DRISI

CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

Research Results

Updated Caltrans Rigid Pavement Design Catalog Using Pavement ME

Calibrate Pavement Mechanistic-Empirical (ME) models and develop concrete design tool

Pavement

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Project Title:
Updated Caltrans Rigid Pavement Design Catalog Using Pavement ME

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Task Manager:
Weili Zhao
Transportation Engineer
weili.zhao@dot.ca.gov

WHAT WAS THE NEED?

Jointed Plain Concrete Pavement (JPCP) design method and delivery approach used by Caltrans was updated more than 10 years ago. It was based on a very early version of Mechanistic Empirical Pavement Design Guide (MEPDG) with the sparse available data at that time.

An updated version of Pavement ME (MEPDG software) has been thoroughly reviewed. New and better as-built and performance data are available to calibrate an updated version of Pavement ME. Updated climate and traffic databases are also obtained to calibrate Pavement ME. Caltrans needs to produce an updated design catalog and software tool for pavement designers to use.

WHAT WAS OUR GOAL?

The goal of this project was to support Caltrans in the implementation of JPCP mechanistic-empirical design based on Pavement ME. Based on a sensitivity analysis of current version of Pavement ME, this design software will be calibrated for traffic, materials, and construction practices in California. The calibrated Pavement ME software will be available to Caltrans.

WHAT DID WE DO?

Caltrans, in partnership with the University of California Pavement Research Center (UCPRC) developed and improved Pavement ME input databases and calibration database. Initial data was used to check the sensitivity of the input variables in the current version of Pavement ME. Sensitive variables were identified, a

set of calibration data that was representative of input information for California conditions was developed.

The local calibration information and the results of sensitivity analysis was used to perform local calibration of Pavement ME. A design catalog using locally calibrated Pavement ME was created. UCPRC will assist Caltrans with development of design guidance.

WHAT WAS THE OUTCOME?

Overall, the JPCP tables of the new HDM Design Catalog result in thinner slabs compared to the current catalog, about 1 to 3 in. thinner depending mainly on the climate region. While the JPCP design tables were prepared by considering the transverse cracking failure, the faulting and IRI were also determined, using Pavement ME (version 2.5.5) nationally calibrated models. For almost all sections, the faulting and IRI predicted at the end of 40-year design life at 95% reliability were below Caltrans's faulting and IRI failure limits of 0.15 in. and 170 in./mi., respectively. Nonetheless, these limits were exceeded in some scenarios with very high AADTT of 12,000 trucks/lane or higher. These specific scenarios may require grinding to correct faulting and/or IRI before the end of the 40-year JPCP design life.

WHAT IS THE BENEFIT?

The updated mechanistic-empirical design will provide a catalog for Caltrans pavement designers to use. This catalog will improve pavement design in California and lead to longer lasting JCPC pavements. The research will also be used in developing design guidance and updating the Highway Design Manual.

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