

**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

F. ANTICIPATED COMPLETION DATE: August 31, 2016

A no cost extension is expected to be requested to accommodate the current coordination contract that NETC has with the University of Vermont. The proposed project period was for 24 months.

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: October 01, 2015 – December 31, 2015

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

- Adjusted the w/cm ratio and adjusted the fly ash class and quantity to determine the final trial batch mixture before moving on to additional testing.
- Added accelerating admixture in an attempt to increase compressive strengths of trial batches as needed. Inconsistent compressive strength results were found with the use of accelerating admixtures; therefore, test results using accelerating admixtures cannot be deemed accurate in small scale batches used for this project.
- A combination of maximum coarse aggregate sizes used to smooth the aggregate gradation curve in order to reduce concerns related to segregation of trial batches.

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 shrinkage test (AASHTO PP 34-99) was successfully performed on a concrete mixture developed through trial batches.

J. PROBLEMS ENCOUNTERED (If any):

No major problems encountered to date. The shrinkage ring tests were started in this reporting period and the specimens are taking longer to exhibit cracking than was anticipated. This has delayed the initiation of subsequent shrinkage ring tests, which may affect the project schedule slightly.

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 (15%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 60%

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-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.
- Perform air content test, pressure method (AASHTO T152 / ASTM C231), on concrete mixtures developed through trial batches.
- 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: December 31, 2015

Total Project Budget: \$ 174,923

Total Expenditures: \$ 89,604

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.