

## Pavement

**MAY 2026**

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

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## Implementation of New Models in CalME

Improving, refining, and updating CalME for mechanistic-empirical design of flexible pavements.

### WHAT IS THE NEED?

The California Department of Transportation (Caltrans) has transitioned from an empirical pavement design method to a mechanistic-empirical (M-E) approach, which more effectively accounts for local materials, climate, and traffic conditions. Ongoing research continues to improve M-E methodologies by refining models to better represent the physical processes influencing pavement performance. Additionally, there is a growing need to replace retired desktop design programs and provide local governments with updated, consistent tools and a flexible pavement design catalog that aligns with Caltrans' adopted M-E framework.

### WHAT ARE WE DOING?

This task order focuses on enhancing the models within the California Mechanistic-Empirical Design (CalME) software to improve prediction accuracy and reduce uncertainties in design outcomes. It involves updating existing models, adding new ones to address additional performance factors, updating climate and traffic databases as needed, and periodically recalibrating the empirical components of the M-E methodology based on the latest performance data. Subtasks include:

- Improving CalME's user interface and functionality
- Updating models and databases within CalME
- Updating the calibration of CalME performance models
- Developing a flexible pavement design catalog for local governments

### WHAT IS OUR GOAL?

The primary goal is to advance the CalME program by enhancing its functionality, refining the accuracy of its models,



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and expanding its design capabilities. The task also aims to support local governments by providing a new, web-based design catalog and user-friendly tools consistent with CalME, ensuring a seamless transition from retired software.

## WHAT IS THE BENEFIT?

Enhancing the CalME program will improve the efficiency and accuracy of pavement design workflows at Caltrans. Refined models will more accurately reflect actual pavement performance under local conditions, reducing uncertainty in predicted outcomes. This enables designers to optimize pavement structures without relying on overly conservative assumptions, resulting in more cost-effective, reliable designs.

Local governments will also benefit from new, consistent design tools aligned with Caltrans' Mechanistic-Empirical methodology, ensuring smoother project delivery and greater statewide consistency in pavement design practices.

## WHAT IS THE PROGRESS TO DATE?

- Continued development of components that can be used in CalME and other applications.
- Released both RealCost-CA for Lifecycle cost analysis and Statistical Pay Factor app for construction quality control using statistical pay factors to Caltrans.
- Continued brainstorming the user interface design for the CalME.
- Continued development of an aging model that accounts for aging effect on stiffness, fatigue, and age-related cracking.
- Completed review of the effect on design for changing from the current surface temperature database to the new one from the recent performance grade map study into CalME.
- Investigated WIM data from 2005 and 2024 to identify discrepancies in lane configuration across individual Weigh-in-Motion (WIM) sites.

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