0-6386: Evaluation and Development of Pavement Scores, Performance Models and Needs Estimates

Background

Over the past decade the Pavement Management Information System (PMIS) Condition Score has become an increasingly important factor for performance monitoring and fund allocation. Most districts are using Condition Scores and associated color-coded maps to plan their future rehabilitation and maintenance programs. As a result, TxDOT recognized that the PMIS score calculation process needed to be reviewed and improved based on input from experienced district personnel and analysis of PMIS data.

TxDOT also realized that PMIS needed to (1) reasonably predict pavement performance and overall network conditions; and (2) have an improved Needs Estimate procedure that would generate more reasonable preventive maintenance and rehabilitation recommendations for the road network. These improvements would make PMIS more useful for TxDOT personnel.

What the Researchers Did

The researchers first prepared a synthesis that summarized the use of pavement scores by the states, including the rating methods used, the score scales, and descriptions; if the scores are used for recommending pavement maintenance and rehabilitation work; how the scores are computed; the distresses that are used for generating the scores; the sampling method; the survey frequency; and each state agency's legislative or internal goal. This synthesis was published in 2009.

The researchers then conducted a literature review, reviewed the PMIS capabilities and processes, compared TxDOT's scoring process to those by other states, and interviewed district personnel to determine needed improvements to the PMIS scoring and Needs Estimate process. The researchers produced a set of recommendations for improving the PMIS score calculations. The findings from these tasks and the recommendations were published in 2011.

The researchers reviewed the performance prediction process used by PMIS and concluded that the process was conceptually sound, but the performance prediction models needed improvement. The researchers then produced revised pavement performance prediction models for PMIS using historical data from the system.

Research Performed by:

Texas Transportation Institute (TTI), The Texas A&M University System

University of Texas at El Paso (UTEP)

Univeristy of Texas at San Antonio (UTSA)

Research Supervisor:
Andrew Wimsatt, TTI

Researchers:
Tom Freeman, TTI
Nasir Gharaibeh, TTI
Carlos Chang Albitres, UTEP
Soheil Nazarian, UTEP
Tom Pappagianakis, UTSA
Angela J. Weissmann, UTSA
Jose Weissmann, UTSA

Project Completed: 8-31-11

The researchers also improved the score calculation and Needs Estimate processes based on the further PMIS data analysis, comparing the analysis results to district projects; and comparing PMIS scores to ratings from district personnel on selected sections in five districts.

What They Found

In preparing the synthesis, the researchers found that the distresses considered and the way they are summarized into indices varies between states. Because the scores are computed differently and the sampling methods vary from state to state, the definition of "good or better condition" varies significantly; therefore, direct comparisons between scores or percent lane miles in good or better condition between states are not valid.

The researchers found that the equations in PMIS for calculating Destress Score, Ride Score, and Condition Score were acceptable, but changes were needed based on analysis of the PMIS data and feedback from TxDOT personnel.

The existing PMIS performance models were predicting distress to occur far more rapidly than was observed in the actual PMIS data. Researchers improved the models to show a slower rate of distress development (Figure 1). The researchers also met with TxDOT district pavement practitioners and simplified the PMIS Needs Estimate procedure to reflect district practices.
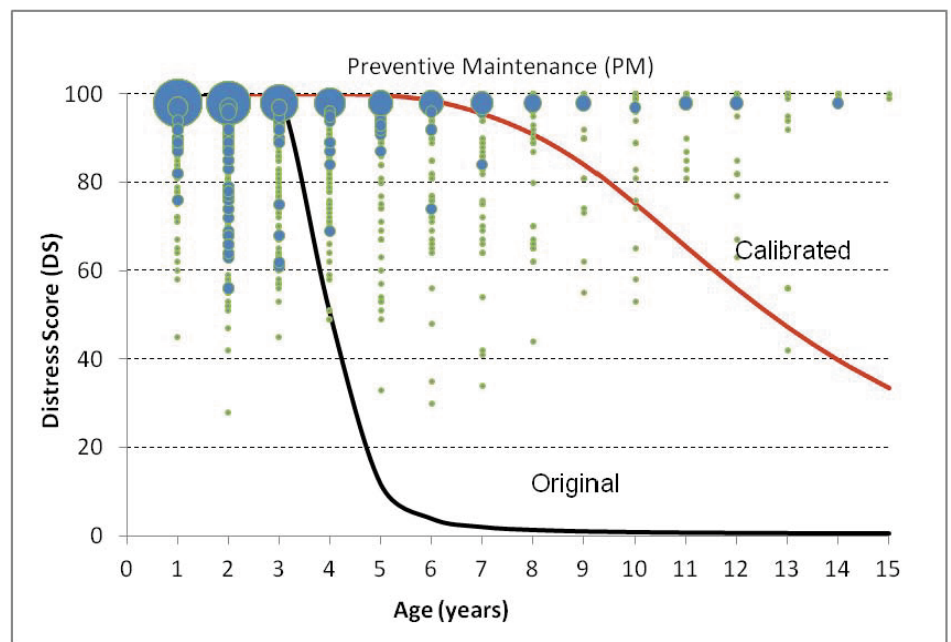

Figure 1. Sample Curve Showing Improvement in Pavement Performance Prediction.

What This Means

As a result of this study, the researchers developed recommended improvements to the PMIS score calculation process, performance prediction measurements, and Needs Estimates improvements that developed more reasonable results and were more comparable to the department's experience in this area. In addition, the researchers recommended improvements to the distress definitions and to the utility factors and estimated impacts of these changes on the pavement Condition Score goal set by the commission.