



Caltrans Division of Research,  
Innovation and System Information

# Research

# Notes

Pavement

SEPTEMBER 2019

Project Title:  
Early-age Cracking Performance

Task Number: 3206

Start Date: July 1, 2017

Completion Date: July 31, 2020

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

## Early-age Cracking Performance

Develop recommendations to reduce the risks of early-age and premature cracking in concrete pavement.

### WHAT IS THE NEED?

The objective of this research is to develop recommendations to reduce the risks of early-age and premature cracking in concrete pavement projects. The long-term performance of Portland cement concrete (PCC) pavement can be greatly compromised by early-age cracking. However, the causes of early-age cracking can be numerous, it is not easy to identify and evaluate a potential project with early-age cracking.

To prevent or minimize early-age cracking, it is necessary to identify and control design and construction variables that would influence early-age cracking performance.

California Department of Transportation (Caltrans) has made several changes in construction and material specifications in the past decade which might have affected early-age cracking performance of PCC pavements placed since then. This research will first evaluate the extent of early-age cracking in PCC pavements placed in the past years, and then develop appropriate design parameters and/or construction procedures to limit or prevent early-age cracking in PCC pavements.

### WHAT ARE WE DOING?

The research team will conduct the following tasks:

1. Review literature related to the topic.
2. Review Caltrans' specifications and practices for potential improvement need related to early age cracking.
3. Develop computational models to simulate the mechanisms of early-age and premature cracking; and identify critical factors affecting early-age and premature cracking.



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

4. Monitor on-going construction projects to evaluate gaps in the current construction specifications; and whether better enforcement of the current specifications is necessary.
5. Analyze statistical Caltrans Projects Experimental Data.

The delivery of the project will be a final research report including literature review, data collection and analysis, conclusions, and recommendations to reduce the risk of early-age and premature cracking; and proposed changes to Caltrans' specifications and guidelines.

### WHAT IS OUR GOAL?

The goal of the project is to evaluate and identify potential causes of the early-age cracking, assess risks of early-age cracking in concrete pavement construction, and provide recommendations to reduce them.

### WHAT IS THE BENEFIT?

Early-age cracking identification and evaluation will help Caltrans improve its current design and construction practices related to long term pavement performance. Caltrans may be able to take a pro-active approach and reduce the risk of premature cracking in concrete pavement construction. This will ultimately lead to improved pavement performance and maintenance, and rehabilitation cost savings.

### WHAT IS THE PROGRESS TO DATE?

The research team categorized and summarized the critical factors that determine early-age cracking of concrete, quantified factors in a number of projects (slab and lane replacements); and identified link factors to performance (statistical link).