

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): _____

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.

Transportation Pooled Fund Program Project # <i>(i.e., SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</i> TPF-5 (225)	Transportation Pooled Fund Program - Report Period: <input type="checkbox"/> Quarter 1 (January 1 – March 31) <input checked="" type="checkbox"/> Quarter 2 (April 1 – June 30) <input type="checkbox"/> Quarter 3 (July 1 – September 30) <input type="checkbox"/> Quarter 4 (October 1 – December 31)	
Project Title: Validation of Hot-Poured Crack Sealant Performance Based Guidelines		
Name of Project Manager(s): Imad L. Al-Qadi	Phone Number: 217-265 0427	E-Mail alqadi@illinois.edu
Lead Agency Project ID: VCTIR 98160	Other Project ID (i.e., contract #):	Project Start Date: 09/01/2010
Original Project End Date: 09/01/2014	Current Project End Date: 09/01/2014	Number of Extensions:

Project schedule status:

- On schedule
 On revised schedule
 Ahead of schedule
 Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date
730,000	449,895.82	60%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
80,850.13	80,850.13	70.8%

Project Description:

Recently, performance-based guidelines were developed as a systematic procedure to select hot-poured bituminous crack sealants. These guidelines are the outcome of the pool-funded North American Consortium led by the University of Illinois at Urbana-Champaign and the National Research Council of Canada. The work proposed a "Sealant Grade" (SG) system to select hot-poured crack sealant based on environmental conditions. A special effort was made to use the equipment originally developed by the Strategic Highway Research Program (SHRP), which was used to measure binder rheological behavior as part of the Performance Grade (PG) system.

These developed laboratory tests allow for measuring hot-poured bituminous-based crack sealant's rheological and mechanical properties over a wide range of service temperatures. Preliminary thresholds for each test were identified to ensure desirable field performance. Then, the preliminary thresholds were utilized in the SG system based on extensive laboratory testing, limited between-laboratory testing, and limited field performance data.

However, because the preliminary thresholds were determined based on only limited field data, mainly from Canada, a comprehensive field study is urgently needed to validate and fine-tune the present threshold values.

Furthermore, the developed guidelines should be validated in several states under various climate zones.

Tasks:

- I. Laboratory Validation
- II. Field testing and installations
- III. Test section monitoring
- IV. Threshold value fine tuning
- V. Cost effectiveness quantification
- VI. Development of crack sealant selection procedures and installation guidelines.

Objectives:

The developed laboratory tests and the new guidelines must be verified for precision and bias between laboratories as well as within laboratories. In addition, since preliminary thresholds were established for each test based on extensive laboratory testing but with limited field and within-laboratory data, an extensive field study is urgently needed to validate and fine-tune the threshold values. Hence, this proposed study aims 1) to validate the developed laboratory tests, 2) to determine the thresholds using a more diverse array of field performance data, and 3) to implement crack sealant guidelines for field application.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**Meetings:**

A meeting took place on May 1st in Champaign.

Task-I: Laboratory Validation (70% completed):

Lab aging investigation was completed on the materials Ad, Bb, Ca, Da, Ed, Fb, Jd, Mb, Ob, and Kc using the test protocols of CSBBR, CSRv, adhesion, and CSDSR. Short-term and long-term aging were considered using a lab melter, kettle aging, and field aged. The results have been compared to the accelerated laboratory vacuum oven aging procedure developed in phase 1. A progress report summarizing the aging study will be made available in the next quarter report.

Low temperature characterization of 18-month field-aged samples has been completed. Intermediate temperature testing Using DSR is in progress.

The initial test results from the inter-laboratory testing program have been received. New samples were prepared for some of the labs due to inconsistency of the results.

The research team will use an accelerated test section at ATREL for tracking test validation. Two sections were routed and cleaned during the previous quarter. Loading will be applied after installation to simulate tracking failure of sealants. Six sealants were considered. Accelerated testing is expected this summer.

Data analysis of the samples collected from Michigan test sections was completed. The correlation between laboratory and field survey results (cohesion failure) was very good (agreement between lab and field for 5 out of 6 products).

Task-II: Field Testing and Installation (100% completed):
This task was completed.

Task-III: Test section monitoring (60% completed).
No progress in this task this quarter.

Task-IV: Threshold value fine-tuning (30% completed).

The survey results obtained from different test sections were analyzed. A summary of analysis results were provided as an attachment to this document. A performance index considering full depth and partial depth failures were introduced. Some of the sealants used in these sections were selected for laboratory performance testing. A correlation between field and laboratory results was sought. This is the preliminary stages of threshold validation and fine-tuning. The laboratory experimental matrix will be expanded to the other materials installed in the test sections in order to complete this task.

Task-V: Cost effectiveness quantification (0% completed).

Task-VI: Development of crack sealant selection procedures and installation guidelines (5% completed).
The work on field installation guidelines was launched last month. An outline for the document was prepared.

Anticipated work next quarter:

1. A document will be prepared to summarize aging study.
2. Testing will be completed for the inter-laboratory testing program.
3. The data analysis of inter-laboratory testing results will continue.
4. Field tracking resistance test will be conducted using the accelerated testing facility at ATREL.
5. Sealant grading process will continue for all sealants used in the test matrix.
6. 24-month field-aged samples will be collected from the ATREL test section for further testing.

Significant Results:

A performance index (PI) considering partial and full depth adhesive failure of sealants was introduced. This parameter appears to adequately predict sealant field performance. According to preliminary results of laboratory to field comparison, a satisfactory correlation exist between PI and laboratory ranking of selected sealants.

According to the test site survey analysis, rout geometry influences PI values of the sealants. For example, the rout geometry of 12.5 × 12.5 mm had the highest PI values among all the rout geometries at the MN and NH sites.

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).

Potential Implementation:

Based on the field validation study at various test sites, performance thresholds use in Sealant Grade System will be Updated. These thresholds were initially determined based on limited field data. The finalized grade system can be used by States and other agencies for selecting sealants based on climatic region. Sealant field installation guidelines will also be available at the end of this project.