Kansas Department of Transportation

TECHNICAL SUMMARY

Calibrating the Mechanistic-Empirical Pavement Design Guide for Kansas

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Xiaohui Sun
Jie Han, Ph.D., P.E.
Robert L. Parsons, Ph.D., P.E.
Anil Misra, Ph.D., P.E.
Jitendra K. Thakur

The University of Kansas

Introduction

The Kansas Department of Transportation (KDOT) is moving toward the implementation of the new American Association of State Highway and Transportation Officials (AASHTO) *Mechanistic-Empirical Pavement Design Guide* (MEPDG) for pavement design. The MEPDG provides a rational pavement design framework based on mechanistic-empirical principles to characterize the effects of climate, traffic, and material properties on the pavement performance, as compared with the 1993 *AASHTO Guide for Design of Pavement Structures*. Before moving to the MEPDG, the nationally calibrated MEPDG distress prediction models need to be further validated and calibrated to the local condition.

Project Description

The objective of this research was to improve the accuracy of the MEPDG to predict the pavement performance in Kansas. This objective was achieved by evaluating the MEPDG-predicted performance of Kansas projects, as compared with the pavement performance data from the pavement management system (PMS), and calibrating the MEPDG models based on the pavement performance data. In this study, 28 flexible pavement projects and 32 rigid pavement projects with different material properties, traffic volumes, and climate conditions were strategically selected throughout Kansas. The AASHTO ME Design software (Version 1.3) was used in this study.

Project Description (Continued)

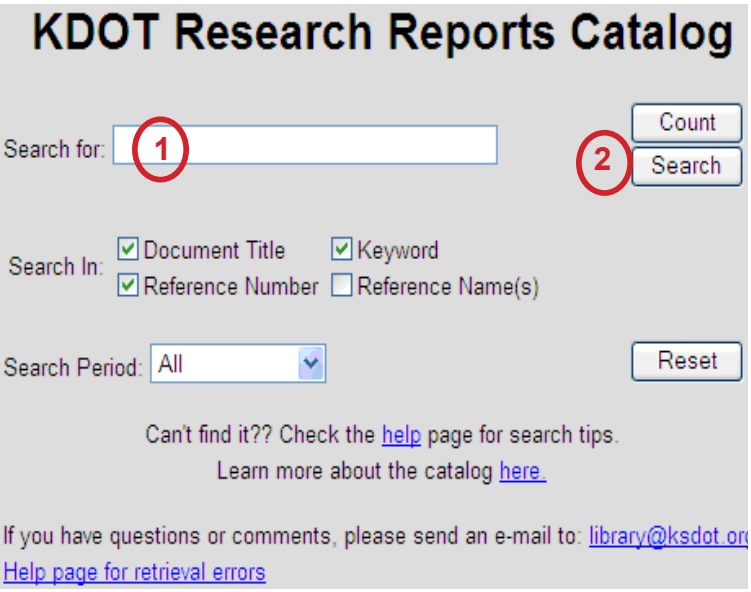
The comparisons between the MEPDG-predicted pavement performance using the nationally calibrated models and the measured pavement performance indicated the need for the calibration of the MEPDG models to the Kansas conditions. For new flexible pavements, the MEPDG using the nationally calibrated models overestimated the rutting due to the overprediction of the deformation of the subgrade layer. Biases also existed between the predicted top-down cracking, thermal cracking, and International Roughness Index (IRI) and the measured data. The relationship between the measured and the predicted IRIs was more obvious than that for the cracking. Using the coefficients determined through local calibration in this study, the biases and the standard errors were minimized for all the models based on the statistical analysis.

Project Results

For new rigid pavements, very low mean joint faulting was measured in actual projects as compared with the default threshold of the MEPDG. The type of base course had a minor effect on the pavement performance. The traditional splitting data method was adopted in the process of local calibration. After the local calibration, the biases between the predicted pavement performance (mean joint faulting and IRI) and the measured pavement performance were minimized, and the standard errors were reduced.

Project Information

For information on this report, please contact Jie Han, Ph.D., P.E.; University of Kansas, 1530 W. 15th St, Lawrence, KS 66045; (785) 864-3714 phone; jiehan@ku.edu.



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