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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

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

Advancing California's Mechanistic-Empirical (CalME) Pavement Design System and Mainstreaming Performance-Based Specifications.

Pavement

November 2025

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

Task Number: 3810

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) has adopted the Mechanistic-Empirical (M-E) method for pavement design to create an efficient transportation network that bolsters California's economy and livability. Caltrans seeks to expand M-E method implementation to optimize flexible pavement design and rehabilitation under varied local conditions such as materials, climate, and traffic. The M-E method uses computer models to simulate pavement deterioration by capturing the physical processes that affect pavement performance. Ongoing research continues to refine the M-E method for greater accuracy and real-world applicability.

WHAT ARE WE DOING?

This task continues to improve, refine, and update various models for the M-E method as applied to asphalt-surfaced pavements. Key activities include updating the user interface based on Caltrans engineer feedback and enhancing models to capture traffic-wander effects on permanent deformation and moisture effects on unbound and partially bound layers. Data from recent projects are used to develop, refine, and recalibrate these damage models.

This study includes the following sub-tasks:

- Developing and implementing new CalME features
- Improving CalME models
- Calibrating damage models with recently collected data
- Updating performance-test protocols for design and

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construction

- Integrating CalME with the Data Interchange for Materials Engineering (DIME) database
- Preparing project documentation

WHAT IS OUR GOAL?

The goal of this research is to deepen knowledge of pavement behavior and use that insight to further improve the M-E method for California pavements, reducing reliance on empirical factors.

WHAT IS THE BENEFIT?

Compared to empirical methods, the M-E method better accommodates new materials and construction processes. By accounting for local conditions, such as climate, traffic, and material properties, the M-E method optimizes pavement performance rather than defaulting to worst-case assumptions. This leads to more cost-effective, longer-lasting pavements and advances Caltrans' objectives of efficiency and sustainability.

WHAT IS THE PROGRESS TO DATE?

Research activities are complete, and the research team is preparing the final report.