

**Investigation of Low Temperature Cracking in Asphalt Pavements
National Pooled Fund Study 776**

September 30th Meeting Minutes
University of Minnesota – Department of Civil Engineering

Introductions were made and an attendance sheet was passed around for everyone to sign up.

Ben Worel gave an update that included the schedule and funding of the project. Handouts were distributed to all the participants. The handout included a detailed work plan for the project as well as Task 2 report: “Identify Pavement Sites and Laboratory Materials.”

The University PI’s gave a presentation of the work plan. The tasks involved in the project are:

1. Literature review – review current and previous research efforts on asphalt materials characterization, experimental results analysis and modeling, pavement system analysis and modeling, and low-temperature pavement performance.
2. Identify pavement sites and laboratory materials – the first set of materials have been used in pavements for which performance information is well-documented and readily available, while the second set consists of laboratory-prepared specimens following a statistically designed test matrix. The field sites will consist of a mix of new (less than 3 years old) and old (more than 7 years old) pavements that are good and poor performers. More discussion on this point follows. Mike Heitzman brought up the question of aggregate gradation. While it would be ideal to have several different gradations (coarse, fine, gap, SMA), it would also add a variable to the test matrix and greatly increase the laboratory work.
3. Laboratory specimen preparation and experimental testing – current and newly developed testing protocols will be performed on the asphalt binders and mixtures. A breakdown of each test and who will perform the test was given.
4. Analysis of experimental results – a database will be delivered, which will include test results as well as other relevant information about the materials tested. This task will result in testing protocols for low temperature material characterization, and it will also provide better temperature-dependent material parameters that will be incorporated into an analysis tool developed in Task 5.
5. Modeling – fracture modeling will use fundamental material properties measured from laboratory tests to develop an accurate and complete description of thermal cracking mechanisms in the field.
6. Final report – a final report containing all of the updated information from Tasks 1-5 will be delivered. Also included will be a database containing all of the experimental results and proposed test protocols for selecting asphalt binders and mixtures with enhanced thermal cracking resistance.

The budget for the project was discussed; it was mentioned that additional work, as indicated in the work plan, could be done if more funds become available. The additional work would be done under the same contractual agreement with University of Minnesota as lead university and administrator of the project. The proposed schedule was discussed, anticipating that the project will be completed in 2 years.

A detailed discussion of the field sampling program ensued. It was made clear that this study did not address reflective cracking, only low temperature cracking. Overlays would also be excluded from this study; however, old cracked pavements that have been overlaid could be considered as long as the old pavement was suitable for the study.

The discussion continued on the development of a 2-part survey to nominate pavement sections for this study. The first survey will be a preliminary survey that gathers basic information to help in the site selection process. The second survey will gather more detailed information on the pavements that have been chosen for study. A cover letter should be included with the basic idea of what information should be considered. Items that may be on the nomination form include:

- Age of pavement
- Traffic – ADT, ESALs, truck %
- Pavement performance category (old/new, good/bad)
- Are original raw materials available for testing?
 - Existing samples of binder and mix
 - Similar raw materials from same source that can be re-mixed
- Layer thicknesses
- Videos
- Preventative maintenance data
- Thermal cracking appearance (when did they appear?) – spacing and severity
- Is this pavement part of another study?
- Layer thickness ≥ 2 inches
- Is RAP included in the mix?
- Other distresses present
- Mix design method (Marshall, gyratory)
- Binder grade – was polymer used?
- Aggregate type

The discussion continued with the layout of the sample area in the field. Due to the comprehensive testing included in the study a large number of field core and beam samples are required. The engineers from each state differed somewhat on how their state takes samples in the field. It was decided that general guidelines on taking samples will be given, but each state can work with the TAP to figure out what works best for them. More details on the field sampling will be included in the revised Task 2 report. The size of the field cuts should be made clear to the maintenance workers who are taking the samples. Michigan Tech University will further cut the samples in the laboratory for each individual test to be run. It was proposed that a researcher from the core research group should go out and monitor each field sampling site to ensure the samples are taken correctly. Mike Heitzman raised an important issue related to sampling between the wheel paths. He mentioned the need to avoid the longitudinal segregation created the gear box on most pavers' screeds. The participants agreed to include this recommendation in the second more detailed sampling instructions.

The meeting ended with discussions about the laboratory prepared specimens. The participants agreed to the idea of using two types of aggregates that have different thermal expansion-contraction properties. Following a recommendation from Mike Heitzman, it was decided to go with limestone and quartzite for the mix preparation. The discussion continued on the selection

of the binders used in the laboratory study. Dr. Bahia and Dr. Williams talked about the crude sources (keep the number of sources to one or two) and potential modifiers (SBS, Elvaloy, EVA) for the binders that could be used to prepare the laboratory mixtures. This will be addressed in more detail at the next meeting.

Action Items

- Mihai {
 - Meeting notes should be prepared
 - The survey should be written and distributed to the TAP before it goes out to the states
 - Task 2 report should be updated
 - Quarterly reports are due to feds by the 15th of the month following the end of the quarter
- Chris {
 - Limestone and quartzite aggregates will be used for the laboratory mixtures. MTU will be responsible for getting the necessary quantities
 - Select binder sources (MTU and WISC)

Another meeting should be held early next year to update everyone on the progress of the project. Options include:

- TRB – January 9-13, Washington, D.C.
- Minnesota Pavement Conference – February, St. Paul, MN
- AAPT – March 7-9, Long Beach, CA