

**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: July 01, 2015 – September 30, 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

- Developed a mix design based on proportions from ACI 211.4R; 4 trial batches were tested based off of these initial proportions. The coarse and fine aggregates were adjusted in order to improve strength and workability.
- The optimal ratio of coarse aggregate to fine aggregate in terms of maximum compaction was determined.
- Using the w/cm ratio specified in ACI 211.4R, and the maximum compaction of aggregates, a series of trial batches were tested to find the optimum volume of paste to volume of voids ratio.
- Based on the w/cm ratio specified in ACI 211.4R, the maximum compaction of aggregates and the optimum volume of paste to volume of voids ratio, various fly ash replacement quantities (Class C and Class F) were tested.
- The w/cm ratio and fly ash class and quantity are currently being adjusted to determine the final trial batch mixture before moving on to additional testing.

Task 4: Test Mixture

- The set time test (AASHTO T197 / ASTM C403) and the slump test (AASHTO T119 / ASTM C143) were performed on each trial batch starting at the beginning of the quarter.

- Shrinkage test (AASHTO PP 34-99) setup has been fully designed and fabricated. The test setup is ready for the shrinkage test to be performed.

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 –85%

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

M. PERCENT COMPLETION OF TOTAL PROJECT: 50%

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

- Finalize trial batch mixture that will be subject to the remaining concrete property testing. The trial batch must reach the compressive strength, slump and set time goals, and have qualitatively acceptable workability.

Task 4: Test Mixture

- Execute shrinkage test (AASHTO PP 34-99) on the soon to be selected trial batch mixture.
- Begin design and fabrication of bar pullout test (ASTM A944) setup.

O. FINANCIAL STATUS:

As of: September 30, 2015

Total Project Budget: \$ 174,923

Total Expenditures : \$ 75,212

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.