

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

A. PROJECT NUMBER AND TITLE:

NETC 19-3 New Improved Load Rating Procedures for Deteriorated Unstiffened Steel Beam Ends

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

Simos Gerasimidis, University of Massachusetts – Amherst
Sergio Breña, University of Massachusetts – Amherst.

C. WEB SITE ADDRESS (If one exists):

N/A

D. START DATE (Per NETC Agreement): 9/18/2020

E. END DATE (Per NETC Agreement): 3/31/2023

F. ANTICIPATED COMPLETION DATE: 3/31/2023

*If different from the END DATE in paragraph E., the reason must be given. It is the responsibility of the Principal Investigator to insure that the project, including review of the draft report by the Project Technical Committee and the printing of the Final Report, is completed prior to the Agreement End Date. Costs incurred after the Agreement End Date cannot be reimbursed. **Requests for extensions of the Agreement End Date must contain the reasons for the request and be submitted so as to arrive in the Coordinator's office at least 90 days prior to the Agreement End Date.***

G. PROJECT OBJECTIVES:

In order to capitalize on the knowledge and methodology developed from ongoing research on new improved load rating procedures for deteriorated unstiffened steel beam ends, the structure of the proposed project will be designed accordingly. The research will identify and quantify the most common beam-end corrosion topologies across states in New England. The goal of this work is to enhance load rating methods for assessing corroded unstiffened beam ends to avoid overly conservative bridge posting recommendations. The new developed methods from ongoing research in the state of Massachusetts calculate more accurately the load carrying capacity. However, the wide application of the new procedures needs to be validated with experiments including several different configurations, beam sizes, corrosion shapes, and support conditions. Laboratory testing will validate and enrich the new procedures while providing valuable insight into the failure mechanisms that control these scenarios. Finally, finite element computational calculations will be calibrated using the produced experimental data from full-scale testing of the corroded beams.

H. REPORT PERIOD:

Quarter 4, 2021 (October 1 – December 31)

I. ACCOMPLISHMENTS THIS PERIOD:

We adapted the test set up in the lab for the needs of the project. We performed the first test of the project using one of the CT beams. The test was very successful as we reached instability of the beam and we were able to capture a lot of important data. We are currently processing the experimental data. During the report period we also built expertise on the computational analysis of the beams and we are able to perform analysis of the corroded beams prior to testing. We also used the ultrasonic pocket Mike to measure corrosion on the specimen and we also scanned the beam using the LiDar we have in house. We built the method for LiDar data (point cloud) processing from scanning to a finite element model.

We have 29 specimens on site that are composed of beams from Vermont, Maine, and Connecticut. We are waiting for the rest of the states to have and provide bridges with potential beam candidates that can be used for the testing of the project.

J. PROBLEMS ENCOUNTERED (If any):

None

K. TECHNOLOGY TRANSFER ACTIVITIES: *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

None yet.

L. STATUS BY TASK: *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

Task #	Description	%
1	Identify common unstiffened beam-end corrosion topologies	100
2	Review of existing structures	75
3	Laboratory testing	25
4	Calculate and validate/update the new load rating procedures	15
5	Draft final report, presentation	0
6	Final report	0

M. PERCENT COMPLETION OF TOTAL PROJECT: 40%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

By the next quarter, the research team expects to progress with tasks 2 and 3.

O. FINANCIAL STATUS:

As of: Month, Day, Year

Total Project Budget: \$179,995.15

Total Expenditures : \$ 0

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.