

Basics

What is RAP?

RAP is an acronym for reclaimed asphalt pavement. RAP can be milled from existing asphalt pavements, pavement rubble from roadway destruction or plant waste.

What does RAP processing mean?

Processing RAP often includes crushing and/or screening. Crushing is used to break apart large RAP particles. Screening prevents overly large RAP conglomerations from entering the plant-mixing process.

What is fractionation?

RAP may be screened into two or more stockpile sizes in a process called fractionation. A fractionation process that separates RAP into three sizes, the stockpiles are typically 3/4" x 3/8", 3/8" x 3/16" and minus 3/16". Two-size RAP fractionation systems typically screen the RAP into a +1/2" and a minus 1/2". The larger size fractions will have lower asphalt contents and dust contents than the finer fractions. The coarse fraction will have a lower asphalt content than the fine fraction.

Fractionation allows a mix designer to have greater control of the RAP asphalt contribution as well as control over fine and coarse aggregate contributions. More RAP fractions allow greater flexibility in using the RAP, but will also require additional RAP bins on the plant and more stockpile space. Data from NCAT shows that fractionation does not reduce the variability of RAP.

How much RAP can I use?

The amount of RAP you can use in a mixture depends on local specifications, the quality of RAP, the design of the asphalt plant and availability of RAP. Your local agency may have established maximum RAP percentages for different mix types. The quality of RAP can also limit the amount that can be used in a mixture. Excessive dust, high aggregate gradation variability, high asphalt-content variability and aggregate quality can all limit how much RAP can be used.

What is the best way to manage RAP stockpiles?

The goals of RAP management should be to ensure consistency, eliminate contamination and minimize dust content of the RAP. Stockpiles should be tested frequently to assess consistency of gradations, asphalt content and specific gravity. Keeping track of how RAP processing, handling and stockpiling practices affect the consistency of the materials is key to identifying best practices.



Did you know ...

- Asphalt pavement is the most recycled material in the U.S.
- The average RAP content used in new asphalt paving mixtures is estimated to be 12 percent.
- Our goal is to increase the average RAP content to 25 percent, which will save more than 71 million tons of aggregate and 21 million barrels of asphalt, as well as 1.5 million tons of CO₂, per year.

For more information, visit
www.MoreRAP.us

ENB1010NT1

Auburn University is an equal opportunity educational institution/employer.
This brochure was created with the support of members of the FHWA Recycled Asphalt Pavement Expert Task Group.

RAP

Reclaimed Asphalt Pavement

Frequently Asked Questions



Mix Design

Should mixtures containing RAP meet the same requirements as virgin mixes?

Asphalt mixtures containing RAP should meet the same mixture design and quality assurance requirements as mixtures containing only virgin materials. However, there are some differences between the mix design processes for a mix containing RAP and one that does not.

The asphalt and aggregate contribution from the RAP must be accounted for and can be determined using an ignition oven or solvent extractions. The RAP aggregate specific gravity can be measured from extracted aggregate or estimated from the theoretical maximum specific gravity.

A standard mix performance test employed during mix design, regardless of RAP content, is a moisture susceptibility test. When a mix includes more than 25 percent RAP binder, it is prudent to include additional testing to assess resistance to cracking.

Variability

Several studies have shown that well-managed RAP stockpiles have a more consistent gradation than virgin aggregate stockpiles. Therefore, using more RAP can reduce the variability of the mixture.

Benefits

What savings can be achieved by using RAP?

Using RAP can significantly reduce the cost of a mixture. The savings realized by using RAP will vary. The table below shows an example of estimated savings of using RAP in a mixture with a target asphalt content of 5 percent and the virgin material prices listed.

Virgin Mix Assumptions

Virgin aggregate: \$13 per ton

Virgin binder: \$435 per ton

Per ton cost of virgin mix: \$34.10

RAP Mix Assumptions

Virgin aggregate: \$13 per ton

Processed RAP: \$9 per ton

RAP has 5 percent asphalt content

Per ton cost of mix with 20 percent RAP: \$28.99

Example cost savings by using 20 percent RAP:
\$5.11 per ton

Using RAP as a base material or for shoulder build-up does not utilize its full economic value. From an accounting perspective, RAP is worth the value of the material it replaces.

What are other benefits of using RAP in asphalt mixtures?

The use of RAP conserves natural resources by reducing the amount of virgin materials required for a mixture and the energy required for extracting, processing and transporting these materials.

Performance

What kind of performance can I expect from high RAP mixtures?

Research shows that asphalt pavements made with recycled materials can perform the same as or better than those made with virgin materials.

NCAT compared Long Term Pavement Performance (LTPP) sections of pavements containing at least 30 percent RAP with virgin pavements constructed at the same time. The pavements were constructed between 1990 and 2000 in 16 states and two Canadian provinces and were regularly monitored to assess rutting, cracking, raveling, and other distresses.

To date, nearly all of the sections containing 30 percent RAP show performance equal to or better than those constructed with virgin materials. The few cases where a RAP section showed more cracking than its virgin counterpart are likely attributed to poor RAP mix design characteristics, such as excessive dust contents or low asphalt contents.

