Kansas Department of Transportation

TECHNICAL SUMMARY

Development of a Simplified Flexible Pavement Design Protocol for New York State Department of Transportation Based on the AASHTO Mechanistic-Empirical Pavement Design Guide

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Introduction

The New York State Department of Transportation (NYSDOT) has used the AASHTO 1993 Design Guide for the design of new flexible pavement structures for more than two decades. The AASHTO 1993 Guide is based on the empirical design equations developed from the data collected in the AASHO Road Test in the early 1960s. A newer pavement design method, called the Mechanistic-Empirical Pavement Design Guide (MEPDG), was developed by the National Cooperative Highway Research Program (NCHRP) to provide a more efficient and accurate design method that is based on sound engineering principles. The MEPDG models have been incorporated in the AASHTOWare Pavement ME Design 2.1 software program. Due to the advanced principles and design capabilities of the AASHTOWare program, NYSDOT decided to implement the MEPDG and calibrate the distress models included in the software for the conditions in the state.

Project Description

This report summarizes the local calibration of the distress models for the Northeast (NE) region of the United States and the development of new design tables for new flexible pavement structures. Design, performance, and traffic data collected on the Long-Term Pavement Performance (LTPP) sites in the NE region of the United States were used to calibrate the distress models. First, the AASHTOWare Pavement ME Design 2.1 with global calibration factors was used to compare the predicted and measured distress values. The local bias was assessed for all distress models except for the longitudinal cracking model; it was found the bias existed for this model even after calibration. The thermal cracking model was not calibrated because of inaccurate measured data. The calibration improved the prediction capability of the rutting, fatigue cracking, and smoothness prediction models.

Project Description (Continued)

The calibrated AASHTOWare software was used to run design cases for combinations of traffic volume and subgrade soil stiffness (resilient modulus, Mr) for 24 locations in the state of New York. The runs were performed for a road classified as Principal Arterial Interstate, 90% design reliability level, and 15- and 20-year design periods. State-wide average traffic volume parameters and axle load spectra were used to define the traffic. The configuration specified in the current design table used by NYSDOT, which is included in the Comprehensive Pavement Design Manual (CPDM), was followed for the pavement design solutions. The thicknesses for the select granular subgrade materials and the asphalt layer thicknesses were varied to include several values higher and lower than the thickness recommended by the CPDM. The thicknesses of asphalt surface and binder layers were kept constant; only the thickness of the asphalt base layer was changed. For each design combination, the design case with the thinnest asphalt layer for which the predicted distress was less than the performance criteria was selected as the design solution. The design solutions for each of the 24 locations were assembled in design tables.

Project Results

The comparison of the design tables showed that some variation in the design thickness for the asphalt layers exists with thicker asphalt layers being needed for the locations in the upper part of the New York State. The comparison between the new design tables and the table included in the CPDM proved that the new design tables require thinner asphalt layers at low Annual Average Daily Truck Traffic (AADTT) and thicker asphalt layers at high AADTT than the corresponding designs in the CPDM table.

Project Information

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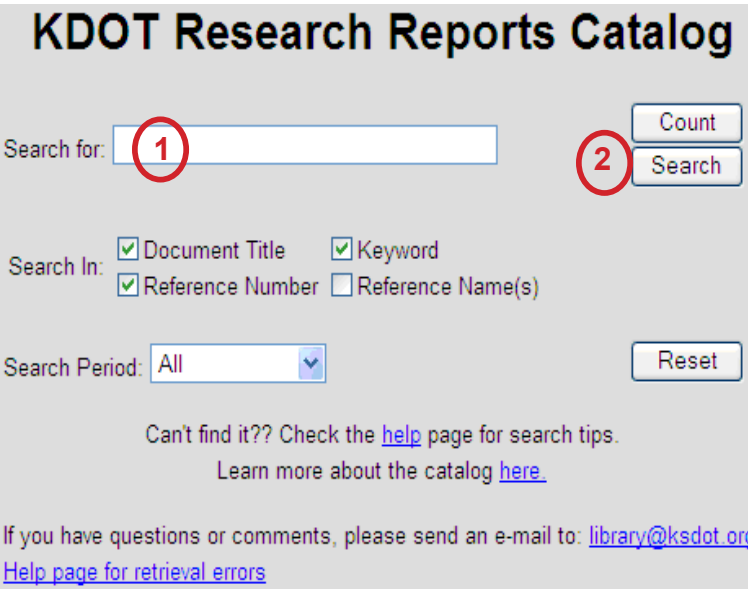

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