Research Project

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C a p s u l e

LTRC

Technology Transfer Program

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Accelerated Loading Evaluation of a Sub-Base Layer on Pavement Performance

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Principal Investigator:
Masood Rasoulian, P.E.
Senior Pavement Research Engineer, LTRC

Co-Principal Investigators:
Dr. Louay Mohammad, P.E.
Associate Professor
Louisiana State University

Dr. Zhongjie "Doc" Zhang, P.E.
Senior Geotechnical Research Engineer, LTRC

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

Technical:
Mark Morvant, P.E.
Pavement & Geotechnical Research Administrator
(225)767-9124

LTRC
Louisiana Transportation Research Center

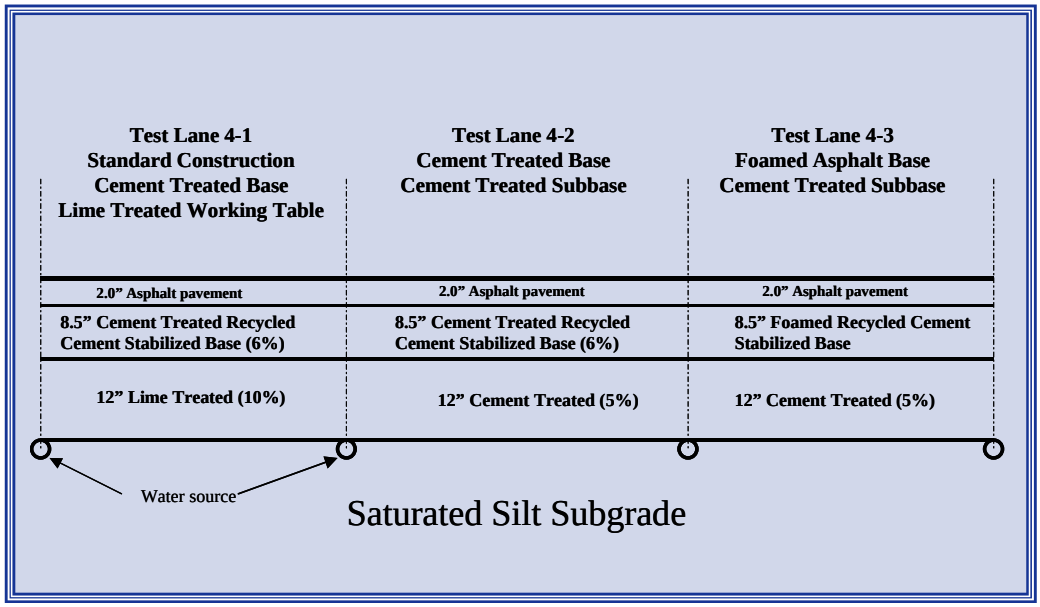
Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

4101 Gourrier Avenue
Baton Rouge, LA 70808-4443

Problem

Results of a recently completed laboratory study conducted by the University of New Orleans indicate that cement treatment of a silt subgrade can provide greater pavement performance benefits than lime treatment, even in wet conditions. This concept has been successfully implemented on several LaDOTD projects, using the current design methodology whereby no structural value is attributed to the pavement subgrade. If the strength contribution of a cement-treated subgrade is taken into account, pavements may be built more economically by reducing the thickness of the more expensive surface layers.

In addition to studying the properties of pavement layers constructed with cement treatments, the performance of foamed asphalt-treated base course materials will be evaluated. Foamed asphalt treatment is a process that combines hot asphalt cement with small quantities of water to produce a foam that is incorporated into base material. In the recent reconstruction of US 190 near Baton Rouge, an experimental base of recycled asphalt pavement (RAP) treated with foamed asphalt was utilized. Initial laboratory testing indicates that the foamed asphalt-treated RAP possesses increased cohesive and triaxial



Pavement Schematic for Test Lanes

strength. Subsequent non-destructive field testing has shown that the foamed asphalt-treated RAP is a viable alternative to a stone base. An evaluation of long-term performance of this material in the presence of moisture is needed.

Objective

One objective of this study is to prove that cement treatment of a subgrade layer will not only provide a working table for pavement construction, but that it will also provide a layer that contributes to the pavement's overall structural capacity. Another objective of this study is to evaluate the performance of foamed asphalt treated base courses.

This research will involve accelerated loading of pavement test lanes constructed with and without a strong sub-base layer, accelerated loading of a pavement test lane constructed with a foamed asphalt base course, and a laboratory program to evaluate material characteristics of experimental sub-bases and base courses.

Description

Three full-scale test lanes will be constructed at the LaDOTD Pavement Research Facility (PRF). One test lane (4-1) will be constructed with a lime-treated sub-base, while the two other lanes (4-2, 4-3) will be constructed with a five percent cement-treated sub-base. Each lane will incorporate a recycled cement stabilized base. The bases of lanes 4-1 and 4-2 will be treated with cement, while the base of lane 4-3 will be treated with foamed asphalt. Each test lane will be surfaced with two inches of asphalt pavement. Accelerated loading of the full-scale test lanes will be performed until pavement failure is achieved.

A series of laboratory tests will identify and document the fundamental engineering characteristics of the materials used for the asphalt pavement, base, and sub-base layers. Three different soils will be evaluated for sub-base stabilization. The soil samples will be tested for strength at different moisture contents, concentrating on the wet side of optimum moisture, with different cement, lime, or lime/fly-ash treatments at different time periods.

Chemically treated subgrade test sections have been constructed on LA 182 in St. Landry Parish and US 171 in Beauregard Parish. These test sections will be monitored with non-destructive field testing to determine overall pavement strength, durability, and performance.

Results obtained from the performance of the PRF test lanes will be correlated with results of the laboratory and field programs. Laboratory procedures and guideline specifications will be developed for use in optimizing stabilization methods based on material properties and field conditions.

Implementation Potential

The purpose of this study is to prove that appropriate stabilization techniques will result in improved performance of roadways built with high silt soils over wet subgrade. If results are favorable, special provisions and design guidelines will be developed for implementing the findings.

Accelerated Loading Device at Pavement Research Facility