

Surface Retexturing, Rejuvenation Boost N.C. Interstate Performance

The initial problem identified by Division 3 of the North Carolina Department of Transportation for a section of I-40 near Wilmington was twofold: This pavement was about nine years old and exhibited both surface raveling and lower surface friction. The division's monitoring of wet weather accidents indicated a need to review options for improvement.

The obvious remedy would be to mill and replace the open graded friction course, except for one drawback: lack of funds for that magnitude of intervention.

Albert Edgerton, Division 3 project engineer, recalled a process, that of surface retexturing coupled with asphalt binder rejuvenation using a maltene-based asphalt rejuvenator. This process was developed by two firms: Pavement Technology, Inc. of Westlake, Ohio, and Skidabrader, of Reston, La. Both firms have been in business for more than 35 years, working primarily in pavement restoration and preservation.

Several meetings with Edgerton; Colin Durante, president of Pavement



On I-40 near Wilmington, N.C., Reclamite maltene rejuvenator is applied with a Bear Cat computer-controlled 2,500 gal distributor truck

Technology; and the late Gary Billiard, president of Skidabrader, resulted in Division 3's development of a new performance-based specification for the unique combination process.

PERFORMANCE SPECIFICATION

The new specification addressed the needed improvements to the pavement, being surface friction increase for safety, macro texture adjustment for improved transverse water flow to reduce

hydroplaning, and correction of in-place asphalt binder rheology for durability and lifecycle extension.

The specific requirements were a significant increase to surface friction following rejuvenator application to NC DOT requirement, as measured by friction testing equipment conforming to ASTM E 274 and ASTM E524, macro texture adjustment verified by outflow meter reading of 10 seconds or less (ASTM E2380 / E2380M-09), and maltene



Directly behind the surface texturing procedure macro texture evaluation at three tests per lane mile were performed using the specified outflow meters



Working in tandem the two Skidabrader units, each with an effective width of six feet, covered an entire lane width in a single pass

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ratio improvement with viscosity reduction of a minimum of 20 percent in the asphalt binder as measured by dynamic shear rheometer (AASHTO T 316) on extracted binder samples two weeks following treatment. The two-week delay in asphalt binder extraction was necessary to insure a product of high volatility was not used as a rejuvenator.

The successful bidder—Pavement Technology—selected equipment provided by Skidabrader and a maltene-based rejuvenator, Reclamite, supplied by D & D Emulsions, Inc of Mansfield, Ohio, a licensed manufacturer of the product by Tricor Refiners, Bakersfield, Calif.

Actual construction began in late June of 2012 with standard lane

closure on I-40, set up to maintain one lane of traffic flow at all times. The train operation began by first testing surface friction on the pavement prior to beginning the process. The friction testing was provided by Dynatest, headquartered in Ventura, Calif., using a 1295 Locked Wheel Pavement Friction Tester conforming to ASTM E274. Tests were run at 40 mph under wet condition using a ribbed tire.

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FRICITION ENHANCEMENT VIA ABRASION

Following the initial friction tests two Skidabrader units directed abrasive media at the pavement surface. Working in tandem the two units, each with an effective width of 6 ft, covered an entire lane width in a single pass. The texturing process controlled the forward progress of the entire project, operating at a production rate of one lane mile per hour. Directly behind the surface texturing procedure macro texture evaluation at three tests per lane mile were performed using the specified outflow meters.

Following surface abrasion, the Dynatest equipment again measured and recorded surface friction to verify the performance requirement of the specifications. Immediately after the second friction testing the Reclamite maltene rejuvenator was applied with a Bear Cat computer controlled 2,500 gal distributor truck.

The selected rate of application of the rejuvenator, following field test

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strip applications, was 0.06 gallons per square yard. After the rejuvenator was given time to be fully absorbed by the textured pavement surface, a period of about 30 minutes, the Dynatest equipment again measured surface friction for verification that the pavement was ready to accept traffic. In all cases the treated sections were open to traffic within 30 minutes.

The entire process was performed in daylight hours with no measurable disruption to normal traffic flow. This process can be performed at night should traffic volume make that type operation necessary. The process on I-40 was completed in four days at a cost of \$2.00 per square yard, which included all testing during and post construction.


DOCUMENTING USER SAFETY

The evaluation of user safety, although not part of the performance specification, is a significant indicator of the overall value of this project.

The regular collection of crash data by the Safety Evaluation Group of the NC DOT revealed some significant and welcome information. The I-40 nine-month monitoring update indicates a 51 to 84 percent reduction in total crashes per year, and a 39 to 78 percent reduction in "lane departure wet" crashes per year as compared to pre-project data.

These improvements to safety can be attributed to the friction upgrade to

the pavement surface, with additional credit afforded to the macro texture adjustment and the overall removal of foreign materials that affect the porosity of the open graded friction course matrix. This later improvement was provided by the high-efficiency vacuum system on the Skidabrader units removing nine years of deleterious materials from the open graded matrix. The safety data will continue to be monitored in the future to determine the long term performance of this technique.

The need for pavement managers to find new ways to extend the life cycle of infrastructure elements entrusted to their care is ever increasing in importance. As available funds for our nation's roadway and bridge system preservation continue to be reduced, processes like the retexturing and rejuvenating combination system can help remedy the shortfall. When user safety can also be improved in the process the benefit to cost ratio becomes even more valuable to the professional pavement manager. 



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