

Development of Decision Trees for the Selection of Pavement Maintenance and Rehabilitation Activities in South-Central United States

Developing decision trees to aid in the selection of effective maintenance and rehabilitation activities

With time, pavements deteriorate due to both traffic loading and the environment, no matter how well-designed. In general, maintenance and rehabilitation activities slow down or reset the rate of pavement deterioration. Rehabilitation activities are those activities conducted to repair portions of existing pavements to reset the deterioration rate. They are defined by the American Association of State Highway and Transportation Officials (AASHTO) as “structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capacity. Maintenance activities are used by transportation agencies to reduce the deterioration rate of existing pavements by identifying and addressing specific pavement deficiencies. Maintenance activities are widely included in pavement preservation programs, which are defined by the Federal Highway Administration (FHWA) as “a program of activities aimed at preserving investment in the nation’s highway system”, providing and managing usable roadways, extending pavement life, enhancing pavement performance, reducing costs, and reducing user delays.

Problem Statement

Decision trees (or decision metrics) need to be developed to select maintenance and rehabilitation procedures for asphalt pavements in Louisiana. This will aid transportation agencies justify their maintenance and rehabilitation decisions. The proposed decision trees would consider all the variables impacting treatment performance, including, pavement age, pavement type (asphalt or composite), traffic level, and maintenance history to ensure that an efficient, economical treatment is selected.

Objectives

This project aims to draft systematic decision trees and/or decision matrices for Louisiana and other South-Central Region 6 states to select maintenance and rehabilitation treatments for

asphalt pavements. This will help transportation agencies optimize their maintenance and rehabilitation decisions. The proposed decision trees and/or decision matrices would examine all variables affecting treatment performance, including but not limited to, pavement age, pavement types, traffic level, and the maintenance history to ensure that the most efficient treatment is chosen. Implementing the proposed decision-making tools in this study will assist DOTs in making consistent decisions for road-network treatment strategies, thus avoiding human errors. The developed framework is expected to assist transportation agencies in South-Central U.S enhance their pavement asset management considerably.

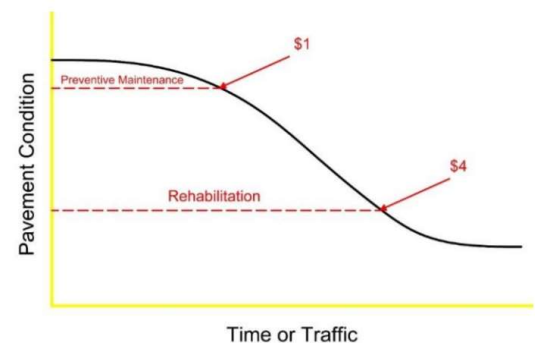


Figure 1: Costs of Pavement Preventive Maintenance versus Rehabilitation

Intended Implementation of Research

Education and Workforce Development: This project will fund one Ph.D student at Louisiana State University. This will help prepare future leaders in the Transportation Sector. The research team will also prepare educational materials on the new decision-making tools for treatment selection. The research data and results will be incorporated in undergraduate and graduate courses at LSU.

Outreach: This research will extend at least one summer internship to high school students within

Project Number:

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Start Date:

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Tran-SET

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LaDoTD

Total Project Cost:

\$106,975



the High School Student Research (HSSR) Intern Program organized by Dr. Adam Melvin at LSU

Anticipated Impacts/Benefits of Implementation

The main deliverables from this study are:

- (1) A final report will include a complete description of the objectives, approach, findings, conclusions, and recommendations.
- (2) An implementation report will be shared at the end of the implementation phase with the Tran-SET template for implementation reports. The Implementation Report will have a thorough description of developed products from the education, T2, and workforce development activities that were performed during the implementation phase.
- (3) Presentations to be delivered at national conferences (TRB and ASCE) to share findings.

Web links

- Tran-SET's website
<https://transet.lsu.edu/research-in-progress/>

Tran-SET

Tran-SET is Region 6's University Transportation Center. It is a collaborative partnership between 11 institutions (see below) across 5 states (AR, LA, NM, OK, and TX). Tran-SET is led by Louisiana State University. It was established in late November 2016 "to address the accelerated deterioration of transportation infrastructure through the development, evaluation, and implementation of cutting-edge technologies, novel materials, and innovative construction management processes".

Learn More

For more information about Tran-SET, please visit [our website](#), LinkedIn, Twitter, Facebook, and YouTube pages. Also, please feel free to contact Dr. Momen Mousa (Tran-SET Program Manager) directly at transet@lsu.edu.

