MPC-611
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Project Title

Field Performance of Asphalt Mixtures Based on Flexibility Index Results

University

University of Utah

Principal Investigators

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Research Needs

The Flexibility Index of asphalt mixtures have been identified as a valuable parameter to evaluate the intermediate temperature performance of roads. However, while it is known that low FI values result in high propensity for cracking, an actual threshold value has not been determined in the state of Utah. Values between 5 and 10 have been suggested for other states (Illinois, Wisconsin, etc.). Materials from seven different field sections were collected and tested in the laboratory resulting in FI values between 3 and 20. There is a need to document the early field performance of these sections to determine what the appropriate limit should be for the state of Utah and the region.

Research Objectives

The objective of this research is to document the early performance of asphalt pavements in the state of Utah and correlate their performance to the Flexibility Index (FI) values obtained in the lab. Knowing the relation between FI and field performance will allow for the development of asphalt mixtures optimized for all weather conditions. At the conclusion of this project, it will be possible to establish a limit on the FI to ensure adequate field performance of asphalt mixtures.

Research Methods

This research will perform a condition survey of the pavement sections for which the material was collected and tested, including weather and traffic. This will be done either through Mandli surveys or on-site visits. Those sections that have early cracking (within 2 years of construction) will be identified and their performance will be compared with the FI that was determined at the time of construction.

Once a relation has been established a threshold or lower limit on the FI for mixtures will be develop.

Expected Outcomes

The expected outcome of this work will be a limit for the flexibility index (FI) based on field performance.

Relevance to Strategic Goals

State of Good Repair – by having the ability to identified asphalt mixtures that are susceptible to early cracking, mixture designs can be adjusted so that road surfaces stay in good condition. The concepts developed from this project will allow highway agencies and industry partners to optimize the design of asphalt mixtures to improve its longevity and thus minimize the life cycle cost of the system.

Educational Benefits

Given the limited funding, one graduate student will assist on this project. Student will be involved in all aspects of the project including data collection, analyses, and development of limits. Beyond the obvious acquisition of knowledge, by being involved in the research the student will have to present results and write journal articles on the discoveries, thus greatly improving communication skills.

At the end of their studies, students will join the workforce as knowledgeable practitioners.

Technology Transfer

The main objective of this work is to allow for a balanced, longer lasting, asphalt mix design by means of relating field performance to laboratory testing. Technology transfer will be an integral component of this project since this work is part of a large project with partners both from state highway agencies (i.e., UDOT), and contractors (i.e., PEPG Material testing). There is already a UDOT advisory committee who would guide the process and ensure the technology will be applicable to the state department of transportation. Furthermore, the work will include publication in the leading journals and presentation in conferences such as the Transportation Research Board Meeting that occurs every January. The PI will work with MCP staff to advertise the results so that other interested parties can benefit from the technology being developed.

A report will be provided so that agency leaders, materials engineers, and interested staff can evaluate for themselves the ability of both tests to capture mixture performance then decide which test better suits the agency needs.

Work Plan

The specific steps to be followed include:

Task 1. A literature review will be performed to determine the limits imposed by other states that have adopted the FI as a parameter.

Task 2. Perform a condition survey of the pavement sections for which the material was collected and tested, including weather and traffic (either through Mandli surveys or on-site visits).

Task 3. Identify those sections with early cracking (1 or 2 years cycle) and relate their performance to the measured FI

Task 4. Report results

Project Cost

Total Project Costs:	$70,000
MPC Funds Requested:	$30,000
Matching Funds:	$40,000
Source of Matching Funds:	Utah Department of Transportation

References

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