

UTC Project Information

Project Title	Developing a Test Method to Investigate Water Susceptibility of Joint and Crack Sealants
University	North Carolina A & T
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Funding Source(s) and Amounts Provided (by each agency or organization)	\$187,754 USDOT \$113,595 NC A&T
Total Project Cost	\$301,349
Agency ID or Contract Number	DTR13-G-UTC44
Start and End Dates	June 1, 2014 – May 31, 2016
Brief Description of Research Project	<p>This study aims to develop laboratory test methods based on fundamental sealant properties to evaluate sealants' water resistance. These tests will be used to predict sealant performance when it is exposed to water for a specific period of time. Five sealants from various producers will be studied in the laboratory. Bulk (cohesive) and adhesive properties of each sealant will be examined following the crack sealant guidelines developed through Federal Highway Administration pooled-fund study TPF5 (045) and the U.S.–Canadian Crack Sealant Consortium. The adhesive bonding strength between sealant and crack walls and the cohesive bonding strength within sealant will be used to characterize the water susceptibility of sealant. Change in bulk and adhesive properties of sealant after water conditioning will be used as an indication of water susceptibility of the sealant. The cohesive property of the sealants will be examined by measuring stiffness and average creep rate using a bending beam rheometer (BBR). Adhesive properties will be studied through two fundamental properties of the material: surface energy and interfacial fracture energy.</p> <p>Surface energy will be measured using sessile drop method. The interfacial fracture energy (IFE) will be measured using a pressurized blister test. The changes in stiffness, average</p>

	creep rate, surface energy and interfacial fracture energy before and after water conditioning will then be used to characterize the water effects on sealants.
Describe Implementation of Research Outcomes (or why not implemented)	N/A
Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	<p>A recent study sponsored by FHWA and US-Canadian Crack Sealant Consortium developed a performance based guideline for crack sealant. The guideline addresses the important properties of crack sealant, including aging, temperature and curing. However, in this study the effect of water exposure on sealant performance was excluded to simplify the analysis even though different sealants having different water resistivity perform differently when exposed to water repeatedly. Therefore, sealants which perform well in a relatively dry region may fail if applied in a more humid area with high amount of annual rain. Although sealant failure is mainly reported during the cold season when pavement contracts causing cracks to be most noticeable, the actual failure may have been initiated much earlier during the warmer-rainy season due to high amount of repeated water exposure. Unfortunately, sealant performance cannot be predicted due to lack of any standard test to evaluate sealant properties in the presence of water.</p>
Web Links	
<ul style="list-style-type: none"> • Reports • Project website 	<p><www.chpp.egr.msu.edu></p>