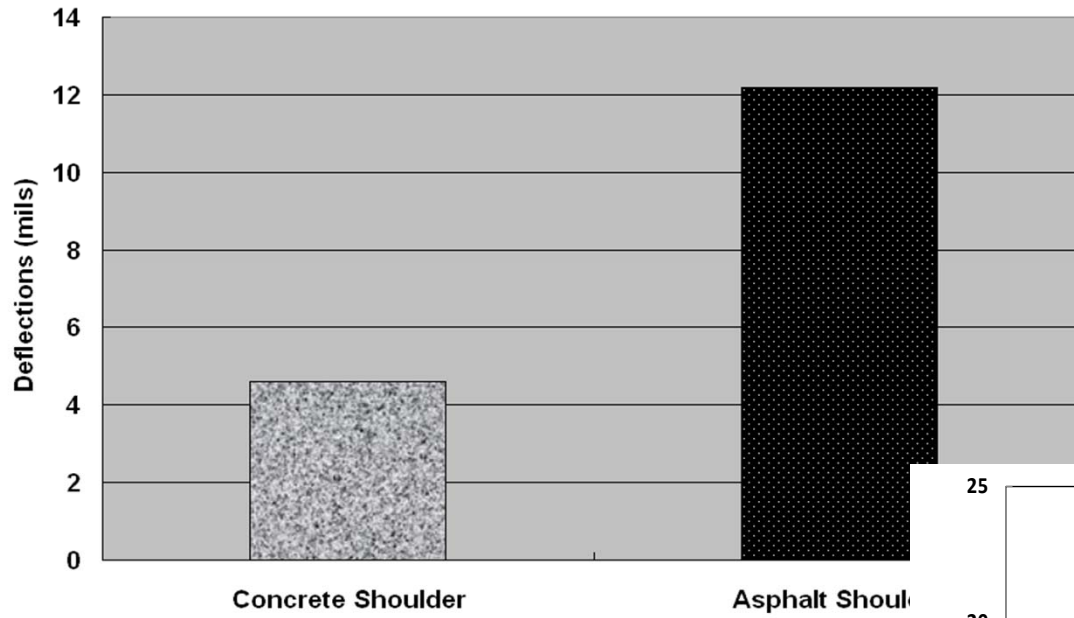
- Importance of Tying Lanes Together
- Potential Causes of Lane Separation
- Construction Inspection Items
- Repair of Lane Separation

# Importance of Tying Lanes Together





## Effect of Shoulder Type on Edge Deflections









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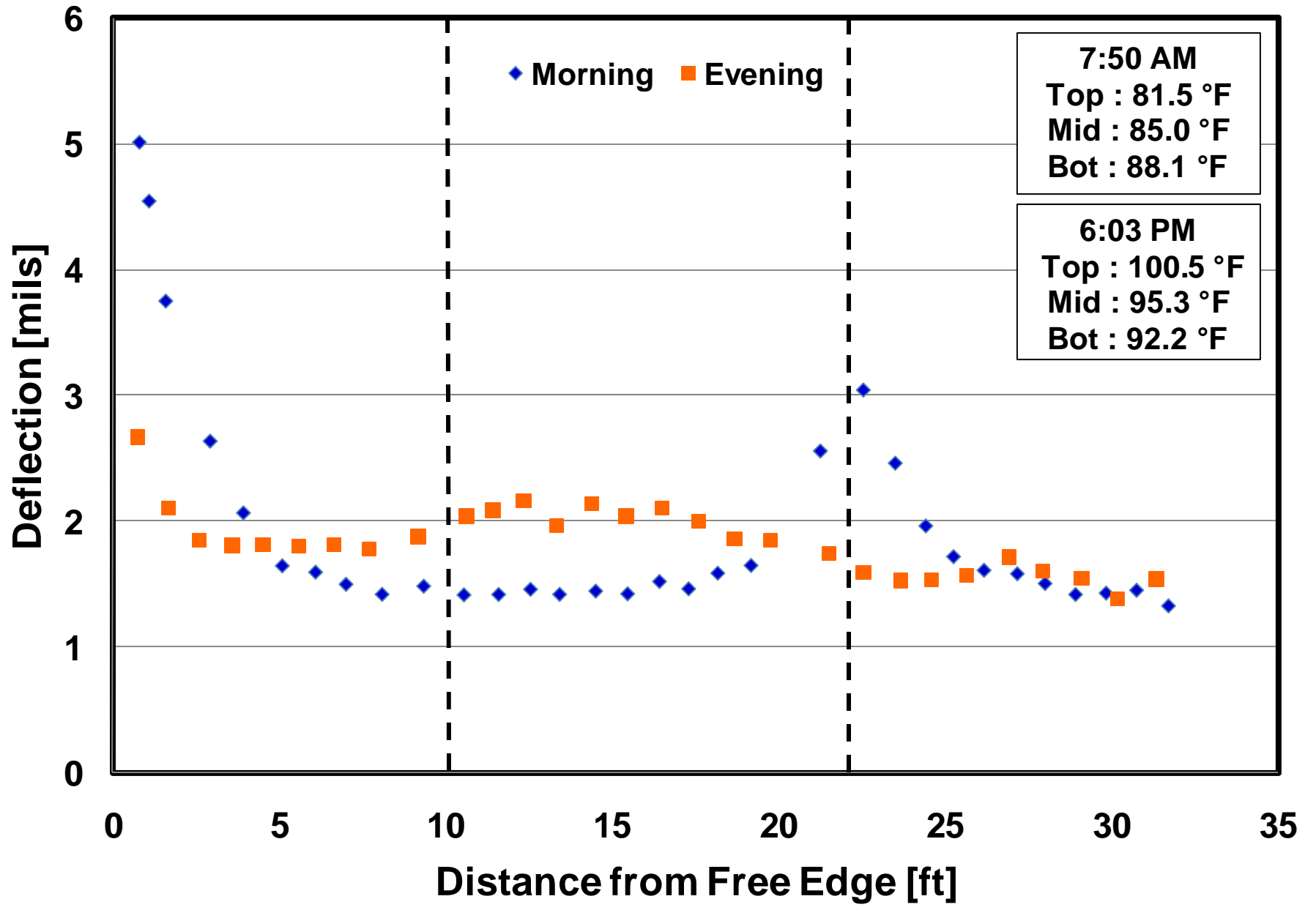




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# Potential Causes of Lane Separation

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

# Poor quality tie bar installations





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# Improper tie bar/transverse steel design





# Unstable base or subgrade volume changes









# Construction Inspection Items

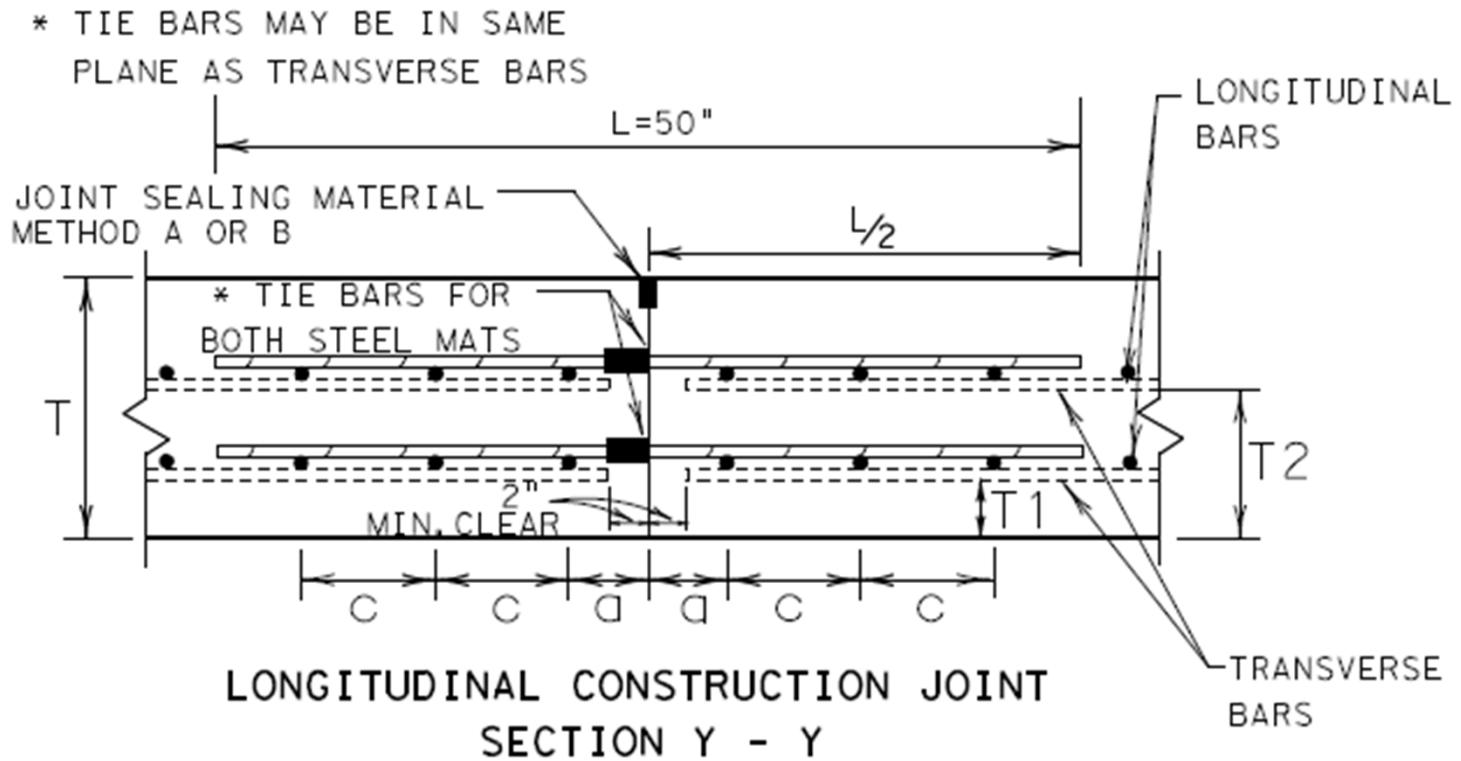
- Tie Bars
- Tie bar spacing
- Single-piece tie bars
- Multi-piece tie bars

# 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 NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
6.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24



# 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.