

# STRATEGIC RECYCLING PROGRAM FACT SHEET

Original Date: FY 2008  
Updated: FY 2020



## *Project:*

Post-Consumer Shingles  
in Hot-Mix Asphalt

## *Site Location:*

PennDOT District 6-0  
Buck County, SR 4033

## *Date of Project:*

2003

## *Recycled Material:*

Post-Consumer Shingles

## *Estimated Quantities:*

Approximately 1,827  
tons 9.5 mm Superpave  
mix with 5% post-  
consumer shingles

## *Partnerships:*

The Pennsylvania  
Department of  
Environmental  
Protection provided  
funding and assistance  
for this Project.

## *Did you Know?*

Over 10 million tons of  
post-consumer waste  
shingles or “tear-off”  
shingles from replacing  
old roofs are generated  
in the U.S. every year.

This could represent  
over 2 million tons of  
liquid asphalt binder  
available for use in  
asphalt paving mixtures,  
or a replacement of  
almost 9% of the  
current national need  
for liquid asphalt binder  
in pavement  
construction.

## Introduction

Since the late 1990's PennDOT has been experimenting with the addition of shingles, both manufactured recycled asphalt shingles (RASs) and post-consumer asphalt shingles (RCASs) in hot mix asphalt (HMA) pavements. By composition, shingles typically contain asphalt cement, granulates, felt, and other miscellaneous materials. Shredded shingles have been allowed as a replacement for a percentage of virgin asphalt cement in HMA. Early studies focused on the uses of shingle tabs (RAS) because the waste material was more homogenous and less contaminated with other debris. In 1999, PennDOT issued Provisional Specifications for RAS in Bituminous Concrete Courses.

The use of RCAS was a bigger challenge, but without a doubt a much larger source. RCAS are the third-largest category of construction waste disposed in landfills.



Ground Post-Consumer Shingles

Issues and obstacles identified with the use of post-consumer shingles include potential asbestos content, higher cross-contamination with other construction debris, variability in content due to mixed sources, and mixed age and condition of the RCAS.

## Summary of Project

In 2003, PennDOT District 6-0 completed a rehabilitation Project on approximately 2.8 miles of SR 4033 in Bucks County. Approximately 1.9 miles of the roadway was paved using 9.5 mm Superpave with 5% RCAS, while approximately 0.9 miles of the roadway was paved using a control mix of 9.5 mm Superpave virgin asphalt content. The RCAS additive in the mix had to meet or exceed the PG 64-22 binder grading. The design mix allowed for a 1.3% contribution of asphalt from the shingles towards the total asphalt content.

Due to the excessive stiffness of the recovered asphalt from the RCAS, an elevated melting temperature was used to mold the pulverized shingles. As a result, the HMA containing RCAS had to be placed at a higher temperature than normal paving conditions would require. The asphalt plant increased the mixing time slightly to allow the pulverized shingles to disperse well into the batched bituminous paving mixture. Extra precaution also had to be taken to ensure the drum rollers remained wet to prevent the mix from sticking to the drum.



Placement of HMA with 5%  
Post-Consumer Shingles

The paving Project was monitored for 5 years post completion and produced various results. Specifically, the pavement showed signs of deterioration within 1.5 years of initial placement.

In 2008, the final performance evaluation was completed for the Project. The final evaluation yielded unsatisfactory results that were attributed to the amount of binder contributed by the asphalt shingles being lower than expected.

## Project Update

In 2015, the wearing course of the segment of SR 4033 that was improved as part of this demonstration Project was replaced using a 9.5 mm conventional Superpave wearing course.

In 2017, to advance the use of RCAS in pavement design, PennDOT initiated a research Project to develop a Specification for the use of RCAS in asphalt mixtures. The contract is held with Pennsylvania State University and is being funded by PennDOT in cooperation with the Federal Highway Administration (FHWA).

At the end of the three-year study, PennDOT will assess whether a Specification can be developed for the standard use of RCAS in pavement design for roadways in Pennsylvania. Additionally, this research data will be shared with the FHWA and other state transportation agencies.

In 2019, PennDOT implemented the use of Warm Mixed Asphalt (WMA) over HMA. Since shingles are typically used in HMA's this is another consideration that will need to be addressed before a use Specification can be released, and adequately implemented.

## Project Information:

Blooming Glen, an affiliate of H&K Group was the paving contractor for this Project.

## Project Contacts:

Since this Project site has been repaved, please contact the SRP for additional information.

## For Additional Information:

Go to the Strategic Recycling Program page on the PennDOT website at:  
<https://www.penndot.gov/ProjectAndPrograms/RoadDesignEnvironment/PollutionPrevention/Pages/default.aspx>. or send a request to [PennDOTSRP@pa.gov](mailto:PennDOTSRP@pa.gov).