

**NEW ENGLAND TRANSPORTATION CONSORTIUM  
QUARTERLY PROJECT PROGRESS REPORT**

**A. PROJECT NUMBER AND TITLE:**

NETC 10-3 “Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology”

**B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):**

Professor Walaa S. Mogawer, PE, F.ASCE, Highway Sustainability Research Center (HSRC), University of Massachusetts

**C. WEB SITE ADDRESS (If one exists):**

[http://www.uvm.edu/~transctr/?Page=netc/netc\\_fy/netc\\_fy2010.php#netc103](http://www.uvm.edu/~transctr/?Page=netc/netc_fy/netc_fy2010.php#netc103)

**D. START DATE (Per NETC Agreement):**

9/16/2013

**E. END DATE (Per NETC Agreement):**

5/31/17

**F. ANTICIPATED COMPLETION DATE:**

5/31/17

**G. PROJECT OBJECTIVES:**

The research project will evaluate the moisture susceptibility and low temperature cracking properties of RAP mixtures produced with WMA technologies. Plant mixtures produced with varying RAP contents and warm mix technologies will be sampled. Laboratory testing will include an evaluation of mixtures susceptibility to moisture damage using one or more of the following tests: (1) AASHTO T324 “Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)”, (2) AASHTO T-283 “Resistance of Compacted Hot Mix Asphalt (HMA) to Moisture-Induced Damage”, and (3) ratio of wet to dry dynamic modulus measured at 20°C. The test(s) selection will be based, as described later in the proposal, on the literature review conducted under Task 1. Also, the low temperature cracking susceptibility will be evaluated using the following two tests: (1) AASHTO TP10-93 “Standard Test Method for Thermal Stress Restrained Specimen Tensile Strength (TSRST)” and (2) AASHTO T322 “Standard Method of Test for Determining the Creep Compliance and Strength of Hot Mix Asphalt (HMA) Using the Indirect Tensile Test Device.” Additional testing will include evaluating the effect of the different WMA technologies on the workability of the mixtures and evaluating the degree of blending between the RAP binder and the virgin binder using a procedure developed by Bonaquist.

**H. REPORT PERIOD:**

2016 Quarter 4 – October through December

**I. ACCOMPLISHMENTS THIS PERIOD:**

1. On October 14<sup>th</sup>, 2016; UMass Dartmouth received a no-cost extension for the project until 5/31/17. This agreement for this project expired on 6/30/16. The extension time was so that the remainder of mixtures can be produced, tested and analyzed.
2. UMass Dartmouth continued analysis of the test data for all the mixtures tested to date.

**J. PROBLEMS ENCOUNTERED (If any):**

The research team has been consistently making arrangements with contractors to provide plant produced mixtures as stated in the scope of work. UMass Dartmouth is consistently following up with the second contractor to produce more of the mixtures noted in the test matrix. No new mixtures were received this quarter even though the contractor had promised delivery of some mixtures in the fall. The mixtures UMass is awaiting are high RAP mixtures prepared using foaming as the WMA technology.

**K. TECHNOLOGY TRANSFER ACTIVITIES:** *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

A Transportation Research Board (TRB) paper was submitted in August of 2016 related to this research work for this project. The paper was accepted for presentation at the Transportation Research Board 96th Annual Meeting in Washington DC on January 10<sup>th</sup>, 2017. The paper entitled “Understanding Influence of Moisture on Performance of Plant-Produced High Reclaimed Asphalt Pavement Content Mixtures Incorporating Warm-Mix Asphalt Technologies” will be presented in TRB session 636 “Reclaimed Asphalt Pavement and Recycled Asphalt Shingles in Asphalt Mixtures.”

**L. STATUS BY TASK:** *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

- Task 1: Literature Review (100%)
- Task 2: Determine Critical Information (70%)
- Task 3: WMA Technologies Selection Process (100%)
- Task 4: Identify Moisture Susceptibility Test (70%)
- Task 5: Development of a Testing Matrix (100%)
- Task 6: Obtain Plant Produced Samples (80%)
- Task 7: Laboratory Testing of Plant Produced Samples (70%)
- Task 8: Prepare a Final Report (20%)
- Task 9: Execute Implementation Plan (0%)

**M. PERCENT COMPLETION OF TOTAL PROJECT: 80%**

**N. ACTIVITIES PLANNED FOR NEXT QUARTER:**

UMass Dartmouth will continue testing the plant produced mixtures as they are received.

**O. FINANCIAL STATUS:**

*As of: 12/31/16*

**Total Project Budget: \$ 150,157.70**

**Total Expenditures: \$ 63,904.44**

**Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.**

