

**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: April 01, 2015 – June 30, 2015

I. ACCOMPLISHMENTS THIS PERIOD:

Task 1: Literature Search

- Progressed on written summary of the literature review including main findings of relevant research reports, technical papers and survey responses.
- Performed additional literature review to obtain research reports and technical papers to assist in further development of mix design trial batches.

Task 3: Develop Mix Design

- Tested 7 concrete mix design trial batches initially based off of a state-of-practice mix design, and compared test results using compressive strength tests on 4 by 8 in. cylinders and workability. The adjustments made to the state-of-practice mix design throughout the 7 trial batches include decreased maximum coarse aggregate size, elimination of fly ash, modification of admixture quantities and variation of the water-to-cement ratio.
- Developed new base mix design using proportioning specified in ACI 211.4-R: Guide for Selecting High-Strength Concrete Using Portland Cement and Other Cementitious Materials.

Task 4: Test Mixture

- Shrinkage test (AASHTO PP 34-99) setup has been fully designed and fabricated nearly to completion.

J. PROBLEMS ENCOUNTERED (If any):

No problems encountered to date.

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 being developed –25%

Task 4: Test Mixture – Experimental test setups are being designed and prepared (5%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 35 %

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

Task 1: Literature Search

- Continue working on written summary of the literature review including main findings of relevant research reports, technical papers and survey responses.
- 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 (**pending feedback from committee**).

Task 3: Develop Mix Design

- Adjust the newly proportioned mix design (ACI 211.4R proportions) to obtain required strength and sufficient workability.
- Test preliminary concrete mixtures that reach compressive strength goal and qualitatively acceptable workability for remaining initial short-term performance criteria (set time, air content and slump).

Task 4: Test Mixture

- Complete fabrication of shrinkage test (AASHTO PP 34-99) setup. Execute practice tests using the test setup.
- Begin design and fabrication of bar pullout test (ASTM A944) setup.

O. FINANCIAL STATUS:

As of: June 30, 2015

Total Project Budget: \$ 174,923

Total Expenditures : \$ 50,947

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.