Overview: Using RAS in Asphalt Pavements

(based on initial literature search)

Adam Zofka
Assistant Professor
Civil and Environmental Engineering
University of Connecticut

Outline

- **National level**
  - History
  - National perspective
  - Pro/Cons
- **CT state level**
  - Potential benefits
  - Research need

History of RAS in pavements

- Experiments started in late 70's and early 80s
- First technical literature published in late 80's
- On a large scale RAS have been used in the asphalt pavements for last 15 years

- Two "types":
  - Tear-off shingles (consumer aged waste shingles)
  - Manufacturer waste (a.k.a. roofing shingle tabs or punch-outs) that include "out-of-spec" and mis-colored or damaged shingles.

National perspective

- States that have completed research projects and RAS implementation (not exhausted list):
  - Missouri, Virginia, Minnesota, North and South Carolina, Texas
- Numerous reports, publications, specs
- Typically states allow up to 5% RAS (by weight of total mix) but min 70% of total binder should be virgin; RAS are typically processed down to ½ in or less
- The 5th Asphalt Shingle Recycling Forum, Dallas, TX, October 2011
- “Recycling Tear-off Shingles: Best Practices Guide”, funded by U.S. Environmental Protection Agency (U.S. EPA)

National perspective

- *Standard Specification for Use of Reclaimed Asphalt Shingles as an Additive in Hot Mix Asphalt (HMA)*, American Association of State and Highway Transportation Officials (**AASHTO**), MP15-2009
- *Standard Practice for Design Considerations When Using Reclaimed Asphalt Shingles (RAS) in New Hot Mix Asphalt (HMA)*, American Association of State and Highway Transportation Officials (**AASHTO**), PP53-2009
- National Pooled Fund Study *Performance of Recycled Asphalt Shingles (RAS) in Hot Mix Asphalt'* TPF-5(213)

Pro/Cons

- **Pros:**
  - A good source of asphalt
  - Increase in strength and stiffness (*depends on the fibers and polymers in RAS*)
  - Reduces landfill consumption and conserves natural resources
  - Economics
- **Cons/concerns:**
  - Presence of asbestos
  - Pre-mature aging of the HMA (for tear-offs)
  - HMA more prone to cracking (with high RAS content)
  - Requires special handling/processing and good QA/QC on the plant

Potential benefits in CT

- **Approx. 900,000 tons of HMA used per year in CT**
  - @5% this could consume **45,000** tons of RAS
  - @20% asphalt content in RAS, this could save 9,000 tons of virgin binder
- **Economics is more complex though; need to take into account:**
  - (+) Savings: fine aggregate, tipping fee
  - (-) Costs: hauling/storage, processing, capital, asbestos monitoring and other extra QA/QC
- **How much RAS is produced every year in CT?**
  - Rough estimate **120,000** tons

All values are estimates!

Research need

- Because each state is different
- Because RAS sources are different from state to state
- Because HMA materials and design practices are different from state to state
- Because DOT and DEP specs are different from state to state

Thank you!

Adam Zofka, Ph.D.
azofka@engr.uconn.edu