STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR PCCP DOWEL BAR RETROFIT

JANUARY 30, 2001

I. DESCRIPTION

The work consists of installing epoxy coated 1-1/2 inch diameter by 18 inch long plain round dowel bars into existing concrete pavement joints. The existing Portland cement concrete pavement shall be removed and the dowel bars shall be retrofit across the pavement joints.

There is a patent associated with simultaneous cutting of slots for the dowel bar retrofit. The provisions associated with the use of patented devices in conjunction with SDDOT projects is addressed in Section 7.3 of the Standard Specifications. The provision allows the use of patented processes and indemnifies the Department from any claims associated with the use of such patents.

II. MATERIALS

Dowel bars shall meet the requirements of Section 1010 of the Standard Specifications. All surfaces of the dowel bars shall be epoxy coated, including the ends of the bars.

The dowel bars shall be further coated, prior to installation, with a bond breaking compound. The bond breaking coating shall be either form oil, white pigmented concrete curing compound, asphaltic or other bond breaker conforming to Section 1010.

The dowel bars shall have tight fitting end caps made of nonmetallic material that allows for 1/4 inch bar movement at each end of the bar. The Contractor shall submit an end cap sample to the Engineer for approval prior to installation.

Chair devices for supporting and holding the dowel bar in place shall be completely epoxy coated or made of nonmetallic material. The Contractor shall submit a chair sample to the Engineer for approval prior to installation.

The foam core board filler material shall be a 3/8 inch thick (minimum), closed cell foam faced with poster board material or plastic faced material on each side. This material is commonly referred to as Foam Core Board by Office Suppliers or a dense closed cell foam insulation material faced with plastic or foil.

The Portland cement concrete pavement that is removed to install the dowel bars shall be replaced with one of the following approved patching products: Patchroc 10-60, Five Star Highway Patch, or L & M Durapatch Highway, or an approved equal. The use of Set 45 will not be allowed.

Patch Material Requirements:

1. Compressive Strength, 3 hr, minimum 3000 psi, (ASTM C-109)
2. Compressive Strength, 24 hr, minimum 5000 psi, (ASTM C-109)
3. Final Set Time-minimum 25 minutes
4. Shrinkage, 4 days, 0.13 percent maximum, (ASTM C-596)

With Maximum Aggregate Extension:

1. Flexure Strength, 500 psi, 24 hr, (California Test 551)
2. Bond to Dry PCC, 400 psi, 24 hr, (California Test 551)
3. Bond to SSD PCC, 300 psi, 24 hr, (California Test 551)

The patching product may be extended up to 100% with aggregate (defined as 10 lbs. of aggregate to 10 lbs. of patching material) as recommended by the manufacture. The aggregate extender shall meet the requirements of Section 820 of the Standard Specifications. Section 820.2 D shall not apply to the aggregate extender. The Contractor's supplier of the patching product shall provide a concrete mix design, including all additives, to meet a minimum compressive strength of 4000 psi in six hours. This mix design shall be performed with the materials that will be used on the project.

The Contractor shall verify the results of the suppliers mix design prior to beginning work. If the suppliers mix design is not satisfactory, the Contractors shall provide the Department with a mix design that meets the requirement prior to the beginning of work. This mix design shall be performed with the materials that will be used on the project.

III. CONSTRUCTION REQUIREMENTS

The Contractor shall install the dowel bars in the existing Portland cement concrete pavement as shown in the plans and according to the following requirements:

A. Saw cut the pavement to place the center of the dowel bar at mid-depth in the pavement. Multiple saw cuts parallel to the centerline may be required to properly remove the material from the slot. The saw cuts for the six slots at each transverse joint shall be made such that the dowel bars are placed within the following tolerances:

1. Centerline of individual dowel bars shall be parallel to the top of pavement within ±1/8 inch in 18 inches.

2. Centerline of individual dowel bars shall be parallel to the other dowel bars within ±1/16 inch in 18 inches.

3. Centerline of individual dowel bars shall be parallel to the roadway centerline ±1/2 inch in 18 inches.

B. Any jackhammers used to break loose the concrete shall not be larger than the 30-pound class. If the pavement is damaged by the 30-pound jackhammer, the Engineer will require the Contractor to use a 15-pound hammer.

C. All exposed surfaces and cracks in the slot shall be sand blasted and cleaned prior to bar installation.

D. The dowel bars shall be lightly coated with the bond breaking compound prior to placement. The bar chairs shall provide a 1/2 inch clearance between the bottom of the dowel bar and the bottom of the slot and chair. The dowel bars shall be placed to the depth shown on the plans, parallel to centerline and the top of the roadway surface, and at the middle of the slot, all within the specified tolerances. The chairs shall hold the dowel bar securely in place during placement of the patching mix.

1. Longitudinal dowel bar placement for skewed joints shall be within ±2 inches.

2. Longitudinal dowel bar placement for perpendicular joints shall be within ±1 inch.

E. The 3/8 inch thick foam core board shall be placed at the middle of the dowel bar to maintain the transverse contraction joint. The foam core board shall fit tightly around the dowel bar and to the bottom and edges of the slot. The width of the foam board in its final position shall be 1/16 inch wider than the slot to minimize movement of the foam board and prevent incompressible material from entering the contraction joint during concrete placement. The top of the foam core board shall be flush with the top surface of the concrete pavement.

The Contractor may need to increase the width of the foam core board for pavements with skewed joints. The skew angle may vary for different pavement sections.

F. The Contractor shall thoroughly moisten all surfaces on the sawed slot immediately prior to filling with patching compound. Care shall be taken to prevent standing water in the slot. All excess water shall be removed with compressed air.

The Contractor shall fill the slot (with the installed dowel bar, chairs, and foam core board in place) with an approved patching material. The patching material shall be vibrated with a small hand held vibrator capable of thoroughly consolidating the patching compound into the slot and around the dowel bar. The top surface of the filled slot shall be trowel finished and cured. The curing compound shall meet the requirements of Section 821.1 B.

The patching material will be tested by the Engineer once for each 4 hours of production or a minimum of once per day. The patching material shall have a minimum compressive strength of 4000 psi in 6 hours. Department compression testing may be performed up to 24 hours after the cylinders are made. If the compressive strengths are not being met, production shall cease and the Contractor shall resubmit a concrete mix design correcting the strength problems. Price adjustments will be made for low concrete strength when the concrete fails to meet minimum strength of 4000 psi within the 24 hour testing period.

G. The transverse contraction joints shall be sawed and sealed as required in the plans.

H. Any individual dowel bar retrofit not functioning or damaged shall be repaired or replaced at the expense of the Contractor.

IV. METHOD OF MEASUREMENT

Dowel Bar Retrofit will be measured by each dowel bar installed and accepted.

IV. BASIS OF PAYMENT

Dowel Bar Retrofit will be paid at the contract unit price per each dowel bar. Payment shall be full compensation for equipment, materials, labor, and all incidentals required.

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