**TRANSPORTATION POOLED FUND PROGRAM**

**QUARTERLY PROGRESS REPORT**

Lead Agency (FHWA or State DOT): Minnesota Department of Transortation

**INSTRUCTIONS:**

*Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.*

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| **Transportation Pooled Fund Program Project #**  *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)*  TPF-5(132) | | **Transportation Pooled Fund Program - Report Period:**  □Quarter 1 (January 1 – March 31)  C:\Program Files\Microsoft Office\MEDIA\OFFICE14\Bullets\BD21301_.gif□Quarter 2 (April 1 – June 30)  □Quarter 3 (July 1 – September 30)  □Quarter 4 (October 1 – December 31) | |
| **Project Title:**  Investigation of Low Temperature Cracking in Asphalt Pavements - Phase II | | | |
| **Name of Project Manager(s):**  Tim Clyne | **Phone Number:**  651-366-5473 | | **E-Mail**  [tim.clyne@state.mn.us](mailto:tim.clyne@state.mn.us) |
| **Lead Agency Project ID:**  Contract 89261 | **Other Project ID (i.e., contract #):**  WO # 103 | | **Project Start Date:**  6/17/08 |
| **Original Project End Date:**  1/31/12 | **Current Project End Date:**  8/31/12 | | **Number of Extensions:**  2 |

Project schedule status:

C:\Program Files\Microsoft Office\MEDIA\OFFICE14\Bullets\BD21301_.gif□ On schedule □ On revised schedule □ Ahead of schedule □ Behind schedule

Overall Project Statistics:

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| **Total Project Budget** | **Total Cost to Date for Project** | **Percentage of Work**  **Completed to Date** |
| $505,000 ($475k research; $30k admin) | $451,250 (+ 6 TAP meetings) | 95% |

***Quarterly*** Project Statistics:

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| **Total Project Expenses**  **and Percentage This Quarter** | **Total Amount of Funds**  **Expended This Quarter** | **Total Percentage of**  **Time Used to Date** |
| 0 | $145,590 | 96% |

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| **Project Description**:  The Minnesota Department of Transportation initiated this pooled fund study as a continuation of a long-standing  investigation of low temperature cracking. The Phase I pooled fund study was aimed at developing a fracture  mechanics-based specification for a better selection of asphalt binders and mixtures with respect to their resistance  to crack formation and propagation.    The Phase I study has developed new models for intrinsic material properties, laboratory testing behavior, and mixture performance in an in-service pavement. An integrated approach that combines laboratory materials testing, numerical  modeling, and prediction of pavement performance is taken in Phase II of this study. Part of this approach will include  field validation of the aforementioned tests and models by constructing 3 test sections at MnROAD.    The main objective of this project is to develop test methods and specification criteria that will allow the selection of  fracture resistant asphalt mixtures and binders at low temperatures. |

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| **Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**  *Task 4, Develop Improved TCMODEL* – Final verification of the ILLI-TC program was conducted, and the task report was submitted in May 2012.  *Task 6, Validation of New Specification* – This task was conducted in parallel with Task 4. The model and mixture specification limits were further validated with the mixtures from the sections selected as part of the validation process. This task report was submitted in May 2012.  *Task 7, Development of Draft AASHTO Standards and Final Report* – The final report (and Draft AASHTO Standard for SCB) was assembled from the research in each task. The draft final report was submitted at the end of May 2012. The project TAP was asked to review and comment on the report so that the final version of the final report could be produced.  The University of Minnesota submitted a request for a No Cost Time Extension to allow time for revisions to the final report and publishing thereof. The request was granted by MnDOT, with a new contract expiration date of August 31, 2012. |
| **Anticipated work next quarter**:  All TAP comments on the draft final report have been received by the researchers, and a revision is in progress to address these comments and submit final report for publication. This report will be completed and submitted before August 31, 2012. |

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| **Significant Results:**  Researchers have proposed specification limits for the chosen asphalt mixture fracture test, the DCT. These spec limits will differentiate between good and poor performers in terms of low temperature cracking. AASHTO standard test methods have been proposed for the SCB and BBR mix tests.    Significant improvements have been made to ILLI-TC. This model is a stand-alone program with a graphical, user-friendly interface.    The University of Wisconsin has developed sophisticated testing and modeling techniques to account for thermal stress buildup in asphalt mixtures.    Statistical analyses performed by ISU have shown that the DCT test does a good job differentiating between mixtures and their different parameters.  State DOTs will need to decide how to best implement the results of this research project. In lieu of performing the DCT test and accomanying modeling, the research has demonstrated how mix parameters (i.e., air voids, aggregate type, aggregate size, binder grade, binder content, RAP/RAS content, etc.) affect the mixture resistance to thermal cracking. |
| **Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that**  **might affect the completion of the project within the time, scope and fiscal constraints set forth in the**  **agreement, along with recommended solutions to those problems).** |

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| **Potential Implementation:**  MnDOT and the other participating states may potentially revise their bituminous paving specifications to include a low temperature fracture test based on the results of this study. Iowa is in the process of developing performance  specifications around the DCT test this year.    The states need to decide for themselves how the results of the study will be implemented. MnDOT is in the process  of developing our “HMA Implementation Plan” through discussions between the Research Section and Bituminous  Office.  The MnDOT TL has received funding through both the Research Services Implementation Program and Destination Innovation to use the DCT test method and mixture specification on several construction projects in the 2012 and 2013 construction seasons. The goal of this implementation project is to take what we’ve learned in the pooled fund study and apply it to real-world construction projects in Minnesota. |