**Research Notes**

Program Steering Committee (PSC): Pavement

June 2014

Title: Blending Effects of Recycled Asphalt Pavements on Virgin Binders

Task Number: 2565
Start Date: April, 1, 2013
Completion Date: September, 30, 2014

Product Category: New or improved technical standard, plan, or specification

Task Manager:
Hamid Sadraie, Research Engineer
*hamid.sadraie@dot.ca.gov*

---

**TITLE:**
Blending Effects of Recycled Asphalt Pavements on Virgin Binders

Investigation of the Effects of Recycled Asphalt Pavements and Recycled Asphalt Shingles on Performance Grade of Conventional Asphalt Binders

---

**WHAT IS THE NEED?**

The use of Recycled Asphalt Pavements (RAP) and Recycled Asphalt Shingles (RAS) as components of new asphalt mixes is expected to reduce construction costs, protect the environment, and conserve natural resources. However, the use of high percentages of RAP and RAS requires engineering adjustments to accommodate the stiffer binder, which in turn requires quantification of the effects of the RAP and RAS binder on the fresh binder used in the mixture.

Current methods for such estimates are performed on the basis of either chemical extraction or recovery of the binder or prediction from Hirsch model. The former is not desirable because of the unknown effects of the chemical solvents on the binder, and the latter requires assumptions regarding blending of RAP and RAS binders. This research discusses a modified new analysis procedure for estimating the rheological properties of composite binder by means of testing mortars using the established Superpave equipment.

**WHAT ARE WE DOING?**

We will perform a literature review on research related to the topic, with special emphasis on the work of the Federal Highway Administration (FHWA) and on recent National Cooperative Highway Research Program (NCHRP) projects. We will develop a simplified procedure to assess the contribution of RAP and RAS binder properties on the composite binder. We will also develop an experimental design plan to evaluate the effects of RAP and RAS type, source, quality, and characteristics on properties of the composite binder

containing at different percentages. We will evaluate the rheological properties of the composite binder at different percentages and accounting for short-term and long-term aging with respect to the performance in the field. We will finally perform a statistical analysis on the results.

**WHAT IS OUR GOAL?**

Our goal is to develop and validate a simple procedure to assess the contribution of RAP and/or RAS on the final composite binder properties with the use of the standard Superpave testing equipment.

**WHAT IS THE BENEFIT?**

We will investigate the effects of RAP and RAS on the performance grade of the asphalt binder. The research outcome will provide guidance on minimizing the risk of designing and producing mixes containing RAP and/or RAS with poor constructability and durability. We will have training and workshop materials for Caltrans based on the results of the project.

**WHAT IS THE PROGRESS TO DATE?**

RAP/RAS sample collection and sieving is complete. Specimen preparation including mix design with RAP only, and RAP/RAS has started.