

Retrofitting Dowel Bars to PCC Pavement Joints

1. *Description:* The work consists of the addition of dowel bars at the transverse contraction joints of existing, undoweled PCC pavement in order to restore load transfer capability at the joints. These Special Provisions shall supplement the SCDOT Standard Specifications as follows.
2. *Materials:*
 - 2.1. *Parting Compound:* The parting compound used on the dowel bar shall conform to the requirements of Section 702.04.
 - 2.2. *Dowel Bar End Cap:* Dowel bar end caps shall be tight fitting and made of non-metallic material which will allow for 0.25 inches of movement at each end of the bar. Before use, the Engineer shall approve the dowel bar end caps.
 - 2.3. *Caulking Filler:* Caulking filler shall be a silicone sealant. The caulking filler shall be approved by the Engineer before use.
 - 2.4. *Joint Filler Material:* The joint filler material shall be a closed cell foam faced with poster board material or plastic-faced material on each side and is commonly referred to as Foam Core Board by suppliers of office materials. The joint filler material shall be approved by the Engineer prior to use.
 - 2.5. *Concrete Patch:* Areas of pavement removed for dowel bar retrofit shall be replaced with one of the following prepackaged materials: Burke 928 Fast Patch, Fosroc Patch 10-60, Five Star Highway Patch, CTS Rapid Set DOT, or L & M Durapatch Highway. Mixing placement and curing of these prepackaged materials shall be accomplished in accordance with the manufacturer's recommendations. Aggregate used as extension material for dowel bar retrofit slot backfill shall meet the standard SCDOT requirements for a #789 stone.
 - 2.6. *Dowel Bar Chairs:* The dowel bar chair shall hold the bar firmly centered in the slot and be constructed of non-metallic material. The Engineer shall approve the dowel bar chairs before use.
 - 2.7. *Dowel Bars:* Dowel bars shall conform to Section 501.09, be 1.5 inches in diameter, 18 inches in length, and be grade 60.
3. *Equipment:*
 - 3.1. *Slot Cutting:* The slots shall be cut using diamond-bladed saws or modified milling machines capable of cutting at least three slots simultaneously to ensure that the slots are closely parallel to each other.
 - 3.2. *Jack Hammers:* Jack hammers used to break loose concrete shall have a weight less than 30 pounds. In order to prevent damage to the existing pavement, hammers greater than 30 pounds shall not be used for any removal process.
 - 3.3. *Vibrator:* The patching material shall be consolidated by using a 1 inch or less vibrator as approved by the Engineer.
4. *Construction:* Dowel bars shall be installed in the existing concrete pavement joints where shown in the Plans.
 - 4.1. *Slot Location:* Locate slots in the pavement as required to place the center of the dowel at mid-depth in the concrete slab. Multiple saw cuts parallel to the centerline may be required to properly remove material from the slot and to provide a level, secure surface for the feet of the dowel bar chairs. Slots that intersect random cracks shall not be retrofitted.

SUPPLEMENTAL SPECIFICATIONS

- 4.2. *Slot Tolerance:* Saw cut slots shall be cut and prepared such that dowel bars can be placed within the following tolerances:
- Placed within 0.5 inches of the center of the existing pavement depth
 - Centered over the transverse joint with a minimum embedment length of 8.5 inches.
 - Placed parallel to the centerline and within the plane of the roadway surface within the following limitations:
 - Horizontal Position: +/- 0.5 inches
 - Vertical Position: +/- 0.5 inches
 - Skew from Parallel: +/- 0.5 inches per 18 inches
- 4.3. *Slot Cleaning:* All exposed surfaces and cracks in the slot shall be sand blasted and cleaned to bare concrete to remove saw slurry, parting compound, or other foreign materials prior to dowel installation. The Contractor shall protect the traveling public from this work. **Traffic shall not be allowed to travel on slots where the concrete has been removed.**
- 4.4. *Dowel Preparation:* Prior to placement, the dowel bars shall be lightly coated with a parting compound and placed on a chair that will provide a minimum of 0.5 inches clearance between the bottom of the dowel and the bottom of the slot. The chair design shall hold the bar tight during placement of the cement patch. Any chair design that may allow movement of the bar during placement of the cement patch will be rejected by the Agency.
- 4.5. *Joint Caulking:* Immediately prior to placement of the dowel bar and cement patch, the Contractor shall caulk the existing transverse joint or crack at the bottom and sides of the slot as shown in the Plans. The caulking should not be placed any further than 0.5 inches outside either side of the joint or crack. The transverse joint or crack shall be caulked sufficiently to satisfy the above requirements and to prevent any of the patching material from entering the joint/crack at the bottom or sides of the slot.
- 4.6. *Joint Filler:* A nominal 0.375 inches thick joint filler material shall be placed at the middle of the dowel to maintain the transverse joint as shown in the Plans. The joint filler material shall fit tight around the dowel and to the bottom and edges of the slot and be a minimum of 0.5 inches below the existing concrete surface. The joint filler material shall be capable of remaining in a vertical position and tight to all edges during placement of the patch. If for any reason the joint filler material shifts during placement of the patch the work shall be rejected and redone at the Contractor's expense.
- 4.7. *Consolidation:* The Contractor shall consolidate the patching material using a suitable vibrator as given above. The patch material shall not be overworked during the patch consolidation process, leaving fine material on the surface. Also, care shall be taken to minimize the contact between the vibrator and the dowel bar to avoid moving the bar out of alignment beyond the tolerance limits listed above.
- 4.8. *Finishing:* The concrete patching material shall be finished smoothly and evenly with the surrounding pavement surface. Curing compound shall be applied to the surface of the patch as recommended by the manufacturer of the patching material.
- 4.9. *Joint Sawing:* The joint shall be maintained by saw cutting the surface with a hand-pushed single blade saw. The cut width shall be 0.25 inches and the depth 1.5 inches. The cut length shall be 32 inches long centered over the three retrofit dowel bars and shall be sawed with 24 hours of placement of the cement patching material.
5. *Measurement:* Dowel Bar Retrofit will be measured by the unit for the actual number of bars placed and accepted in the completed work.
6. *Payment:* Payment for the work shall include furnishing all labor, materials, and equipment required to install retrofit dowel bars as shown on the Plans and described above.