

Asphalt Shingle Recycling: A Working White Paper

February 2021

Background

According to the [2018 Disposal-Facility-Based Characterization of Solid Waste in California](#) (May 2020) an estimated 687,155 tons of asphalt roofing shingles were disposed of in California's landfills, roughly 1.7% of the statewide total.

Asphalt shingles, also known as composition, consist of a base mat of either fiberglass or organic material (cellulose), asphalt, and granulated mineral. Asphalt shingles can enter the waste stream clean (free of contaminants) or contaminated. Clean is often generated as manufactured scrap (pre-consumer) or from cut-offs from new roof installations (post-consumer). Contaminated material is all post-consumer and is primarily generated from demolition activities or re-roofing tear-offs. Contaminates often include nails, mastic, or underlayment and decking materials, such as plywood or oriented strand board.

Up until the 1980's, asbestos was utilized in some roofing materials. In response to the concerns about asbestos in the shingle waste stream, the [California 2008 Statewide Waste Characterization Study](#) examined roofing samples and found, "of the 191 roofing samples collected and analyzed, just one sample of roofing mastic was found to contain traces of asbestos."

Existing markets for recycled asphalt shingles are limited, and uses include: hot-mix asphalt (HMA), aggregate base, and new asphalt shingle manufacture (clean material only). As a component of HMA, shingles have generally been considered as aggregate rather than for asphalt binder replacement. While shingles do contain asphalt, oxidation occurring during the service life of asphalt shingles complicates utilization of the asphalt as binder replacement.

Program Goal

The primary program goal is to increase the diversion of asphalt shingles, including post-consumer, and the most likely market to achieve that is through HMA. The primary vehicle for increased HMA utilization is for Caltrans to adopt a Standard Specification for the use of reclaimed asphalt shingles (RAS) in HMA. The importance of a Caltrans spec is two-fold: 1) to increase the ability to use RAS on state road projects and 2) increase the ability to use RAS on local projects. Inclusion in the Standard Spec would allow Caltrans' contractors to use those materials without special approval. For local road projects, most California jurisdictions choose either Caltrans' specs or, in the case of Los Angeles County and many other southern California jurisdictions, the *Greenbook: Standard Specifications for Public Works Construction (Greenbook)*. *Greenbook* does not have a RAS spec, and staff have indicated that they will defer development of RAS spec until after Caltrans develops a spec. The pathway to Standard Spec adoption roughly includes the following steps:

- Draft spec development
- Demonstration projects and performance testing
- Adoption of a Provisional Spec
- Standard Spec adoption
- *Greenbook* and local adoption and use

Actions Taken

Over the years, CalRecycle has undertaken many efforts with respect to Caltrans and asphalt shingles. Unfortunately, much of the information on pre-2006 efforts have been lost due to retirements and loss of institutional knowledge. However, since the mid-2000s, staff has spent considerable amounts of time on these efforts.

A focused effort occurred between 2007 and 2009. In 2007, CalRecycle entered into a contract with Caltrans providing \$150,000 for the following main deliverables: 1) draft specification development, 2) material testing, 3) demonstration project construction, and 4) performance testing. During 2007, staff convened a technical advisory committee including Caltrans and paving industry members. Those efforts resulted in the development of a draft spec. That spec allowed for a HMA mix with up to 5% clean (pre-consumer) RAS. At Caltrans, material use approvals are made at the district, not headquarters (HQ) level. Unfortunately, Caltrans HQ was unable to locate a district willing to undertake a project. In 2009, CalRecycle had to rescind the contract as liquidation period for expenditure of the money ran out. While not meeting the overall project goals, development of a draft spec was a significant step forward.

Since then, staff has made many efforts to encourage the use of RAS both at the Caltrans HQ and district level. Staff has, at times, looked into further RAS testing and research, but unlike tire derived pavement's dedicated funding source, shingle funding would need to come from the IWMA.

Caltrans has independently pursued the use of RAS. To date, staff is aware of two Caltrans projects using RAS. These are:

- District 1- In 2010, as a result of a contractor's material change request, RAS was utilized on MEN 101 near Ukiah. The project included the use of RAS on an inside shoulder section. No test data is available, but, anecdotally, Caltrans D1 staff report no issues.
- District 10- During work on SR4 in Stockton, several ramps included the use of RAS as shoulder material. No testing or performance data has been provided. It is understood that this project used post-consumer RAS.

In 2020, Caltrans developed a draft RAS pilot project spec as a [Nonstandard Special Provision \(nSSP\)](#). The most recent draft nSSP provides for pavement test sections with the following HMA mixes: 0% RAS and RAP, 3% RAS, 10% RAP, and 3% RAS and 10% RAP. They are currently looking for districts to run a pilot, but have not yet been

able to identify one. Local industry contacts report using a RAS/RAP mix for unspecified, private projects.