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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: CONTROLLING REFLECTION CRACKS IN ASPHALT CONCRETE OVERLAYS

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APPROVED: Shirley J. Clark for
J. ROBERT LAMBERT, Director, Facilities Design Division

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At this time, the most widely accepted method of rehabilitating older deteriorated Portland cement concrete pavements is to overlay them with asphalt concrete. However, if the thermal contraction that occurs at transverse joints and cracks in the underlying Portland cement concrete pavements is ignored, reflective cracks will develop in the overlays within a short time. Subsequent degradation of these cracks leads to premature overlay failure.

In EI 88-21 there are three techniques currently available to counteract the effects of thermal contraction. They are:

1) Item 18403.2502 - Sawing And Sealing Joints In Bituminous Concrete Overlays

2) Item 18203.9903 - Cracking and Seating Existing Concrete Pavement

3) Item 18502.7589 - Rubblizing Existing Portland Cement Concrete Pavement

Each of these techniques (specifications) was expressly prepared to address specific conditions. In order to select the most appropriate of the three for a proposed asphalt concrete resurfacing contract, it is essential that the condition of the existing pavement be known. This can best be accomplished by conducting an on site pavement evaluation (distress survey). Treatment selection should not be made solely based on costs and/or ease of construction. There may be cases when more than one treatment is warranted in a contract.

Questions concerning pavement evaluations and/or the following warrants for using the subject specifications should be directed to the Field Engineering I section of the Materials Bureau at (518) 457-5956.

The warrants for the use of these techniques follow:

ITEM 18403.2502 Sawing and Sealing Joints in Bituminous Concrete Overlays.

This specification assumes that normally anticipated movement from thermal expansion and contraction is still occurring in the majority of transverse joints in the existing Portland cement concrete pavement being resurfaced.

Sawing and sealing transverse joints in an asphalt overlay directly over the underlying PCC joints confines the development of reflective cracking to the sawcut, minimizes secondary cracking and prevents the intrusion of water, fines, salt and debris into the pavement structure.

PCC pavement joints that have lost structural integrity due to blow-ups and/or full depth spalls will not be benefited by sawing and sealing unless such conditions are corrected. The working face or moving edge of a PCC transverse joint should be a straight line in order for the procedure to be effective. Consequently, transverse joints exhibiting full depth corner breaks or meandering cracks are not good candidates for the sawing and sealing procedure. Partial depth joint spalls should be repaired with PCC or AC based patching material. Joints that exhibit full depth deterioration, blow-ups and slabs containing working cracks should be corrected with full depth PCC slab repair. Low volume secondary roads could use full depth AC repairs. High volume roads with truck traffic may exhibit shoving and bumps after several years if full depth asphalt repairs are used.

Pavements deteriorated to the point where slab cracks are providing considerable relief for thermal movements should be considered for other methods of rehabilitation. The increased costs associated with numerous full depth slab repairs make other alternatives more attractive.

Pavements or portions of pavements exhibiting a significant number of wide transverse joint openings (equal to or greater than 1 1/2") and offset transverse joints due to blow-ups are not good candidates for the sawing and sealing procedure. Multiple reflective cracking and overlay deterioration are likely to develop in transverse joint areas.

The decision when to use the sawing and sealing procedure should be based on anticipated pavement performance, life cycle cost and whether the pavement is suited to such a procedure. Typically, normal overlay thicknesses of 2 1/2 to 4 inches are used with this item.

ITEM 18203.9903 Cracking and Seating Existing Concrete Pavement.

This specification assumes that most of the thermally induced movement has shifted from transverse joints to existing transverse slab cracks. Consequently, the location and amount of movement and subsequent overlay cracking is unpredictable. By further cracking the Portland cement concrete pavement slabs, additional relief for thermal expansion and contraction is provided, thus, distributing movement throughout the entire slab. This significantly reduces stress concentrations in the overlay minimizing reflection crack development. This item is also appropriate when a significant number of transverse joints are misaligned and/or separated 1 1/2 inches or more as a result of pavement blowups. Significance should be determined through economic analysis.

In conjunction with the crack and seat item, existing joint spalls and/or spalls that result from the cracking and seating operation should be repaired with AC patches prior to resurfacing. Depending on their condition after the cracking and seating operation, existing blowup patches may also need to be repaired with AC before resurfacing.

This item is not recommended in areas where existing underground utilities could be damaged from the operation of the cracking and seating equipment. Typically, overlay thickness is 5 inches or greater to compensate for the diminished support value that results from cracking slabs.

ITEM 18502.7589 Rubblizing Existing Portland Cement Concrete Pavement.

This specification is suitable if distress in an existing Portland cement concrete pavement is the same as described for Item 18203.9903, Cracking and Seating Existing Concrete Pavement, but where underground utilities (gas, water and sewer lines) could be damaged by the operation of slab cracking equipment. This item has also been successful in pavements with narrow (less than one lane width) widening. The pavement is widened with crushed stone before being rubblized and compacted. The rubblized pavement and crushed stone widening provide a uniform open base which drains to a free draining crushed stone shoulder or edge drain.

The equipment specified in this item relies on high frequency, low amplitude blows to reduce the existing pavement to rubble without disrupting utilities. Once compacted, this rubble has sufficient support value to be utilized as a subbase for a new replacement pavement. Replacement pavements are generally 6 inches thick. Thicker pavements may be necessary in pavements with a high percentage of truck traffic. Use of this item should be limited to the warrants stated herein as it's cost is considerably higher compared to the others.