

UPDATE ON ECONOMICAL REFLECTIVE CRACKING TREATMENTS NO MAGIC BULLET!

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Reflective Cracking



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

Reflective Cracking Treatments Used

- Sawcut & Seal*
- Sawcut & Seal over “Band-aids” (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

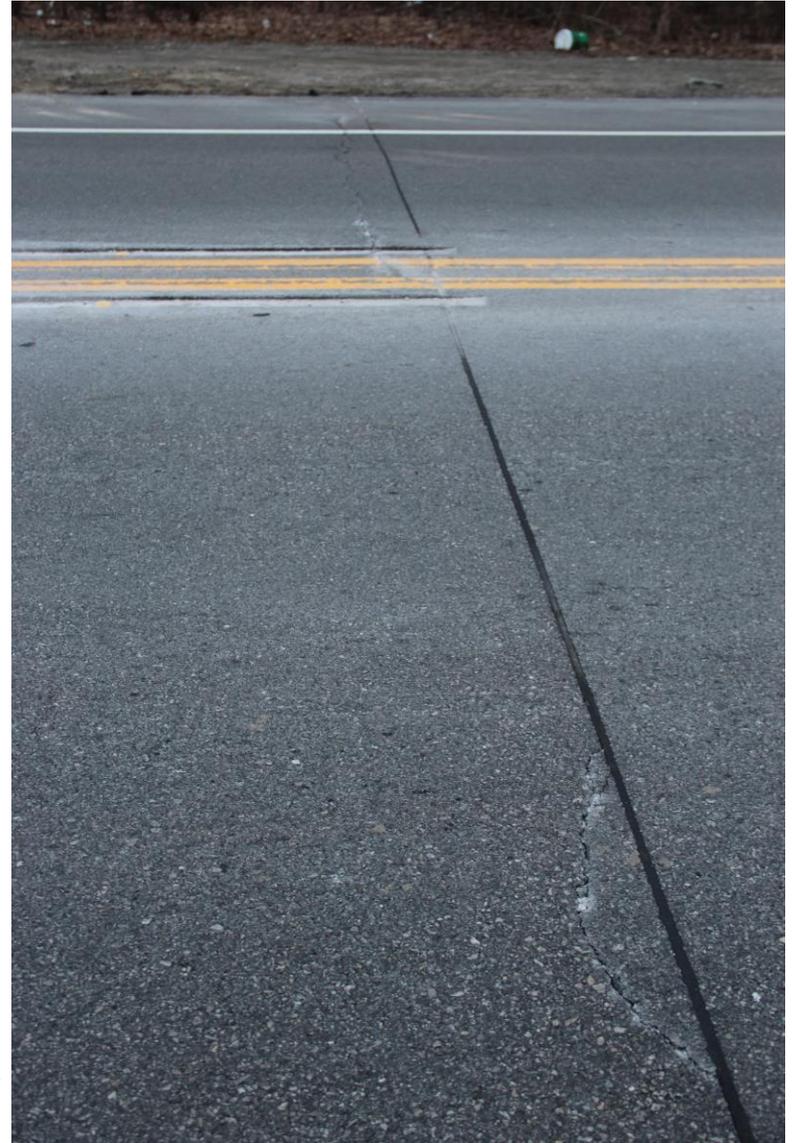
Section	Base	Band Aid	SAMI	HMA	SawCut & Seal	8 Year Comment Summary
1	Gravel			9"		
2	8" PCC	X	X	3"	X	5% Reflective Cracking 5% S&S Failed 1.
3	8" PCC	X	X	3"		1% Reflective Cracking
4 CONTROL	8" PCC			3"		85% Reflective Cracking Reflective Cracks Spalling
5	8" PCC	X	X	3"		1% Reflective Cracking
6	8" PCC	X		3"	X	90% Joint Sealant Failed Fair Ride Quality
7	6" HMA		X	3"		1% Reflective Cracking
8	Gravel			9"		

1. Some Band-Aid Failures due to damage during construction.
2. Loss of Sealant may be attributed to workmanship.

Conclusions

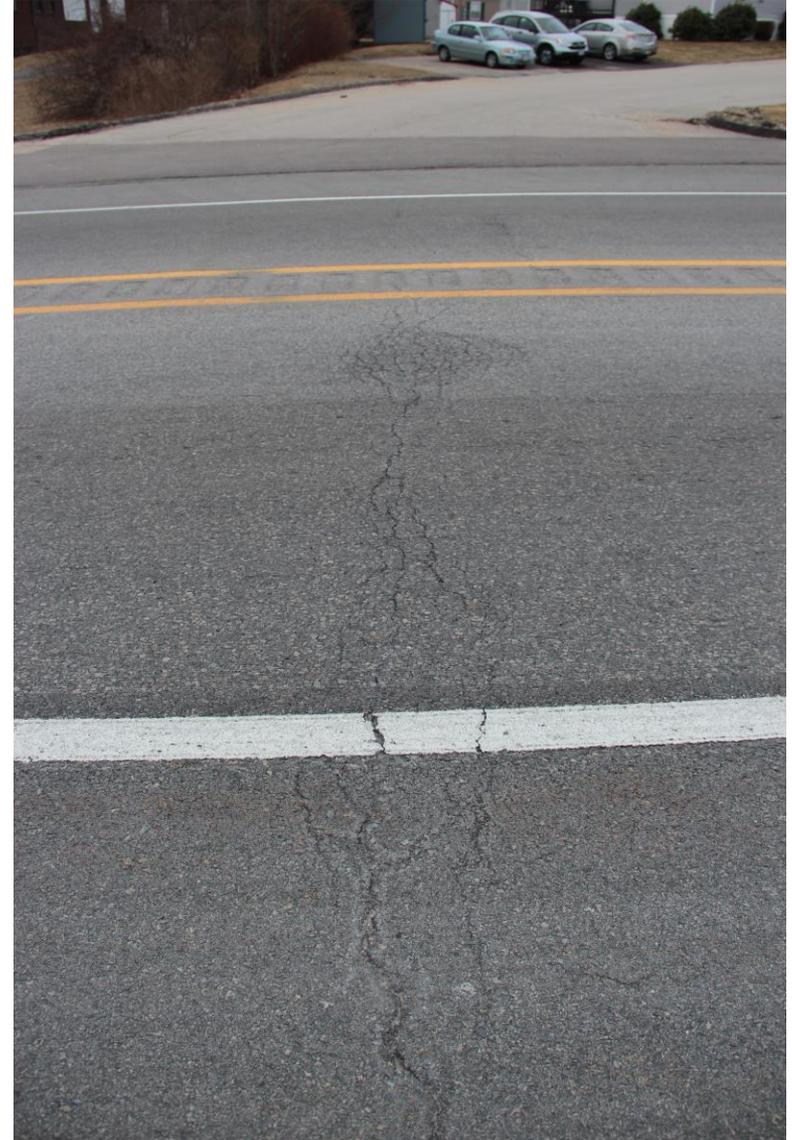
- Asphalt Rubber SAMI with “Band-Aid” was effective
- Control Section had 30 times more cracking than any other test section.
- Sawcutting & Sealing was less effective due to sealant failure
 - Sealant failure caused deterioration.
 - Subsequent use of Sawcut and Sealing has provided good performance.

Rt 20 Sawcut & Seal – Northboro 2 Years



Rt 20 Auburn – 3 years

Mirafi FG200 Tencate

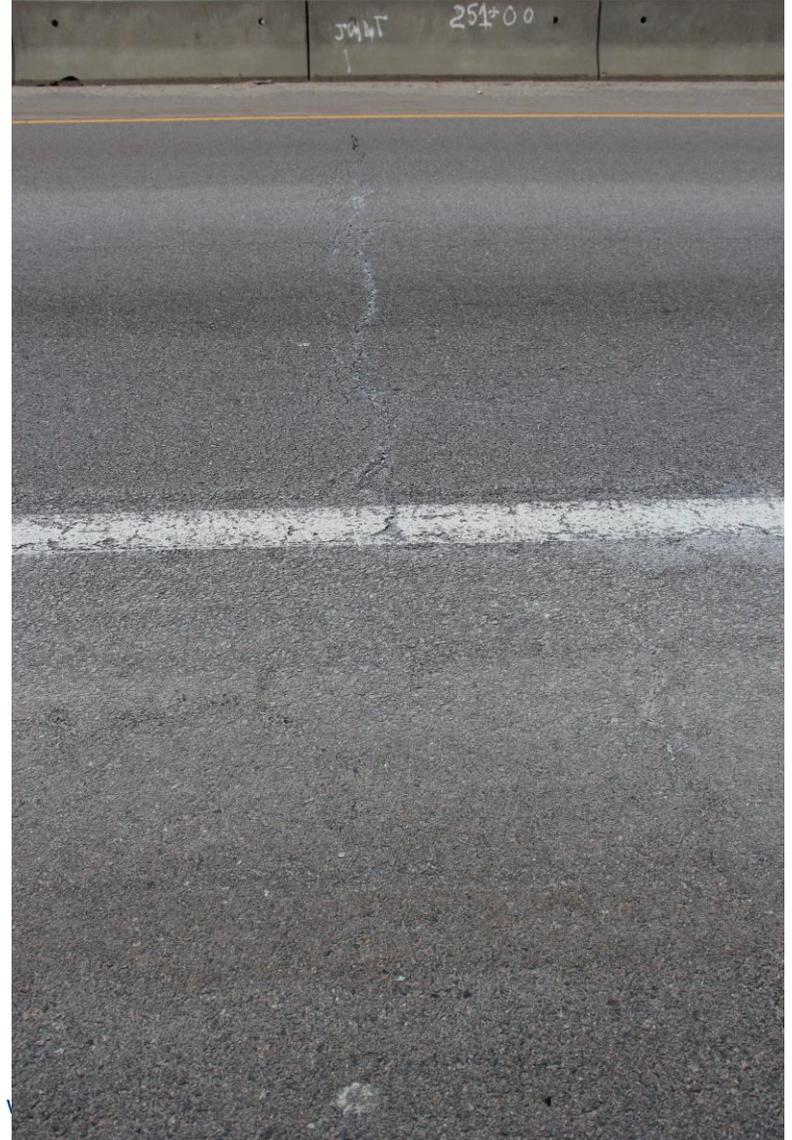


Rt 20 Auburn – cont.

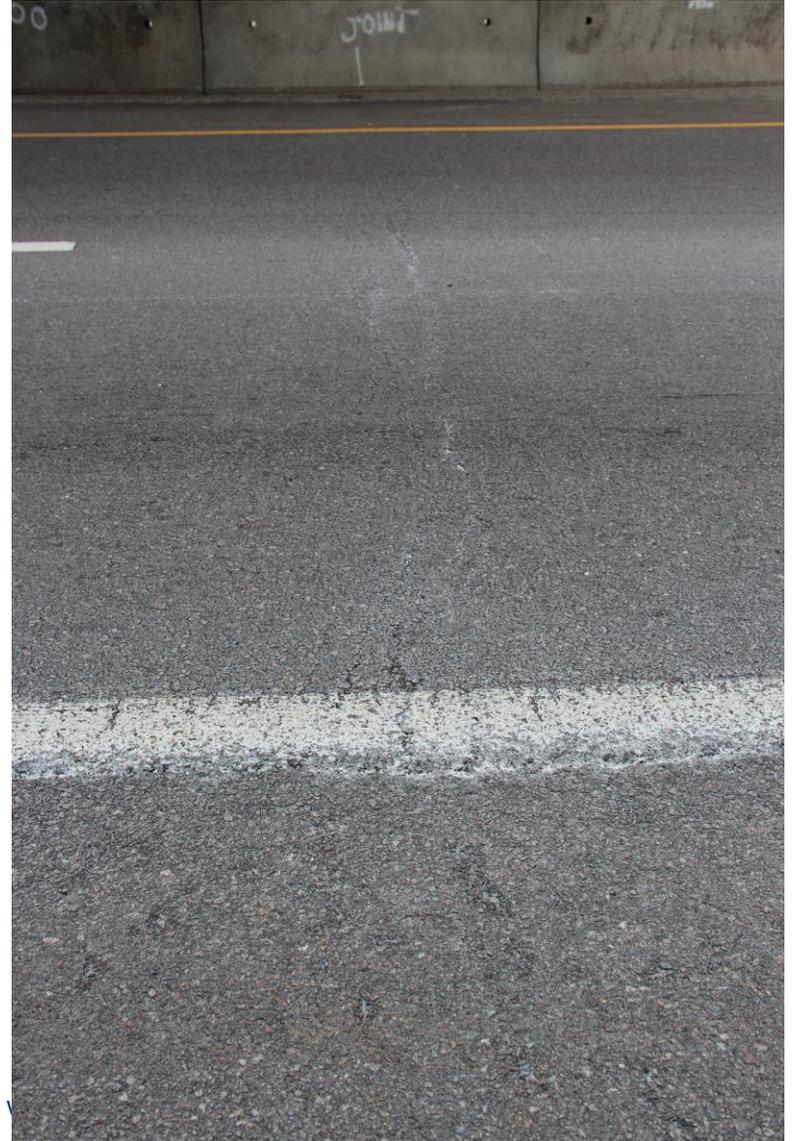


Rt 9 Framingham –5 years

Tensar Glassgrid 8502

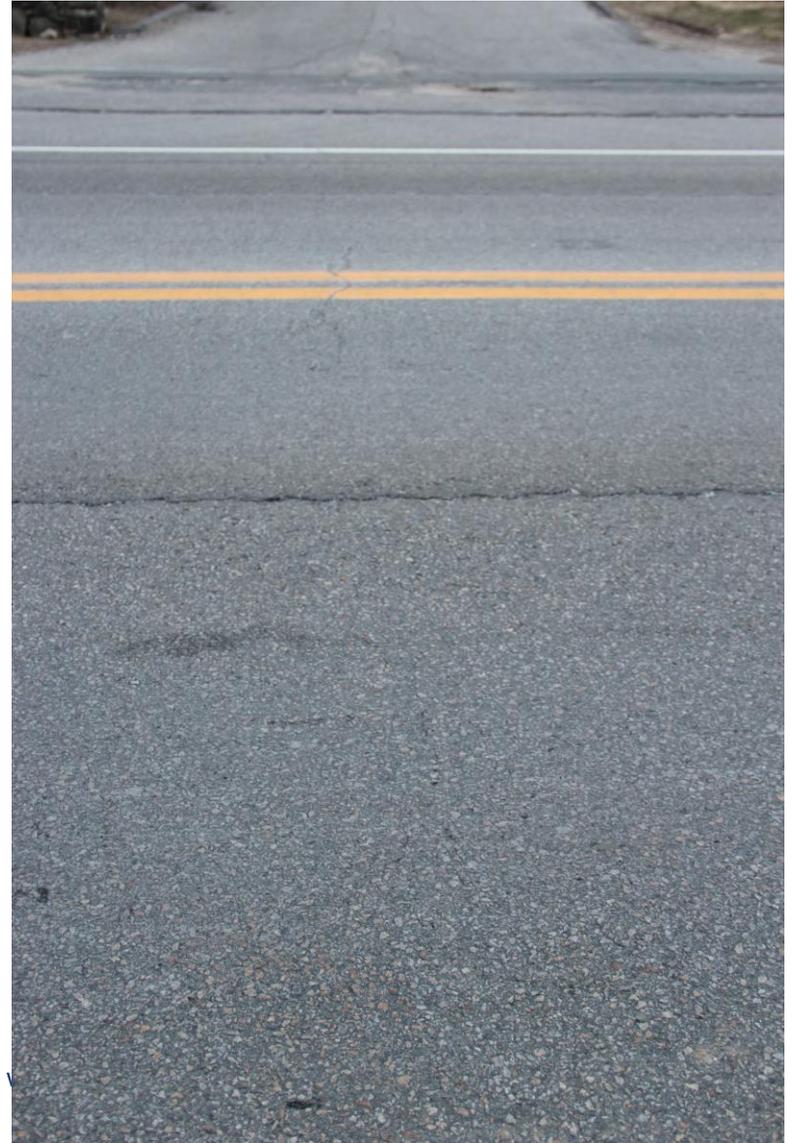


RT 9 Framingham – cont.

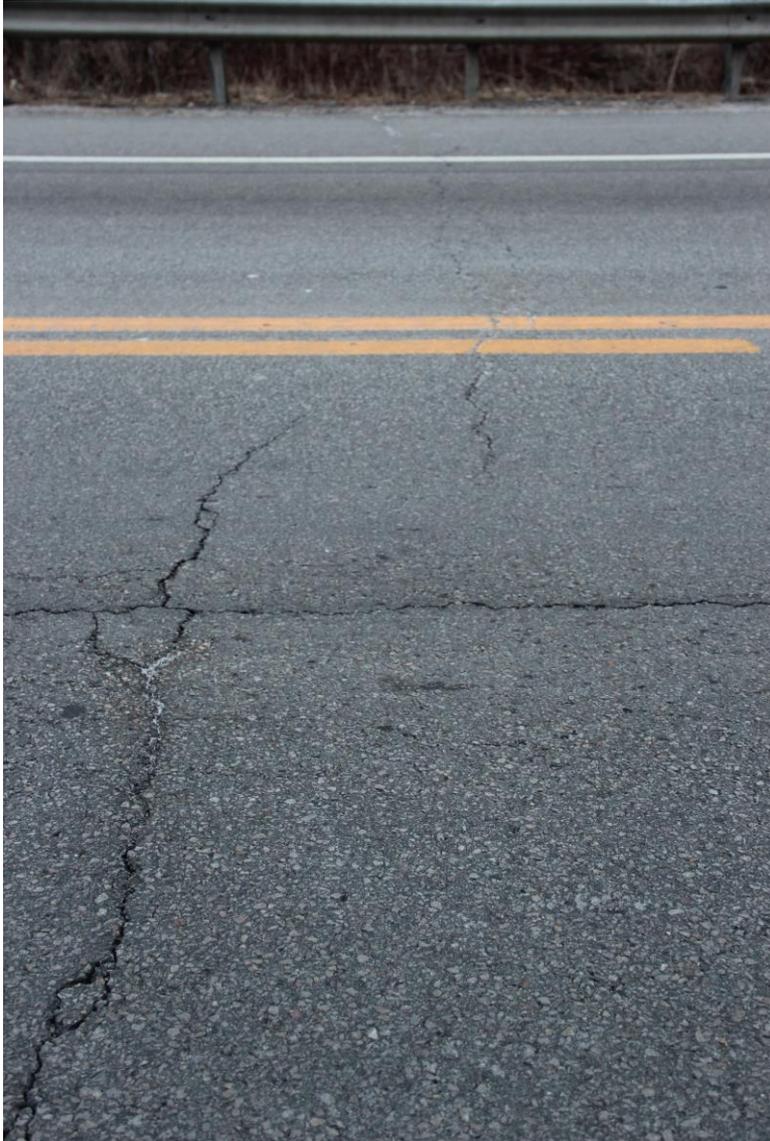


Rt 20 Worcester

No Treatment (5 years)



Rt 20 Worcester Cont.



Route 6 Westport (5 years)



Rubber Chip & Crack Seal



Route 6 Westport (5 years)



AR SAMI



I-495 STRATA (6 years)



I-495 STRATA Cont.



Asphalt Rubber SAMI Usage



PROJECT NUMBER	LOCATION	BID OPENING	ITEM	ITEM	QUANTITY	Price
604687	ARLINGTON	2/19/2014		466 SAMI	47200	\$4.90
605615	HUNTINGTON	2/12/2013		466 SAMI	133000	\$4.40
606034	CHICOPEE	2/5/2013		466 SAMI	18600	\$5.20
606008	ATHOL-PETERSHAM - FA#STP-002S(446)X	1/8/2013		466 SAMI	54822	\$4.60
605616	BECKET	12/18/2012		466 SAMI	115000	\$4.40
605614	BLANDFORD	12/4/2012		466 SAMI	125000	\$4.40
602653	AGAWAM	11/6/2012		466 SAMI	74972	\$4.40
606396	DISTRICT 1	7/31/2012		466 SAMI	138000	\$4.40
605517	BOSTON - CAMBRIDGE	1/24/2012		466 SAMI	1300	\$8.00
605874	CANTON	10/18/2011		466 SAMI	6250	\$6.50
605855	DISTRICT 1	8/10/2010		466 SAMI	133806	\$4.10
604718	CHESTERFIELD	2/2/2010		466 SAMI	29600	\$5.00
604293	NEW BEDFORD	1/5/2010		466 SAMI	6500	\$5.50
605625	BOSTON	10/27/2009		466 SAMI	8540	\$15.00
605386	CHESHIRE	5/5/2009		466 SAMI	24000	\$3.65
605028	LANESBOROUGH - NEW ASHFORD	4/29/2009		466 SAMI	5000	\$4.00
604314	WESTPORT	4/22/2009		466 SAMI	110000	\$4.45
605211	LANESBOROUGH - PITTSFIELD	3/10/2009		466 SAMI	29300	\$3.70
605548	DISTRICT 6	11/23/2010		466.1 SAMI	175	\$1.00
606097	DISTRICT 6	8/17/2010		466.1 SAMI	540	\$1.00
605386	CHESHIRE	5/5/2009		466.1 SAMI	26500	\$4.45
605211	LANESBOROUGH - PITTSFIELD	3/10/2009		466.1 SAMI	27900	\$4.50
					1,116,005	\$4.50

Route 32 Roylaston (1 year)

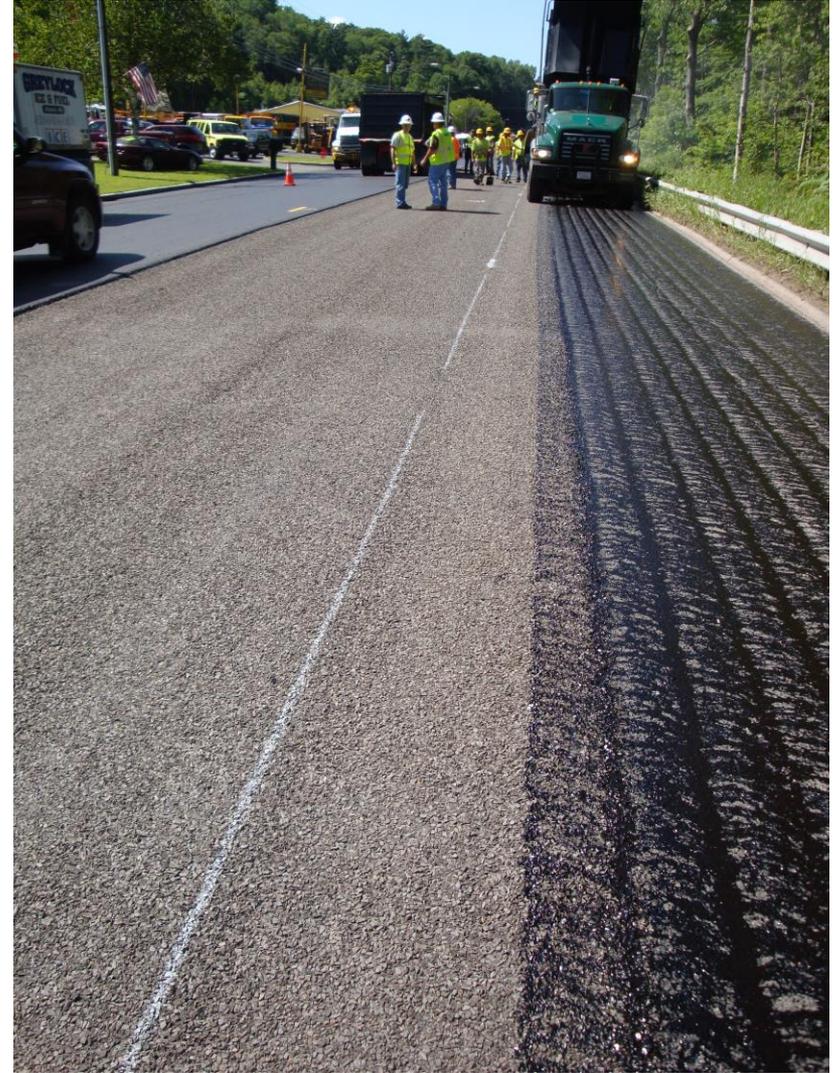


Route 8 Cheshire Lanesboro Ongoing Monitoring



- 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

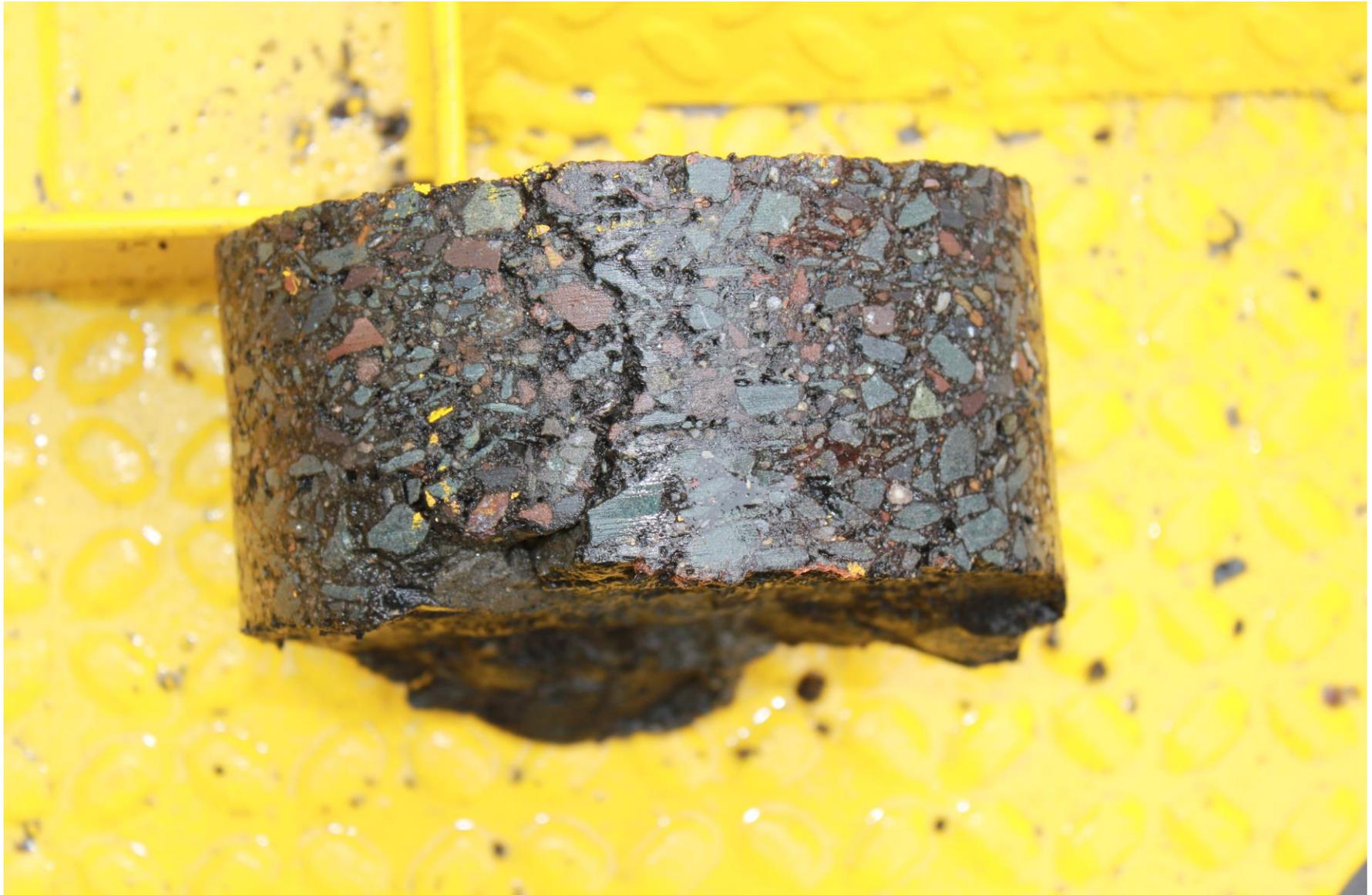
Route 8 Cheshire Lanesboro Construction



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



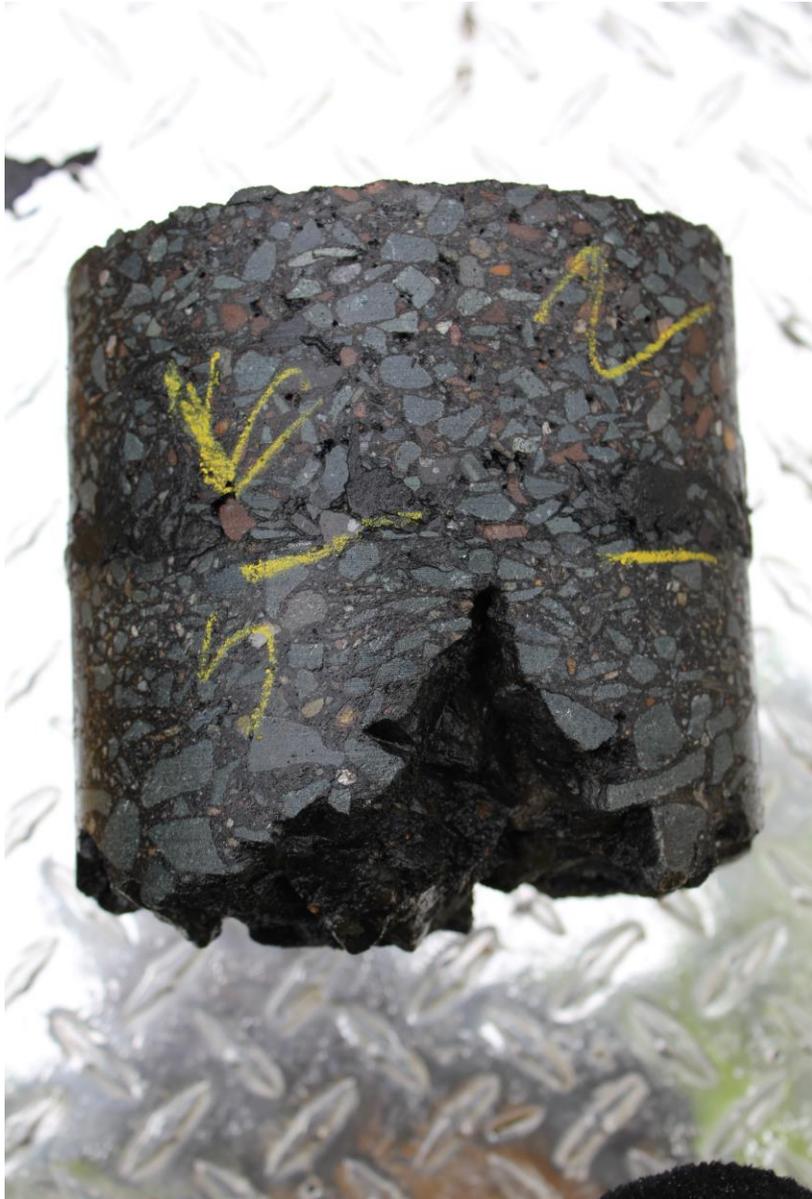
Cheshire - Lanesboro
HMA over Rubber Chip Seal
SAMI



- 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.

Cheshire Lanesboro UTBO on Rubber Chip SAMI



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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