RESEARCH
PROJECT CAPSULE
August 2018
19-2P
TECHNOLOGY TRANSFER PROGRAM

Mechanistic Characterization of Asphalt Overlays for Pavement Rehabilitation and Preservation using Pavement ME Approach

JUST THE FACTS:

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30 months

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SPR: TT-Fed/TT-Reg

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POINTS OF INTEREST:

Problem Addressed / Objective of Research / Methodology Used Implementation Potential

PROBLEM

Asphalt overlays are commonly used as a pavement rehabilitation and preservation technique for both rigid and flexible pavements. Despite the widespread use of asphalt overlays, questions remain regarding their life expectancy, cost effectiveness, and potential role in improving pavement structural capacity and functional properties.

At present, the Louisiana Department of Transportation and Development's (DOTD's) pavement design approach is in transition from the 1993 AASHTO procedure to a locally calibrated Pavement ME method. Current Pavement ME design software provides methods for performance prediction that focus on new design and structural rehabilitation, but do not consider the contributions of pavement preservation treatments.

This study aims at facilitating the transition by characterizing the performance of various asphalt overlays using both the 1993 AASHTO procedure and Pavement ME method, including an effort to identify approaches for considering the effects of preservation treatments in Pavement ME design.

OBJECTIVE

The objectives of this research are to assess/evaluate the performance and condition of structural overlay sections utilizing DOTD's locally-calibrated Pavement ME design software; to address existing issues encountered by DOTD design engineers regarding the Pavement ME method; to evaluate the performance and existing trigger system of pavement preservation overlay strategies using the Pavement ME design approach; and to update local calibration factors used in the Pavement ME asphalt overlay design and develop a set of optimum design inputs for both rehabilitation and preservation overlays for DOTD implementation.

METHODOLOGY

DOTD pavement design engineers have encountered several issues with the locally-calibrated Pavement ME software, including apparent inability to accommodate stone interlayer, reflective cracking criterion cannot be satisfied for overlay on cement stabilized base, and unreasonable predicted performance for rigid pavement with widened slab or reduced thickness. This research will address these issues by analyzing the Pavement ME distress models, possibly recalibrating, and recommending optimum design inputs.

Pavement condition surveys and falling weight deflectometer tests will be performed at selected pavement sites to determine Pavement ME design inputs. Overlay thickness design will be performed based on the Pavement ME approach for comparison with designed overlay thickness data from DOTD's pavement management system. Based on the analysis, the current DOTD distress threshold/trigger system will be evaluated and the structural impact of preservation overlays can be assessed. Figure 1 shows the selection and timing of maintenance options in the Pavement ME. Figure 2 presents an example of using the Pavement ME in estimation of the performance of ultrathin asphalt overlays for pavement preservation.

Pavement ME implementation guidelines will be developed. Life cycle cost analyses will be performed for use when making policy decisions on preservation strategies.

IMPLEMENTATION POTENTIAL

After this study, it is anticipated that DOTD will be able to conduct asphalt overlay design for rehabilitation and preservation using the Pavement ME software. A set of updated, local calibration factors and design inputs for overlay design in pavement preservation and solutions for several Pavement ME software issues encountered by DOTD design engineers will be provided.

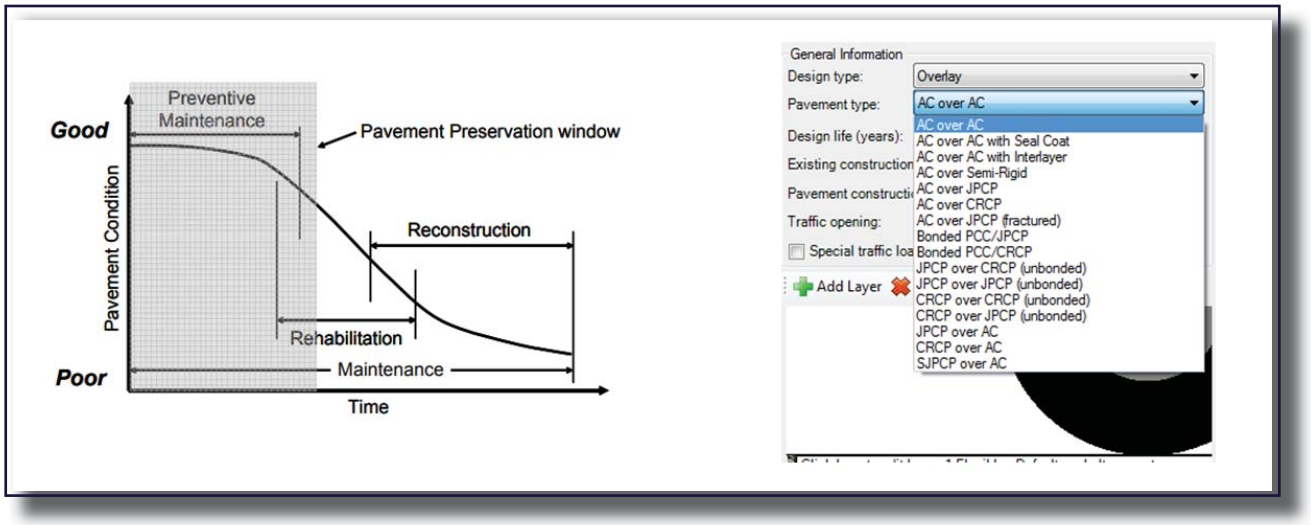

Figure 1
The selection and timing of maintenance options in Pavement ME

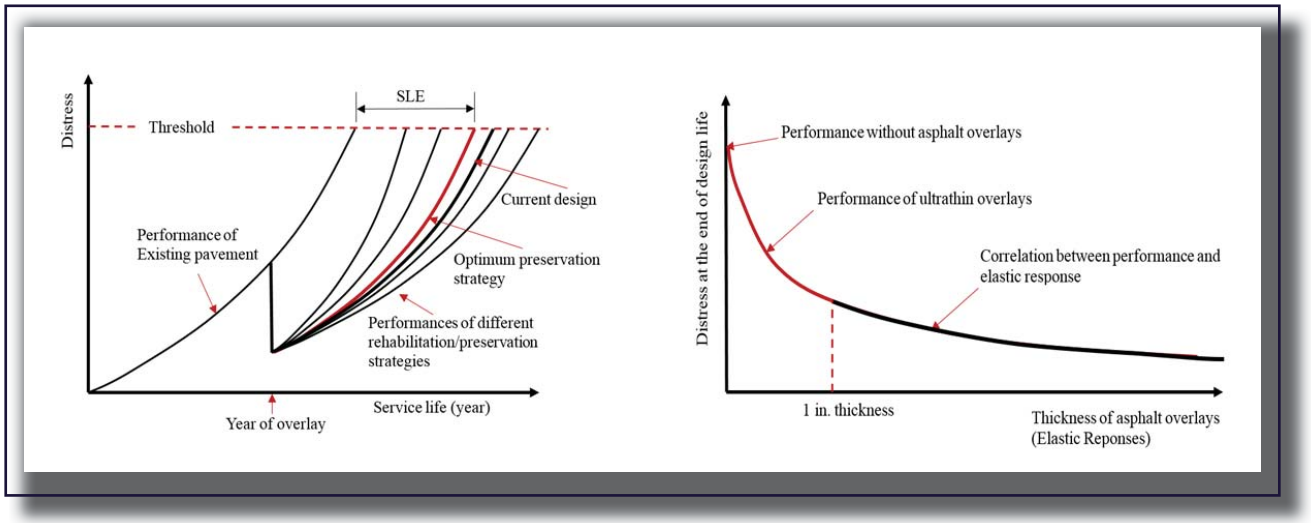

Figure 2
Estimation of ultrathin asphalt overlays using Pavement ME