MassDOT – Pavement Preservation Updates

Northeast Pavement Preservation Partnership

Boston, MA

November 8-10, 2011

Topics

- Massachusetts Mileage Overview
- Statewide Pavement Condition
- Multi-Year Resurfacing Programs
  - NHS & Interstate
- Preservation Projects ~ A Look Back
  - Micromilling & ARGG Thin Overlays
  - Interlayers with Thin Overlays
- MassDOT Trends
- Research (UMass ATMC)
- Miscellaneous

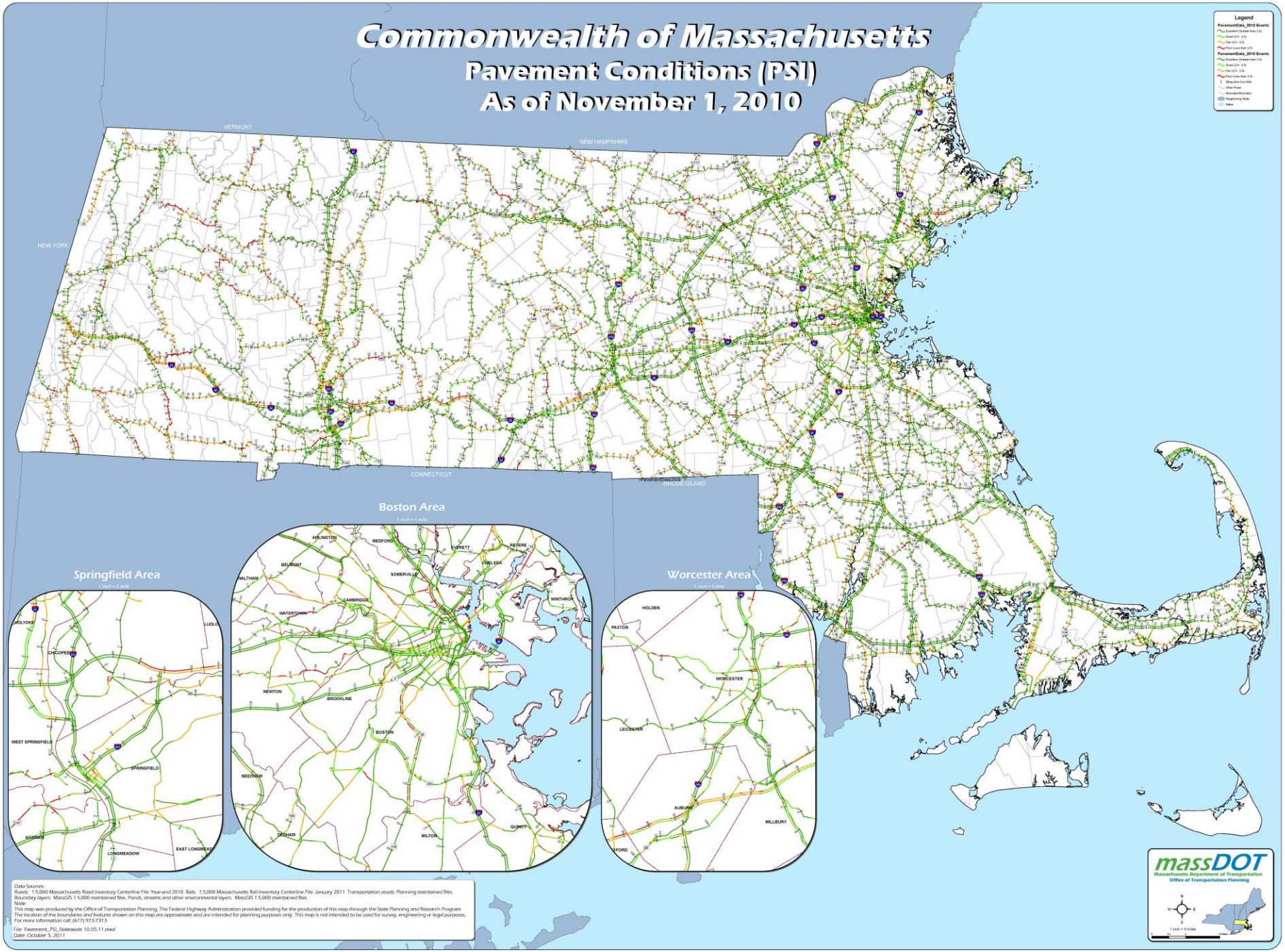
Mileage by Jurisdiction

Jurisdiction by Functional Class - Centerline Miles					
Jurisdiction	Interstate	Arterial	Collector	Local	**Total**
MassDOT	572.72	2130.22	249.83	56.96	**3009.73**
City/Town	0	4216.6	4552.34	20413.05	**29181.99**
DCR	0	118.14	4.23	135.64	**258.01**
MassPort	0.17	6.09	0	1.99	**8.24**
State Park	0	0	9.24	272.76	**282**
State Institutional	0	3.46	1.57	89.19	**94.22**
County Institutional	0	0	0.01	3.49	**3.5**
Combined Federal	0	2.02	8.18	102.93	**113.13**
Unaccepted	0	8.65	16.18	3270.91	**3295.74**
TOTAL	**572.89**	**6485.18**	**4841.56**	**24346.92**	**36246.56**

Commonwealth of Massachusetts

Pavement Conditions (PSI)

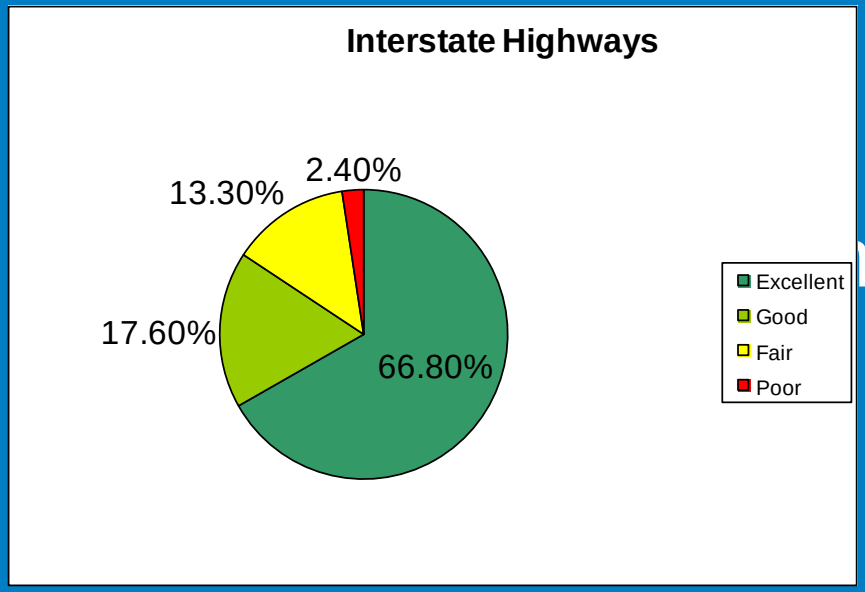
As of November 1, 2010

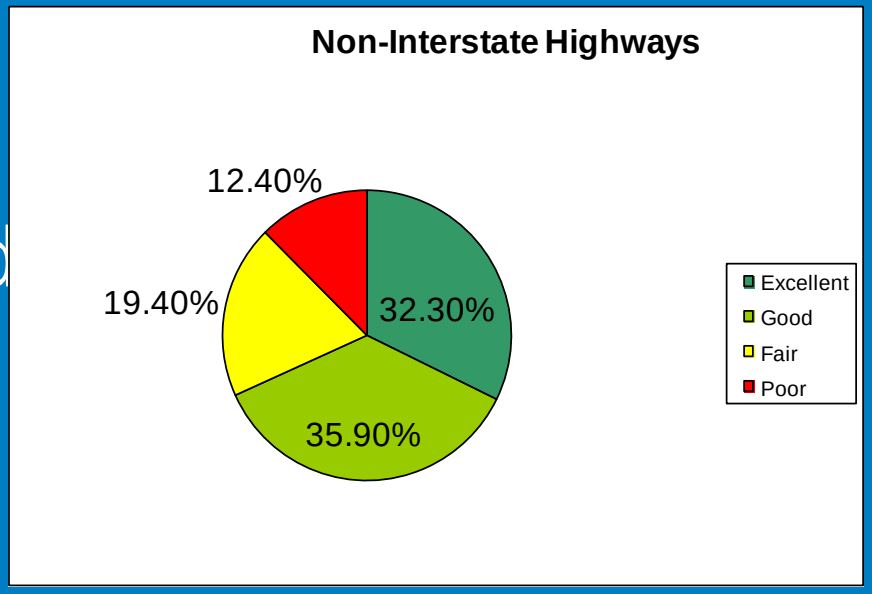


Data Sources:
Roads: 1:5,000 Massachusetts Road Inventory Centerline File: Year-end 2010. Rails: 1:5,000 Massachusetts Rail Inventory Centerline File: January 2011. Transportation assets: Planning maintained files. Boundary layers: MassGIS 1:5,000 maintained files. Ponds, streams and other environmental layers: MassGIS 1:5,000 maintained files.

Note:
This map was produced by the Office of Transportation Planning. The Federal Highway Administration provided funding for the production of this map through the State Planning and Research Program. The location of the boundaries and features shown on this map are approximate and are intended for planning purposes only. This map is not intended to be used for survey, engineering or legal purposes. For more information call: (617) 973-7313

File: Pavement_PSI_Statewide 10.05.11.mxd
Date: October 5, 2011





Interstate Pavement Condition

Excellent	66.80%
Good	17.60%
Fair	13.30%
Poor	2.40%

Non-Interstate Pavement Condition

Excellent	32.30%
Good	35.90%
Fair	19.40%
Poor	12.40%

NHS Preservation

massDOT Massachusetts Department of Transportation Highway Division

MassDOT - NHS Pavement Preservation Program 2010 - 2014

Year	NHS Route	Location	Proj. Num.	Dist	From	To	Lns+ Shld	Tot Lane MI	Prelim Cost/ lane mi	Prelim. Office Estimate	Program TFPCC
2008	7	LENOX LEE STOCKBRIDGE	605029	1	18.0	23.4	3	16.3	20	1,550,560	
	10/202	WESTFIELD	605134	2	11.6	14.4		0.0	0	1,928,800	1,583,000
	2	LANCASTER HARVARD	604467	3	103.0	110.3		0.0	0	3,555,370	3,181,614
	2	LEXINGTON	604628	4	128.2	131.7		0.0	0	3,328,830	
	20	WESTON WALTHAM	605138	4	141.0	144.0		0.0	0	702,900	677,135
	3	BOURNE PLYMOUTH	604223	5	3.0	9.0		0.0	0	3,364,150	
		Total FFY 2008:						16.3	20	14,430,610	5,441,749
2009	6	PITTSFIELD LANESBOROUGH	605211	1	44.4	47.6	4	12.8	16	19	
	2	HARVARD LITTLETON	604400	3	110.3	115.5	6	31.2	38	46	
	2	ARLINGTON BELMONT CAMBRIDGE	605259	4	131.7	134.0	10	23.0	28	34	
	24	AVON STOUGHTON	605238	5	34.0	38.0	8	32.0	39	48	
		Total FFY 2009:						**99.0**	105	128	
2010	33	CHICOPEE- SOUTH HADLEY- RESURFACING, CONCRETE REPAIRS & RELATED WORK ON ROUTE 33 (MEMORIAL DRIVE)	605260	2	0.0	4.0	4	16.0	275,000	4,400,000	5,368,000
	146N *	DOUGLAS- NORTHBRIDGE- SUTTON- UXBRIDGE- RESURFACING & RELATED WORK ON ROUTE 146 (NB)	606035	3	3.7	13.7	3	30.0	258,100	7,742,985	9,500,000
		Total FFY 2010:						**46.0**		**12,142,985**	**14,868,000**
2011	2	FITCHBURG- LEOMINSTER- LANCASTER- RESURFACING & RELATED WORK ON ROUTE 2	605722	3	97.0	103.0	6	36.0	140,000	5,486,799	6,309,819
	28	FALMOUTH- RESURFACING & RELATED WORK ON ROUTE 28	605619	5	50.7	56.5	6	34.8	115,000	4,002,000	4,882,440
	24	FALL RIVER- RESURFACING & RELATED WORK ON ROUTE 24 (Alternate - Rt 6 Sandwich)	605698	5	0.00	1.80	6	10.8	225,000	2,430,000	2,964,600
		Total FFY2011:						**81.6**		**11,918,799**	**14,156,859**
2012	2	ACTON- BOXBOROUGH- LITTLETON- RESURFACING & RELATED WORK ON ROUTE 2	604472	3	114.0	119.8	6	34.8	147,000	5,115,600	6,087,564
	24	RANDOLPH- CANTON- RESURFACING & RELATED WORK ON ROUTE 24	605607	6	37.8	40.1	8	18.6	264,000	4,908,831	5,890,415
		Total FFY2012:						**53.4**		**10,024,431**	**11,977,979**
2013	3	WEYMOUTH- RESURFACING & RELATED WORK ON ROUTE 3	605602	6	36.0	38.0	8	16.0	175,000	2,800,000	3,416,000
	114	MIDDLETON	606126	4	10.8 to	11.16	3	9.0	145,000	1,305,000	1,592,100
	6	BOURNE SANDWICH RESURFACING OF ROUTE 6 (MID CAPE HIGHWAY)	606286	5			4	35.0	150,000	5,250,000	6,405,000
		Total FFY2013:						**63.4**		**9,355,000**	**11,413,100**
2014	20	NORTHBOROUGH- RESURFACING & RELATED WORK ON ROUTE 20	605610	3	122.0	126.5	4	18.0	145,000	2,610,000	3,079,800
	28	BOURNE - RESURFACING AND RELATED WORK ON RT.28 (OTIS ROTARY)	606178	5	56.5	62.9	6	38.4	120,000	4,608,000	5,621,760
	7	LENOX - PITTSFIELD RESURFACING AND RELATED WORK ROUTE 7		1	25.7	28.7	4.5	13.5	145,000	1,957,500	2,309,850
		Total FFY2014:						**62.4**		**9,175,500**	**11,011,410**
2015	7	SHEFFIELD - GREAT BARRINGTON - RESURFACING AND RELATED WORK ON US RT. 7	605887	1	0.0	7.6	4	31.2	83,367	2,601,038	3,173,266
	9	CUMMINGTON RESURFACING AND RELATED WORK ON US ROUTE 9	605582	1	16.7	27.6	4	44.4	140,000	6,216,000	7,583,520
		Total FFY2014:						**75.6**		**7,654,000**	**10,756,786**

MassDOT Interstate Maintenance Program 2012 - 2015

Year	Route	Location	Proj. File	TFPCC	Dist.	TFPCC Adjust. For Inflation
2012	I-91	HOLYOKE- WEST SPRINGFIELD- INTERSTATE MAINTENANCE & RELATED WORK ON I-91 (MM10.8 TO 15.0)	605594	$16,452,096	2	
	I-495	FRANKLIN - BELLINGHAM - MEDWAY - MILFORD - INTERSTATE RESURFACING AND RELATED WORK ON I-495	606169	$15,104,000	3	
	I-495	HAVERHILL- INTERSTATE MAINTENANCE & RELATED WORK ON I-495	605598	$17,794,400	4	
	I-93	BOSTON - SOMERVILLE - INTERSTATE MAINTENANCE RESURFACING AND RELATED WORK ON I-93	606167	$10,738,000	6	
	I-495	MANSFIELD- NORTON - INTERSTATE MAINTENANCE & RELATED WORK ON I-495	605591	$12,838,400	5	
	I-495	WESTFORD- INTERSTATE MAINTENANCE & RELATED WORK ON I-495	605586	$3,776,000	3	
		Total FFY2012:		**$76,702,896**		
2013	I-190	WORCESTER- INTERSTATE MAINTENANCE & RELATED WORK ON I-190 (NB)	605588	$8,590,400	3	$8,934,016
	I-95	LYNNFIELD- WAKEFIELD- INTERSTATE MAINTENANCE & RELATED WORK ON I-95	605597	$13,192,400	4	$13,720,096
	I-95	FOXBOROUGH - INTERSTATE MAINTENANCE & RELATED WORK ON I-95	605596	$8,307,200	5	$8,639,488
	I-93	WILMINGTON- WOBURN- INTERSTATE MAINTENANCE & RELATED WORK ON ROUTE I-93	604879	$12,253,120	4	$12,743,245
	I-95	LEXINGTON - BURLINGTON - INTERSTATE RESURFACING AND RELATED WORK ON I-95	606170	$29,647,500	4	$30,833,400
		Total FFY2013:		**$71,990,620**		**$74,870,245**
2014	I-91	EASTHAMPTON NORTHAMPTON - INTERSTATE MAINTENANCE AND RELATED WORK ON I-91		$10,797,000	2	$11,660,760
	I-91	BERNARDSTON - INTERSTATE MAINTENANCE RESURFACING AND RELATED WORK	606173	$9,027,000	2	$9,749,160
	I-84	STURBRIDGE- HOLLAND- INTERSTATE MAINTENANCE & RELATED WORK ON I-84	605592	$13,275,000	3	$14,337,000
	I-495	CHELMSFORD - LOWELL - TEWSKBURY - INTERSTATE MAINTENANCE RESURFACING AND RELATED WORK	606174	$13,688,000	4	$14,783,040
	I-195	NEW BEDFORD -FAIRHAVEN - INTERSTATE MAINTENANCE RESURFACING AND RELATED WORK ON I-195	606172	$10,384,000	5	$11,214,720
	I-495N	FOXBOROUGH - PLAINVILLE - WRENTHAM - FRANKLIN - I. M. RESURFACING AND RELATED WORK ON I-495	606176	$12,272,000	5	$13,253,760
		Total FFY2014:		**$69,443,000**		**$74,998,440**
2015	I-95	SHARON - INTERSTATE RESURFACING AND RELATED WORK ON I-95	606171	$8,326,080	5	$9,325,210
	I-495S	FOXBOROUGH - PLAINVILLE - WRENTHAM - FRANKLIN - I. M. RESURFACING AND RELATED WORK ON I-495	606176	$9,515,520	5	$10,657,382
	I-95	DANVERS TOPSFIELD MIDDLETON RESURFACING ON I-95		$19,328,400	4	$21,647,808
	I-495	CHELMSFORD		$8,722,560	4	$9,769,267
	I-190	STERLING		$9,664,200	3	$10,823,904
	I-91	HATFIELD WHATELY		$11,151,000	2	$12,489,120
		Total FFY2015:		**$66,707,760**		**$74,712,691**

I-95 Attleboro “Before”

- I-95 Attleboro (2008)
- 4.57± miles (37.56 lane miles)
- 3 lanes + Breakdown lane & Shoulder
- Distress
  - Ravelling & Weathering OGFC
  - Delamination & Thermoplastic
  - Longitudinal Joints & Plow Damage
- Rehab
  - Micromill & 1.25” ARGG Thin Overlay
- Bid $3,022,045.35
  - Clearing & Grubbing
  - Frames/Grates (lockdowns)
  - Guardrail repairs & Safety items
  - Traffic Control, Striping, etc.
- Cost $82.6K/lane mile

Pre-Construction Ride Statistics								
ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0095N	0.00	4.57	74.65	85.84	80.25	No Bridge	2008	54309

I-95 Attleboro

Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0095N	0.00	4.57	74.65	85.84	80.25	Before	2008	54309
0095N	0.00	4.57	40.57	56.07	48.32	After	2009	54309

I-95 Attleboro “After”

Ride Quality Improvement

ROUTE	FROM	TO	LIRI	% REDUCED	RIRI	% REDUCED	AVG IRI	% REDUCED
0095N	0.00	4.57	34.09	45.7%	29.77	34.7%	31.93	**39.8%**

I-95 North Attleboro – Foxboro "Before"

- I-95 North Attleboro-Foxboro (2008)
- 6.39± miles (51.12 lane miles)
- 3 lanes + Breakdown lane & Shoulder
- Distress
  - Ravelling & Weathering OGFC
  - Delamination & Thermoplastic
  - Longitudinal Joints & Plow Damage
- Rehab
  - Micromill & 1.25" ARGG Thin Overlay
- Bid $6,008,093.25
  - Bridge Repairs, ramp & interchanges ($0.9M)
  - Clearing & Grubbing
  - Frames/Grates (lockdowns)
  - Guardrail repairs & Safety items
  - Traffic Control, Striping, etc.
- Cost $ 117.5K/lane mile

Pre-Construction Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0095N	4.57	8.22	77.91	88.53	83.22	Before	2008	58178
0095N	9.38	12.12	70.29	67.50	68.90	Before	2008	58178

I-95 North Attleboro - Foxboro

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Construction Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0095N	4.57	8.22	55.39	65.49	60.44	After	2009	58178
0095N	9.38	12.12	41.82	65.64	53.73	After	2009	58178

I-95 North Attleboro - Foxboro

Reduction In IRI After Project Completion								
ROUTE	FROM	TO	LIRI	% REDUCED	RIRI	% REDUCED	AVG IRI	% REDUCED
0095N	4.570	8.220	22.52	28.9%	23.04	26.0%	22.78	**27.4%**
0095N	9.380	12.120	28.48	40.5%	1.86	2.8%	15.17	**22.0%**

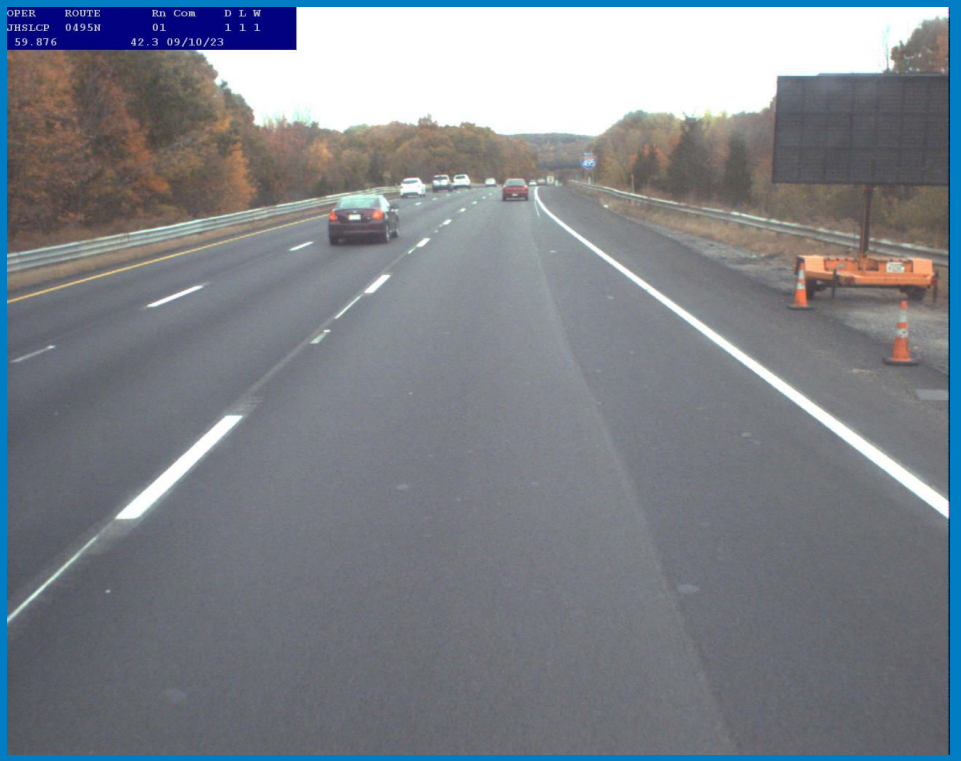
I-495N Milford – Southborough "Before"

- I-495N Milford - Southboro (2008)
- 11.12± miles (44.48 lane miles)
- 3 lanes + Breakdown lane & Shoulder
- Distress
  - Ravelling & Weathering OGFC
  - Delamination & Thermoplastic
  - Longitudinal Joints & Plow Damage
  - Structural Cracking north of I-90
- Rehab
  - Micromill & 1.25" ARGG Thin Overlay
  - Added 1.75" pavement structure north of I-90
- Bid $4,800,781.00
  - Clearing & Grubbing
  - Frames/Grates (lockdowns)
  - Traffic Control, Striping, etc.
- Cost $ 107.9.5K/lane mile

Pre-Construction Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0495N	50.55	61.67	83.94	81.17	82.55	Before	2008	54488

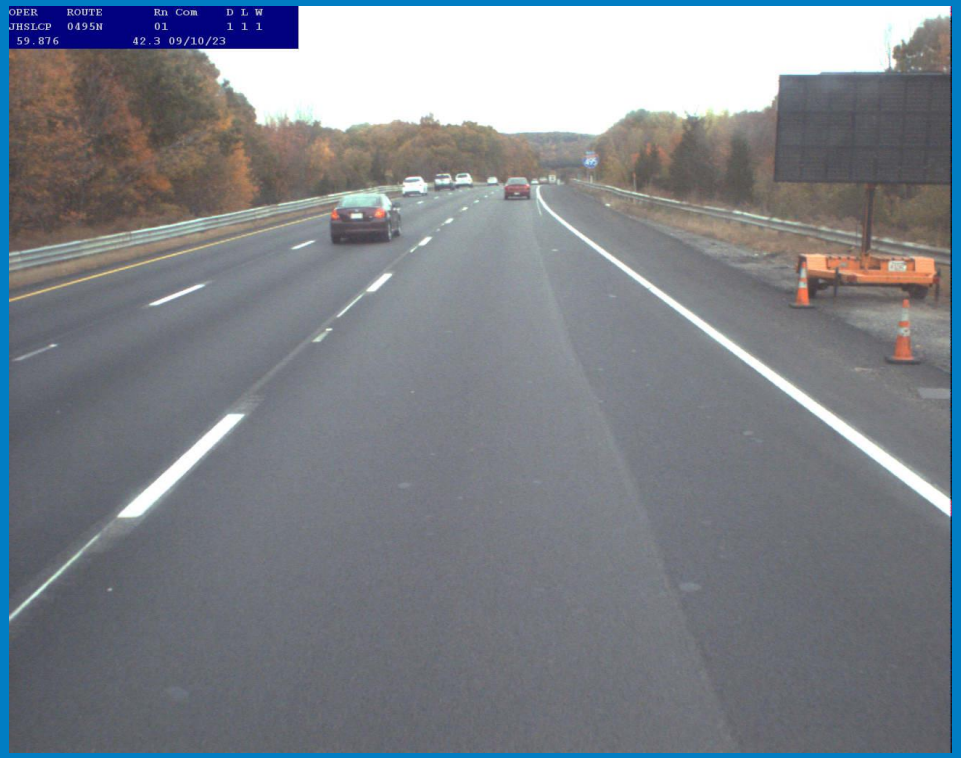
I-495N Milford – Southborough



Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0495N	50.55	61.67	83.94	81.17	82.55	Before	2008	54488
0495N	50.55	61.67	37.89	52.86	45.37	After	2009	54488

I-495N Milford – Southborough “After”



Reduction In IRI After Project Completion								
ROUTE	FROM	TO	LIRI	% REDUCED	RIRI	% REDUCED	AVG IRI	% REDUCED
0495N	50.55	61.67	46.05	54.9%	28.31	34.9%	37.18	**45.0%**

Rt 24 Brockton – Raynham “Before”

- 12.38± miles (99.04 lane miles)
- 3 lanes + Breakdown lane & Shoulder
- Distress
  - Ravelling & Weathering OGFC
  - Delamination & Thermoplastic
  - Extensive temporary patching
  - Structural Cracking at bridges only!
- Rehab
  - Micromill & 1.25” ARGG Thin Overlay
  - Added 2” pavement structural inlay at bridge approaches.
- Bid $12,275,737.50
  - Extensive Bridge Work
  - Clearing & Grubbing
  - Frames/Grates (lockdowns)
  - Traffic Control, Striping, etc.
  - Major Interchange network at I-495.
- Cost $ 123.9K/lane mile

Pre-Construction Ride Statistics								
ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0024N	21.43	33.81	80.06	68.28	74.17	Before	2010	61791

Rt 24 Brockton – Raynham

Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0024N	21.43	33.81	80.06	68.28	74.17	Before	2010	61791
0024N	21.43	33.81	65.34	56.96	61.15	After	2011	61791

Rt 24 Brockton – Raynham “After”

Reduction In IRI After Project Completion								
ROUTE	FROM	TO	LIRI	% REDUCED	RIRI	% REDUCED	AVG IRI	% REDUCED
0024N	21.43	33.81	14.72	18.4%	11.32	16.6%	13.02	17.6%

RT 24 Avon Stoughton “Before”

- 4.02± miles (31.16 lane miles)
- 3 lanes + Breakdown lane & Shoulder
- Distress
  - Ravelling & Weathering OGFC
  - Delamination & Thermoplastic
  - Thermoplastic markings gone
- Rehab
  - Micromill & 1.25” ARGG Thin Overlay
- Bid $4,349,096.25
  - Bridge Patching & Repairs
  - Clearing & Grubbing
  - Frames/Grates (lockdowns)
  - Traffic Control, Striping, etc.
  - Guardrail repairs & interchanges.
- Cost $ 139.5K/lane mile

Pre-Construction Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0024N	33.82	37.84	74.61	85.76	80.18	Before	2009	59128

RT 24 Avon Stoughton

Post-Construction Ride Statistics

ROUTE	FROM	TO	LIRI	RIRI	AVG IRI	COMMENTS	COLLECTION YEAR	PROJECT #
0024N	33.82	37.84	37.58	42.58	40.08	No Bridge	2010	59128

RT 24 Avon Stoughton “After”

Reduction In IRI After Project Completion								
ROUTE	FROM	TO	LIRI	% REDUCED	RIRI	% REDUCED	AVG IRI	% REDUCED
0024N	33.82	37.84	37.03	49.6%	43.17	50.3%	40.10	**50.0%**

Ride Quality & Thin Overlays

- Ride quality improvements with thin overlays? Yes!
- Incentives or Penalties based on IRI? Yes!
- Micromilling & Surface Preparation vary significantly.
- Began collecting data on thin lifts, milling and ride – not sufficient data to make a conclusion, but……
- Hypothesis: poor milling is related to poor final ride?

Project	Left wheel IRI Milled	Rt Wheel IRI Milled	Average IRI Milled	Average IRI Paved
Roadway A	79.39	81.00	80.20	61.15
Roadway B	77.23	74.74	75.98	TBD
Roadway C	95.44	95.93	95.68	TBD
Roadway D	124.61	126.70	125.65	TBD
Roadway E	116.75	117.58	117.17	TBD
Roadway F	71.74	76.13	73.94	45.37
Roadway G	146.07	143.67	144.87	TBD

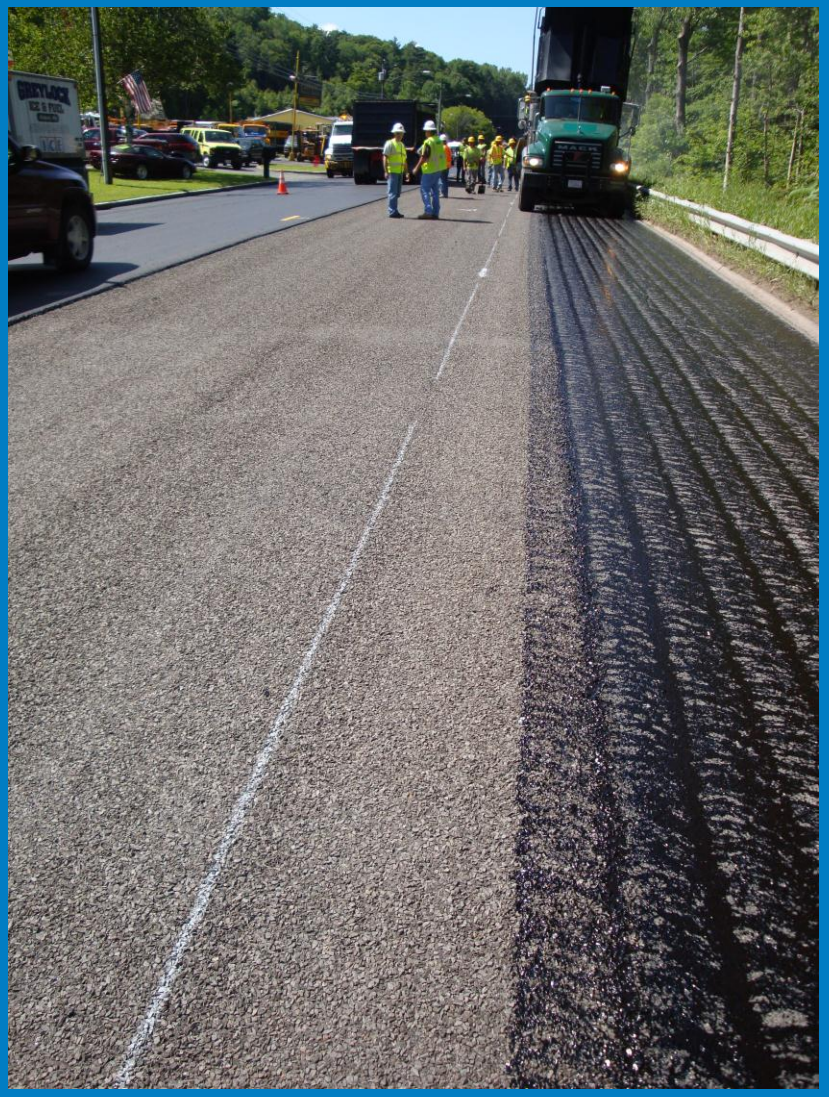
Route 8 Cheshire Lanesboro
Ongoing Monitoring

- MassDOT looked at systems & methods to mitigate reflective cracking.
- Use of “strain tolerant” layers in preservation ~ Stress Absorbing Membrane Interlayers (SAMI).
- Systems that could be placed independently of an overlay, such as Rubber Chip Seals and Fibermat.
- Four test sections were constructed on Route 8 in the towns of Cheshire- Lanesboro.

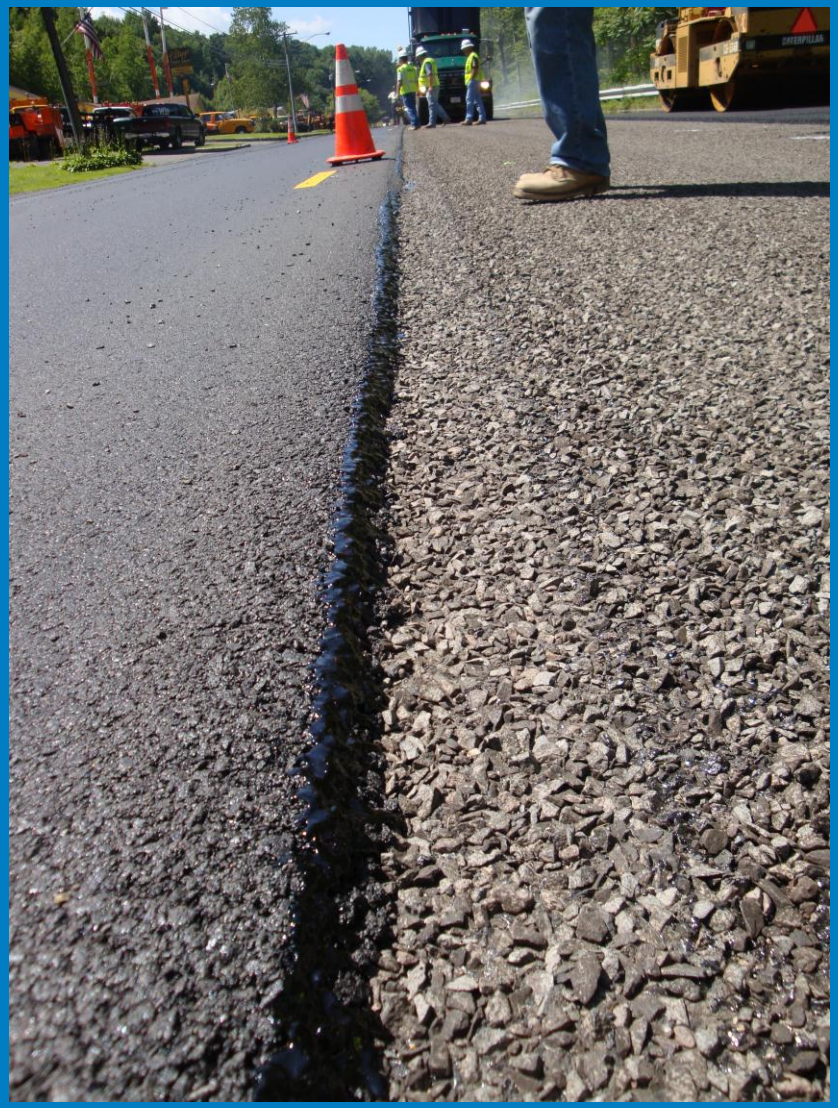
Route 8 Cheshire Lanesboro
Ongoing Monitoring

- HMA thin overlay on Fibermat SAMI.
- HMA thin overlay on Asphalt Rubber SAMI
- Bonded Thin Overlay (Novachip) on Asphalt Rubber SAMI
- Bonded Thin Overlay (Novachip) on Fibermat SAMI

Route 8 Cheshire Lanesboro Construction



Route 8 Cheshire Lanesboro Construction



Cheshire-Lanesboro – Two Years Later
HMA Overlay on Shoulder – No SAMI

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Cheshire Lanesboro – Two Years Later
No SAMI - Core

- Cheshire Lanesboro Route 8
- Fibermat SAMI stops at fog line.
- Surface cracking stops at fog line.

Cheshire Lanesboro
HMA over Fibermat

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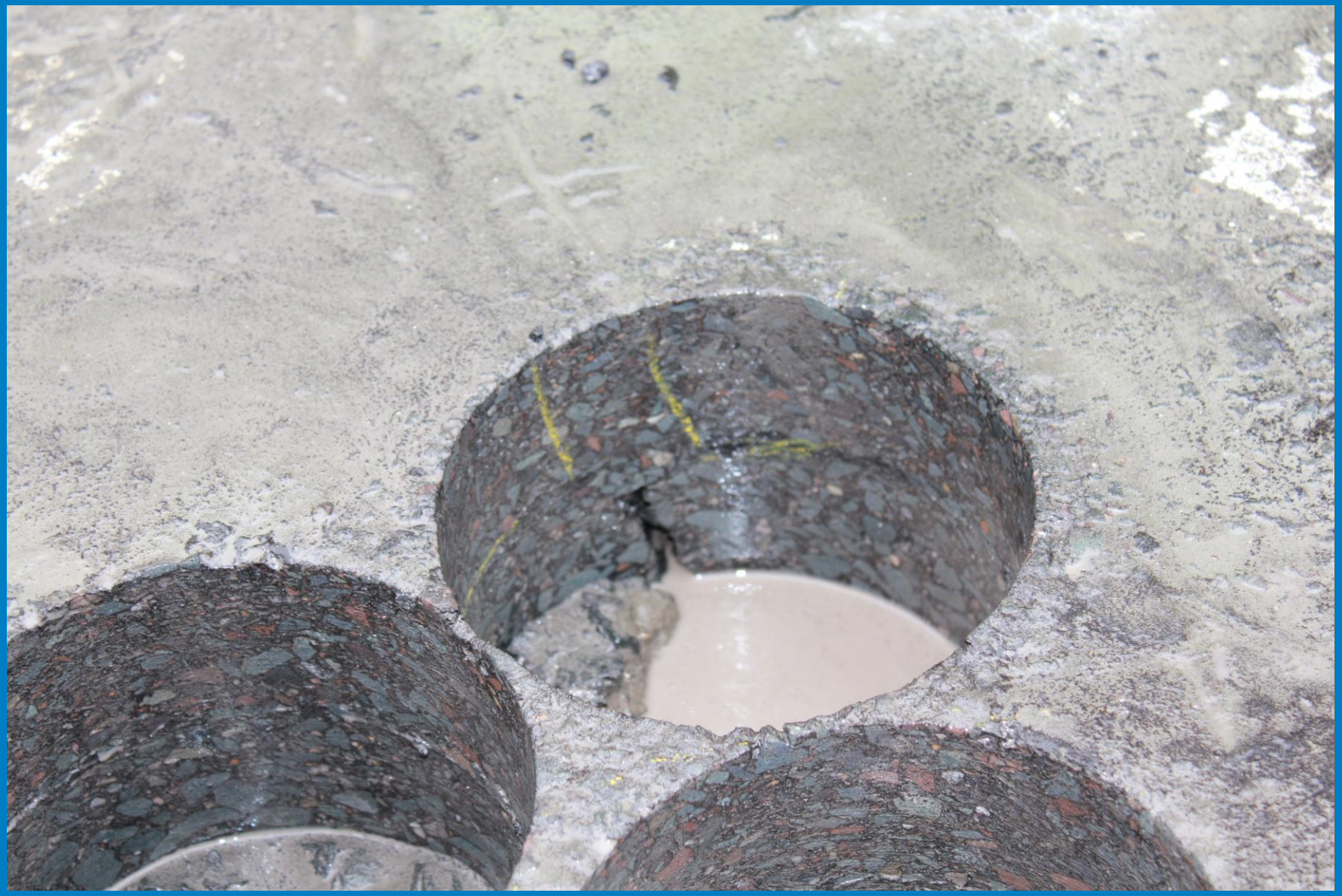

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Cheshire - Lanesboro
HMA over Rubber Chip Seal
SAMI

- 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.

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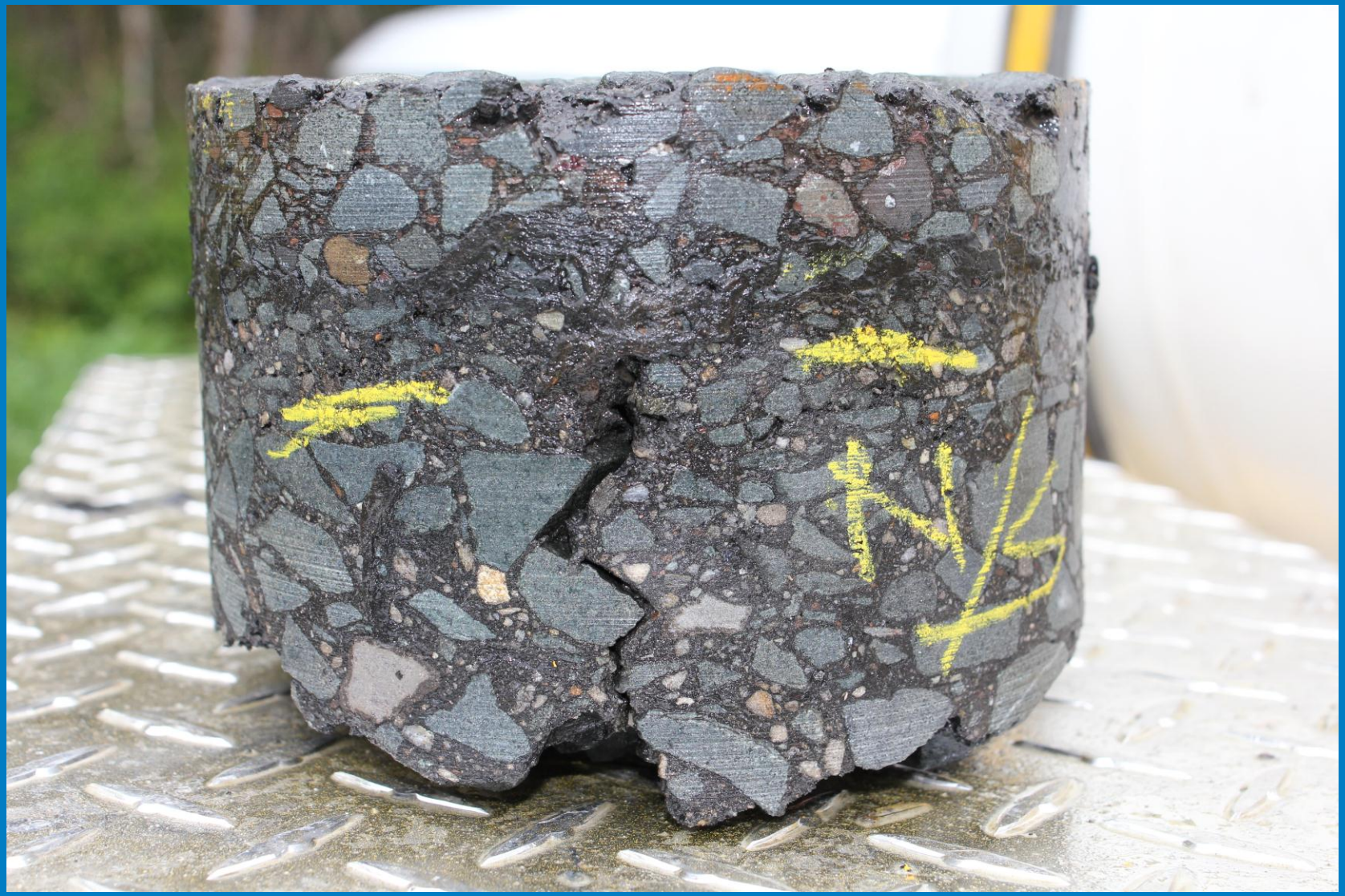
- Route 8 Cheshire Lanesboro
- Bonded Thin Overlay on Asphalt Rubber SAMI
- Light Reflective Cracking visible
- SAMI and core appear intact.

Cheshire Lanesboro
Bonded Thin Overlay on Rubber Chip SAMI



Cheshire Lanesboro
Bonded Thin Overlay over Fibermat

Cheshire – Lanesboro Cores
Bonded Thin Overlay on Fibermat SAMI

- Light reflective cracking visible – mostly transverse
- Core & Fibermat SAMI Intact

Cheshire – Lanesboro Cores
Bonded Thin Overlay on Fibermat SAMI

- Fibermat with Bonded thin overlay.
- Light reflective cracking – mostly transverse.
- Core and fibermat SAMI intact.

Preservation Observations

- Learning curves are slowly becoming performance curves.
  - 2004 CMCR ¾” overlay on I-91 Bernardston-Greenfield ~ performing well. (trucks)
  - 2005 CMCR thin overlay on Rt 146 performing well.
  - 2006 CMCR thin overlay on Rt 2 performing well.
  - 2007-2008 Bonded thin overlays on I-190 performing well.
  - 2007 ARGG thin overlays performing well on I-295 & others.
  - 2008 Rt 8 Cheshire Lanesboro Interlayer Project performing well to retard cracks.
  - 2010 MassDOT piloted Cold-In-Place Recycling in Pittsfield with HMA overlays (2 roads).
    - Treatment seemed appropriate for the pavement thickness, but localized freeze thaw action was considerable ~ 6”+ frost heaves.
    - Drainage, Drainage, Drainage. Don’t skip the obvious (or not so obvious)!
    - Not magic bullets ~ project is performing well, but design work and testing is necessary to ensure performance!

MassDOT Trends

- GreenDOT and other Green initiatives.
  - Warm Mix ~ need to **actually lower** temperatures (and quantify reductions in GHG)!
  - Emphasis on treatments having reduced carbon footprint!
  - Many contracts require a sustainability statement when going to the MassDOT Board!
- Preservation work remains subject to “Complete Streets” program and consider ADA, Sidewalk, Environmental, Safety (guardrail height) and Bicycle Accommodations.
- Need to work with our Industry partners to provide training and get the preservation message out!
- Thin mixes with polymers and higher RAP content mixes are of interest.
- Still looking for a project ~ HIP with polymer thin overlay.

Research & Projects

- UMass Dartmouth ATMC Open Ended Research
  - *"Determining the Influence of Plant Type and Production Parameters on the Performance of Plant Produced RAP Mixtures."* (Plant RAP)
  - *"Performance Characteristics of Thin Lift Overlay Mixtures Containing High RAP Content, RAS and Warm Mix Asphalt Technology."* (RAP, RAS & Warm Mix)
  - *"Performance Characteristics of Asphalt Rubber Mixtures Containing RAP and Warm Mix Asphalt Technology."* (RAP & Asphalt Rubber)
  - Thin Lifts with High RAP for Low(er) Volume Roads.
  - University Project to track MassDOT experimental pavements (pending)..

Research & Projects

- *Evaluating the Impacts of Reductions in Gyratory Compactive Effort on HMA Mixtures (100 to 80) – WMA & HMA.*
- Calibration Center for Profiling Devices for QA.
- *"Manual for the Preservation, Maintenance and Rehabilitation of Highway Pavements."*

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