UPDATE ON ECONOMICAL REFLECTIVE CRACKING TREATMENTS
NO MAGIC BULLET!

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NEPPP - Burlington
4/8/2014
Reflective Cracking

• Types
  • Composite Pavement (HMA/PCC)
    • Load Transfer Joints
    • Shoulder Widening
  • HMA/HMA
    • Thermal – Transverse
    • Block/Fatigue/Longitudinal/Seam
    • Widening
    • Utility Trenches

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Reflective Cracking Treatments Used

- Sawcut & Seal*
- Sawcut & Seal over “Bandaids” (Paveprep)
- Fabrics
  - Tensar Glassgrid 8502 (Rt 9)
  - Mirafi FG 200 Tencate (Rt 20)
- AR SAMI + HMA Overlay
- AR SAMI + UTBO Overlay
- Fibermat SAMI + HMA Overlay
- Fibermat SAMI + UTBO Overlay
- STRATA SAMI
- Rubblization
Reflective Cracking

- MassDOT Network
  - 15% Composite Roadways
  - Many US Routes 1, 5, 9, 20, etc.
- 1980’s Research Project
  - “Evaluation of Asphalt Rubber Overlay of Old Concrete”.
    - Constantino, Abraham & Murray – MDPW
    - Asphalt Rubber Producers Group.
- Route 12 Sterling - Boylston
Route 12 Sterling-Boylston

- 8” Jointed RCP
- 1940’s PCC Construction
- 51’ Joint Spacing
- Six (6) PCC Overlay Treatment Applied
- Two (2) 9” Full Depth HMA Sections
- 1980 Overlay with Experimental Sections
- 1988 Report
## Test Sections

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<tr>
<th>Section</th>
<th>Base</th>
<th>Band Aid</th>
<th>SAMI</th>
<th>HMA</th>
<th>SawCut &amp; Seal</th>
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<td>4 CONTROL</td>
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<td>90% Joint Sealant Failed Fair Ride Quality</td>
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<td>9”</td>
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1. Some Band-Aid Failures due to damage during construction.
2. Loss of Sealant may be attributed to workmanship.
Rt 12 Sterling – Boylston

Conclusions

- Asphalt Rubber SAMI with “Band-Aid” was effective
- Control Section had 30 times more cracking than any other test section.
- Sawcutting & Sealing was less effective due to sealant failure
  - Sealant failure caused deterioration.
  - Subsequent use of Sawcut and Sealing has provided good performance.
Rt 20 Sawcut & Seal – Northboro 2 Years
Rt 20 Auburn – 3 years
Mirafi FG200 Tencate
Rt 9 Framingham – 5 years

Tensar Glassgrid 8502
Rt 20 Worcester
No Treatment (5 years)
Route 6 Westport (5 years) Rubber Chip & Crack Seal
Route 6 Westport (5 years)

AR SAMI

[Images of cracked asphalt]

[MassDOT logo]
I-495 STRATA (6 years)
## Asphalt Rubber SAMI Usage

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<tr>
<th>PROJECT NUMBER</th>
<th>LOCATION</th>
<th>BID OPENING</th>
<th>ITEM</th>
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**Total:** 1,116,005 $4.50
Route 32 Roylaston (1 year)
MassDOT specifies Stress Absorbing Membrane Interlayers (SAMI) to mitigate reflective cracking in some applications. Item #466.

SAMI can be placed independent of an overlay and left open to traffic.

Four test sections were constructed on Route 8 in the towns of Cheshire- Lanesboro.

Two Sections included a Rubber Chip Seal SAMI.

- SAMI & HMA Overlay
- SAMI & Bonded Thin Overlay
Cheshire-Lanesboro – Two Years Later
HMA Overlay on Shoulder – No SAMI
Cheshire Lanesboro – Two Years Later
No SAMI - Core
Cheshire Lanesboro
HMA over FiberMat SAMI
Cheshire - Lanesboro
HMA over Rubber Chip Seal
SAMI

- First Core on shoulder – no SAMI
- Second Core through SAMI
- Effective on most longitudinal cracking
- Effective on less light to moderate transverse cracking
Cheshire Lanesboro
HMA over Rubber Chip Seal SAMI
Route 8 Cheshire Lanesboro

- HMA over Rubber Chip Seal SAMI
- Crack stops at SAMI.
- Effective on most longitudinal cracking.
- Effective on less severe transverse cracking.
HMA over AR SAMI – (5 years)
HMA over FiberMat SAMI – (5 years)
Route 8 Cheshire Lanesboro
UTBO on Asphalt Rubber SAMI
Light Reflective Cracking visible
SAMI and core appear intact.
UTBO over AR SAMI – (5 years)
UTBO over FiberMat SAMI (5 Years)
Preferred Practices

- Repair PCC Joints when $$$ Suitable
  - Diamond Grind if PCC Surface.
  - Item for localized repairs rarely used.

- Composite Pavements
  - Mill Oxidized Asphalt.
  - SAMI with HMA & Sawcut & Seal
    - Sawcut layer close to slab.
  - Two Lift Overlay
  - “Band-Aids” or SAMI not near surface
    - Cracks will Jump the SAMI layers.
  - Modified Binders in overlay.
Route 7 Cheshire
Lanesboro Observations

- UTBO with SAMI-AR & FiberMat SAMI
  - Cracking Performance as anticipated.
  - Ride quality good.
  - SAMI keeping cracks dry.
  - AR SAMI with UTBO more elastic & forgiving.

- HMA with SAMI-AR & FiberMat SAMI
  - HMA more cracking visible than UTBO.
  - Appears more brittle.

- SAMI retarded cracking for 2+ years.
- After 5 years, SAMI waterproofing & reducing maintenance.
What Next???

- Continue use of SAMI-AR with HMA
- SAMI – AR with PCC when overlay limited
- Route 9 Project Westborough-Southboro
  - Asphalt Rubber – 2 Lift Overlay
  - Composite base
  - Sawcut & Seal
- Existing composite approx. 20 years old.
  - Recipe Mix that Rutted – Not Cracked.
  - Are these Superpave mixes hurting PCC Overlays?
Conclusions

- Reflective Cracking not solved yet!
- Reflective Cracking Cure beyond scope of Preservation Activities
- We’re buying time.
- Keeping moisture out!
- Maintaining Ride Quality!
- SAMI Layers
Last Resort……
Questions???

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