

## 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:**

January 1, 2008 – March 31, 2008

**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 states

**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 the last quarter of 2008

Working to setup a state conference call but its been difficult to develop. I have talked with Ohio and Maryland on the phone and held "Minnesota" meetings to help get our states thoughts in order. I have also got some input from NCAT "Mike Heitzman" on some ideas that could be used in this research depending on the states needs.

**SUMMARY OF ACTIVITIES EXPECTED TO BE PERFORMED NEXT QUARTER:**

1. State DOT conference call to determine the direction of this pooled fund.
2. Work to get a workplan/RFP developed so a contractor can be developed to help with this study.

**STATUS AND COMPLETION DATES:**

1. Some additional notes from May 2007 are attached on page 3 of this update, which will be used for the phone conference in April (place to start the discussion).

**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)
- Note FMIS does not have a entry for this study – Ben will ask about.
- LRRB needs a technical lead – Minnesota will work on.

	<b>MN</b>	<b>OH</b>	<b>TX</b>	<b>MD</b>	<b>LRRB</b>	
<b>2007</b>	15,000	15,000	15,000	15,000	75,000	
<b>2008</b>	15,000	15,000	15,000	15,000		
<b>2009</b>	15,000	15,000	15,000	15,000		
<b>2010</b>	15,000	15,000	15,000	15,000		
<b>2011</b>	15,000	15,000	15,000	15,000		
<b>Total</b>	75,000	75,000	75,000	75,000	75,000	<b>Totals</b> \$375,000
<b>Obligated?</b>	0	0	0	0	0	\$0
<b>Technical Contacts</b>	Ben Worel <a href="mailto:Ben.worel@dot.state.mn.us">Ben.worel@dot.state.mn.us</a>	Aric Morse <a href="mailto:Aric.Morse@dot.state.oh.us">Aric.Morse@dot.state.oh.us</a>	Tammy Sims <a href="mailto:tsims@dot.state.tx.us">tsims@dot.state.tx.us</a>	Geoffrey Hall <a href="mailto:ghall1@sha.state.md.us">ghall1@sha.state.md.us</a>	Debra Fick (Need Technical Lead) <a href="mailto:deb.fick@dot.state.mn.us">deb.fick@dot.state.mn.us</a>	

**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