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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Modify CRCP Mechanistic-Empirical Models used in PavementME and Update Rigid Pavement Design Catalog for CRCP

Modify Continuous Reinforced Concrete Pavement (CRCP) Mechanistic-Empirical Models in PavementME and update Rigid Pavement Design Catalog for CRCP.

Pavement

NOVEMBER 2024

Project Title:

Partnered Pavement Research Center (PPRC) 23: Mechanistic-Empirical Design

Task Number: 4225

Start Date: January 10, 2024

Completion Date: September 30, 2026

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WHAT IS THE NEED?

The current concrete pavement design catalog was developed in 2005 using Empirical Pavement Design Guide (MEPDG) version 0.8 software. This version of MEPDG was found to have bugs/errors. In the updated commercial version, these issues have been resolved and an extensive model refinement was also implemented. The current California Department of Transportation (Caltrans) rigid pavement design catalog for Jointed Plain Concrete Pavement (JPCP) has been updated in 2019 – 2020. This update is made after calibrating the software using the latest automated pavement condition survey (APCS) data.

The CRCP design catalog needs to be updated and the design catalog for JPCP needs to be reviewed to reflect these changes. In addition, Caltrans aims to facilitate the statewide implementation of the Rigid Pavement Design Catalog to enhance the pavement design in addition to improved economic, user, and environmental advantages.

WHAT ARE WE DOING?

Recent research has revealed discrepancies in PavementME CRCP design procedure, resulting in unrealistic rapid deterioration of load transfer efficiency (LTE) over cracks and overestimation of slab thickness. Field data will be collected from California CRCP sections to determine the prevalent crack spacing and crack widths in California. Falling Weight Deflectometer (FWD) testing will also be performed to determine LTE for various crack widths. PavementME models will then be updated based on the compiled field data

Caltrans

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for California conditions to provide realistic and field representative LTE and crack spacing. Rigid pavement design catalog that will be supported and maintained by UCPRC will be included.

This study is divided into 4 tasks:

- Task 1: Literature Review
- Task 2: CRCP performance experimental data collection
- Task 3: CRCP performance model development
- Task 4: CRCP performance model implementation in AASHTOWare PavementME
- Task 4: Caltrans Rigid Pavement Design Catalog update

WHAT IS OUR GOAL?

The main goal of this task is to modify the CRCP Mechanistic-Empirical Models in AASHTOWare PavementME and update the Rigid Pavement Design Catalog for CRCP.

WHAT IS THE BENEFIT?

The outcome of this research will provide a reliable design tool for design of highway concrete pavements for various regions and traffic levels. This research will also help update current design guidance, technical standards, plans, and specifications.

WHAT IS THE PROGRESS TO DATE?

The research team analyzed the continuously reinforced concrete pavement (CRCP) on the California state highway network.

Twenty-nine percent of the work has been accomplished.

Next quarter's deliverables include conducting a literature review and reaching out to ARA Company to obtain the Pavement Mechanistic-Empirical (PaveME) calibration dataset.