



CALTRANS DIVISION OF RESEARCH,  
INNOVATION AND SYSTEM INFORMATION

# Research



# Notes



Pavement

MAY 2024

Project Title:  
Partnered Pavement Research  
Center (PPRC) 20: Mechanistic-  
Empirical Design

Task Number: 3977

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## New Rubberized Hot Mix Asphalt (RHMA) with Recycled Asphalt Pavement (RAP) /Recycled Asphalt Singles (RAS) for Interlayers and Base for Rigid Pavements

Laboratory testing to characterize properties of Rubberized Hot Mix Asphalt (RHMA) containing Recycled Asphalt Pavement (RAP)/Recycled Asphalt Singles (RAS) for Interlayers and base for rigid pavements.

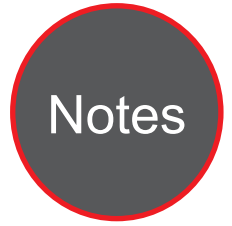
### WHAT IS THE NEED?

Caltrans has increased the allowable binder replacement of 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 binder aging properties and the degree of blending during mix production and thereafter. The binder in existing pavements is known to oxidize and age-harden over time and hence significantly alter original binder properties. Studies have also demonstrated that the aged RAP/RAS binder can blend appreciably with the virgin binder, ultimately changing the binder properties, as a result, it could affect pavement performance especially when the mix contains higher percentages of RAP/RAS.

To date, solvent extraction and recovery is the only method that physically separates the RAP/RAS binder from the aggregate for characterization. The process has long been questioned due to the force-blending of the virgin and RAP binders, the potential for altering the rheological properties of the binder, and health risks to workers and hazardous waste disposal issues. Non-representative blending and rheology results can have significant implications in terms of asphalt performance in both hot and cold weather. These concerns are further complicated when rejuvenating agents are utilized to soften the RAP binder, or when warm-mix technologies are employed.



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## WHAT ARE WE DOING?

This research investigates the use of RAP in Rubberized Hot mix Asphalt (RHMA) without reducing the amount of recycled tire rubber used by Caltrans. This phase will continue laboratory testing to establish properties of RHMA mixes containing RAP/RAS. This study includes the following sub-tasks:

- Literature review of recently completed research.
- Laboratory testing of select RHMA mixes with RAP and/or RAS.
- Field evaluation of JPCP slab-base interaction.
- Preparation of a research report.

## WHAT IS OUR GOAL?

The goal of this task is to develop guidelines for use of RAP in RHMA mixes and to prepare PRS for RHMA used for interlayers and base in rigid pavements.

## WHAT IS THE BENEFIT?

As the availability of asphalt and aggregates declines, it becomes more desirable to use higher quantities of RAP/RAS in asphalt mix designs and less expensive virgin materials. This research helps to better understand the full effects of RAP/RAS on the performance of the composite binder, enabling Caltrans to design more durable and cost-effective pavements.

## WHAT IS THE PROGRESS TO DATE?

This research is complete. The research team is in the process of delivering the final report.