New England Rubber- Modified Asphalt and Civil Engineering Workshop

October 20-21, 2005

Providence, Rhode Island

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RIDOT Research and Technology

Background - RIDOT's Experience with Crumb Rubber

- 1987 – Demo Project with Plusride
- 1991 – ISTEA Mandate – Research with crumb rubber – modified asphalt
- 1999 to 2005 – Crumb rubber used in RIDOT Pavement Preservation Program
  - Crack Seal
  - Chip Seal
  - Modified Asphalt Overlay
- 2005 to ? – Use of crumb rubber with warm asphalt technology

Plusride Project

- Year Placed – 1987
- Location – Rt. 2 in East Greenwich
- Mix Details
  - AC - 8.2%
  - Rubber – 3.5%, max nominal size ¼”
  - Aggregate – 88.3%
  - Concrete/Corrosion
- Layer Thickness – 1.5”
- Performance – Same as control section after 5 years

ISTEA Mandate

- Research at URI on crumb rubber asphalt binder using SuperPave Binder Specification
- PG binder range of virgin asphalt extended 2 to 3 grades
- Mixture testing indicated rutting would be mitigated

1999-2005 Pavement Preservation

- Worked with Hudson/All States Asphalt to incorporate the chemically modified crumb rubber asphalt (CMCRA) into the following
- Crack seal – Low viscosity CMCRA w/fibers
- Chip Seal – Used CMCRA in demo sections with chip seal (requires less rubber)
- Elastomeric Mix – Used CMCRA binder to produce crack resistant mix
- *Also used in department's overlay program

RIDOT

Pavement Preservation Program (P^3)

2003

From the June 2003 Issue of:

Better Roads

For The Government/Contractor Project Team

road manager by Ruth W. Steiger, Editor-in-Chief

Prevention versus Repair — Managing Your Budget

Ideally, we'd all use preventive road maintenance. In the real world, budgets may only allow lowest-initial-cost expenditures unless other answers can be found.

How can you find the money to make the switch from repeated repairs to scheduled preventive maintenance? And how do you convince the head of the agency and the taxpayers that it's the right thing to do?

Every dollar spent on preventive maintenance saves three to four dollars in future road repairs according to the conservative estimate from the National Cooperative Highway Research Program.

Michigan, a leader in pavement preservation, reports that it saves up to $10 for each preventive maintenance dollar spent.

Even so, some states still use very little preventive work. Florida, Hawaii, Kentucky, North Carolina, Ohio, Rhode Island, and Tennessee lag behind the other states according to a study conducted by the American Association of State Highway and Transportation Officials' Pavement Preservation Lead States Team.

The study found that pavement preservation maintenance programs were most often integrated with pavement management systems, letting the state departments of transportation and their engineers make optimal use of computerization.

Of the states responding to the questionnaire for the study, 85% had PPM programs. Half of those had been in use for more than 10 years.

Practices used vary widely, with some states leaving PPM-versus-repair decisions to district managers and engineers. Other DOTs

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From a potential problem…

… to a problem waiting to happen…

…that becomes a problem for everyone.

Rhode Island Department of Transportation Mission Statement

"…to provide a safe, effective and environmentally responsible intermodal transportation system that supports economic development and improves the quality of life for all Rhode Islanders."

RIDOT Annual Report 1999

Concepts

- Pavement Preservation – All activities undertaken to provide and maintain a serviceable roadway
- Routine Maintenance – Refers to day-to-day highway maintenance operations
- Preventive Maintenance – Strategy and cost effective treatments that preserve the system

Welcome

to

Extending Pavement Life

Extending Pavement Life

- Why Extend Pavement Life?
  - Because it Maximizes the Return on the Taxpayers Investment
- Pavements represent a billion dollar investment
  - WE MUST PROTECT THEM!

Pavement Preservation Treatments

- Rhode Island experience to date
  - Crack Seal/Rout and Seal
  - Microsurfacing
  - Rubberized Chip Seal
  - Paver-Placed Surface Treatment
  - Elastomeric Mix (new)
  - Combination Cape Seal/SAMI

Crack Sealing — Definition

- Crack Seal – Blow clean and heat crack; fill and overband with rubberized asphalt cover
- Rout and Seal – Grind out and heat crack; fill with rubberized asphalt

Crack Seal Material Composition

Neat Asphalt – PG 58 – XX

Crumb Rubber – Minimum 5%, mesh is 80 maximum

Blend AC – PG 70-34/64-34

Blend Viscosity – 3 Pa · s

Chemical Linker – Required

Fibers – 10 mm length polyester, 15 dpf

Crack Sealing — Heating Kettle

Crack Sealing — Preparation (Hot Air Lance)

Crack Sealing — Sealing Operation

Rubberized Asphalt Chip Seal (RACS) — Description

The RACS is a blend of 20% crumb rubber and asphalt. RACS is hot spray-applied at the rate of 0.6 gallons per square yard. Then covered with 3/8" or 1/2" precoated stone, followed by rolling.

- Flexible - Good for moderately cracked roads.
- Relatively easy/fast to apply
- Ideal for cold wet climates
- Other unique applications

Chip Seal Material Composition

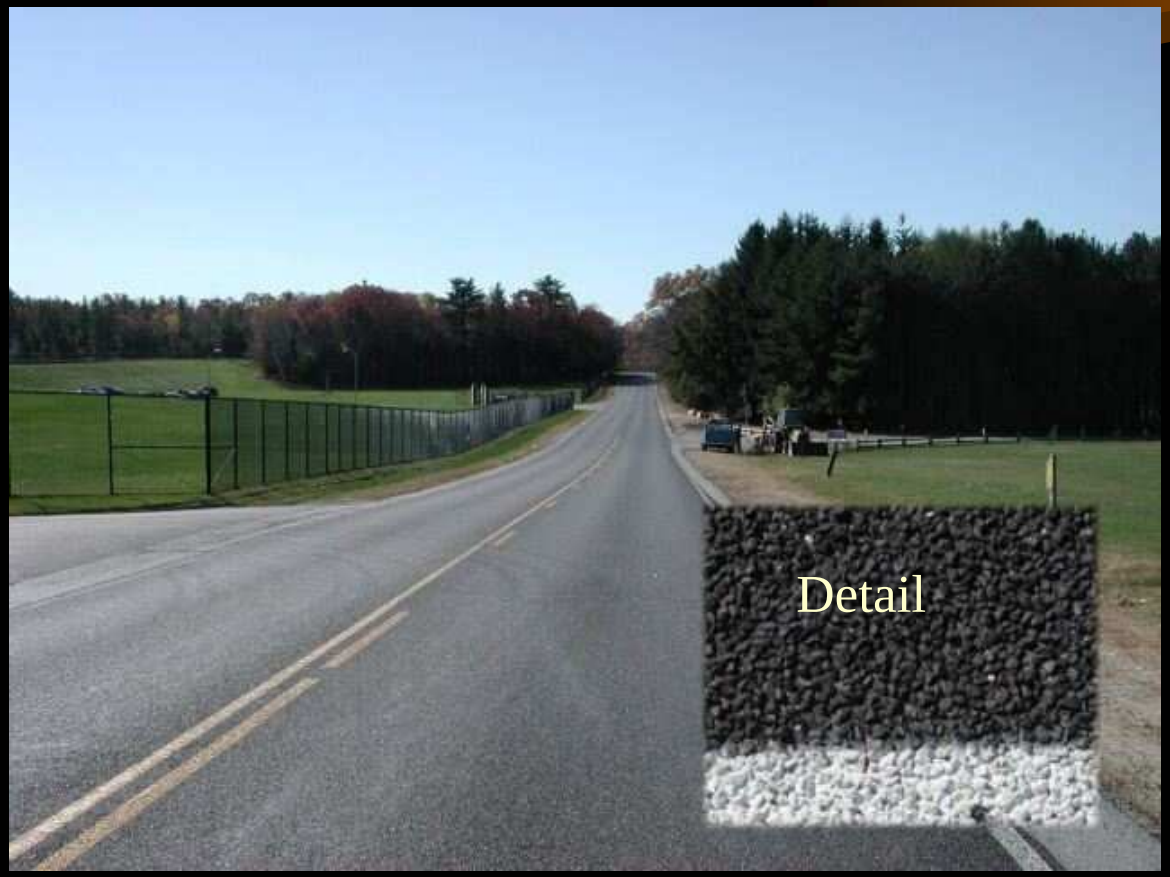
- Neat Asphalt – PG 58 – 28
- Rubber – Max size #10 sieve
- Rubber % - 20 ± 3
- Aggregate Size – ¼” to ½” (single size)
- Aggregate Coating – 100% coating
- w/PG 58 - 24

Rubberized Asphalt Chip Seal

Rubberized Asphalt Chip Seal — Prep/Shimming

Rubberized Asphalt Chip Seal — Before

Rubberized Asphalt Chip Seal — After



Rubberized Asphalt Chip Seal — Sprayer

Rubberized Asphalt Chip Seal — Chip Spreader

Rubberized Asphalt Chip Seal — Rolling

Rubberized Asphalt Chip Seal — Unique Applications

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Rubberized Asphalt Chip Seal — Unique Applications

Concrete Pavement

Paver-Placed Elastomeric Surface Treatment (PPEST) — Definition

PPEST is a mixture of coarse-graded 3/8 inch crushed aggregate and a chemically modified crumb rubber (CMCR) asphalt binder. The binder is PG 70-40 and contains a minimum 5% CMCR. The mix has a binder content of 6.0 to 7.5%. PPEST is:

- Produced in a Conventional hot mix plant
- Applied to a tack-coated surface
- Placed to a one-inch compacted thickness

Elastomeric Surface Treatment Composition

Neat Asphalt – PG 58 – XX

Crumb Rubber – 5%

Chemical Linker – As required

Asphalt Blend – PG 70 – 40

Separation < 5%

PAV < 5000 KPa @ 7 °C

Aggregate – Maximum size ½”

Marshall Mix Design – Stability 1000 lbs.

Flow 8-16

Paver-Placed Elastomeric Surface Treatment — Before

Paver-Placed Elastomeric Surface Treatment — After

Paver-Placed Elastomeric Surface Treatment — Train

Paver-Placed Elastomeric Surface Treatment — Spreader and Mix

Paver-Placed Elastomeric Surface Treatment — Roller

Paver-Placed Elastomeric Surface Treatment — Open Texture

Rhode Island Use of Crumb Rubber - Crack Seal (General Roads)

Year	Miles	1000 Ft.
1998	135.8	2058
1999	121.2	2617
2000	39.6	1519
2001	65.0	1962
2002	61.8	2271
2003	64.7	2276
2004 (bid)	89.0	3000
2005 (bid)	70.7	2700

1288 tons of Rubber

Rhode Island Use of Crumb Rubber - Crack Seal (Limited Access Highways)

Year	Miles	1000 Ft
1999 (bid)	26.4	295
2000 (bid)	65.7	500
2004 (bid)	41.0	500
2005 (bid)	-----	500

125 tons of Rubber

Rhode Island Use of Crumb Rubber

- Rubberized Asphalt Chip Seal (RACS)

Year	Miles	1000 Yd²
1999	6.7	133
2000	6.7	272
2001	20.0	302
2002	18.8	286
2003	20.6	371
2004	23.0	406
2005	21.8	400

= 890 tons of Rubber

Rhode Island Use of Crumb Rubber

- Paver-Placed Elastomeric Surface Treatment (PPEST)

Year	Miles	1000 Yd²
2001	7.4	152
2002	5.4	135
2003	5.4	108
2004	10.0	206
2005	7.5	183

154 Tons of Rubber

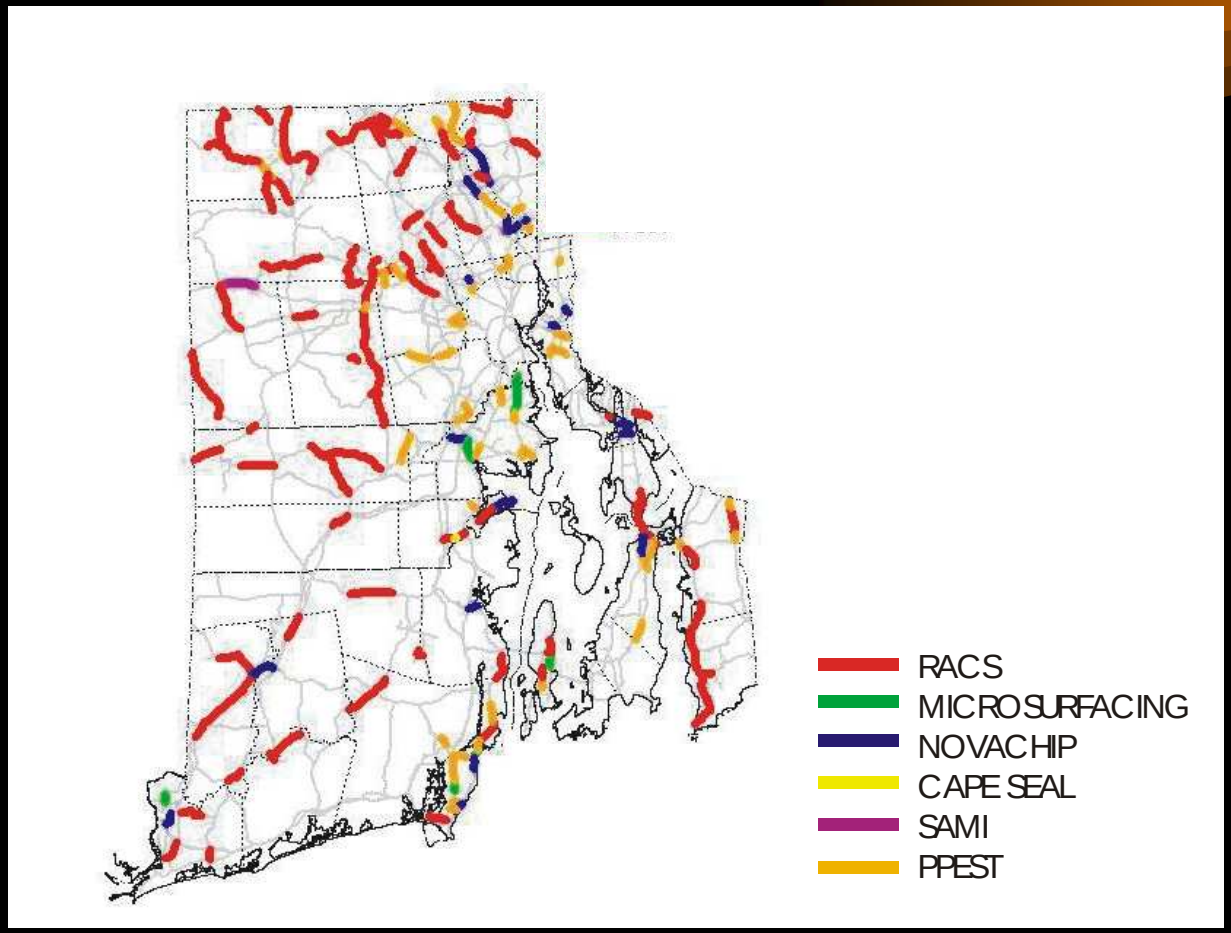
Total Rubber Usage

Program Total Rubber Usage to Date = 2457 Tons
Program Total for 2005 = 446 Tons

This amount is expected to increase in future years as:

1] RIDOT's Pavement Preservation Program is expanding
2] Rubber-modified binders are increasingly being used in typical overlays on rehabilitation and reconstruction projects

Map of Surface Seals 1999-2005



Questions