

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): New Hampshire 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(230)		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"/> <u>Quarter 3 (July 1 – September 30)</u> <input type="checkbox"/> Quarter 4 (October 1 – December 31)	
Project Title: Evaluation of Plant-Produced High-Percentage RAP Mixtures in the Northeast			
Name of Project Manager(s): Jo Sias Daniel	Phone Number: 603-862-3277	E-Mail jo.daniel@unh.edu	
Lead Agency Project ID:	Other Project ID (i.e., contract #):	Project Start Date: 8/11/2010	
Original Project End Date: 12/31/2013	Current Project End Date: 12/31/2013	Number of Extensions: 0	

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
781,706	237,152	30%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	72,293	

Project Description:

Research Objectives

The objectives of this research project are to:

1. evaluate the performance in terms of low temperature cracking, fatigue cracking, and moisture sensitivity of plant produced RAP mixtures in the laboratory and field
2. establish guidelines on when it is necessary to bump binder grades with RAP mixtures
3. provide further understanding of the blending that occurs between RAP and virgin binder in plant-produced mixtures
4. refine fatigue failure criteria for RAP mixtures that can be used in the Simplified Viscoelastic Continuum Damage (S-VECD) model

Research Plan

The research plan is broken down into two phases. Phase I will focus on evaluating the effects of binder grade and plant type on the properties of mixtures with various percentages of RAP. Phase II of the study will be geared towards evaluating the amount of blending that occurs between the virgin and RAP binders. Phase I mixtures will be used to refine the fatigue failure criteria in the S-VECD model.

The following tasks will be required to achieve the research objectives for both phases of this project:

1. Producing Plant Mixtures
2. Testing and Analysis of Asphalt Binders and Mixtures
3. Construction and Evaluation of Field Test Sections
4. Reporting

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

A. Binder Testing

Critical cracking analysis of extracted and recovered asphalt binders were conducted for the binders below. Critical cracking was determined using the procedure outlined in AASHTO R49-09, Determination of Low-Temperature Performance Grade (PG) of Asphalt Binders. The software program TSAR developed by Abatech is being used to generate the critical cracking temperatures of the asphalt binder.

- a. Pike (Williston, VT) extracted PG64-28 0, 20, 30, 40% RAP
- b. Pike (Williston, VT) extracted PG52-34 0, 20, 30, 40% RAP
- c. Callanan (Cordell Rd) extracted PG64-22 0, 20, 30, 40% RAP
- d. Callanan (Cordell Rd) extracted PG58-28 30, 40% RAP

Binders have been aged, tested, and master curves for aged binders have been constructed.

Sampled asphalt binder used in producing NH Phase II mixtures, is currently being tested.

B. Mixture Testing

Dynamic modulus specimens' fabrication and testing have been completed on the following mixtures:

- a. Pike (Portsmouth, NH) PG64-28 0, 20, 30, and 40% RAP
- b. Pike (Williston, VT) PG52-34 0, 20, 30, 40% RAP

Currently Dynamic modulus testing in underway for Pike (Williston, VT) PG64-28

In order to run the fatigue testing, a temperature study that uses the asphalt mixture performance tester (AMPT) has been conducted by NCSU to determine the temperatures at which the supporting temperature chamber and AMPT chamber should be set in order to achieve the target testing temperatures for the shortest conditioning time. Selected temperatures are 13°C, 20°C, and 27°C. According to the results, fatigue testing can start 60 minutes after the specimen is set in the AMPT chamber.

Crosshead-control fatigue testing on the primary mixture (VTe30LC-Core Core mix) has been completed for all three temperatures at three different strain level inputs and with two replicates for each testing condition.

Overlay Tester was conducted for all Phase I mixtures. Also, Flexural Fatigue testing (AASHTO T321) has been conducted on the following mixtures:

- a. Callanan PG64-22 20, 30, 40% RAP
- b. Callanan PG58-28 30, 40% RAP

Creep and Low Temperature Strength testing for the Phase I mixtures currently are underway. IDT specimens for Phase II mixtures received up to date are fabricated.

HWTB testing has been conducted on Phase II mixtures received to date.

C. Phase II Mixtures

Four of the 2011 Phase II VA mixtures were produced. They are going to be shipped in the next few days.

Anticipated work next quarter:

A. Binder Testing

PG Grading and Critical cracking analysis will be done on the extracted binder from Phase I RAP sampling.

Continue testing for Phase II binders.

B. Mixture Testing

Dynamic modulus testing has to be done for the remaining of Phase I mixtures.

Crosshead-control fatigue testing for the other mixtures will be continued. Also, programming the AMPT to run the simplified viscoelastic continuum damage (S-VECD) fatigue tests in load-control mode will be undertaken during next quarter.

Flexural Fatigue testing (AASHTO T321) has to be conducted on the rest of Phase I mixtures.

Continue the Creep and Low Temperature Strength testing on phase I mixtures.

HWTB testing has to be done for the compacted specimens received for the NH Phase II mixtures.

Continue testing of Phase II mixtures.

C. Phase II 2011 Remaining Mixtures

The research team is working with VA to obtain additional four mixtures.

Silo Storage Study:

Mixtures to be produced by Callanan in NY.

Virgin mix and RAP mix (20-30% RAP)

Mix will be siloed and sampled at the following times: 0, 2, 4, 8, 12 hrs

Specimens will also be compacted at the plant for comparison with reheated & compacted specimens

Significant Results:

The research team submitted a paper to AAPT based on the Phase I testing results. The draft is attached.

The research team also presented Phase I results at the Northeast Asphalt User Producer Group meeting in Providence RI on October 5th. The presentation is attached.

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).

The breakdown of the UNH Instron has caused delays in the low temperature creep and strength testing of the Phase I mixtures. The equipment is being repaired and testing should commence in a few weeks.

Potential Implementation: