

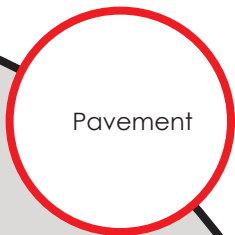


Caltrans Division of Research,
Innovation and System Information

Research



Results



Pavement

DECEMBER 2015

Project Title:

Evaluation of the Combined Effect of Recycled Asphalt Pavement (RAP), Recycled Asphalt Shingles (RAS), and Different Virgin Binder Sources

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Evaluation of the Combined Effect of Recycled Asphalt Pavement (RAP), Recycled Asphalt Shingles (RAS), and Different Virgin Binder Sources

A new method to test blended virgin and reclaimed asphalt binders

WHAT WAS THE NEED?

The California Department of Transportation (Caltrans) promotes using reclaimed materials, such as reclaimed asphalt pavements (RAP) and recycled asphalt shingles (RAS). However, the blending of the aged RAP and RAS binders with the virgin binder in the asphalt mix can affect the performance and durability of the pavement. These effects are not known and should be addressed. In addition, current practice uses aggressive chemical processes to extract and recover the binder from RAP and RAS in order to test its effects on the asphalt mix. The extraction and recovery processes can alter the properties of the aged binders in RAP and RAS materials. As a result, a new method to test the effects of RAP and RAS on new asphalt mixes should be developed.

WHAT WAS THE GOAL?

The goal was to propose a new method to test the effects of RAP and RAS on asphalt mixes without the need for chemical extraction and recovery processes. This new method would be used to evaluate effects of RAP and RAS binders on the performance and durability of new asphalt mixes.

WHAT DID WE DO?

We proposed to test the fine aggregate matrix (FAM) of mixes containing RAP as an alternative to extracting binder from the RAP and then blending it with the virgin binder. We compared the results of the FAM tests with the results of binder tests which



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used extraction and recovery processes. We also evaluated the effects of virgin binder source, virgin binder grade, RAP and RAS source, and RAP and RAS content on the asphalt mixes.

WHAT WAS THE OUTCOME?

Based on the findings from this study, FAM mix testing is considered to be a potentially appropriate procedure for evaluating the properties of blended asphalt binder in mixes containing relatively high quantities of RAP and RAS. Statistical analyses of the test results indicated that RAP and RAS content, asphalt binder grade and source, and rejuvenating agent all had an influence on FAM mix stiffness, as expected. The effect of RAP in increasing the stiffness of blended binders was dependent primarily on the asphalt binder grade and, to a lesser extent, by the source of asphalt binder. Asphalt binder extracted and recovered from RAS could not be tested due to its very high stiffness. The influence of rejuvenating agent on reducing the blended binder and FAM mix stiffnesses was evident.

WHAT IS THE BENEFIT?

The new FAM testing seems to be promising for the evaluation of asphalt mixes with higher RAP and RAS contents. When higher use of reclaimed materials is necessary, the concerns about negative effects of aged RAP and RAS binders on asphalt mixes will be addressed by FAM testing

LEARN MORE

Final Report

<https://ncst.ucdavis.edu/project/evaluation-combined-effects-recycled-asphalt-pavement-rap-recycled-asphalt-shingles-ras-and>

IMAGES

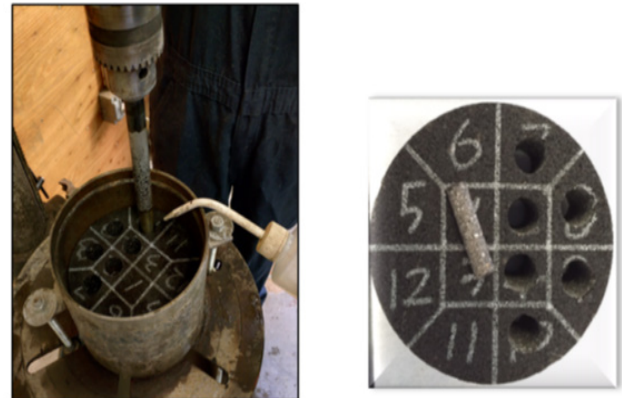


Image 1: Coring of a FAM cylinder from a Superpave gyratory compacted specimen.



Image 2: The FAM testing setup: a dynamic shear rheometer (DSR) with a torsion bar fixture.