

High-Volume U.S. 3 Gets R26 Showcase Preservation

By Ed Naras

The recently completed pavement preservation project on U.S. 3 in Massachusetts would be considered significant based on its size alone, with nearly 1 million sq. yds. of mainline paving, and over 400,000 sq. yds. of preservation on the shoulders and breakdown lanes.

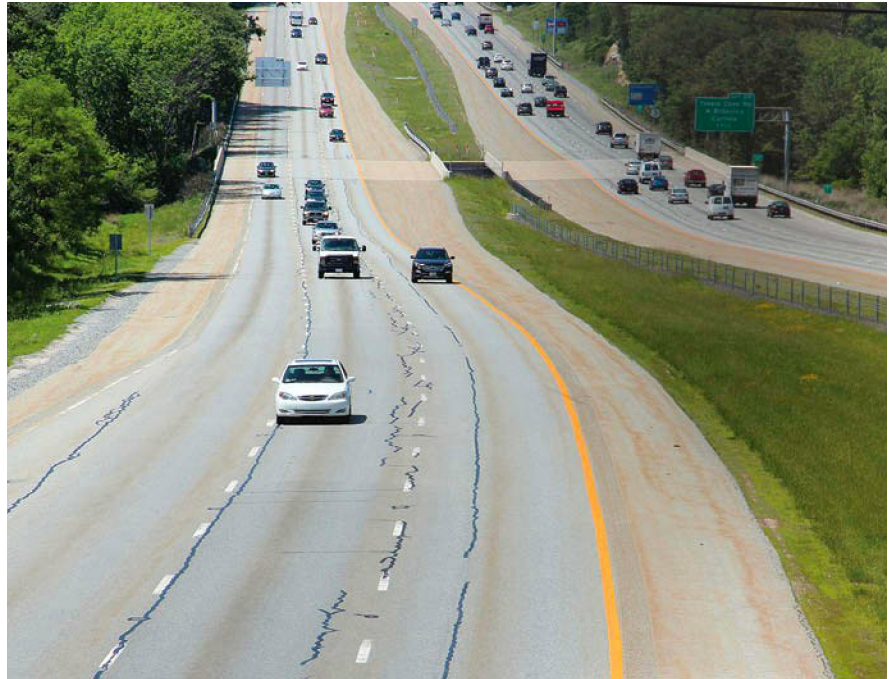
Add to that a scope of work that included the use of over 10 new pavement treatment combinations, and the result is a showcase project by anyone's standards.

Completed in fall 2015, the project involved work along a section of U.S. 3 north and south from Burlington, Mass., to the New Hampshire state line at Tyngsborough, Mass. This 20.6-mile stretch of road is one of the main routes between Boston and New Hampshire, with average daily traffic counts of approximately 100,000 vpd. The route consists of six total travel lanes (three northbound and three southbound), as well as high speed shoulders and breakdown lanes in each direction.

SHRP2-R26 AND U.S. 3

Authorized by Congress in 2005 as part of SAFETEA-LU and funded at \$232.5 million, SHRP2 was a follow-up to the 1987 authorization of SHRP. The program included four broad areas of emphasis: *Highway Safety, Renewal, Reliability, and Capacity.*

As part of the Renewal focus – the document, *R26: Guidelines for the Preservation of High-Traffic-Volume Roads* – was completed. This report, released in 2011, provided valuable research and information to help expand state usage of pavement preservation techniques on high-traffic-volume roadways.



U.S. 3 in Massachusetts prior to the start of the SHRP2-R26 pavement preservation project



Completed view of U.S. 3 following all pavement preservation applications

As a part of the implementation of R26, MassDOT was selected as a Lead Adopter State, with U.S. 3 as a Showcase Project for SHRP2-R26. Funding provided by the Implementation Assistance Program is being utilized to for testing and to monitor the performance of the numerous pavement preservation techniques, resulting in a great opportunity for performance evaluation and comparison of the treatments. Performance evaluations and mixture testing are being performed by Dr. Walaa Magower of the UMass Dartmouth's *Highway Sustainability Research Center* during the project's two-year evaluation period.

PROJECT SCOPE AND HIGHLIGHTS

The contract for the project, awarded to Brox Industries, Inc. of Dracut, Mass., involved a comprehensive scope of work, including significant pavement repairs and surface preparation, placement of several types of preservation treatments, replacement of pavement markings using multiple methods, and traffic control and safety management throughout the entire project.

The project also included of a ride specification, making it the first ultrathin bonded overlay (UTBO) project in the region to include this requirement.

Prior to the placement of any preservation treatments, work was completed to re-profile bridge approaches and departures to improve overall rideability, and provide smooth transitions. Additional pavement preparation – including micro milling of high distress areas, keyways, and transitions to the edge of all fog lines – was completed to help improve both the rideability and performance of the preservation treatments.

The mainline paving of the highway was completed utilizing an UTBO which involved placement of a heavy application (0.18 to 0.25 gal./sq. yd.) of polymer emulsion “bond coat”, immediately followed by a 5/8 to 3/4-in. gap-graded hot mix overlay.



Spray paver places ultrathin bonded overlay treatment



R26 Showcase event drew attendees from across the United States

This process, completed using a specially designed self-priming paver, seals the existing surface and provides a superior bond to the hot mix overlay. On the U.S. 3 project, the road was split into three approximately even length sections that were each treated with a different type of UTBO. These included sections with a PG 64-28 binder (control section), PG 64V-28 binder (polymer modified section), and ASTM D6114 asphalt rubber binder (recycled material section).

Further to the goal of evaluating several types of preservation treatments, the breakdown lane and high speed shoulders along the roadway were treated with several combinations of fog seal treatments.

A light spray application of diluted asphalt emulsion (0.06 to 0.20 gal./sq. yd.), fog seal treatments are a “top of the curve” preservation treatment used primarily to seal the existing pavement surface.

In the breakdown lanes along the entire 20.6 mile section of U.S. 3, a maltene rejuvenator seal (*Reclamite*) was applied. The high speed shoulders were split into three sections, similar to the UTBO, with different types of asphalt fog seals placed on each section.

The fog seals included a CRS-2 (unmodified emulsified binder), CRS-2Pd (polymer modified emulsified binder), and GSB-88 (Gilsonite) emulsion. Additionally, texture was added to both the

breakdown lane and high speed shoulder through a combination of the Skidabrader shot blasting process, and application of boiler slag. These pavement preservation treatments are being evaluated for pavement friction and permeability testing during the project's two year evaluation period.

As the project's quantities were significant, MassDOT was also able to evaluate different pavement marking materials on the northbound and southbound barrels. Polyurea and

thermoplastic pavement markings with embedded wet reflective elements were utilized to enhance the wet weather visibility. These pavement markings were slightly recessed in diamond-cut grooves beneath the pavement surface to eliminate damage from winter plowing operations. Wet and dry retroreflectivity readings were performed for MassDOT acceptance initially and will be performed intermittently for informational purposes.

As part of the SHRP2-R26 program, MassDOT hosted a one-day showcase to highlight the project and the preservation treatments involved. The event, sponsored by the Federal Highway Administration (FHWA), was attended by over 60 people representing federal and state agencies and industry organizations from across the country.

The agenda for the showcase included presentations from representatives of MassDOT, FHWA, and contractors involved in project. The group also had the opportunity to visit the project to see up close several areas where treatments had already been placed on the roadway.



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QUALITY ASSURANCE

MassDOT was initially concerned that a UTBO treatment would not provide an opportunity to provide the needed profile corrections at several bridge approaches that had settled over time. The approaches at four bridge decks were surveyed, milled and re-profiled utilizing single (or multiple) leveling courses to achieve significant improvements.


The project included quality assurance (QA) specifications and required a quality control (QC) plan for the pavement preservation work. These specifications required ride quality testing (IRI) by the contractor and MassDOT. Pay incentives were calculated utilizing a quality level analysis (QLA) for ride quality and other mixture properties. The contractor achieved bonuses for both the ride quality and mixture properties.

PROJECT PERFORMANCE

All of the work on the project was completed by the end of the 2015

construction season, with the road being completely free of construction before the start of winter.

To date, the preservation treatments placed have performed very well, and all testing that has been completed has shown positive results. As a result, MassDOT has added several similar projects to its pavement preservation plan, and is looking at additional opportunities to utilize the applied preservation treatment techniques on other state roadways.

In addition, several surrounding states and local agencies have begun employing some of the treatments from the U.S. 3 project into their preservation strategies. The performance of this project will continue to be monitored and tested by MassDOT, with the results being made available for use by other agencies in the future. 

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