Florida Department of Transportation Research

Evaluation of Asphalt Rubber Membrane Interlayer (ARMI) Using the University of Florida's Composite System Interface Cracking (CSIC) Test
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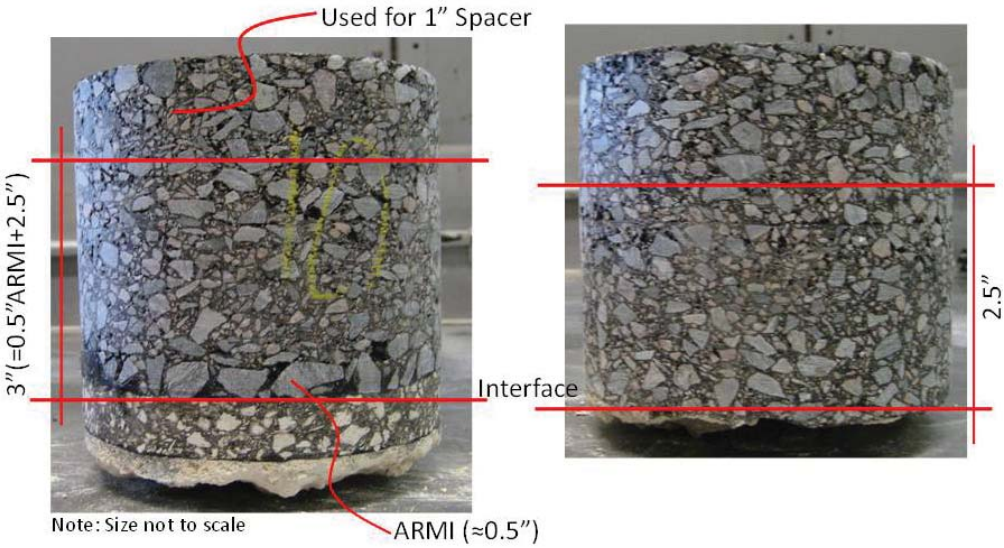
Since the late 1970s, FDOT has applied an interlayer of Asphalt Rubber Membrane Interlayer (ARMI) to asphalt roadway surfaces. ARMI layers are constructed by spraying asphalt rubber binder onto the asphalt, covering the layer with no. 6 stone, and rolling the stone into the asphalt with a pneumatic tire roller. A final layer of asphalt is applied on top of the ARMI layer. ARMI adds cost to the asphalt roadway project but has been used as a means to extend the life of the roadway by mitigating reflective cracking.



Typical cores from sections with ARMI layer (left) and without ARMI layer (right)

Field reports have been mixed as to the effectiveness of ARMI to prevent rutting, and FDOT researchers theorized that ARMI may even contribute to rutting. The University of Florida recently developed a composite specimen interface cracking (CSIC) test to simulate the crack initiation and propagation process and to evaluate the effect of bonded interface conditions on top-down cracking. Three core samples were taken from the section constructed with ARMI and three samples from the control section constructed without ARMI. Testing of the samples involved repeated tensile loading with the CSIC test. Researchers also monitored the rate of damage development. All tests were conducted at 10°C.

Researchers found that after an average of 175,000 load cycles, specimens with ARMI failed by cracking through mixtures, and that after an average of 220,000 load cycles, specimens without ARMI failed, indicating that specimens without ARMI outperformed the specimens with ARMI in terms of cracking resistance. The tests indicate that ARMI not only does not delay reflective cracking, but to some extent reduces reflective cracking resistance. It also indicates that asphalt rubber does not have the same capability of Polymer Modified Asphalt Emulsion (PMAE) to dissipate stresses accumulated near the interface.

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