

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): **Wisconsin 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 # TPF-5(302)		Transportation Pooled Fund Program - Report Period: <input checked="" 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 type="checkbox"/> Quarter 4 (October 1 – December 31)	
Project Title: Modified Binder (PG+) Specification and Quality Control Criteria			
Name of Project Manager(s): Barry Paye		Phone Number: (608)246-7945	E-Mail barry.paye@dot.wi.gov
Lead Agency Project ID: 0092-14-20 (original/amendment)		Other Project ID (i.e., contract #):	Project Start Date: 9/30/2014
Original Project End Date: 03/31/2018		Current Project End Date: 3/31/2018	Number of Extensions: 1

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
\$350,000	\$249,248.23	72%

Quarterly Project Statistics

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
\$6,545.27, 2 %	\$6,545.27	71.4%

Project Description:

This project was extended in January 2017 for 15 months with specific added tasks and a work plan approved by the partner states. The extension work plan was developed based on the stated needs and goals that were highlighted after the delivery of the final report of the original work plan. The extension work plan is focused on the following two tasks.

- Task 1: Evaluating the Effects of RAP/RAS on PG+ and Developmental Test Blending Charts
 - *Subtask 1.1: Proof of Concept of Using Blending Charts for New Tests.*
 - *Subtask 1.2 : Validation using recycled asphalt materials (RAM) from Partner States.*
- Task 2: Effects of Low Temperature Modification Technologies on PG+ and Developmental Test Methods.

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

The following points represent summary of the progress during this quarter:

- Work progressed for Subtask 1.1 of the project. Two asphalt binders commonly used in the Mid-West region of the United States were selected to produce 'artificial' RAP materials (A-RAP): an unmodified (neat) PG 64-22 binder, and a polymer modified binder (PMA) PG 70-28 collected from the member state Wisconsin. The artificial RAP materials were produced by exposing the virgin binders to extended cycles (40 and 60 hours) of aging in the Pressure Aging Vessel (PAV).

Testing of samples of the A-RAP and virgin binders have started. Testing results for the MSCR, ER-DSR, BYET and SENB have been collected and are being analyzed. Initial results show that 40 hours of PAV aging is not sufficient for the PG 64-22 as the hardening is not severe enough, while the 40 hours aging of the PMA PG 70-28 resulted in very severe hardening with the binder graded as PG 100.

- Subtask 1.2 requires evaluation of one RAM material from each partner state. Therefore, RAP materials were requested from partner states for binder extraction, recovery and testing.

- RAP sample was received from Colorado DOT.
- Kansas volunteered to supply a RAP sample and it has been shipped.
- Other DOTs have not responded yet.

- An unmodified soft material produced by a refinery in the Mid-West was requested and received. This material will be used during the Task 2 of the project.

Anticipated work next quarter:

The work planned for next quarter is as follows:

- Effect of aging in the PAV for 60 hours will be continued to generate sufficient aged binders with sufficient hardening.
- Blending of the A-RAP materials (A-RAP1 and A-RAP2) with the polymer modified base asphalts (WI 70-28 and KS 64-34) sampled from partner states will be started. A total of 16 binders will be tested including the two PMAs blended with the two A-RAPs at four ratios (PMA/A-RAP): 100%/0%, 80%/20%, 60%/40%, and 0%/100%. These ratios are expected to encompass typical usage rates of RAM (for example 15- 30 Percent Binder Replacement- PBR) as well as include higher ratios to establish/confirm linearity or non-linearity in the blending charts. Each combination will then be tested with a selected suite of test procedures including those recommended by the research team during the original project (Multiple Stress Creep and Recovery, Elastic Recovery DSR, Binder Yield Energy Test, Linear Amplitude Sweep Test, Single Edge Notched Beam).
- Extraction and evaluation of binders from the RAP and RAS materials received from Partner States will start.

Significant Results:

During this quarter, the focus of the research team was the preparation of artificial RAP materials, and collection of RAP/RAS. The progress is mostly in the Subtask 1.1 of the project:

- For the neat PG 64-22 binder, the artificial RAP material was first produced by exposing the virgin binder to 2 full cycles (40 hours) of Pressure Aging Vessel (PAV) aging. After analysis of the standard performance grade results for both high and low temperature, it was observed that another cycle of 20 hours of PAV aging was necessary to severely age the binder. Therefore, the A-RAP₁ material produced for this project will consist of neat PG 64-22 binder after 60 hours in PAV.
- For the PMA binder (A-RAP₂), Wisconsin PG 70-28 was exposed to 2 full cycles (40 hours) of PAV aging. The results show that the aged binder is significantly stiff and fit for the blending.
- Two polymer modified base asphalts were sampled from partner states for blending with the A-RAP materials; they include WI PG 70-28 and KS PG 64-34. The blending of these binders with A-RAP₂ has been completed and testing of the blends already started.

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).

Dr. Raquel Moraes has been added to the Research team and will lead coordination of the experimental testing program. She has replaced Mr. Erik Lyngdal who accepted a new position outside of the University. No impact on budget or time is expected.

Potential Implementation:

It is anticipated that the results can be used to quantify the effects of using heavily aged recycled binders, and softening oils (rejuvenators) on the criteria used by the Partner States for the PG + tests. This will allow specifying requirements for using rejuvenators for varying amounts of recycled binder replacements.