

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.

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| 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 type="checkbox"/> Quarter 3 (July 1 – September 30) <input checked="" 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: 12/31/2015 | Number of Extensions: 1 extension for a year |

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 (original budget) | 709,674 | 80% |

Quarterly Project Statistics:

| Total Project Expenses and Percentage This Quarter | Total Amount of Funds Expended This Quarter | Total Percentage of Time Used to Date |
|--|---|---------------------------------------|
| 25,003 | 25,003 | 81% (with updated schedule) |

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 in this quarter.

Task-I: Laboratory Validation (85% completed):

Progress in the laboratory testing is summarized as follows:

- The BBR results were correlated with sealant field performance to validate and fine-tune the BBR test method. A draft report is prepared to be submitted to the panel for review.
- New concept for an adhesion test is under development. Different sample sizes and shapes are being evaluated using the new fixture utilizing asphalt mix and aluminum subgrade.
- New adhesion molds are being designed to improve test method AASHTO TP 89. The molds are designed to be used with the direct adhesion test device.
- Two new labs (FHWA and Colorado DOT) are added to the interlaboratory study. All testing materials were shipped.
- Chemical and micro level testing such as XRD and AFM are initiated at MRL facility at University of Illinois
- Third year field aged samples are collected from the ATREL test site.

Task-II: Field Testing and Installation (100% completed):

- This task is completed

Task-III: Test section monitoring (90% completed).

Due to a new test site installed in Virginia, a winter survey is being expected for this test site.

Task-IV: Threshold value fine-tuning (70% completed).

Lab measurement (e.g. CSBBR test) results are correlated with field survey data. Statistical results show a good correlation between field and lab performance. Based on these results, CSBBR test method is validated. Primary thresholds for low and high limits are selected and will be finalized in the next quarter.

- Data from the Michigan test section were obtained. This is a complete clean and seal section. Statistical analysis was performed on the sealant performance and laboratory test results. A draft report is prepared to summarize the results from this section and correlation between lab and field performance results was conducted.

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

No progress in this task this quarter.

Task-VI: Development of crack sealant selection procedures and installation guidelines (50% completed).

The reviews on installation guidelines are collected from the panel in this quarter and are applied on the draft version.

Anticipated work next quarter:

1. Accelerated testing facility (ATLAS) will be used to verify the tracking test. ATLAS preparations will continue and testing will take place.
2. Development of a new adhesion test will be continued.
3. CSBBR test method fine tuning will be completed.
4. Chemical and micro level testing will be continued on the aged samples
5. Test results from various labs will be collected.
6. Virginia and New York test site evaluations will be arranged and conducted in this quarter.
7. CSDTT test will be validated and fine-tuned.

Significant Results:

1. BBR test results show a good correlation with field performance. It is proven by field and lab correlation that a minimum BBR stiffness thresholds is essential as well as maximum threshold.
2. According to the field aging study for sealants, sealants were grouped into three categories according to their aging potential: low, medium, and high.

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 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.