Rhode Island - State of Pavement Preservation

NEPPP 2011
Boston, MA
PROGRAM OUTLINE

1) Program History
   - 1998 - $460k, 4 state funded crack seal projects
   - 2011 - $6.2 mil, 6-crack seal, 2-Chip seals, 2-1” thin overalys

2) Pavement Preservation Tools/Treatments
   a) Crack Seal
   b) Microsurfacing
   c) 20% Rubber Asphalt Chip Seal (RACS)
   d) Double Latex Emulsion Chip Seal
   e) Nova Chip
   f) Polymer/Crumb Rubber Modified Asphalt Thin Overlay
   g) Stress Absorbing Membrane Interlayer (SAMI)
   h) Reclamation
RIDOT Crack Seal Program
1998-2011
Crack Seal

1998-2011

1700 Lane Miles
27 Million Linear Feet
Crack Seal Material Composition

- ASTM D 6690 Type II
- Chemically Modified Crumb Rubber Asphalt
  - Neat Asphalt – PG 58 – XX
  - Crumb Rubber – Minimum 5%, 80 mesh
  - Chemical Bonding Agent
  - Blended AC – PG 70-28
  - Blend Viscosity – 3 Pa · s @ 300°F
  - Fibers – 10 mm length polyester, 15 dpf
RIDOT Surface Seal Program
1999-2011
1999-2011
Surface Seals

624 Lane Miles
Microsurfacing
1999-2000
Pavement Preservation Program

- MICROSURFACING - A polymer modified asphalt slurry consisting of emulsion, aggregate and Portland cement.
Microsurfacing Projects

1999 - Block Island

- No hot mix asphalt plants
- 16 lane miles
- 113,000 yd²
Microsurfacing Projects

2000 - Mainland

- 28 lane miles
- 197,000 yd²
Microsurfacing Issues

- Cracking
- Delamination
Microsurfacing Issues — Delam
CHIP SEALS

– 20% Rubber Asphalt Chip Seals (RACS)

– Double - Latex Modified Emulsion Chip Seal
20% Rubber Asphalt Chip Seal (RACS)
20% Rubber Asphalt Chip Seal (RACS) — Definition/Properties

RACS is a blend of 20% crumb rubber and asphalt, spray-applied at the rate of 0.6 gallons per square yard and covered with 3/8" or 1/2" precoated stone.
20% Rubber Asphalt Chip Seal Material Composition

- PG 58 – 28
- Crumb Rubber – Max size #10 sieve
- Rubber % - 20 ± 3
- Aggregate Size – 3/8” to ½” (single size)
- 100% Aggregate coating w/PG 58 - 22
20% RACS Projects

1999 - 2011

• 549 Lane Miles

• 3,900,000 yd²
Asphalt Rubber Chip Seal Issues — Stone Kick Out
Asphalt Rubber Chip Seal Issues — Flushing
Paver Placed Surface Treatment (Nova Chip) 2000-2001
PPST is a polymer emulsion (applied at 0.25 gallons per square yard) sprayed immediately before placement of the hot mix overlay (5/8").
Paver-Placed Surface Treatment (Nova Chip/PPST)

2000 - 2001

• 40 Lane Miles

• 282,000 yd²
Paver-Placed Surface Treatment (Nova Chip/PPST) - Issues
Paver-Placed Elastomeric Surface Treatment – 1” Thin Overlay (PPEST)
Paver-Placed Elastomeric Surface Treatment — Definition

PPEST is a mixture of coarse-graded 1/2 inch crushed aggregate and a modified asphalt binder.

- Produced in a conventional hot mix plant
- Applied to a tack-coated surface (.08 gal/yd²)
- Placed to a one-inch compacted thickness
Paver-Placed Elastomeric Surface Treatment

PPEST: Paver Placed Elastomeric Surface Treatment (1” Overlay)

• 2001-2008: Chemically modified crumb rubber asphalt (CMCRA 7% rubber); 91 lane miles ~640,100 yd²
• 2008 – 2010: Polymer Modified Asphalt (SBS); 17.3 lane miles ~ 120,000 yd²
• 2010 – 2011: Crumb Rubber Modified Modified Asphalt; 22 lane miles ~ 155,000 yd²
CRMCA PPEST Composition

Binder: CMCRA
- Neat Asphalt: PG 58 – XX
- Crumb Rubber: 7% with Chemical Bonding Agent
- Asphalt Blend: PG 76 – 28
  - Separation < 5%
  - PAV < 5000 KPa @ 7 °C
  - El Rec ≥ 70% @ 4°C

Aggregate: Maximum size ½”

Marshall Mix Design: Stability 1000 lbs, Flow 8-16
Binder: SBS Polymer Modified

- Neat Asphalt: PG 58 – XX
- Meet AASHTO M 320 for PG 76-28
- Separation less than 5%
- Elastic Recovery $>70\%$ @ $4\,^\circ C$
Asphalt Binder with Crumb Rubber- PPEST composition

Binder:
- Neat Asphalt: PG 58 – XX
- Meet AASHTO M 320 for PG 76-28
- Terminally Blended
- Crumb Rubber $\geq$ 15% by weight max. size 40 mesh
- Elastic Recovery $\geq$ 70% @ 4°C
2011 PPEST TEST SECTIONS

River Road, Lincoln, RI

• 1.2 miles long
• 6000 ADT, 5% trucks
• Three .4 mile test sections
  ▪ Asphalt Binder with 17% crumb rubber
  ▪ Polymer modified ((SBS) Asphalt
  ▪ Asphalt Binder with 17% crumb rubber with warm asphalt te
Stress Absorbing Membrane Interlayer (SAMI)
Pavement Preservation
SAMI to Date

- SAMI (Stress Absorbing Membrane Interlayer)
  - 2000
    2 RACS + Novachip (1 lane mile, Cape Seal (.4 lane miles)
  - 2004
    RACS + PPEST (1.2 lane miles)
    RACS + Hot mix (2.8 lane miles)
    - 2005 – RACS + PPEST (7.5 lanes miles)
    - 2009 – RACS + PPEST (15.5 lanes miles)
    - 2011
      RACS + PPEST (5.4 lane miles)
      RACS + Polymer Modified Asphalt
Full Depth Reclamation (FDR)
2005-2011
FDR Projects

2008 - 2009
Three FDR with Calcium Chloride

2010
Two FDR with latex modified emulsion

2012
One FDR with portland cement and emulsion
RIDOT Pavement Preservation Monitoring Program

2000 - 2007
Distresses/Measurements Monitored

- Joint Opening (Linear feet)
- Longitudinal Cracking (Linear feet)
- Transverse Cracking (Linear feet)
- Edge Cracking (Linear feet)
- Alligator Cracking (Area)
- Block Cracking (Area)
- Reflection Cracking from rigid base (Linear feet)
- Potholes (Number and Area)
- Utility Patches (Number and Area)
- Rutting
- Shoving
- Raveling (Area)
- Bleeding (Area)
- Polished Aggregate (Area)
- Skid Data
- IRI (mm/m)
Monitoring – Performed by the Pavement Management Engineer and assisted by an R&T Technician.

- 2 sections of 100’ of roadway were chosen randomly [for each treatment], with each lane representing a monitoring segment within each section.
- Distress assessments were conducted per the LTPP Distress Manual, with some modifications.
- Fall and spring were chosen as the times to inspect each section.
- Photographic records are also maintained.
Section Crack Map 2003

- Monitoring Type:
- Year Placed: 2000
- Road:
- Limits:
- Town: Jamestown
- Review Date: Fall 2003
- Section ID:
• Hot in place recycling
• Cold in place recycling
• Fog Seals
Questions