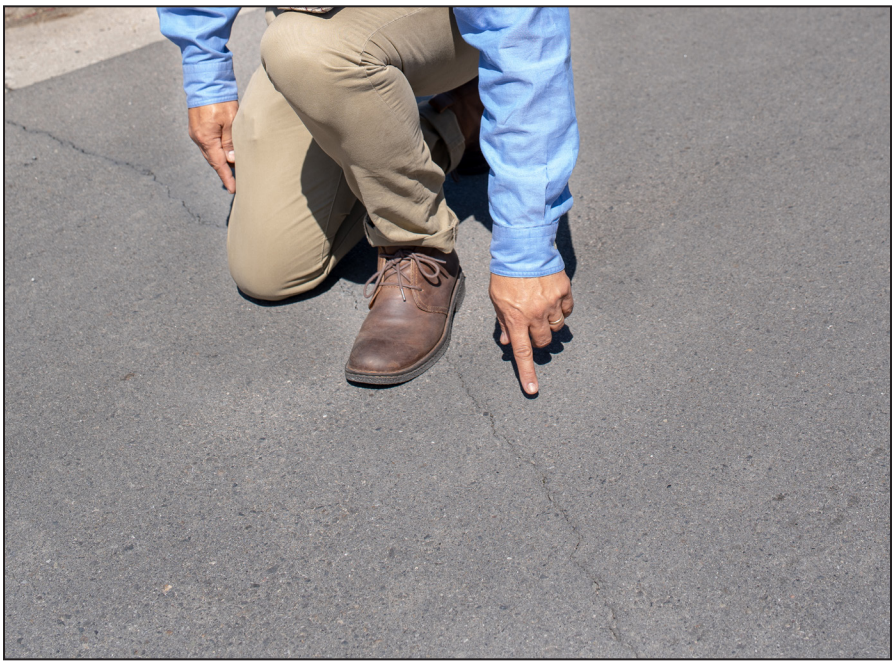
MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 19-404 (project 468) | November 2019

Evaluation of the Durability of Thin Lift Surface Treatments



the ISSUE

To maintain quality road surfaces, each year the Utah Department of Transportation (UDOT) spends over $20 million in maintenance alone. A significant portion of this maintenance is preservation treatment, a preventative measure to slow down structural deterioration and prolong road lifespans. For flexible pavements, this consists of applying a bituminous layer to the surface of the pavement to prevent water ingress and structural deterioration. Thin lift treatments (TLTs) are an important tool within the maintenance preservation toolbox. They are hot-mix asphalt (HMA) surface mixtures and are, at most, one-and a-half inches thick. They are comprised of either an open grade surface course (OGSC), dense grade asphalt (DGA), or stone matrix asphalt (SMA) mix. TLTs are more robust than the other preservation treatments and are more effective across a wider range of climate and distress conditions; however, they are also more expensive because they are thicker than other surface treatments and thus require more material. Selecting the optimum time to apply TLTs and choosing the best mix for a particular road segment are important decisions in optimizing road maintenance budgets.

the RESEARCH

Fourteen thin lift treatments (TLTs) in UDOT's Region 2 were evaluated over a five-year period in order to assess their performance. Surface distress data was quantified using pavement condition indices (PCIs) and remaining service life (RSL) were estimated following procedures utilized by UDOT.

With the first 5 years' evaluation, 2 TLTs sections failed by the wheel path index, and 2 TLT sections failed by the environmental index. I-80.1, and SR-210 failed due to the wheel path evaluation, SR-89

MOUNTAIN-PLAINS CONSORTIUM REGION 8

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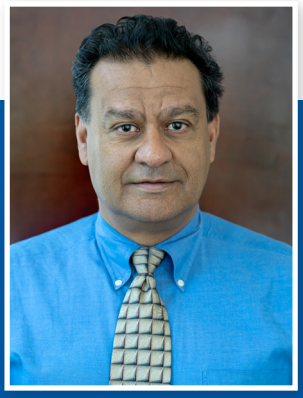

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Project Title

Performance Evaluation of Highway Surface Treatments (Phase 1: Short-term Performance)

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the **RESEARCH** (cont.)

and SR-210 failed due to the environmental evaluation, in total 3 sections have reached failure. SR-210 has failed mainly due to environmental distresses.

When all of the different treatments are grouped and both environmental and traffic loading are considered, it was found that the average life for the dense-graded surface treatments is 7.3 years and the average life for the open graded surface course was slightly better at 7.9 years. It is estimated that the average life of SMA's is 11.7 years.

The local TLTs were compared to similar pavements from the long term pavement performance database. Both UDOT and long term pavement performance roads are seeing a greater number of environmental failures as opposed to structural or wheel-path failures.

the **FINDINGS**

It is concluded that environmental factors are the main cause of deterioration of surface treatment. The TLT's placed on UDOT's Region 2 have a life expectancy of at least 7 years. Based on their performance, it is recommended that, whenever feasible, stone matrix asphalt should be used in high valued roads.

the **IMPACT**

The most cost-effective maintenance treatment type during a pavement's life is often uncertain as it depends on many factors (e.g., environment, traffic). Delaying maintenance for rehabilitation can increase cost by as much as seven times compared to preservation. At the same time, applying preservation treatment too soon does not provide a benefit that is worth the cost of a preservation treatment. Additionally, electing for preservation when rehabilitation is needed will result in rapid deterioration and a "backlog of pavements in need of repair."

This project enhances the understanding of the performance of various TLTs so that engineers can apply the most appropriate treatments at the right time in the pavement life cycle.

For more information on this project, download the entire report at https://www.ugpti.org/resources/reports/details.php?id=976

For more information or additional copies, visit the Web site at www.mountain-plains.org, call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.

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