Florida Department of Transportation Research

Evaluation of Reflective Cracking Mitigation Treatments Using the Composite Specimen Interface Cracking Test

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Current Situation

Reflective cracking is often regarded as the most common problem affecting resurfaced pavement. This cracking occurs when cracking in the original pavement appears in the new pavement surface. Cracking can lead to further degradation of the pavement surface – exactly what resurfacing is meant to prevent. To mitigate reflective cracking, the Florida Department of Transportation (FDOT) specifies the use of a special layer of pavement – a rubberized asphalt interlayer – between the old pavement and the new one. Recent evidence has raised concerns that this asphalt rubber membrane interlayer (ARMI) is not adequately effective in preventing reflective cracking or rutting.

Research Objectives

University of Florida researchers developed guidelines for an effective alternative to the ARMI for pavement resurfacing, emphasizing fracture tolerance and shear resistance.

This photo of a repaving project shows the original road surface (lower left), the interlayer (upper left), and the new pavement surface (right).

Project Activities

One alternative to the ARMI is geotextile, a very tough fabric used in earthworks and other construction projects. However, with the miles of roadway repaved each year, the cost of geotextile would be very high. So the researchers sought an alternative that would balance cost with improved resistance to reflective cracking.

Two promising possibilities were identified in the literature: fracture-tolerant interlayer and stone matrix asphalt interlayer. These interlayer designs specify proportions of aggregate in specific size ranges mixed with asphalt in specific ratios, which are crucial to any pavement's resistance to permanent deformation and cracking. Key characteristics identified from these approaches were combined with parameters from the DASR-IC model to establish mixture gradation guidelines for effective interlayer mixtures. DASR-IC stands for dominant aggregate size range (coarse aggregate) and interstitial component (fine aggregate, asphalt binder, and air voids). Fourteen interlayer mixtures were designed: seven using granite and seven using limestone. The fourteen designs were the basis for testing, which also included two asphalt binders and three thicknesses.

These interlayer options were tested using the composite specimen interface cracking (CSIC) test developed in previous work for FDOT and the asphalt pavement analyzer (APA). CSIC was primarily used to test for cracking, and enhancements to the test were made for this project. APA was used to test rutting performance of the asphalt mixtures. Results of these tests identified the mixtures that were the most fracture tolerant and shear resistant (FTSR), leading to a set of preliminary design guidelines for FTSR interlayers likely to be most effective in mitigating reflective cracking. These preliminary guidelines will form the basis of more testing using more aggregate types, gradations, and interlayer thicknesses to further refine the guidelines.

Project Benefits

Repaving is a major activity and expense on Florida roads throughout the year. Results of this project offer significant savings by reducing maintenance and repaving.

For more information, please see www.fdot.gov/research/.