RUBBERIZED 
ASPHALT 
PAVEMENT

Waste Tire Working Group
Department for Environmental Protection
Energy and Environment Cabinet
December 3, 2013
Rubberized Asphalt Pavements

Topics

- Why Rubberized Asphalt?
- Common Questions & Answers
- Possible Kentucky Uses
- Pilot Project
- Where do we go from here?
- Resources
Why Rubberized Asphalt?

- Tire Derived Fuel $20-40/ton
Why Rubberized Asphalt?

- Crumb rubber $200-400/ton
Rubberized Asphalt Pavements

- 81% Waste Tires Recycled in KY
- 18% still landfilled
Binder and Pavement Rehabilitation

- Stress Absorbing Membrane Interlayer (SAMI)
  - SAM with Rubberized Gap Graded Asphalt overlying layer

Before: San Jose, p. 4 Western Pavement Maintenance Forum
2009 Award of Excellence in Contracting Chip Seal / Innovation Category
TWO AND THREE LAYER SYSTEMS

- Asphalt-rubber SAMI and either the gap or open graded hot mix material as the final wearing course
- Avoids costly reconstruction
How many waste tires can be used?

- A two-inch-thick RAC resurfacing project uses about 2,000 scrap tires per lane mile (CAL Recycle)
- Depending on type of use, 500-2,000 tires per lane-mile (Liberty Tire)
How many waste tires are used?
- rubberized asphalt uses 100 million pounds of crumb rubber per year (RMA Market Report for 2007).

2% U.S. Waste Tire Generation
FL highest with 5% of annual waste tire generation
Why isn’t it more widely used?

- “Experimental”
- Engineers expected comfort with the usual materials
  - Test sections needed to familiarize engineers, contractors, plant operators
  - Training of asphalt plant hot mix operators by AR operators is required
Does the use of rubber cause dangerous emissions?

- New additives reduce emissions
- NIOSH finds emissions no more generally than conventional asphalt
- Aroma is different
Frequently Asked Questions

- Can rubberized asphalt be recycled?
  - City of Los Angeles, LA., recycled a 12-year old RA pavement
  - Met specifications and passed all tests
Can RA be used in cold climates?
- California uses in Sierra Mountains
- Alaska and Sweden use to counter snow tires stud damage
- Massachusetts and New Jersey use
- Proper mix design and construction practices are critical (no OGFC)
Polymer Replacement

- Polymer shortage increased cost in 2008 and changed projects
- KY TC paved interstates using PG specs without polymer
- Rutting susceptibility potential increased and pavement endurance decreased
- TC wants to be in a position to continue paving should polymer shortage return
Pilot Project

To Protect and Enhance Kentucky’s Environment

TAG Resource
Recovery

Eaton Asphalt Paving Co.

PAIKY
Plantmix Asphalt Industry of Kentucky

Modified Asphalt Solutions, Inc
July 24, 2013 Planning Meet at District 6, Florence:

- Rejected KY 18 (Road to Florence Mall from I-75) due to structural problems with underlying concrete
- Selected KY 8 (2.2 mile from I-471 to Dayton KY)
Pilot Project

- July 24, 2013 Planning Meet at District 6, Florence:
  - One lane is control using standard asphalt and 0.38A PG 76-22 (interstate grade) Superpave 0.38 spec.
  - Both 6.0% base asphalt, 5.0-5.2% liquid with 20% RAP
  - Other lane is same as above plus 14% ground tire rubber with 100% passing #30 size
July 24, 2013 Planning Meet at District 6, Florence:

- EEC to pay $85,000 over initial $651,000 project costs
  - $70,000 to TC for rubberized asphalt and interstate quality asphalt over regular street asphalt
  - $15,000 to UK for long-term testing
September 25, 2013 Preconstruction Meet and Project Start:

- Discussed testing
- Ingredient added to make rubberized asphalt handle similar to regular asphalt, decreases rubber smell
Spraying the tack coat looking northeast. Ohio River floodwall on right and background. Photo by Mark Belshe RPA
Paving train applying rubberized asphalt looking west.  
Photo by Mark Belshe RPA
Paving train applying rubberized asphalt looking southwest.
Photo by Mark Belshe RPA
Workers smoothing rubberized asphalt around manholes looking southwest. Photo by Mark Belshe RPA
Vibratory roller with view to southeast.
Photo by Mark Belshe RPA
Pilot Project

Downtown Dayton KY rubberized and polymer asphalt. Photo by Brian Donnelly TC
Pilot Project

Close-Up of control and rubberized asphalt. Photo by Brian Donnelly TC.
Close-up of rubberized asphalt. Photo by Brian Donnelly TC.
Density Tests: 100% payment or 92% density

Initially there were high void content in the mix, but this was quickly brought under control with deletion of sand and add 0.3% asphalt.
Pilot Project Results

- Constant adjustments made at plant
  - District 6 QA suspects rubber settlement occurred
  - Contractor says 14% AR too high
  - Rubber particles meet spec (100% passing #30 sieve)
  - RPA engineer says worked like regular asphalt
  - FL DOT says watch settling of rubber particles (stir, haul distance)
KY Transportation Center permeability tests yield normal results

Spring: Skid testing, visual survey, another round of cores
Pilot Lessons Learned

- Look at lower AR% used by other states: FL 10%, GA 5%
  - May require +polymer or additive
  - May require KY to lower elasticity spec from 75% to 70% or lower (KY highest in U.S.)
Pilot Lessons Learned

- Do another pilot project that meets 70-22 GTR spec and do long-term testing (contractor)
- Not many contractors in state have vertical tanks or stirring equipment like Eaton
- KY not ready if polymer prices increase
Rubberized Asphalt currently costs $12.00 per ton vs. $8.00 polymer-modified asphalt

- Costs good only for this project
- Costs vary with transportation distance and other factors
- May swing the other direction with polymer shortage
KTC & DWM attended Rubberized Asphalt Conference in AZ Oct. 14-17, 2013

DWM led round table at KACo annual meeting November 21

Presentation to Annual Meeting for Plantmix Asphalt Industry of Kentucky in February 2014 at Louisville
After Pilot

- Plot polymer shortage strategy with Division of Materials to adjust specs, tests or recommendations
- Pursue future hot-mix pilot with Transportation Cabinet
- Pursue chip-seal pilots with counties
Resources

U.S. EPA Scrap Tire Workgroup Website

http://www.epa.gov/wastes/conserve/materials/tires/workgroup.htm
Questions?

George Gilbert, P.E.
Environmental Engineer Consultant
Director’s Office
KY Division of Waste Management
george.gilbert@ky.gov
(502) 564-6716

Member U.S. EPA Scrap Tire Committee

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