MPC-640
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Project Title

Testing of Field Cores to Determine Performance of Asphalt Mixture Performance Parameter

University

University of Utah

Principal Investigator

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Research Needs

Pavements are perhaps the largest and most important asset of our transportation network. A significant amount of research has been dedicated to evaluate and predict the performance of asphalt mixtures once placed on the field. The Semi-Circular Bend Flexibility Index Test (SCB-iFIT) as described in AASHTO TP124 and the IDEAL CT have been recognized as appropriate tests to measure the properties of asphalt mixtures at intermediate temperatures. The Bending Beam Rheometer (BBR) as described in AASHTO TP125 has also been recognized as an appropriate test to measure the properties of asphalt mixtures at low temperatures. However, while it is known that these tests can identify mixtures with high propensity for cracking, an actual threshold value has not been determined. As part of a previous study, materials from seven different field sections were collected and tested in the laboratory resulting in initial values. Now, after 2 years, cores from some of the sections can be obtained and tested to evaluate how the material has been aged in the field.

Research Objectives

The objective of this research is to obtain field cores and test them to correlate the observed performance of the mixtures to the values obtained in the lab. Knowing the relation between lab tested field cores and field performance will allow for the development of asphalt mixtures optimized for all conditions. At the conclusion of this project, it will be possible to establish cracking parameter to ensure adequate field performance of asphalt mixtures at low and intermediate temperatures.

Research Methods

This research will obtain cores from at least 4 of the 7 sections and test them using the SCB iFIT, the IDEAL-CT and the BBR. Once the testing has been conducted, the results will be correlated to the values obtained from testing the asphalt mixtures prior to compaction. This will give us a

unique opportunity to establish a relation between the results from fresh asphalt mixtures (as obtained from the plant prior to laydown), the same mix after 2 years in the field (as obtained from field cores), and pavement performance.

Expected Outcomes

The expected outcome of this work will be a relation between laboratory prepares samples, field cores, and 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. This will complement the results from MPC-611

Work Plan

The specific steps to be followed include:

Task 1. Visit sites previously identified (from MPC-611) and obtain at least 8 cores from the shoulder.

Task 2. Bring the cores to the lab and test them according to the following matrix:

- SCB-iFIT 2 cores 4 replicate tests at 1 temperature
- IDEAL CT 4 cores 4 replicate tests at 1 temperature
- BBR 2 cores 8 replicate tests at 2 temperatures

Task 3. Report results

Project Cost

Total Project Costs:	$37,000
MPC Funds Requested:	$17,000
Matching Funds:	$20,000
Source of Matching Funds:	Utah Department of Transportation

References

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