

Performance Evaluation of Louisiana's Superpave Implementation Projects Utilizing the Superpave Shear Tester

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Problem

Asphalt pavements account for more than ninety percent of all paved highways in the United States. For more than a half century, asphalt hot mixes have been designed by the Marshall mix design method, the Hveem mix design method, or their variants.

These methods use empirical test data to control the quality of the designed asphalt mixtures. They lack the capability of characterizing the fundamental material properties and predicting pavement per-

formance. The performance of conventionally designed mixtures has been increasingly inadequate under the strain of increasing traffic volume and loads.

A major result of the research conducted under the Strategic Highway Research Program (SHRP) from 1987 to 1993 was the development of the Superpave™ (Superior Performing Asphalt Pavements) system for the comprehensive design of asphalt pavements.



Superpave Shear Tester



LTRC



Louisiana Transportation
Research Center

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The three major components of Superpave are the asphalt binder specification, the mixture design and analysis system, and a computer software system. Included in this performance-based design system is the selection of a performance grade of asphalt binder plus mixture design and analysis to facilitate the selection and combination of binder, aggregate, and, where necessary, modifier to achieve a required level of pavement performance based on traffic, environment (climate), pavement structure, and reliability.

The Superpave system is currently being implemented throughout the United States. Most state DOTs will have fully implemented the system by 2000.

Currently, the Louisiana Department of Transportation and Development is in the process of implementing the new Superpave system.

Objectives

The primary objective of this study is to evaluate and predict the performance of Superpave mixtures being designed in Louisiana. The Superpave Simple Shear Tester (SST) will provide an excellent tool to examine the Superpave mixtures designed with materials typically available to our local contractors.

The actual field performance versus the predicted performance obtained from SST data will provide invaluable information for Louisiana and the nation. Mixes will be characterized based on their fundamental

material properties obtained from various tests of this study. Pavement performance will be predicted based on the Superpave performance models and then be evaluated by other test methods.

Description

The proposed research will evaluate and predict the performance of the nine projects using the Superpave system. A Cox and Sons Model CS7000 Superpave Simple Shear Tester will be used to perform fundamental testing developed by SHRP. An Asphalt Pavement Analyzer (APA) type of Georgia Loaded Wheel Testing device has been installed at LTRC and it will be used to evaluate the mixtures performance against rutting.

Using the newly acquired Superpave Shear Tester, material parameters of the mixtures designed by the Superpave mix design method will be studied. In addition, other fundamental engineering tests (i.e. indirect tensile strength and strain test, indirect tensile resilient modulus test, and indirect and axial creep test) will be conducted.

Mixtures will be characterized based on their fundamental engineering properties. A loaded wheel tester will also be used to evaluate the mixes. The result will be used to evaluate the mixtures' resistance to permanent deformation, fatigue endurance, and moisture susceptibility.

Through comprehensive material testing and laboratory simulation, the proposed study will help understand the fundamental engineering properties of the asphalt mixtures for the designated field projects. Material characterization and pavement performance predictions will help evaluate and acquire experiences of the new Superpave design method.

Implementation Potential

This study is conducted to assist DOTD in developing performance data for Superpave mixtures. It is anticipated that the SST will provide excellent data to predict mixture performance. The laboratory simulation results of the Loaded Wheel Testing will be used to evaluate the model prediction and the actual pavement performance.

The knowledge and experience obtained from this project will facilitate the full implementation of the new Superpave mixture design method in the state of Louisiana.

Predicting asphalt mixture performance with laboratory tests is a national priority. National performance models should be available by the year 2005. In the meantime it is necessary to develop a method of evaluating and predicting the rut susceptibility, durability and fatigue resistance of mixtures currently being designed in Louisiana.