

Pavement

FEBRUARY 2022

Project Title:
Guidance, Tests and Specifications
for High RAP/RAS in HMA and RHMA
Mixes

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Guidance, Tests and Specifications for High RAP/RAS in HMA and RHMA Mixes

Development of Testing Procedures and Criteria for
Specifications for High RAP/RAS in HMA and RHMA Mixes

WHAT IS THE NEED?

This task is a continuation of a study investigating determination of binder replacement rates in high Reclaimed Asphalt Pavement (RAP)/ Reclaimed Asphalt Shingles (RAS) mixes without the need for binder extraction. The California Department of Transportation (Caltrans) has increased the allowable binder replacement from RAP to 25 percent in asphalt mixes. Potential concerns associated with the use of RAP/RAS include the influence of the aged binder from the RAP/RAS on the virgin binder aging properties, the degree of blending during mix production and thereafter, and the process of solvent extraction and recovery. These concerns are further complicated when rejuvenating agents used to soften the RAP binder and warm-mix technologies are used.

WHAT ARE WE DOING?

This task will continue testing plant-produced materials under different conditions to compare results with laboratory-produced mixes. Tests will be developed to characterize RAP and RAS material properties for use in asphalt mixes. A RAP/RAS classification system based on HMA mix properties will be prepared. Field projects will be monitored to assess long-term effects of RAP/RAS on binder aging rates. This task will also continue assessing effects of rejuvenators, asphalt modifiers, and warm mix technologies on long-term performance and the recyclability of already recycled materials. A method for rapid characterization of RAP materials for use in new HMA/ RHMA and in Cold-In-Place (CIR)/ Cold Central Plant Recycling (CCPR) projects will be developed.



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WHAT IS OUR GOAL?

The objective of this project is to prepare guidelines for binder replacement in mix design when using high RAP/RAS contents in California, to finalize simplified performance related test methods, and to develop construction Quality Control (QC)/Quality Assurance (QA).

WHAT IS THE BENEFIT?

As virgin material sources become increasingly scarce and more expensive, and the volume of pavement material that is generated during paving maintenance and rehabilitation programs increases as the backlog of pavement maintenance is addressed, it becomes more desirable to use higher quantities of RAP and/or RAS in asphalt mix designs.

To use RAP and/or RAS in asphalt mix which will reduce construction costs, reduce energy costs and greenhouse gas production leading towards more sustainable and durable pavements.

WHAT IS THE PROGRESS TO DATE?

As of February 2022, the research team has made the following progress:

- Continuing to work on literature review on aging of RAP mixes
- Continuing to batch, mix, and test remaining mixes in laboratory mix factorial
- Continuing extraction of RAP, binder blending, and rheological testing. Completed testing for RA-5 petroleum based rejuvenating agent. Completed testing of second rejuvenating agent (bio based from Ingevity) and received supply working with manufacturer. Continuing to determine rejuvenating agent content for mixes that use the new material
- Continuing stiffness and fatigue testing of fine aggregate matrix (FAM) mixes
- Continuing to work on binder aging as part of binder and mix testing

- Help contractor and district with RAP/RAS and RAS pilot project on ELD-49. Sampled and documented construction in November. Start doing required performance related mix and binder testing
- Outline report and start adding experiment design and methods information