

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	286,820.94	40%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
64,535.67	64,535.67	45.8%

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:**

No meetings took place this quarter.

Task-I: Laboratory Validation (40% completed):

Lab aging study has been conducted on the materials Ad, Bb, Ca, Da, Ed, Fb, Jd, Mb, and Ob products using a test protocol involving BBR, RV, and adhesion tests. The main objective of this task is to verify and fine-tune aging procedure developed in the first phase. The stages considered are laboratory short-term and long-term aging using a lab melter, kettle aging, and field aged. The results have been compared to accelerated laboratory vacuum oven aging procedure.

Samples were collected from ATREL test section for characterization. The same protocol of aging testing was applied to these samples. The samples were sliced into two fractions "bottom" and "crust" as suggested in the panel meeting in February 2012 to monitor the extent of weathering effects on the surface of sealants. This study was conducted on eight of the sealants installed in the test section.

A sealant tracking resistance test is being investigated. Two different test methods have been evaluated. These are multiple stress creep and recovery (MSCR) and yield test. The MSCR test was proposed in the first phase to determine high temperature grading of sealants considering tracking resistance. An alternative test to MSCR has been studied to simulate tracking resistance. The yield test has been conducted on five of the materials along with the MSCR test.

Task-II: Field Testing and Installation (45% completed):

Test site selection and installation for New York, Colorado, Virginia, Rhode Island, and San Antonio is underway.

A candidate test site was determined for San Antonio and Virginia. The search continues for determining a proper

test site in New York.

Additional and new sealants were requested for the next installations. Two stiff products were requested from Crafcoc for San Antonio installation.

Task-III: Test section monitoring (20% completed).
First year survey data is digitized. Data interpretation has been continued.

Task-IV: Threshold value fine tuning (0% completed).
Task-V: Cost effectiveness quantification (0% completed).
Task-VI: Development of crack sealant selection procedures and installation guidelines (0% completed).

Anticipated work next quarter:

1. Field installations in New York, Virginia, San Antonio, and Colorado are planned. San Antonio test site installation can take place in the fourth quarter.
2. Laboratory validation efforts will be continued on lab aged and field aged samples using BBR, Adhesion, and RV test. Complex modulus using DSR will be added to the protocol to investigate intermediate temperatures.
3. Preparation for inter laboratory testing will be initialized. Materials to be included in this study will be finalized.
4. First year survey data will be analyzed. A field installation and evaluation report will be prepared.
5. Test sites for Colorado, New York and Rhode Island will be finalized. A test matrix (with the sealant products) for each site will be prepared.

Significant Results:

Laboratory Validation:

1. Tests on the field aged samples from ATREL section indicate severe weathering effects on the crust portion of sealants (3-5 mm from surface). This is a noticeable change in the material properties even within 6-9 months after installation. Bottom portion of the material appears to be slightly affected by weathering effects. In most of sealants, the stiffness of the bottom portion decreased or remained intact. The effects of weathering on adhesive properties were also apparent. The adhesive strength and energy was considerably reduced for the crust portion as compared to initial stages.
2. According to the aging study, most of the products exhibited stiffening by vacuum oven aging (VOA) procedures. There is a good correlation between the BBR results of VOA aged samples and the crust part of field aged samples.
3. Based on the BBR results for the samples obtained using one hour homogenization procedure (ASTM 5167) and from the kettle during ATREL test site installation, one hour homogenization can be considered as a good representative of short term aging.

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).

No problems encountered in this quarter.

Potential Implementation:

Based on the field validation study at various test sites, performance thresholds will be updated for the laboratory tests designed for sealant grading. These thresholds were initially determined based on limited field data. The finalized grade system can be used by the states on the selection of sealants in their climatic region. Sealant field installation guidelines will also be available at the end of this project for the use of states.