Research Project

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C a p s u l e

LTRC

Technology Transfer Program

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Optimization of Asphalt Mixture Design for the Louisiana ALF Test Sections

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Principal Investigator:
Louay Mohammad, Ph.D.
LTRC
Civil and Environmental Engineering Department, LSU

LTRC Contacts

Administrative:
Harold "Skip" Paul, P.E.
Assoc. Director, Research
(225) 767-9102

Technical:
Samuel B. Cooper, Jr., P.E.
Senior Asphalt Research Engineer
(225) 767-9165

Louisiana Transportation Research Center

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

4101 Gourrier Avenue
Baton Rouge, LA 70808-4443

Problem

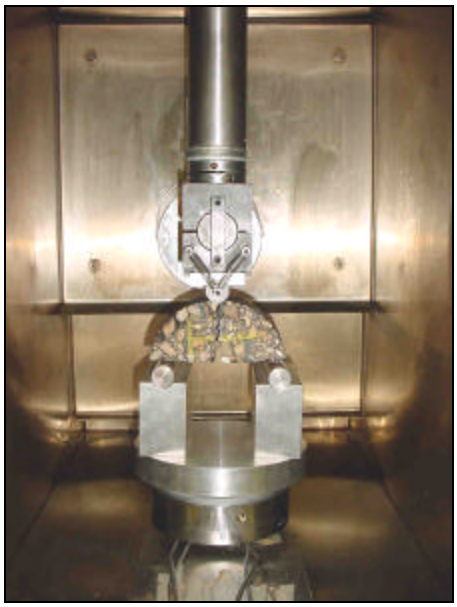
Superpave is a system for specifying asphalt materials, designing and analyzing asphalt mixtures, and predicting pavement performance. This system is an improvement on previous design methods because Superpave accounts for location, climate, and traffic. However, Superpave still has some imperfections that necessitate additional research to address the highway industry's concerns.

One of the main shortcomings of the Superpave mixture design method is that the whole process is purely volumetric. The method relies solely on requirements that were derived from the findings of limited research studies. Improvements to aggregate specifications for greater mixture stability are possible.

Objective

The primary objective of this research is to develop an optimum asphalt mixture design, as determined by an analytical aggregate gradation design method and mixture mechanistic performance tests. Selected designs will be recommended for field performance verification at the LADOTD Pavement Research Facility (PRF).

Laboratory testing equipment



Bend testing of semi-circular specimen of compacted asphalt mixture

The secondary objective is to understand the effect of identifiable variables, such as aggregate type and gradation, on mixture mechanical responses. Superpave design limits will be critically examined to consider the potential of a wider range of mixtures for superior performance.

Description

The Superpave design method simply does not properly address the expected performance of mixtures in terms of major pavement distresses, such as rutting and fatigue cracking. A key ingredient of a simple and effective mixture design methodology is an understanding of how mechanical performance is affected by properties of the mixture components.

A test factorial of three aggregate types, three aggregate gradations, and two binder types results in 18 different asphalt mixtures; a suite of physical and mechanistic tests will evaluate and verify the performance of each mixture. These fundamental tests will provide excellent data for predicting mixture performance. Performance verification of selected mixtures will then be recommended for accelerated load testing at the LADOTD PRF.

Implementation Potential

This study will provide significant new information on the relationship between aggregate characteristics and asphalt mixture performance. This information may be used to develop performance-based specifications for high-performance Superpave asphalt mixtures.