

**Investigation of Low Temperature Cracking in Asphalt Pavements
National Pooled Fund Study TPF-5(132)**

November 18, 2009 Meeting Minutes

Maplewood, MN

9:00 – 2:30 pm

Agenda

The agenda is attached to the end of these notes.

In Attendance

See attached sign-in list with the email provided.

Note: Jack Youtcheff (FHWA), Iowa DOT, and Ontario Ministry of Transportation joined on the web conference but was not listed the attached list.

Project Update

Ben gave a brief welcome and introductions were completed. The goal of this meeting was to discuss the current status, what's coming up, and what needs the Universities have for the participating states to make decisions on before we progress any further.

Summary of the budget for this pooled fund.

Research Funding (6 states + LRRB) = \$525,000

University Contract (UofMN lead with three subcontractors) = \$475,000

Pooled Fund Meeting Funding = \$24,000 (Used \$3,600 for first meeting)

Remaining Funds at this time = \$26,000

MnDOT SPR for MnROAD Cell Construction (not funded through state contribution for research) – note the numbers may change some as we finalize this work.

Construction of 3 test cells = \$372,516

Instrumentation Costs = \$50,169

General Review of Tasks

Mihai updated the group on the current status of each task and outlined some items he wanted discussed related to the direction the research should go. All presentations will be posted on the pooledfund.org web site for further review. Highlights/action items include for each task from all the presenters included:

Contract

- All subcontracts with the University of Minnesota is complete with the other 3 Universities (Iowa State, University of Wisconsin and University of Illinois)

Timelines

- We are currently at month 16 of the 40 month contract, and it is on schedule.

Task-1 Literature Review

- Draft literature review was submitted and comments were incorporated into the document to help states understand the current research and what it means to them and how it relates to the direction of this study.

- Contractor will finalize this document and submit it for acceptance before December 1, 2009.

Task-2 Field Samples and Testing

- All samples have been received and testing is well underway.
- Both Mihai and Hussain covered this task in their presentations.
- Discussion related to difficulty for the universities to prepare samples of the NY mix at a 4% air void content. NY said this was an “odd” mix for them also in the field and that only testing at 7% air voids was possible. Task-2 covers the testing of these state mixes along with the MnROAD samples as shown in the contact table describing the mixes that will be used in this study.
- Changes to the mix conditioning shown in the contract will be changed to fit better with the current thinking of the researchers related to the need for long term aging. Instead of testing 4 hours at 135C (short term aging) the lab prepared samples will be conditioned at 5 days@85°C (long term aging) and cores will be added to the testing at the PG grade stated. This was acceptable to the TAP for this project. See Mihai’s presentation. No changes are needed to the contract with this change.
- Mihai made a request for additional cores from NY, Wisconsin, and MnROAD. States are ok with this request but may not be able to do the coring till next spring.
 - Contractor will develop a request/plan for the number of 6” cores and where in the roadway they should be sampled from.
- Some discussion on Warm Mix and recycled mixes and how this LTC contract is not testing any of the MnROAD test cells. Ben and Mihai pointed out how MnROAD already contracted with the University of Minnesota to do SCB, IDT, BBR and other typical lab testing for every HMA MnROAD test section which includes both warm mix and recycled mixes. All this data will be available to this study and will be used.
- Subtask on physical hardening was noted by Mihai (more discussion on the topic later in the notes). Mihai noted that they are reviewing the Canadian specs relate and the work done in Canada relate to this issue.
- Subtask-2 was covered by Raul of University of Wisconsin. He explained the current research findings related to the glass-transition and the aging the effects of physical hardening of binders as the material during heating and cooling cycles. He also showed how binder’s physically hardening is reversible, but when testing mixtures it is non-recoverable and damage is present. He compared the Tg and ABCD testing also in his presentation. Raul also showed the physical hardening of asphalt that are modified with recycled automobile oil and how it passes the current PG grading system but fails the Tg tests and has poor field performance. Ontario is also struggling with this issue.

Task-3 Develop a LTC Specification

- Some discussion related to what group this specification should be developed for. The TAP wants the specification to be presented to AASHTO for approval because the specification was developed for the states with state funding. ASTM specification was discussed but the TAP felt this was not as good as AASHTO. The mix ETG could also be of assistance to get the spec approved under a provisional spec (fairly easy) and the full standard can be done later in approximately 2-4 years. Note the DCT is an ASTM specification. Again the TAP requests they are both submitted through AASHTO.

- Round robin testing was also discussed to help with the acceptance for these test specifications especially related to AASHTO specification acceptance because it's required. These labs seem to have the ability to participate in this round robin – Asphalt Institute, Mn/DOT (but needs fixture), Road Science, FHWA, MTE, Iowa State, RILEM, and we could ask the mix ETG.
 - Contractor will develop an updated list and pursue partners for round robin testing.

Task-4 TCMODEL Update

- Bill Buttlar updated the group on the progress of this task which includes both the funding from this project and other outside funding. Here are the highlights:
 - Sophie Leon has been hired as a graduate student for the U of Illinois.
 - The updated TC Model from this project will be combined with the integrated enhanced climate model to serve as a stand alone module for low temperature cracking that can be run alone from the MEPDG as needed. Greg Larson (ARA) and Bill are working on making this happen.
 - The new software will be made publically available (freeware) and distributed on the project and university websites.

Task-6 Validation of New Specification

- This task will be started next year.
- Eddie Johnson shared some cracking data from the Olmstead WRI project (attached to the email sent). It shows the linear feet of cracking in a 1500 foot section in the 12 foot NB lane on CR112 and the comparison between two lanes on CR104 (warm mix vs HMA). He will continue to monitor the performance, and this data will be made available to the researchers upon request.

Task-7 Final Report

- This task is not started yet.

General Discussion Items

- Mats Wendel of Sweden presented 3 slides related to Sweden's experience related to low temperature cracking and his thoughts on the topic. He stated LTC is not a problem in Sweden and that he would be willing to share materials with the study to investigate both binder and loose mix they have kept for a number of projects for their warranty sampling.
 - Contractor should make a request list of sample needed and a funding source will be identified to pay for the shipping.
 - Ben Worel will also share with Mats the initial data sheets used to describe the roadway used in LTC Phase-I for them to fill out.
- Related to aging the group felt that we needed to avoid this topic related to LTC because of the complexity of the topic and the current efforts going on related to other studies. It was felt we need to track the work being done at ARC and WRI and use that information for this study when it becomes available.
- Ron Horner started the discussion on the final product and how this was proposed to be implemented. States need to know what test equipment, software, operator training, etc.

would be needed to run a fracture type of test and how it could be implemented if funding was not available in each state for the equipment.

- Contractor is asked to develop a written two-tiered implementation system exploring the following in the next 6 months (will be a working draft).
 - Using the specifications to do your own testing on materials for the state or hire consultants to do it for you. Define the costs to develop the testing equipment and fixtures needed. Also make some proposals what testing protocol would be suggested related to the specific binders, aggregates, and mixtures used in a state.
 - Use the results of the testing already done by the Universities to develop a program to predict fracture toughness related to typical testing done at each state. This may include aggregate quality, fracture, creep, PG grades, modifiers, air voids, recycled mix properties (percent, grad, AC content),

Next Meeting

- Next formal (funded) pooled fund meeting is expected in the fall of 2010. Location of the meeting was discussed and options will be considered related to the needs of the state agencies. Most members support staying in Minnesota due to the travel connections and the needs for this type of meeting.