

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Virginia 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 type="checkbox"/> Quarter 2 (April 1 – June 30) <input checked="" 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	311,821.81	45%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
25,000.87	25,000.87	52.1%

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 (45% completed):

Lab aging study has been conducted on the materials Ad, Bb, Ca, Da, Ed, Fb, Jd, Mb, Ob, and Kc using test protocols including CSBBR, CSRV, adhesion, and DSR. The main objective of this task is to verify and fine-tune aging procedure developed in the first phase. Short-term and long-term aging were considered using a lab melter, kettle aging, and field aged. The results have been compared to accelerated laboratory vacuum oven aging procedure. The CSBBR tests are completed except for material Kc. A document summarizing the aging study is attached.

Sampled from the ATREL test section were collected after 12 months for characterization. The samples were sliced into two parts: "bottom" and "crust". Characterization of field-aged samples is underway utilizing CSBBR and DSR tests. The CSBBR tests were completed for all samples and DSR tests are near completion.

A laboratory sealant tracking resistance test is being investigated. Two test methods have been evaluated: Multiple stress and recovery (MSCR) and yield tests.

The preparation for interlaboratory testing has started. A testing program was prepared. Sample preparation for participating labs is underway.

For field tracking test validating, the research team will use an accelerated test section at ATREL. The section will be routed and sealed. Loading will be applied after installation to simulate tracking failure of sealants. Six sealants are being considered in the study. Each sealant will be installed in three routs. A mini-melter will be used for proper installations.

Task-II: Field Testing and Installation (75% completed):

Test site selection and installation for Virginia, and San Antonio is underway. Test sections in San Antonio and Virginia were selected. Scheduling for Virginia test site installation is underway.

The test site installation in New York was completed on September 11-12, 2012.

New sealants were received for the next installation; including Crafc0 241, 233, 541, and 521 sealants.

Task-III: Test section monitoring (20% completed).

Collected data from survey sections is being analyzed.

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 Virginia and San Antonio are planned. Virginia and San Antonio test site installation can take place during the next quarter.
2. Laboratory validation efforts will be continued on lab-aged and field-aged samples using CSBBR, adhesion, CSRV, and DSR tests.
3. Preparation for inter-laboratory testing will start.
4. A field installation and evaluation report will be prepared.
5. The preliminary preparations of field tracking resistance test will start.

Significant Results:

A document summarizing the experimental program is attached. The following are the main highlights:

1. Tests of field-aged samples (from ATREL section) indicated severe weathering effects on the crust part of sealants 5mm from surface). It is a significant change in material properties within one year after installation. Sealants showed significant increase in stiffness with respect to the 6 month field-aged data.
The effect of aging on the bottom part is also noticeable after one year of weathering.
2. The yield test could be useful to identify tracking failure. A comparison of sealant grading using MSCR and yield tests indicated that the two test procedures (MSCR and yield) could provide the same high temperature grade.
Further validation will be performed using field data.

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).

Rotational viscometer was out of order during the last quarter and sent to the manufacturer for repair.

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.