
BACKSTORY:

Georgia's interstate system has some of the highest quality pavements money can buy: open graded friction courses (OGFCs). These mixes make excellent wearing surfaces due to their high friction properties and surface permeability. OGFCs are much safer to drive on during heavy rainfall than dense graded surfaces because the mixture is designed to significantly reduce vehicle spray. The tradeoff is this same property makes OGFCs susceptible to raveling, particularly in areas that experience frequent snow, ice and areas of severe sunlight. They are also expensive to maintain. In the case of Interstate 475, just like many other roads across the country, there simply wasn't enough money in the state's budget to repave the aging roadway. As it reached 12 years of service life, I-475 experienced preliminary raveling, and in some places, total section loss. GDOT needed a way to preserve approximately 90 lane-miles of the six lane road until they could afford a more long-term solution. Funding was not the only issue GDOT faced. Safety was also a major obstacle to the substantive repair of this pavement. I-475 is a busy interstate route located south of Atlanta. Dense, high-speed traffic makes repair work a dangerous job and would require any preservation product to support a quick return to traffic. GDOT's Transportation Section Manager and District Maintenance Manager Clayton Moore, said, "Upon discussing with the State Maintenance Office and weighing all available pavement preservation techniques at our disposal, a rejuvenating fog seal was chosen due to ease of application and its low cost versus a micro mill and inlay project."

To determine the effectiveness of fog seals on high traffic pavements and provide direction for future product and site selections, Georgia DOT invited the Georgia Institute of Technology (Georgia Tech) to develop and execute a research project on this job. Throughout the course of the project, researchers from Georgia Tech visited portions of I-475 once a week to assess permeability levels, friction numbers and durability.

PROBLEM:

It is not typical for rejuvenating fog seals to be used on a high-speed pavement, as there is a temporary reduction in friction associated with the application

SOLUTION:

Georgia Tech manually evaluated select portions of the pavement with varying degrees of ravel for additional rock loss in an effort to assess the proper timing of the application. For the most beneficial performance, rejuvenating fog seals should be applied prior to the occurrence of raveling. The preliminary results of Georgia Tech's study, provided by GDOT's State Maintenance Liaison Larry Barnes, were positive across the board. While field tests are still underway, the summary for months one through three states:

1. The friction tests showed that the friction numbers after fog seal met GDOT's requirements.
2. Georgia Tech research team has used video log imaging to conduct visual inspection to qualitatively evaluate the performance of fog seal durability. In addition, Georgia Tech research team is developing a method, using 3D technology along with texture analysis, to evaluate the change of pavement surface texture after fog seal application to quantitatively evaluate the fog seal durability/performance.
3. The optimal treatment time can be determined after long-term monitoring. Due to the short period of time after fog seal, there is no apparent raveling development observed; and more long-term monitoring is needed to assess the fog seal durability.
4. The permeability test showed that the permeability of OGFC decreases after fog seal. And, the permeability in lane 1 (inner lane) is greater than that in lane 3 (outer lane). Because the field permeability test heavily relies on an operator's experience, the measurement significantly varies. It is suggested to assess the permeability using 3D laser data and measured pavement texture.
5. Permeability test cannot be directly used to evaluate the change of splash and spray. Further study is suggested to directly measure the visibility loss due to splash and spray.

Georgia Tech and GDOT will continue to monitor the pavement over the next few years to determine how well the rejuvenating fog seal treatment holds up under the heavy traffic load. There are thousands of miles of OGFC surfaces in need of preservation in the U.S. But these surfaces need to be maintained differently than traditional dense graded surfaces. The Georgia Department of Transportation should be widely commended for their willingness to perform this valuable research that may provide other agencies with data that will facilitate their use of rejuvenating fog seal as a go-to pavement preservation solution.