RESEARCH
PROJECT CAPSULE [20-4P]

September 2020

TECHNOLOGY TRANSFER PROGRAM

Assessment of DOTD's Friction Aggregate Sources through Laboratory and Accelerated Testing

JUST THE FACTS:

Start Date:
January 1, 2020

Duration:
36 months

End Date:
December 31, 2022

Funding:
SPR: TT-Fed/TT-Reg

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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 / Methodology Used / Implementation Potential

PROBLEM

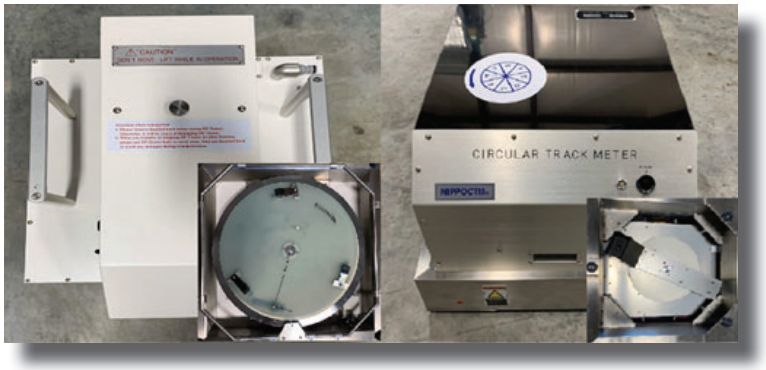

Figure 1
Recently acquired friction/texture devices at LTRC: DFT (left) and CTM (right)

The Louisiana Department of Transportation and Development (DOTD) currently uses an aggregate friction rating table, which is solely dependent on the polished stone value (PSV) of coarse aggregates, as the aggregate friction guideline in a wearing course mixture design. Due to high variations in the aggregate production and shipments, however, it is common to get significantly different PSV test results from a same aggregate source shipped in at a different time. Aggregate suppliers certainly have concerns when their products' PSV test results fail to meet DOTD's target, thereby reducing the aggregate's friction rating. Therefore, there is a need to formalize the use of aggregate friction testing to better utilize aggregates and achieve desirable skid values for the life of a pavement. In addition, this study will also evaluate the dynamic friction tester (DFT) to determine if it provides more reliable aggregate friction information than the British pendulum tester (BPT) that is currently used by DOTD.

OBJECTIVES

The research objectives are to assess the PSV test variation by testing different aggregate sources, shipment times, and test operators; propose a new aggregate friction testing procedure for DOTD, which can be used for initial source approval as well as for predicting field friction performance of wearing course aggregates; determine threshold friction design values for commonly-used wearing course mixtures; to validate and update the correlations obtained in prior LTRC project 12-5P: *Evaluation of DOTD Aggregate Friction Rating Table by Field Measurements* for different pavement friction and texture testing devices, different types of test tires (ribbed and smooth), and different testing speeds; and validate and update the relationship between Skid Number (SN) and International Friction Index (IFI) developed in prior LTRC project 09-2B: *Development of Surface Friction Guidelines for DOTD* through both laboratory and field testing programs.

METHODOLOGY

A comprehensive literature review will be conducted on pavement surface friction requirements, methods of laboratory- and field-friction evaluation, and prediction of related friction parameters. Subsequent laboratory testing of eight coarse aggregate sources

selected from DOTD's approved materials list with different friction ratings will be performed. Laboratory devices, such as the BPT, DFT, and Circular Track Meter (CTM), will be used to assess and measure the friction resistance of the selected aggregates (Figure 1). This study will also continue testing of the 22 projects selected for field evaluation in prior LTRC project 12-5P. Field tests will be carried out on the selected projects to collect pavement surface friction and texture data including measurements from a DFT, CTM, and a locked wheel skid trailer (LWST) for updating the correlations obtained during the prior study. Approximately 10-15 additional sections will be identified, including at least three open-graded friction course (OGFC) mixtures and three stone matrix asphalt (SMA) wearing course mixtures. Core samples will be taken from as many projects as possible and tested in the laboratory for PSV to verify and update the correlation equations from the prior project. The relationship between SN and IFI will be validated and updated by testing slab samples of selected wearing course mixtures. The frictional characteristics of the slab samples will be measured in the laboratory using the DFT and CTM devices. The results will be analyzed and compared to those from the field friction monitoring program of this study and from the prior LTRC project 09-2B.

IMPLEMENTATION POTENTIAL

A potential outcome of this project is the development of a new aggregate friction testing protocol for DOTD that can be used for initial source approval as well as for predicting field friction performance.