DRISI

Caltrans Division of Research,
Innovation and System Information

Research Results

Implement Concrete Mechanistic-Empirical Design Tool

Calibrate pavement mechanistic-empirical (ME) models and develop concrete design tool.

Pavement

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Project Title:
Implement Concrete Mechanistic-Empirical Design Tool

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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 data that was available at that time.

An updated version of Pavement ME (MEPDG software) had been thoroughly reviewed. New and better as-built and performance data were available to calibrate an updated version of Pavement ME. Updated climate and traffic databases were also obtained to calibrate Pavement ME. Caltrans needed to produce an updated catalog or software tool for 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 was calibrated for traffic, materials, and construction practices in California. The rigid pavement design catalog in the Caltrans Highway Design Manual is to be updated based on the calibrated software.

WHAT DID WE DO?

Caltrans, in partnership with the University of California Pavement Research Center (UCPRC) developed Pavement ME input databases and calibration database. Initial data were used to check the sensitivity of the current version of Pavement ME. Sensitive variables were identified, and a set of calibration data were developed that was representative of input information for California conditions. The local calibration information and the results of sensitivity analysis were used to perform local calibration of Pavement ME. A draft design catalog using locally calibrated Pavement ME was created.

WHAT WAS THE OUTCOME?

These results demonstrated the sensitivity of the Pavement ME design software for jointed plain concrete pavements (JPCP) to a set of selected design variable inputs. The sensitivity analysis showed that the overall JPCP performance predictions by Pavement ME are reasonable. The Pavement ME–predicted distresses followed trends expected for the variables considered in the analysis. Further, over the course of the study, the Pavement ME software ran without the occurrence of any major issues.

WHAT IS THE BENEFIT?

Proposed mechanistic-empirical design will provide a tool for Caltrans pavement designers to use. This tool can improve pavement design procedure in California. The research will also be used in developing design guidance and updating Highway Design Manual.

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