

**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 (original); August 31, 2016 (approved no-cost extension)**

F. ANTICIPATED COMPLETION DATE: December 31, 2016

A no cost extension will be requested. Ring shrinkage tests have been taking longer using than the anticipated 3 weeks/mix. This has delayed subsequent activities in the project.

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: January 01, 2016 – March 31, 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

- Remixed multiple trial batches numerous times to understand the variability of properties of the trial batch mix designs

Task 4: Test Mixture

- The set time test (AASHTO T197 / ASTM C403) was performed on each trial batch.
- 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 shrinkage test (AASHTO PP 34-99) was performed on a concrete mixtures developed through trial batches.

J. PROBLEMS ENCOUNTERED (If any):

No serious problems encountered to date. The only issue we have encountered is that the ring shrinkage tests have taken longer than the 3 weeks we anticipated/mix thereby delaying other activities in the project.

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 (25%)

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

- Continue 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). This activity was not included in the original proposal but might be useful for comparison with results from ring shrinkage test.
- Prepare concrete specimens to be sent to regional state DOTs to be tested for freeze-thaw resistance (ASTM C666).
- Contact Readymix plants for fabrication of larger concrete batches.

O. FINANCIAL STATUS:

As of: March 31, 2016

Total Project Budget: \$ 174,923

Total Expenditures: \$ 97,600