DRISI
Caltrans Division of Research,
Innovation and System Information

Research Results

Pavement

Cold In-Place Guidance

Workplan for developing guidelines for project selection and mechanistic-empirical design of cold in-place recycled pavements in California

MAY 2021

Project Title:
Recycling

Task Number: 3196

Start Date: July 1, 2017

Completion Date: September 30, 2020

Task Manager:
Yue Wang
Transportation Engineer
yue.wang@dot.ca.gov

WHAT WAS THE NEED?

The California Department of Transportation (Caltrans) employs a variety of strategies and materials in maintaining and rehabilitating the state highway system's pavements, a necessary approach given the varying characteristics of the pavements in use and their diverse properties.

Partial depth reclamation (PDR) using cold in-place recycling (CIR) is a pavement rehabilitation alternative that has been used by Caltrans since 2005. Current practice is primarily based on contractor experience, which is not supported by any long-term performance monitoring, or comprehensive comparative laboratory testing. Caltrans is interested in developing a comprehensive guideline for the rehabilitation design of pavement using CIR techniques.

WHAT WAS OUR GOAL?

The goal of this project is to develop a comprehensive guideline for the rehabilitation design of pavement using all partial-depth reclamation techniques

WHAT DID WE DO?

Caltrans, in partnership with the University of California Pavement Research Center (UCPRC), monitored and tested a selection of PDR projects.

For new PDR projects, field construction was monitored to assess construction factors that may influence later pavement performance. The test sections were designed and constructed at the UCPRC research facility to efficiently collect performance data on PDR layers stabilized with foamed asphalt and asphalt emulsion. Laboratory testing was also undertaken to characterize materials. Cores and beams were sampled from the UCPRC test track and PDR pilot studies and evaluated in the laboratory to develop performance predictions.

In addition, the research team updated the life cycle assessment (LCA) and life cycle cost analysis (LCCA) parameters for PDR projects. The data collected were analyzed with a range of approaches and a series of simulations to develop mechanistic-empirical (ME) design parameters for PDR projects. The data and findings were used to revise project selection and ME design guidelines as well.

WHAT WAS THE OUTCOME?

The study continued identifying CIR projects for long-term field performance monitoring and laboratory testing. Performance of selected CIR with foamed asphalt projects was monitored. The final delivery of the task is a new Guide for Partial- and Full-Depth Pavement Recycling in California.

The main changes and updates to the 2017 version of the guide (UCPRC-GL-2017-04) include the guide to include cold central plant recycling (CCPR), inclusion of mechanistic-empirical design procedures (CalME) in the design chapter, and inclusion of a provisional laboratory procedure for mix designs for full-depth recycling with cement (FDR-C).

WHAT IS THE BENEFIT?

The guideline for IPR, including both PDR and FDR, can guide practitioners on project investigation, recycling strategy selection, pavement structural design, environmental life cycle and life cycle cost assessment, mix design, and construction of in-place pavement recycling projects on flexible pavements in California. It provides information specific to California conditions to supplement the California Highway Design Manual (HDM), specification documents, and other available design guides.

The guideline can be employed to create additional pavement rehabilitation strategy in Caltrans' toolbox and be used to update standard, plans, and specifications. Moreover, the guidance can be used for project selection in pavement management system.

LEARN MORE

When the reports are published, it can be found at the following link:

https://dot.ca.gov/-/media/dot-media/programs/maintenance/documents/office-of-asphalt-pavements/469fdrpdr-guidestg6ada.pdf