



Recycled Asphalt Shingle use in Minnesota

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Acknowledgements

- Introduction - Materials
 - History & Motivation
- Project Use (Lessons Learned)
- Current Use & Future Direction
- Summary





Outline

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Recycled Asphalt Shingles

MWSS - Manufacturer Waste Scrap Shingles

TOSS - Tear-Off Scrap Shingles (Post Consumer)

RAS - Recycled Asphalt Shingles, includes *both* MWSS & TOSS

RAP - Reclaimed Asphalt Pavement





Reclaimed Asphalt Pavement

- 1976: First Use, Research Project
- 2000's: Used on Virtually all State Hwy Projects (~20%+)





Manufacturer Waste

- 1990's: First Use
- 1996: Supplemental Specifications
- 2003: Permissive Spec (Contractor Choice), 5% max.





Tear-Off (Post Consumer)

- Mid 1990's: First Use
- 2007: Specification (Needed Engineer Approval)
- 2010: Permissive Spec (Contractor Choice), 5% max.





Motivation To Use TOSS

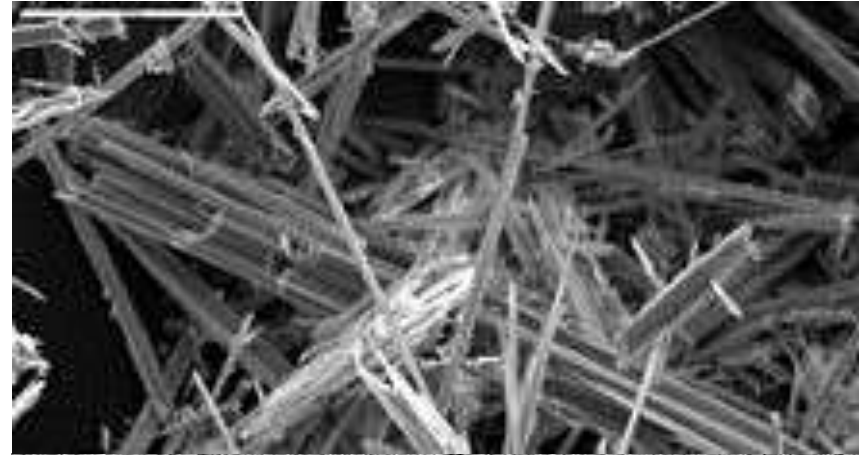
- Expensive to Landfill
 - Increased Costs of Asphalt Binder
 - Possible Legislative Mandate
- => Partnered with Minnesota Pollution Control Industry, Suppliers, Agencies and others to Conduct Research and Develop a Comprehensive RAS Spec.





Concerns About TOSS

- Debris & Other Contaminants
- Asbestos?
- Aging/Stiff Binder





Debris Concerns

Insert Picture with
"Flags"

1. Pre-Sort: Pull out obvious "big waste"





Processing to Mitigate Debris

Expensive to Landfill

1. Pre-Sort: Pull out obvious "big waste"





Processing to Mitigate Debris

2. Hand Sort: Pull out anything that's "Not Shingles"



Sorted

Un-Sorted





Processing to Mitigate Debris

3. Grind, Screen, Magnet (Nails)





Deleterious Materials Spec.

Deleterious Materials: Anything that's not Shingles

- < 0.5 % by weight of material retained on 4.75mm (No. 4) Sieve (500 - 700 gram sample)
- Applicable to both MWSS & TOSS
- It's Difficult, but Suppliers are able to consistently meet after making modifications to their operation.





Mitigating Asbestos

- Shingles from non-regulated facilities
 - Single layer reroofs
 - Single family homes
- Processors are *licensed* waste handlers/facilities
- Processors must have shingles added to their permit
- *Random testing* for asbestos is required
 - Processor Q/C Plan





Aging/Stiff Binder

- Asphalt used to manufacture shingles is a stiff grade (Don't want it to flow).
- Exposure to elements for 20+ yrs. makes it stiffer!



Material Identification	High PG Temp	Low PG Temp	Continuous PG Grade	PG Grade
RAP	79.9	-17.4	79.9 -17.4	76-16
RAP2	74.3	-28.8	74.3 -28.8	70-28
TOSS	112.7	-11.4	112.7-11.4	
MWSS	107.5	+6.0	107.5+6.0	





Aging/Stiff Binder

- 25% RAP & 3 or 5% MWSS (54% "New Oil")
- Prompted a Spec. Change => Min. 70% New Oil
 - RAS: 5% Max ~ Mixture (5% RAS & 10% RAP)





Current RAS Use

- MWSS: Very little enters landfill (**Verify**)
- TOSS: ~10,000 tons/year (**Add DemCon Info**)
- Still Landfilling TOSS - Contractors have RAP "Mountains", due to economy
 - **<Insert RAP Mountain Picture>**





Base Stabilization

4" RAP, 1.5" RAS (10% MWSS + 90% TOSS)
Pulverized with 1" of existing gravel plus 2% new emulsion



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RAS for Dust Control

4" RAP, 1.5" RAS (10% MWSS + 90% TOSS)
Pulverized with 1" of existing gravel plus 2% new emulsion

>Insert Picture from Study<





Thank You!



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