

Pavement

JULY 2020

Project Title:  
PPRC 20: Performance Related  
Specifications

Task Number: 3187

Start Date: July 1, 2017

Completion Date: June 30, 2020

Task Manager:  
Junxia Wu  
Transportation Engineer  
junxia.wu@dot.ca.gov

## Performance Related Testing in Superpave

Performance-related testing to complement current superpave mix design methodology adopted by Caltrans

### WHAT IS THE NEED?

Superpave methodology for mix design was incorporated into Section 39 'Hot Mix Asphalt' (HMA) in the 2015 California Department of Transportation (Caltrans) Standard Specifications. Across the country for more than 30 years, the need has been identified for performance-related tests to provide a greater level of risk mitigation for rutting and cracking.

Caltrans and other states are continuously looking for suitable performance-related tests for routine mix design, quality control, and assurance testing. Tests that have been identified in previous projects for 'balanced mix design' considering both cracking and rutting need further validation and if suitable, calibration against both currently used performance-related tests and field performance. If suitable, the tests will be incorporated into standard Superpave mix design procedures and construction specifications.

### WHAT ARE WE DOING?

The repeated load triaxial test using asphalt mixture performance tester (AMPT) will be evaluated for use in HMA mix design and Quality Control/ Quality Assurance (QC/QA) testing regarding rutting resistance, while the semi-circular beam fracture test will be evaluated, similarly, regarding cracking resistance.

If these tests are proved to be suitable, the research team will evaluate the recommended specification limits, using existing performance-related tests used on larger and more expensive projects. Specifically, the goal will be accomplished through the following tasks:



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

- Implement the use of the repeated load triaxial (RLT) test for HMA mix design and QC/QA testing
- Identify appropriate cracking tests for mix design and QC/QA testing
- Evaluate and account for differences between plant and lab produced mix
- Support implementation in pilot projects
- Evaluate commercial adoption of performance-related testing
- Write report to document the study

## WHAT IS OUR GOAL?

The goal is to develop approaches for performance-related testing for rutting and cracking for routine asphalt mix design and to incorporate them into Caltrans' specifications, follow these approaches in pilot projects, and evaluate feasibility for commercial adoption.

The objective of this project is to develop performance-related testing to complement current Superpave mix design methodology adopted by Caltrans.

## WHAT IS THE BENEFIT?

Fatigue/reflective cracking performance are not assessed in the Superpave mix design process. Longer-term evaluations of roads in several states, where the Superpave mix design procedure is used have indicated that early cracking may be a problem on roads where rutting resistance was the primary focus of the mix design.

An optimal mix design will balance rutting and fatigue-cracking performance by reducing the risk of rutting to an acceptable level, while at the same time maximizing fatigue-cracking performance and achieving at least a minimum required cracking performance. The RLT test using the Asphalt Mixture Performance Tester equipment and the semi-circular beam (SCB) test have potential for suitability for routine asphalt mix design and QC/QA testing.

## WHAT IS THE PROGRESS TO DATE?

The research team has made the following progress as of July 2020:

- Completed CT scans of specimens both before and after RLT, conducted analysis of changes in microstructures for specimens subjected to RLT, and finalized recommendations regarding RLT use.
- Completed evaluation of SCB for potential QC/QA use and established finite element modeling of SCB test. Continued SCB and IDEAL-CT testing on Standard Materials Library and HVS test track materials. Collected SCB and IDEAL-CT test results on mixes that are different only in RAP content. Report is in the process of being finalized
- Started RLT and SCB round robin testing for the SAC-5 AC long life project
- Incorporated RLT and SCB in I-5 Sacramento AC Long Life project and continued round robin for RLT and SCB testing to ensure that contractors and UCPRC produce similar results for the SAC-5 project
- Continuing to develop survey questionnaire
- Continuing to document research progress