

Rocky Mountain West Pavement Preservation Partnership Annual Meeting

Asphalt Rubber: What You Need to Know



Mark Belshe, P.E.
Rubber Pavements Association
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Why Put Rubber In Asphalt?

Tire rubber is an engineering tool to:

- Reduce cracking
- Increase asphalt content and asphalt film thickness
- Prevent bleeding, flushing, and drain-down
- An aid to increase performance life
- Save Money in reduced maintenance
- Save money in project cost through reduced thickness
- Increase safety and reduce noise



Field Blend Mix Site



Asphalt Storage & Heat Tank

Asphalt Transport

Asphalt-Rubber Heater Blender

**Spreader Truck Receiving
Asphalt-Rubber Blend**

Crumb Rubber Hopper



Field Siefer Mill – SBS Polymer Modification



Advantages of Field Blended Binders in Spray Apply (Chip Seal) Applications

- 1. Higher Binder Application Rates (Viscosity)**
- 2. Use of High Quality Pre-Coated Aggregate**
- 3. Resistance to Aging**
- 4. Resistance to Reflective Cracking**
- 5. Lower Initial Cost based on Alternative**
- 6. Lower Life Cycle Cost based on Reduced Maintenance Costs and Performance**



Rubberized Scrub Seal Binder

**** Preparatory Seal or Massive Crack Filler Prior to Surface Treatment***

***Usually 86 to 90 Percent of a Low Penetration
Asphalt Cement***

and

***10 to 14 Percent of a Fine Grind CRM and SBS
Polymer Combination***

Application Rates

Binder - .20 to .50 Gallons Per Square Yard

Aggregate or Sand – None Required



Rubberized Asphalt Binder (RAB)

**** Equal / Alternate to Terminal Blend (AC 15-5TR or PG 76-22TR)***

***Usually 89 Percent PG Asphalt Cement
and***

***11 Percent of Fine Grind CRM and *Coarse
Grind SBS Polymer Combination***

**** Siefert Mill is Utilized to Shear SBS Polymer***

Application Rates

Binder - .30 to .50 Gallons Per Square Yard

Aggregate – 18 to 28 Pounds Per Square Yard



Asphalt-Rubber Binder (A-R)

***Usually 80 to 85 Percent PG Asphalt Cement
and***

***15 to 20 Percent of 12 to 14 Mesh CRM or a
Combination of CRM and High Natural Rubber***

Application Rates

Binder - .55 to .75 Gallons Per Square Yard

Aggregate – 26 to 36 Pounds Per Square Yard



Polymer Modified Asphalt-Rubber (PMAR)

***Usually 82 to 85 Percent of PG Asphalt Cement
and***

***15 to 18 Percent of 12 to 14 Mesh CRM and Fine
Grind SBS Polymer Combination***

Application Rates

Binder - .60 to .75 Gallons Per Square Yard

Aggregate – 26 to 36 Pounds Per Square Yard



Hot Applied Binder Application - Agitated Spreader Trucks



Hot Applied Binder

Aggregate Gradation Requirements

3/8 inch Aggregate

1/2 inch Aggregate

Sieve Size	Percent Passing	Sieve Size	Percent Passing
1/2 inch (12 mm)	100	5/8 inch (15 mm)	100
3/8 inch (9 mm)	70 - 100	1/2 inch (12 mm)	95 - 100
1/4 inch (4.75 mm)	0 - 10	3/8 inch (9 mm)	0 - 20
No. 8 (2.36 mm)	0 - 5	1/4 inch (4.75 mm)	0 - 5
No. 200 (75µm)	0 - 1	No. 8 (2.36 mm)	0 - 2
----	----	No. 200 (75 µm)	0 - 1



Other Aggregate Requirements

- 90% Has 2 – mechanically fractured faces
- ASTM C131 – 100 Revolutions, 7% loss
ASTM C131 – 500 Revolutions, 30% loss
- Maximum of 8% Flat or Elongated Particles
- Sodium Sulfate Test May be Required
- Pre-coating Usually @ 0.5 to 0.75 %



Pre-coated Aggregate Application



What About Your Pavement Condition?

Strongly Consider Pavement Condition Index (PCI) as Your Guide for Binder Use!

Remember Pre-Maintenance is Mandatory!!



Considerations

- **Pavement Condition**
- **Pre-maintenance Activity (If Any)**
- **Scrub Seal Type**
- **Chip Seal Type (Binder? Application Rate?)**
Aggregate Gradation (Pre Coat?)
- **Slurry or Micro**
- **Overlay Type**
- **Climate (Binder Grading)**
- **Traffic (Amount, Trucks?)**
- **Performance Expectations**
- **Budget Issues**



Candidate for Multi Layer?



Candidate for Multi Layer?



Mandatory Pre-Maintenance











Types of Multi Layered Systems

- **Scrub Seal/Chip Seal**
- **Cape Seal**
- **Double Chip Seal**
- **Three Layer Cape Seal**
- **Two Layer Overlay System**
- **Other Uses**



Scrub Seal/Chip Seal











Cape Seal











Double Chip Seal













Triple Layer Cape Seal

















Two Layer Overlay System

Better Known as “SAMI”















Scrub Seal/Chip Seal



Before – August 2004



After – December 2011 (7 Years)



Cape Seal



Before – March 2003



After – June 2008 (5 years)



Double Chip Seal



Before – June 2006



After – March 2012 (6 years)



Two Layer Overlay System



5 Years of Performance, Now 7 Years



Possible Solution Matrix Based on PCI

Pavement Condition Range	Qualified Treatments	Cost Range
100 - 90	Various Fog Seal Applications	\$0.50 - \$0.75 Per Square Yard
90 - 70	Crack Seal/Patching/Scrub Seal Various Fog Seal Applications Slurry Seal/Micro Surface	\$0.50 - \$2.00 Per Square Yard \$0.50 - \$0.75 Per Square Yard \$1.50 - \$3.75 Per Square Yard
70 - 50	Crack Seal/Patching/Scrub Seal Slurry Seal/Micro Surface PMRE/CRS-2P Chip Seal PG-TR Chip Seal Cape Seal (Various) Double Chip Seal (Various) Conventional Overlay	\$0.50 - \$2.00 Per Square Yard \$1.50 - \$3.75 Per Square Yard \$1.75 - \$3.00 Per Square Yard \$2.25 - \$3.25 Per Square Yard \$4.00 - \$6.00 Per Square Yard \$4.00 - \$7.50 Per Square Yard \$6.00 - \$10.00 Per Square Yard
50 - 30	Crack Seal/Patching/Scrub Seal Asphalt Rubber Chip/Cape Seal Double Chip Seal (Various) Hot in Place Recycling/Seal Three Layer Cape Seal (Various) SAMI/Rubber Modified Overlay Mill and Fill	\$0.50 - \$2.00 Per Square Yard \$3.75 - \$7.00 Per Square Yard \$4.00 - \$7.50 Per Square Yard \$6.00 - \$12.00 Per Square Yard \$8.00 - \$12.00 Per Square Yard \$8.00 - \$12.00 Per Square Yard \$12.00 - \$20.00 Per Square Yard
30 - 0	Crack Seal/Patching/Scrub Seal SAMI/Rubber Modified Hot Mix Cold in Place Recycling/Seal Reconstruction	\$0.50 - \$2.00 Per Square Yard \$12.00 - \$14.00 Per Square Yard \$12.00 - \$20.00 Per Square Yard \$45.00 - \$75.00 Per Square Yard



Questions?

www.rubberpavements.org



“I know you believe you understand what you think I said, but I am not sure you realize that what you heard is not what I meant.”

---Alan Greenspan

