



Transportation Consortium of South Central States

Key Points

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\$0

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Louisiana Transportation
Research Center

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\$157,376

Cost-Effective Detection and Repair of Moisture Damage in Pavements

Brief Project Description

The aim of this study is twofold. First, existing GPR, Rolling Wheel Deflectometer (RWD), and Traffic Speed Deflectometer (TSD) data will be evaluated in order to detect stripping and moisture-induced damage in pavements. Test methods, including GPR, will also be evaluated in order to identify top-down cracking without coring. Second, the performance and cost-effectiveness of treatment methods against moisture-induced damage will be analyzed. Maintenance and rehabilitation methods will include overlay of stripped pavements with and without removal, chip seal, and microsurfacing. Performance of past Louisiana DOTD projects as depicted from Pavement Management System (PMS) data will be used to assess the effectiveness of these techniques. Based on the results of this evaluation, a detection testing protocol for moisture-induced damage will be developed, and cost-effective maintenance and rehabilitation strategies to repair stripped pavements will be recommended.

Problem Statement

Moisture damage is a significant distress that affects the overall performance of asphalt pavements in Louisiana. Moisture damage only appears at the surface after detrimental damage has already progressed in the underlying pavement layers.

To ensure adequate long-term pavement performance, methods of early detection and repair of moisture damage are critically needed. The conventional method to detect moisture damage is through core extraction, a destructive and time-consuming process. However, nondestructive evaluation (NDE) techniques can also be used to assess as-built conditions and to evaluate pavement damage and deterioration.

Objectives

By evaluating NDE methods for detecting moisture damage in pavements and analyzing the performance and cost-effectiveness of appropriate pavement preservation techniques, the research team will develop a testing protocol for detecting moisture damage in pavements and will recommend cost-effective maintenance and rehabilitation strategies.



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Methodology

The research team will perform a literature review of methods for detection and repair of moisture damage in pavements. Previously collected deflection measurements are stored in the Louisiana DOTD pavement management system (PMS). The research team will correlate these measurements with the locations of moisture damage that were identified from extracted cores.

The method of repair that was used at these locations will also be determined. Data from PMS will be used to assess the performance of the repair methods. Performance curves for distresses and treatment methods will be developed so that remaining service life of the damaged sections may be predicted.

An economic evaluation will be performed for all of the moisture damage locations. Total cost of treatment method, obtained from bid costs, will be divided by predicted service life extension to obtain a normalized cost value for each location

Based on results from these initial tasks, the project review committee may recommend field testing of the most-promising moisture damage detection methods. For selected methods, the research team will conduct a comprehensive field evaluation on a wide range of road sections. Moisture damage detections will be compared against core conditions to assess a method's rate of success for identifying below-surface moisture deterioration.

Implementation Potential

This study will research and develop innovative and cost-effective test and treatment methods in order to allow early detection of moisture-induced damage, top-down cracking, and to improve pavement performance against moisture damage. As part of this project, the research team will develop an implementation plan that presents a strategy to incorporate the results into the state-of-the-practice, pavement preservation, and specifications of the Department.

Ultimately, an easily-implementable guide document that recommends procedure(s) for moisture damage detection and most cost-effective repair techniques will be developed. It is expected that implementation of the guide will reduce premature failure of pavement preservation activities and improve the performance and functionality of repair methods.

Weblinks:

- [Tran-SET's website \(http://transet.lsu.edu/research-in-progress/\)](http://transet.lsu.edu/research-in-progress/)
- [TRB's Research in Progress \(RIP\) database \(https://rip.trb.org/View/1512708\)](https://rip.trb.org/View/1512708)