

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes



NOVEMBER 2024

Project Title:

Partnered Pavement Research Center (PPRC) 20: Mechanistic-**Empirical Design**

Task Number: 3810

Start Date: June 30, 2020

Completion Date: September 30, 2023

Task Manager:

Junxia Wu **Transportation Engineer** <u>Junxia.Wu@dot.ca.gov</u>



DRISI provides solutions and knowledge that improves California's transportation system.

Further Improvement of CaIME and Integration with Performance-**Related Specifications (PRS) into Routine Practice**

Continue Improving the M-E Design System for California Pavement Design and Integration of Performance-Based Specification into Routine Practice.

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) has adopted the mechanistic-empirical (M-E) method for pavement design to provide an efficient transportation system to enhance California's economy and livability. Caltrans is looking to expand the use of M-E methods for flexible pavement design and rehabilitation so that local conditions such as material, climate and traffic can be effectively accounted for. M-E methods involve using computer models to describe various physical processes that change pavement conditions and to simulate pavement deterioration over time. Researchers have continuously improved M-E design method and implemented the findings to better understand various physical processes affecting pavement deterioration.

WHAT ARE WE DOING?

This task continues improving, refining, and updating various models for ME design of asphalt surfaced pavements. The changes include updating the user interface based on feedback from Caltrans engineers and improving models to consider the effects of traffic wander on permanent deformation and moisture effects on the mechanical properties of unbound and partially bound layers. Data from recently completed projects are used to develop, refine, and recalibrate damage models.

This study includes the following sub-tasks:

- To develop/implement new CalME features.
- To improve CalME models.

ADA Notice: Users with accessibility issues may contact the California Department of Transportation, Division of Research, Innovation and System Information. For TTY assistance, call the California Relay Service at 711, email: pm2.communications@dot.ca.gov or write Caltrans, DRISI - MS-83, P.O. Box 942873 Sacramento, CA 94273-0001



Further Improvement of CaIME and Integration with Performance-Related Specifications (PRS) into Routine Practice





- To calibrate CaIME damage models with recently collected data.
- To update performance tests for design and construction.
- To integrate CaIME and the DIME database.
- To prepare project documentation.

WHAT IS OUR GOAL?

The goal of this research is to gain more knowledge on pavement behaviors and use the knowledge to improve M-E design methods for California pavements, minimizing the need to use empirical factors to cover critical physical processes.

WHAT IS THE BENEFIT?

Compared to empirical methods, M-E method is better at accommodating new materials and construction processes. M-E methods account for local conditions such as climate, traffic, and material and can therefore optimize pavement designs for the specific conditions rather than having to cover the worst-case scenario. The transition to M-E design helps Caltrans design more cost-effective pavements and improve pavement performance, thereby reaching the goal of efficiency and sustainability.

WHAT IS THE PROGRESS TO DATE?

The research is complete. The research team is in the process of delivering the final report.

The contents of this document reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the California Department of Transportation, the State of California, or the Federal Highway Administration. This document does not constitute a standard, specification, or regulation. No part of this publication should be construed as an endorsement for a commercial product, manufacturer, contractor, or consultant. Any trade names or photos of commercial products appearing in this document are for clarity only.