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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Implementation of New Models in CalME

Improving, refining, and updating CalME for Mechanistic-Empirical (ME) design of flexible pavements.

Pavement

NOVEMBER 2024

Project Title:
Implementation of New Models in CalME

Task Number: 4201

Start Date: November 7, 2023

Completion Date: September 30, 2026

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) has transitioned from using empirical method to ME method for pavement design so that local conditions such as material, climate and traffic can be effectively accounted for. Researchers have been continuously improving ME design method to better understand various physical processes affecting pavement deterioration and implementing the findings. Additionally, there is a need to develop new, consistent tools and a flexible design catalog for local governments, replacing retired desktop programs, and aligning with the ME method adopted by Caltrans.

WHAT ARE WE DOING?

This task order involves improving the models within CalME to explain larger portions of observed performance, thus reducing uncertainties in predicted outcomes. It includes updating existing models for better accuracy, adding new models to account for more processes that affect pavement performance, updating climate and traffic databases where necessary, and periodically re-calibrating the empirical part of the ME design to reflect updated performance data.

This task includes the following subtasks:

- Improving CalME user interface and functionality
- Updating models and databases in CalME
- Updating calibration of CalME performance models
- Developing flexible pavement design catalog for local government

WHAT IS OUR GOAL?

The primary goal of this task is to advance the CalME

Caltrans

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program by improving design workflow efficiency, incorporating advanced features, and expanding design functionalities. Additionally, the task order aims to fulfill the needs of local governments by developing a new set of simple tools consistent with CalME, ensuring a smooth transition from retired desktop programs.

WHAT IS THE BENEFIT?

By advancing the CalME program, Caltrans will significantly improve the efficiency of pavement design workflows through the incorporation of advanced features and expanded functionalities.

The refinement of models within CalME will not only enhance design accuracy but also make pavement designs more cost-effective. 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. It reduces the uncertainties in predicted performance by allowing the use of smaller safety factors for the same design reliability.

In addition, local governments will benefit from the development of a new set of tools consistent with CalME, ensuring a smooth transition and alignment with state-of-the-art design methodologies.

WHAT IS THE PROGRESS TO DATE?

The research team has made the following progress to date:

- Initiated development of components that can be used for CalME and other applications.
- Completed the review of aging data for laboratory prepared mix and extracted binder.
- Finalized factorial runs for new construction designs.