RESEARCH
PROJECT CAPSULE [10-4B]
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TECHNOLOGY TRANSFER PROGRAM

Development of Performance Based Specifications for Louisiana Asphalt Mixtures

JUST THE FACTS:

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36 months

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SPR

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Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

POINTS OF INTEREST:

Problem Addressed / Objective of Research / Mehodology Used Implementation Potential

PROBLEM

Currently, Louisiana's quality control/quality assurance (QC/QA) practice for asphalt mixture in pavement construction is based on controlling volumetric properties of mixtures and compacted asphalt mixture layers. Parameters such as gradation, asphalt cement content, air voids, voids filled with asphalt, pavement density, and surface smoothness are included. In fact, this practice is common in many other state highway agencies in the US. While the QC/QA specifications have served highway agencies well to judge if the produced asphalt mixtures are acceptable compared to the initial designs, those volumetric control parameters are found to be insufficient to ensure the long term performance of the asphalt pavements since these parameters are not direct predictors of pavement performance. In addition, with the availability of alternative paving materials being proposed to enhance the sustainability of pavements, such as reclaimed asphalt pavement (RAP), crumb rubber modified asphalt recycled asphalt shingles (RAS), and warm-mix asphalt (WMA) mixtures, there is a pressing need for highway agencies to examine alternative pavement quality control systems. A performance based specification (PBS), which relies on fundamental mechanical properties of asphalt mixtures as performance predictors of pavements, is a promising candidate to replace current QC/QA specifications.

Therefore, it is proposed herein to investigate the feasibility and applicability of key PBS principles such as the utilization of in-situ nondestructive testing (NDT) devices and subsequent use of the NDT measures in performance prediction models that will examine if the produced mixture will meet the performance target parameters at the end of its designed service life. Through this research, it will be ultimately sought to develop a framework for the implementation of the PBS for the Louisiana Department of Transportation and Development (LADOTD) for asphalt pavement construction.

OBJECTIVE

The ultimate goal of the proposed research is to develop a framework for the implementation of a PBS for new and rehabilitated asphalt pavements. Specific objectives of the study include: identifying state-of-the-practice of PBS employed in highway agencies, evaluating the applicability of key PBS principles to LA pavements, developing a tailored PBS for LADOTD, and developing a framework of the PBS implementation in Louisiana.

METHODOLOGY

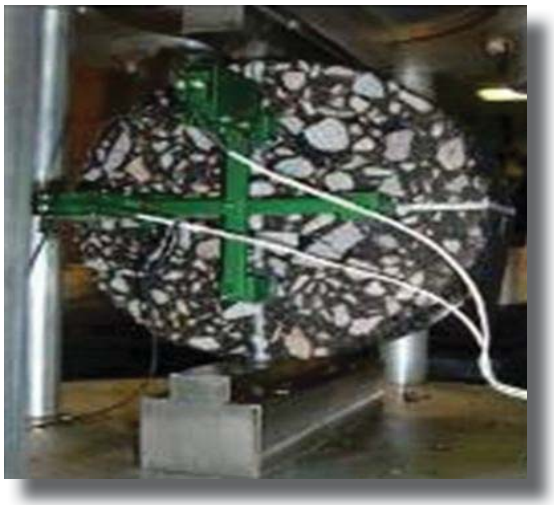
To achieve the objectives of this study, a minimum of 10 rehabilitation projects throughout the state with known traffic data and a good plant record of mixture consistency will be selected. Field core samples, known as plant-produced field-compacted (PF) will be tested at a minimum for the loaded wheel tracking (LWT) test, dynamic modulus test, semi-circular bend (SCB) test, and indirect tensile strength (ITS)

test. In addition, a suite of NDT in-situ tests that includes the falling weight deflectometer (FWD), light falling weight deflectometer (LFWD), and portable seismic pavement analyzer (PSPA) will be conducted at corresponding locations where PF samples are taken for comparisons with laboratory test results. Furthermore, density will be measured in the field and in the laboratory.

In addition to the aforementioned rehabilitation projects, it is anticipated that three new field projects from a proposed companion LTRC study titled *Test and Analysis of LWT and SCB of Asphalt Concrete Mixtures* will provide plant-produced laboratory-compacted (PL) and PF (plant produced field compacted samples) for collecting additional test results. The same suite of tests will be performed on these samples as the one to be performed on the samples obtained from the rehabilitation projects.

The proposed research study will be conducted according to the following tasks:

- Task 1 – Conducting a Literature Review
- Task 2 – Identifying Field Projects and Preparing Samples
- Task 3 – Conducting Laboratory and Field Experiments
- Task 4 – Performing Data Analyses
- Task 5 – Developing a Prototype PBS
- Task 6 – Preparing a Draft Project Report



Indirect tensile dynamic modulus test set up

IMPLEMENTATION POTENTIAL

It is anticipated that results from this study will provide guidelines for the implementation of mechanical tests for QC/QA of asphalt mixture in lieu of the current physical and volumetric properties.

Semi circular bend test set up

Loaded wheel tracking test set up