

**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:

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:

October - December, 2022

I. ACCOMPLISHMENTS THIS PERIOD:

We performed the seventh and eighth experiment of the project on specimens from Maine. The tests were very successful. We achieved instability in both and were able to capture extensive 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 used the ultrasonic thickness gauge (Pocket Mike) to measure corrosion on the specimen and we also scanned the beam using LiDAR and 3D scanning. We built the method for LiDAR data (point cloud) processing from scanning to a finite element model to validate experimental data. We have continued to develop and edit the existing protocol for scanning and post processing corrosion data. We have received beam specimens from every New England State except for Rhode Island. In addition to LiDAR scans, we have used and continue to research other 3D scanners to use to document beam end corrosion.

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	100
3	Laboratory testing	50
4	Calculate and validate/update the new load rating procedures	25
5	Draft final report, presentation	0
6	Final report	0

M. PERCENT COMPLETION OF TOTAL PROJECT: 55%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

By the next quarter, the research team expects to progress with tasks 3 and 4.

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.