

## Research Notes

Program Steering Committee (PSC): Pavement

JUNE 2014

Title: PPRC 11 SPE 4.30 - Coefficient of Thermal Expansion in PCC Pavement Design and Specification

Task Number: 2310

Start Date: November 1, 2011

Completion Date: September 30, 2014

Task Manager:

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### TITLE:

Coefficient of Thermal Expansion in PCC Pavement Design and Specification

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### WHAT IS THE NEED?

Coefficient of thermal expansion (CTE) of Portland cement concrete (PCC) is known to have a significant effect on the cracking performance of rigid pavements in early ages, particularly in the California desert and central valley climates. Yet, the current specifications do not require any control of CTE values in PCC pavement design. So it is necessary to investigate whether CTE should be limited by the specifications. This task will assess the significance of CTE on early and longer-term cracking performance to determine how CTE should be considered in design and materials specifications for use in PCC pavements in California.

### WHAT ARE WE DOING?

The task include following sub-tasks.

1. Develop a detailed work plan to guide the research study.
2. Estimate the risk of not including CTE in design and specifications.
3. Develop design and specification approach for considering CTE in rigid pavements, if needed.
4. Evaluate the variability of CTE test results between commercial CTE labs in the state.
5. Conduct CTE tests using concrete cores obtained throughout the state from the previous GPR (ground penetrating radar) study.
6. Evaluate the correlation between CTE value for the GPR cores and the performance of concrete pavements from which the cores were taken.
7. Evaluate whether CTE is as critical as MEPDG indicates based on results from the sub-task 6.
8. Develop a lab study to determine major controllable factors influencing on CTE (e.g. curing, cast vs core, time of testing, etc.) for Caltrans approval.
9. Develop strategies for cases when CTE test did not pass QA during construction.

Updated: June 2014

**WHAT IS OUR GOAL?**

Assess the significance of CTE on early and longer-term cracking performance to determine how CTE should be considered in design and materials specifications for use in PCC pavements in California.

**WHAT IS THE BENEFIT?**

Appropriate considerations of CTE in PCC pavement design process will help Caltrans achieve better QC/QA practices for reducing risks of early-age cracking in PCC pavement construction and ultimately improving early and long-term performance of PCC pavements.

**WHAT IS THE PROGRESS TO DATE?**

The task has been delayed because of repeated requests from Caltrans Pavement Program for revisions of detailed work plan. The work plan has been finalized, and the task is in progress on a revised schedule. This task will be continued in the next PPRC contract.