

## 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.*

|   |  |   |
|---|--|---|
| <b>Transportation Pooled Fund Program Project #</b><br><i>(i.e., SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</i><br><br><p style="text-align: center;">TPF-5(230)</p> | <b>Transportation Pooled Fund Program - Report Period:</b><br><input type="checkbox"/> Quarter 1 (January 1 – March 31)<br><input type="checkbox"/> Quarter 2 (April 1 – June 30)<br><input type="checkbox"/> Quarter 3 (July 1 – September 30)<br><input checked="" type="checkbox"/> Quarter 4 (October 1 – December 31) |   |
| <b>Project Title:</b><br><p style="text-align: center;"><b>Evaluation of Plant-Produced High-Percentage RAP Mixtures in the Northeast</b></p>                   |  |   |
| <b>Name of Project Manager(s):</b><br><p style="text-align: center;">Jo Sias Daniel</p>   | <b>Phone Number:</b><br><p style="text-align: center;">603-862-3277</p>  | <b>E-Mail</b><br><p style="text-align: center;">jo.daniel@unh.edu</p>             |
| <b>Lead Agency Project ID:</b>  | <b>Other Project ID (i.e., contract #):</b>  | <b>Project Start Date:</b><br><p style="text-align: center;"><b>8/11/2010</b></p> |
| <b>Original Project End Date:</b><br><p style="text-align: center;"><b>12/31/2013</b></p>   | <b>Current Project End Date:</b><br><p style="text-align: center;">12/31/2013</p>  | <b>Number of Extensions:</b><br><p style="text-align: center;">0</p>              |

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              | 332,864                        | 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 |
|--|---|---------------------------------------|
|  | 95,712                                      |                                       |

## **Project Description:**

### Research Objectives

The objectives of this research project are to:

1. Evaluation 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. Provides further understanding of the blending that occurs between RAO 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 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

There are no binder tests results for this quarter.

B. Mixture Testing

Low temperature Creep Compliance tests have been conducted on all Phase I mixtures.

Fatigue testing has been completed for all NH Phase I mixtures.

Flexural beam fatigue testing has been completed for all Callanan (NY) mixtures and most of the Vermont mixtures.

The moisture sensitivity tests in the HWTD following AASHTO T324 were conducted on all the FHWA MATL Compacted Hamburg Specimens – for the Phase II NH mixtures.

NCSU has been working on a temperature study with the AMPT to determine the temperatures at which the supporting temperature chamber and AMPT chamber should be set in order to achieve the target testing temperatures at the shortest conditioning time. During this quarter about half of the CX fatigue testing for the second primary mixture (VTe20LC-Core Verify Mix) was able to be completed. Also, fatigue testing for about half of one of the core mixes (VTa00LC) was completed, but some of the tests need to be run again because of a waveform problem.

**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.

Pike Industries will start the extraction and recovery of Phase II mixtures and RAP sources. Binder testing will commence on these materials once they are available.

B. Mixture Testing

Low temperature strength for Phase I mixtures and Fatigue Testing for NY and VT Phase I mixtures will be completed.

Continue flexural beam fatigue testing for the rest of Phase I mixtures.

The CX fatigue testing at NCSU will continue.

Continued testing of Phase II mixtures.

**Significant Results:**

The paper that was submitted to AAPT in August has been accepted. It will be published in 2012 and presented by Dr. Mogawer at the AAPT meeting in April.

The research team is putting together a paper based on the low temperature binder and mixture testing from Phase I. This will be shared with the technical committee once the draft is submitted.

**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).**

During this quarter, two problems arose at NCSU that prevented some of the planned testing from being conducted. The first problem was with the AMPT hardware and occurred at the beginning of the quarter. The AMPT heater and fan burned out, and the process of ordering new parts from IPC Global in Australia, waiting to receive them, and then installing the replacement parts took more than two weeks. The second issue, which prevented the use of the AMPT for controlled crosshead (CX) fatigue testing, was the unexpected behavior of the loading waveforms that showed pronounced hiccups. These hiccups were more pronounced than any that had been seen before at the start of fatigue testing and that appeared without any obvious reason. This issue made the AMPT unusable for CX fatigue testing, so the testing had to be switched to the MTS machine.

In order to use the MTS machine for CX fatigue testing, new end plates had to be made, and targeting and gluing jigs had to be modified for the new end plates. This fabrication and modification process took about one month.

**Potential Implementation:**