

State Planning and Research Program Quarterly Report

PROJECT TITLE:

Optimal Timing of Preventive Maintenance for Addressing Environmental Aging in HMA Pavements (MnROAD Study)

OBJECTIVES: The goal of this study is to determine the proper timing of preventive maintenance treatments in order to optimize life cycle costs and pavement performance. Environmental aging of the asphalt binder in the underlying pavement is not well understood, and this project will seek to better understand the aging mechanism and how it can be reduced through pavement preservation.

PERIOD COVERED:

October 1, 2007 – December 31, 2007

PARTICIPATING AGENCIES:

MN, OH, TX, MD, LRRB

PROJECT MANAGER:

Benjamin Worel

SP&R PROJECT NO:

TPF-5 (153)

PROJECT IS:

Planning
 Research & Development

LEAD AGENCY:

Mn/DOT

PRINCIPAL INVESTIGATOR:

TBD by TAP

ANNUAL BUDGET:

See page #2 for commitments and obligations according to FMIS = \$375,000

PROJECT EXPENDITURES TO DATE:

No cost to the pooled fund to date

WORK COMPLETED:

Project was just approved this quarter – no work done in 2007

SUMMARY OF ACTIVITIES EXPECTED TO BE PERFORMED NEXT QUARTER:

1. TL to contact Agencies in Study.
2. 1st TAP meeting needs to be scheduled.
3. Start developing a work plan and potential researchers who can assist in the work.

STATUS AND COMPLETION DATES:

1. Just started – Ben is replacing Tom Wood who is leaving MnDOT for another position outside of the DOT. Some additional notes from May 2007 are attached on page 3 of this update.

TPF-5(153)
Optimal Timing of Preventive Maintenance for Addressing
Environmental Aging in HMA Pavements (MnROAD Study)
 Minnesota Lead State

Commitments & Contacts

Currently Funding = \$375,000

(\$350,000 contract + \$25,000 State Travel/Meetings)

* Need to work on State Obligations (put your money in the fund)

	MN	OH	TX	MD	LRRB	
2007	15,000	15,000	15,000	15,000	75,000	
2008	15,000	15,000	15,000	15,000		
2009	15,000	15,000	15,000	15,000		
2010	15,000	15,000	15,000	15,000		
2011	15,000	15,000	15,000	15,000		
Total	75,000	75,000	75,000	75,000	75,000	Totals \$375,000
Obligated?	0	0	0	0	0	\$0
Technical Contacts	Ben Worel Ben.worel@dot.state.mn.us	Roger Green roger.green@dot.state.oh.us	Tammy Sims tsims@dot.state.tx.us	Allison Hardt (Need Technical Lead) ahardt@sha.state.md.us	Debra Fick (Need Technical Lead) deb.fick@dot.state.mn.us	

TPF-5(153)
**Optimal Timing of Preventive Maintenance for Addressing
Environmental Aging in HMA Pavements (MnROAD Study)**
Minnesota Lead State - Tom Wood & Tim Clyne Notes (May 2007)

The Big Question: What is the optimal time (not too late, not too early, and cost-effective) to place a surface treatment on an HMA pavement to minimize environmental aging?

1. What are the environmental factors that cause aging of HMA pavements?
 - a. Oxygen/air
 - b. Water/rainfall
 - c. Ultraviolet radiation
 - d. Wind
 - e. “Environmental/man-made acids” (antifreeze, salt brine, atmospheric pollutants)
 - f. Microbes
 - g. Other
2. What surface treatments are appropriate?
 - a. Chip seal
 - b. Fog seal (CSS-1H or CRS-2P-d)
 - c. Armor seal (Iowa)
 - d. Microsurfacing
 - e. Slurry seal
 - f. Novachip
 - g. Rejuvenator
 - h. Other
3. What is the appropriate time to place the surface treatment?
 - a. Immediately behind the paver (Year 0)
 - b. Year 1
 - c. Year 2
 - d. Year 3
 - e. Year 4
 - f. Etc...
4. Field Study Approach
 - a. Access road off of West LVR (3/4 mile) for annual ST applications
 - i. 3-4 inches “typical” HMA: 58-28, Level 3, no RAP
 - ii. Sees 2 passenger cars per week – essentially no traffic
 - iii. Plow with minimal effort, no salt in winter
 - b. Isolated pavement slabs to study 1a-f factors
 - i. Paved during 4a, compacted, then slabs cut from roadway
 - ii. Mount slabs with protection from isolated factors in 1a-g
 - iii. Collect and store slabs in Polebarn for future testing
 - c. Limited study on ML shoulders (control section – no ST)
 - i. Sees some salt and snowplow application, but little traffic
 - d. Limited study on ML pavement (control section – no ST)
 - i. Compare properties under Interstate traffic to no traffic
5. How do we measure aging?
 - a. Laboratory tests – chemical
 - i. Tests A, B, C
 - ii. Sample preparation, depth from surface, removal of ST, etc.
 - b. Laboratory tests – physical
 - i. Tests D, E, F
 - ii. Sample preparation, depth from surface, removal of ST, etc.
 - c. Field tests
 - i. Tests G, H, I