

SPECIAL SPECIFICATION**3012****Dowel Bar Retrofit**

1. **Description.** Install dowel bars in an existing concrete pavement to restore load transfer between abutting slabs at the transverse joint.
2. **Materials.** Furnish the following materials, unless otherwise shown on the plans or approved by the Engineer:
 - A. **Concrete.** Provide Class HES concrete conforming to Item 421, "Hydraulic Cement Concrete," with the following exceptions or additions:
 1. Design concrete mix with a maximum water to cement ratio of 0.38, and a minimum average compression strength of 4,000 psi at 48 hours. Test in accordance with Tex-418-A.
 2. Use aggregate from siliceous sources only. Provide washed aggregate with 100% passing the 1/2 in. sieve. No more than 15% of the mix must be of any one size of aggregate.
 3. Use shrinkage reducing or compensating admixtures, or water reducing admixtures as approved. Do not use retarding admixtures. When using any admixtures, document the type, quantity, and location of mix placement on a copy of the final plans.
 4. The use of proprietary, high strength, rapid setting mixes may be approved when the materials demonstrate the satisfied performance. Obtain approval for the materials and proportions before using. Document the placement locations and material properties of proprietary materials on a copy of the final plans.
 - B. **Dowel Bars.**
 1. Use smooth, straight, steel dowel bars, free of burrs, 1-1/2 in. diameter and 18 in. long, conforming to Item 440, "Reinforcing Steel."
 2. Apply a thin film of grease or other approved de-bonding materials to the dowel bars for half the length plus 2 in. to prevent bonding.
 3. Provide metal chairs for dowel bar supports unless otherwise approved by the Engineer.
 - C. **Epoxy and Adhesives.** Provide epoxy materials and adhesives for bonding new concrete to old concrete or for concrete repair materials that conforms to DMS-6100, "Epoxy and Adhesives."

- D. **Joint Filler.** Place a temporary filler board or Styrofoam material as joint filler at the mid-length of the dowel to prevent the repair material from entering the joint. The maximum thickness is 3/8 in. Do not use plywood or softwood strips.
 - E. **Curing Compound.** Provide curing compounds in accordance with Section 360.2.C
 - F. **Joint Sealing.** Use backer rods and Class 4 or 5 sealants that conform to DMS-6310, “Joint Sealants and Fillers.”
3. **Construction Methods.** Demonstrate dowel bar retrofit work for approval of all equipment and procedures. Install dowels after under sealing and slab-jacking. Provide dowels at locations and spacing as detailed in the plans.

A. Slot Formation.

1. Use multiple saw cuts made with a diamond impregnated saw blade. Make two saw cuts to outline the longitudinal sides of each dowel bar slots. Control the sizes of the slots to have:
 - a width of 3 in. to 4 in;
 - a depth no greater than 7 in, and has needed clearance under the dowel bars for the support devices and for encasing the dowels in the repair material;
 - the needed length to place dowel bar at the mid-depth of the slab without touching the ends of the slot.
2. Use a maximum 30-lb jackhammer or hand tools to remove the “fins” formed by sawing.
3. Do not spall or fracture concrete adjacent to the slots. Repair damages to concrete pavement caused by Contractor’s operation without any additional compensation. Repair in accordance with Item 361, “Full-Depth Repair of Concrete Pavement” or Item 720, “Repair of Spalling in Concrete Pavement” if spalls are 0.25 to 3 in. in depth, or as approved.

B. Preparation Dowel Placement.

1. Rinse the slot with potable water. Remove debris and expose the clean aggregate in the slot by sand blasting. Blow clean and dry with high pressure air to remove sand, water, and dust from the slot.
2. Prime or coat the slot with an epoxy bonding agent designed to bond fresh concrete to cured concrete. Follow manufacturer’s directions for storing, mixing, and placing the epoxy.
3. Take actions necessary to prevent repair material from entering transverse joint or crack at the bottom of the slot.

C. Dowel Placement.

1. Place dowels on supports such that the dowels rest horizontally and parallel to the centerline of the pavement at the mid-depth of the slab.

2. Place temporary filler board, Styrofoam material or styrene board at mid-length of the dowel to maintain the joint or crack and prevent the repair material from entering the joint or crack.

D. Concrete Repair Material Placement.

1. Do not place concrete when the air temperature is below 65°F. Use a vibrator head at most 1 in. in diameter to consolidate the concrete repair material. Fill the space under each dowel bar with repair material without dislodging or moving the dowel bar out of position.
2. Finish the repair material level with the existing slab surfaces.
3. Cure the repair surface in accordance with Section 360.4.I. If a proprietary mix is used, use manufacturer's curing procedure.
4. Use insulation blankets to facilitate curing and the strength gain of repair areas if desired. Provide insulating blankets with a minimum thermal resistance (R) rating of 0.5 hour-square foot °F/BTU and in good condition.
5. Make and cure concrete compressive strength test specimens as directed.

E. Joint Sealing

1. Remove the filler board, Styrofoam or styrene during joint sawing and resealing operations.
2. Clean and seal the joints in accordance with Item 438, "Cleaning and Sealing Joints and Cracks" and by the details shown on the plans. Abrasive blast clean the vertical faces of the joint reservoir and blow out the joint before placing the backer rod and placing the sealant.

F. Opening to Traffic. The pavement may be opened to traffic after all dowel bars have been installed at a joint and the concrete has obtained a minimum compressive strength of 4,000 psi or as directed by the Engineer. Determine the compressive strength in accordance with Tex-418-A, "Compressive Strength of Cylindrical Concrete Specimens" using concrete cylinders cured at the job site under the same conditions as the pavement, or in accordance with Tex-426-A, "Estimating Concrete Strength by the Maturity Method". Opening the pavement does not relieve the Contractor from his responsibility for the work in accordance with Item 7, "Legal Relations and Responsibilities to the Public." Seal all joints and clean the pavement before opening the pavement to traffic.

4. **Measurement.** This Item will be measured as each dowel bar installed and accepted.
5. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Dowel Bar Retrofit." This price is full compensation for all materials, tools, labor, equipment and incidentals.