

The recycling supplement to Superpave

As Superpave took its place in the 1990s as the leading method for asphalt mix design, transportation agencies needed to know how to incorporate reclaimed asphalt pavement (RAP) into the new design process. The NCHRP research and guidelines that followed still provide definitive answers a decade after publication.

The Superpave design methodology did not originally include provisions for RAP. What effect would the asphalt content of recycled pavement materials have on the properties of the new binder? How much RAP could be used?

A research team from the North Central Superpave Center (NCSC) at Purdue University and from the Asphalt Institute built on efforts by an FHWA expert task group and conducted NCHRP Project 09-12. The results were published in 2001 as *NCHRP Report 452: Recommended Use of Reclaimed Asphalt Pavement in the Superpave Mix Design Method: Technician's Manual*.

“When we developed our state RAP specification, we drew on this report as a key resource.”

Says report co-author Becky McDaniel of NCSC, “This research led to modifications to three widely adopted AASHTO specifications on mix design and binder extraction.” To this day, states continue to rely on the report’s methodology for blending old asphalt with new binder in their Superpave mix designs.

Guidance for experienced and new recyclers

NCHRP Report 452 proved to be a valuable tool for long-time recyclers as well as those new to the practice. Florida DOT was a user of RAP long before Superpave. State bituminous materials engineer Jim Musselman says, “Florida was committed to continuing recycling with Superpave, and we adopted a tiered approach based on the NCHRP report.”

Missouri DOT was at the other end of the spectrum when Superpave was introduced. Joe Schroer, field materials engineer, noted

that the agency went from using no RAP in 2003 to recycling nearly half a million tons of asphalt in 2009. “When we developed our state RAP specification, we drew on this report as a key resource,” says Schroer. “The report not only gave us assurances that RAP would work, but it also provided guidance on what amounts to use.”

Recycling at new levels

Chris Abadie, materials research administrator at the Louisiana Department of Transportation and Development, estimates conservatively that the agency recycles 200,000 tons of asphalt per year. “But it doesn’t need to stop there,” says Abadie. “The NCHRP research demonstrates that we can maintain quality while putting even more recycled material under our feet. Using the information provided by NCHRP, we are looking at adding 5 to 10 percent greater RAP content to our base, binder, and wearing courses.”

Louisiana DOTD sees value in ongoing related research conducted by NCHRP,



Reclaimed pavement feeder at a Missouri asphalt plant

FHWA, and individual states. “New techniques like cold in-place recycling and warm-mix additives will allow even more widespread use of RAP and higher percentages of RAP in mixes,” Abadie says.

“The NCHRP research demonstrates that we can maintain quality while putting even more recycled material under our feet.”

Breaking new ground

Ramon Bonaquist of Advanced Asphalt Technologies routinely conducts the blending analysis described in *NCHRP Report 452* for asphalt producers and paving contractors who want to use additional RAP in their mixes.

Bonaquist says, “The research has had an effect on states that don’t currently include RAP in their specifications. Our paving clients will propose mixes with RAP, and we’ll refer heavily to *NCHRP Report 452* to explain to a state why it’s a good option.” The NCHRP research continues to offer value to the states, from those still considering RAP to those who are completely sold on it.

NCHRP Report 452 may be found on TRB’s Web site at apps.trb.org/news/blurb_detail.asp?id=5477. Hard copies are available from TRB at www.trb.org/bookstore.

AASHTO Specifications Revised Based on NCHRP Report 452

- M323** Standard Specification for Superpave Volumetric Mix Design
- R35** Practice for Superpave Volumetric Design for Hot-Mix Asphalt
- T319** Standard Method of Test for Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures

NCHRP—Transportation research that works

Objective national highway research since 1962 • Focused on practical problems of state DOTs • Contract researchers competitively selected • Overseen by balanced panels of technical experts • Reviewed by TRB highway specialists

ACKNOWLEDGEMENT OF SPONSORSHIP Work was sponsored by the American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration, and was conducted in the National Cooperative Highway Research Program, which is administered by the Transportation Research Board of the National Academies.

DISCLAIMER The opinions and conclusions expressed or implied in reports are those of the research agencies. They are not necessarily those of the Transportation Research Board, the National Academies, or the program sponsors.