



STATE OF MICHIGAN  
DEPARTMENT OF TRANSPORTATION  
LANSING

RICK SNYDER  
GOVERNOR

KIRK T. STEUDLE  
DIRECTOR

February 8, 2013

The Honorable John Pappageorge, Chair  
Senate Appropriations Subcommittee  
on Transportation  
Michigan State Senate  
P.O. Box 30036  
Lansing, Michigan 48909

The Honorable Robert VerHeulen, Chair  
House Appropriations Subcommittee  
on Transportation  
Michigan House of Representatives  
P.O. Box 30014  
Lansing, Michigan 48909

The Honorable Tom Casperson, Chair  
Senate Transportation Committee  
Michigan State Senate  
P.O. Box 30036  
Lansing, Michigan 48909

The Honorable Wayne Schmidt, Chair  
House Transportation Committee  
Michigan House of Representatives  
P.O. Box 30014  
Lansing, Michigan 48909

Dear Senators Pappageorge and Casperson, and Representatives VerHeulen and Schmidt:

In accordance with Section 1i(4) of 2001 PA 259, enclosed is the Michigan Department of Transportation's annual report on the Pavement Demonstration Program.

If you have any questions regarding this report, please contact either me or Brenda J. O'Brien, Engineer of Construction Field Services, at 517-322-1085.

Sincerely,

Kirk T. Steudle  
Director

Enclosure

cc: Members of the Senate and House Transportation Committees  
Members of the Senate and House Appropriations Subcommittees on Transportation



## Pavement Demonstration Program Status Report January 2013

### Background

Public Act 259 of 2001 allows the Michigan Department of Transportation (MDOT) to construct up to four demonstration projects per year that are not subject to a Life-Cycle Cost Analysis (LCCA). The LCCA process is a tool to select the lowest cost pavement design over the expected service life of the pavement. The LCCA process must include, by law, historical information for initial construction and maintenance costs, and performance (service life). This information may not be available for new pavement designs, precluding them from being chosen as alternatives. Also, new pavement designs and new technologies are generally more expensive than the standard methodologies, which may reduce their chance of being selected as the lowest cost alternative. The pavement demonstration legislation provides an avenue for trying new and innovative ideas.

Potential advantages of pavement demonstration projects include increased service life, improved customer benefits, and lower maintenance costs. Future LCCAs may utilize cost, performance, and maintenance information from the demonstration projects.

### Project Selection

Candidate projects are a collaborative effort between central office pavement personnel, region personnel, and industry groups. Once these partners reach a consensus that a project would make a good candidate, the project goes to MDOT's Engineering Operations Committee (EOC) for formal approval. Once approved, the project becomes part of the Pavement Demonstration Program.

Additional costs for the demonstration project are funded by the region's rehabilitation and reconstruction budget.

### Project List

The following table contains a list of demonstration projects to date.

<b>Table 1. Pavement Demonstration Project List</b>							
FY Let	Route	Region	County	Location	Description	Pavement Costs	
						HMA	Concrete
2003	I-75 NB	North	Ogemaw	Ski Park Road to Roscommon County Line	Low volume unbonded overlay		\$1,980,000
2003	M-84 SB	Bay	Bay/Saginaw	Pierce Road to Delta Road	Perpetual pavement	\$700,000	
2004	M-3	Metro	Wayne	St. Aubin to McClellan	Thin unbonded overlay		\$2,200,000
2005	M-13	Bay	Bay	Mary Drive to North Street	Low volume concrete		\$1,200,000
2005	I-96 WB	Metro	Wayne	M-39 to Schaeffer Road	Perpetual pavement	\$4,800,000	



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**Table 1. Pavement Demonstration Project List**

FY Let	Route	Region	County	Location	Description	Pavement Costs	
						HMA	Concrete
2006	M-99	Univ.	Jackson	Village of Springport	Low volume concrete		\$100,000
2008	I-75 NB	North	Cheboygan	Topinabee Mail Road north for 2.37 miles	Perpetual pavement over rubblized concrete	\$781,000	
2009	M-1	Metro	Wayne	Tuxedo to Chandler	Thin unbonded overlay		\$931,000

NB = northbound; SB = southbound; WB = westbound

Below is a brief description of the status or condition of each project based on recent field visits.

I-75 Northbound (Ogemaw County): This project, constructed in 2003, is a 6-inch unbonded concrete overlay on the northbound direction only. It includes the following test sections:

- Section 1: 10 foot transverse joint spacing, unsealed joints, no load transfer bars, 0.25 miles
- Section 2: 10 foot transverse joint spacing, sealed joints, no load transfer bars, 0.25 miles
- Section 3: 12 foot transverse joint spacing, unsealed joints, no load transfer bars, 1.5 miles
- Section 4: 12 foot transverse joint spacing, sealed joints, no load transfer bars, 1.5 miles
- Section 5: 12 foot transverse joint spacing, sealed joints, load transfer bars, 0.5 miles

The southbound direction, constructed at the same time, was rubblized and overlaid with 6.5 inches of Hot Mix Asphalt (HMA).

Latest Survey: Section 3 of the unbonded concrete overlay continues to exhibit new cracking, despite a 2011 project that sealed the joints to keep water from infiltrating the pavement section. This pavement was analyzed by the University of Michigan as part of the research project titled *Improved Performance of Concrete Overlays*. The final report has yet to be completed. A preliminary finding discovered that water was trapped in the HMA separator layer below the concrete overlay causing erosion and loss of support near the shoulders. The new cracks in Section 3 are likely due to damage (erosion) that occurred prior to the joints being sealed. A second finding was that the presence of load transfer bars is helping to reduce the amount of faulting at the joints. The report will recommend several ways to improve drainage in future concrete overlays.

Sections 1, 2, 4, and 5 have little to no distress with only 2 new cracks found in Section 4 and 1 new crack in Section 5.

The rubblize project in the southbound direction is beginning to show both longitudinal and transverse cracking. The longitudinal cracking, which is usually considered to be fatigue damage due to truck loads, is mostly in the passing lane. However, the passing lane carries



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fewer trucks than the outside lane, so the appearance of longitudinal cracks initially in the passing lane is not yet understood. The cracking along the centerline that has been sealed for several years did show signs of heaving, which would indicate the presence of water that has frozen and expanded (survey was completed in late November).

M-84 Southbound: This project is a 6.5-inch HMA perpetual pavement completed in the fall of 2005. This was a two-lane road that was upgraded to a four-lane boulevard section and was built over a two-year period. The northbound direction contained a standard 6.5-inch HMA cross section and was built in 2004. The southbound contains the perpetual pavement, which is designed for a 40-year life. Polymerization of the HMA and a thicker base are expected to increase the service life over the standard cross section.

Latest Survey: Cracking in the northbound roadway (standard section) increased from 848 to 959 feet. The southbound roadway (perpetual section) increased from 218 to 388 feet. In the southbound roadway, 288 feet of the 388 feet total is in the left turn lanes at turnarounds. When comparing the mainline lanes, the perpetual pavement on the southbound side is outperforming the standard cross section on the northbound side.

M-3: This project is a 4-inch unbonded concrete overlay constructed in the fall of 2005. Normal unbonded overlays are 6 inches or thicker. This project contains four test sections involving a combination of sealed and unsealed joints with two different HMA bond breaking interlayer mixes. The HMA interlayer mixes are a normal dense-graded HMA and a more open-graded (drainable) HMA. The test sections are as follows:

- Section 1: Open-graded HMA interlayer, unsealed joints
- Section 2: Open-graded HMA interlayer, sealed joints
- Section 3: Dense-graded HMA interlayer, sealed joints
- Section 4: Dense-graded HMA interlayer, unsealed joints

Latest Survey: Overall, 265 of the 5 x 5 foot concrete panels have a crack (0.7% of the total in the survey area). Of the 265, 120 are on northbound and 145 on southbound. The sealed sections are exhibiting fewer cracks than the unsealed (109 vs. 156), while the drainable HMA interlayer is exhibiting fewer cracks than the dense-graded HMA (118 vs. 147). These counts do not include the 241 panels that were repaired in 2010.

M-13: This project is a low-volume concrete design constructed in the summer of 2005. The concrete is 6 inches thick compared to the normal 8 inches. Joints are spaced 5.5 feet in both directions and are unsealed. A dense-graded base was used instead of the normal open-graded base material.

Latest Survey: There is very little distress on this pavement with only 6 cracks and a few locations with some minor spalls (small pieces of concrete at joint broken off). Approximately 22 of the 5.5 x 5.5 foot panels are cracked at the south approach to the structure over the



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Pinconning River (0.3% of the total in the survey area). These are attributed to heavy equipment (large crane, etc.) that was parked there during a 2009 repair project on the structure.

I-96 Westbound: This project is a 14-inch HMA perpetual pavement constructed in the fall of 2005. The eastbound direction was reconstructed with concrete. The concrete is a 20-year design while the perpetual pavement is a 40-year design; this is not a side-by-side comparison.

Latest Survey: There was no change from the previous year's survey. Last year's survey noted the paving joint between lanes in a few areas was beginning to open up. This is typically a construction-related problem and not a problem with the design.

M-99: This is the second low-volume concrete design project and is the same as the M-13 project, except the joints are spaced at 6 feet in both directions. It was constructed in summer/fall of 2006 and is approximately 800 feet in length.

Latest Survey: There are no additional distresses to report from last year's survey. The five year warranty period for this project ended in late 2011. The amount of cracking on this project exceeded the allowable amount for the warranty, so the contractor made repairs this year. One crack was removed and replaced with new concrete. Most of the cracks were repaired with crack sealing techniques. Some of the crack sealing is already failing. In addition, some of the larger spalls were repaired.

I-75 Northbound (Cheboygan County): This is another 40-year HMA perpetual pavement design constructed in the fall of 2008. For this project, the existing concrete pavement was rubblized (broken into smaller pieces resembling gravel) prior to the paving of the HMA. Rubblization is a standard fix; however, the HMA resurfacing is normally a 20-year design.

Latest Survey: The only thing to note on this pavement was longitudinal cracking at the paving joint between lanes and between the outside lane and outside shoulder. This is typically a construction-related problem and not a problem with the design.

M-1 (Woodward Avenue): This project is a 4-inch unbonded concrete overlay similar to the M-3 project. It was constructed in 2010 and does not contain test sections. All joints were sealed and the same HMA interlayer (drainable open-graded HMA) was used throughout. Transverse joints are spaced at 6 feet while the longitudinal joints are spaced at 5 feet.

Latest Survey: A total of 30 of the 6 x 5 foot panels are cracked after two years of service (0.2% of the total in the survey area).

Prepared by: Michael Eacker, P.E.  
Pavement Design Engineer  
Pavement Management Section  
Construction Field Services Division