

Investigation of Low Temperature Cracking in Asphalt Pavements

“Task 2 – Identify pavement sites and laboratory materials”

Pooled Fund Study (TPF-5 (080))

Updated: October 15, 2004

This is a summary of the details needed to identify pavement sites and obtain testing samples and materials for task-2 of this study. These field materials will then be tested under task-3. Two sets of materials will be investigated in this study.

- **The first set consists of materials that have been used in already built pavements for which performance information is well documented and readily available.**
- The second set consists of laboratory prepared specimens following a statistically designed test matrix.

Nomination of State Field Test Sites

The selection of field samples is of critical importance to the project and therefore the site identification and sample acquisition should be given a lot of consideration and should be performed with a lot of care. **Asphalt overlays and asphalt pavements that include RAP will not be considered in this study** to eliminate to eliminate additional factors that influence performance.

The research team is looking in particular for outliers represented by pavements that show exceptionally good performance or unexpected poor performance due to factors other than poor construction practice and mild weather (exceptional performance).

- Good performance is defined as uncracked or very minimally cracked pavements
- Poor performance is defined as a heavily cracked pavement with significant crack widths.

The research team would prefer that field samples as well as the original materials (loose mix and original binder) be available for these pavements as environmental factors (aging) have a significant impact on thermal cracking. Table 1 outlines the proposed matrix for selecting the field sites.

Table 1. Experimental Matrix for Field Performance

Pavement Performance	Field Sites (Field Samples) (Cores and Beams)	Field Sites Laboratory Prepared Samples (Loose mix, aggregates, AC)
	Good	New / Old
Poor	New / Old	New / Old

New = Less than 3 years old and **Old** = Greater than 7 years

The selection of field sites will be completed based upon a state nominated basis by the four universities. The field sites should come from well-documented, in-service pavement sections for which the following information will be provided before any sampling is conducted (Detailed nomination form is attached). LTPP test sections are considered as options due to their

documentation and should be considered if they fall into the needs of this study (someone needs to look at LTPP datapave for the states participating if this is possible).

- Complete construction, maintenance, traffic, and weather history
- Pavement performance history (pavement management data)
- Pavement layer information including thicknesses, HMA layer/mix properties, base and subgrade material properties.
- Low temperature cracking history, which includes a history of crack development and/or crack mapping if completed. A 500-foot crack map and digital pictures will also be required for the particular pavement being nominated per the LTPP distress manual.

The site nomination form to be used by the states to provide the preliminary information required by the research team for the selection of the field sites is attached at the end of this document.

State Field Sampling

Once a nomination is accepted, field samples can be taken for lab testing. State forces will do the material sampling. Collection of the field samples and original material will be coordinated by the research university closest to the sampling state and will then be delivered to Michigan Technological University (MTU) which will serve as the central location for final sample preparation and distribution to the other universities.

Based on the different types of tests and sample geometry requirements the following number of samples and original material quantities are required as a reasonable minimum:

Table 2 – Overall Samples Required per Site

Field Sample Types	Number of Samples
(18" x 6" x core depth) Beams, see figure 1	9
6" Cores (outside diameter)	36
Loose HMA Mix , kg	300kg
AC Binder (1-gallon bucket)	1

For the field samples both 6" outside diameter cores and 6"x18" beams should be obtained, as indicated in table 2. The depth of the samples should be as large as practically possible and should include the asphalt layers and the interface with the aggregate base. The beams will be further cut at MTU to obtain the 15 x 2.5 x 2.5 (l×h×w) beam samples used for dilatometric and TSRST testing.

The samples need to have a mark on the top surface to show the direction of traffic and should be labeled in the manner shown in Table 3. Please include the label with each sample taken and if possible provide digital pictures of the sampling location and of the samples. Any pavement management or aerial video/pictures of the location where sampling will be performed will also be very valuable.

Table 3 – Sample Identification

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State	
Roadway	
Direction	EB – WB – NB – SB
Date Sampled	/ /
Sample Type	Beam / Core Loose HMA / AC Binder
Sample Number	_____ Of _____
Other Observations	

It is suggested that sampling should be performed between the wheel paths at 50-foot intervals as shown in Figure 1. A suggested detail of the sampling area is shown in Figure 2. The sampling authority can use any other combinations of cores and beams as long as the requirements for sample dimensions and sampling location (between wheel paths) are met. The samples should be wrapped in bubble wrap or other type of material to be protected against damage. Additional samples in excess of the minimum requirements indicated in Table 2 are always welcome by the research team.

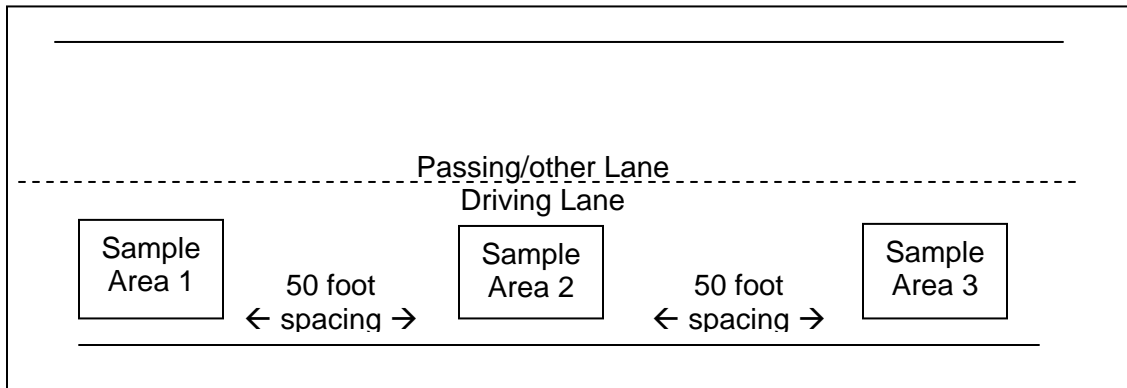


Figure 1 – Sampling Areas in the 500’ Test Section centered between the wheel paths

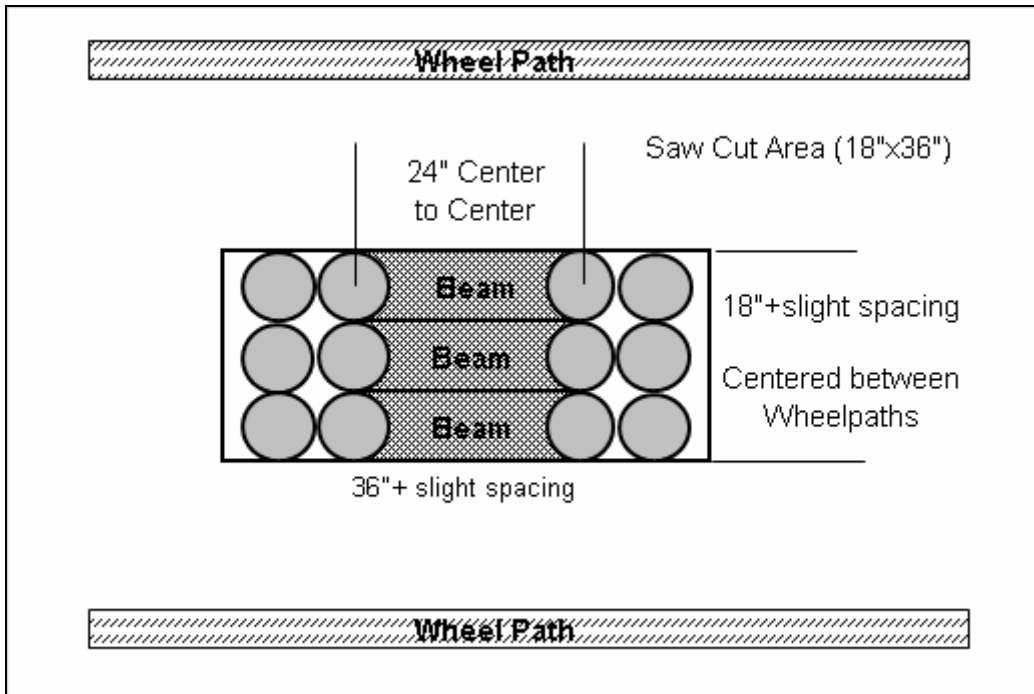


Figure 2 – Example of Sampling Area Detail (12 cores and 3 beams)

Low Temperature Project Nomination Form

State			
Type-Number (I-35, US-12, ST-11)	-		
Nearest City (# miles west of ___)			
Latitude/Longitude (estimated)	Lat=	Long=	
Traffic (ADT / %trucks / ESALS)	/ /		
Pavement Layer Description (HMA – PG Grade per lift) (Base) (Subbase) (Subgrade – Existing Soil)	Layer Description	Thickness	Year
HMA Aggregate Description			
Performance Ranking (circle)	(1=Best) 1 – 2 – 3 – 4 – 5 (5=Worst)		
Record/Sample Availability	Answer	Comment	
Construction Records	Yes/No		
Original Construction Lab Testing	Yes/No		
Historical Research Data (Part of another research study?)	Yes/No		
Pavement Management Data (# Years of ride, distress, video)	Yes/No		
Pavement Instrumentation	Yes/No		
Original HMA Loose Mix*	Yes/No		
Original Asphalt Binder*	Yes/No		
Original HMA Aggregates*	Yes/No		
* If not available is other “typical” materials obtainable?	Yes/No		
Other items worth reporting: 			