

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

A. PROJECT NUMBER AND TITLE:

NETC 13-1: Development of High Early-Strength Concrete for Accelerated Bridge Construction Closure Pour Connections

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

Sergio F. Breña (PI) – University of Massachusetts Amherst
Scott A. Civjan (Co-PI) – University of Massachusetts Amherst

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

D. START DATE (*Per NETC Agreement*): **September 01, 2014**

E. END DATE (*Per NETC Agreement*): **April 02, 2016; August 31, 2016 (amended)**

F. ANTICIPATED COMPLETION DATE: January 14, 2017

A no-cost extension was approved to 31 August 2016 to cover the 24-month project duration requested in the original proposal. A second no-cost extension will be requested because some of the laboratory tests have been taking longer to run causing a delay in other project activities.

G. PROJECT OBJECTIVES:

To develop and validate concrete mixtures capable of developing high early strength without detrimentally affecting their long-term durability. The mixtures are for use in projects using accelerated bridge construction methods.

H. REPORT PERIOD: April 1, 2016 – June 30, 2016

I. ACCOMPLISHMENTS THIS PERIOD:

Task 1: Literature Search

- Performed literature review as necessary to obtain research reports and technical papers to assist in further development of mix design trial batches.

Task 3: Develop Mix Design

- Running ring shrinkage tests to understand behavior of mix designs; will modify based on results
- A mix design typically used for precast/prestressed bulb-tee girders was mixed to compare concrete properties

Task 4: Test Mixture

- The slump test (AASHTO T119 / ASTM C143) or the spread test (ASTM C1611) was performed on each trial batch depending on the workability of the concrete mixture.
- The air content test, pressure method (AASHTO T152 / ASTM C231), was performed on concrete mixtures developed through trial batches.
- The compressive strength was tested for each trial batch at 12 hours and 24 hours (ASTM C39)
- The shrinkage test (AASHTO PP 34-99) was performed on a concrete mixtures developed through trial batches.
- Progression of the design of the bar pullout test (ASTM A944) setup

J. PROBLEMS ENCOUNTERED (If any):

There were some difficulties encountered with the variability of concrete properties. The mixing procedure was altered slightly, while still following ASTM C192, in order to reduce variabilities.

K. TECHNOLOGY TRANSFER ACTIVITIES:

No technology transfer activities were performed.

L. STATUS BY TASK:

Task 1: Literature Search – 85% complete

Task 2: Develop Mixture Design Specification – 35% complete

Task 3: Develop Mix Design – Trial batches have been developed; may need slight adjustments –90%

Task 4: Test Mixture – Experimental test setups are being designed and prepared (35%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 65%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

Task 1: Literature Search

- Continue literature search as required.

Task 2: Develop Mixture Design Specification

- Adjust existing concrete mix design specifications based on feedback from the NETC Project Technical Committee, trial batch results, and feedback from the PCI Bridge Tech Committee.

Task 3: Develop Mix Design

- Adjust concrete mix design and perform select short and long-term tests on additional trial batches as required by results of further testing.

Task 4: Test Mixture

- Complete design and begin fabrication of bar pullout test (ASTM A944) setup.
- Begin the full-scale mockup test setup design to be used for the large-scale specimen representing a longitudinal concrete bridge deck joint.
- Perform shrinkage bar test (ASTM C157) on concrete mixtures developed through trial batches and compare to results from shrinkage ring test (AASHTO PP 34-99).

O. FINANCIAL STATUS:

As of: June 30, 2016

Total Project Budget: \$ 174,923

Total Expenditures: \$ 122,990

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.