

**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):**

<https://www.newenglandtransportationconsortium.org/projects/netc-19-3/>

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

**E. END DATE (Per NETC Agreement):** 3/31/23

**F. ANTICIPATED COMPLETION DATE:** 1/31/2024 – Project extended to allow for testing of additional beams, which was approved by the Technical Committee.

*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:**

April 1 – June 30, 2023

**I. ACCOMPLISHMENTS THIS PERIOD:**

We performed the eleventh and twelfth experiment of the project on specimens from Maine. Instability failure was achieved in both specimens and the post buckling capacity studied. We used LiDAR and 3D scanning technologies to measure corrosion on the specimens and continue to explore many scanners. We have been improving the method for LiDAR data (point cloud) processing from scanning to a finite element model to validate experimental data. We have received beam specimens from every New England State except for Rhode Island. We have continued to improve and edit the existing protocol for scanning and post

processing corrosion data. We performed a demonstration scan on an in-service bridge in Maine and presented work at the MassDOT Innovation Conference and the Engineering Mechanics Institute. Finally, we continued to work on the correlation between observed thickness/section loss for specimens prior to cleaning corrosion and delamination and the cleaned beam end.

**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.*

<b>Task #</b>	<b>Description</b>	<b>%</b>
<b>1</b>	Identify common unstiffened beam-end corrosion topologies	<b>100</b>
<b>2</b>	Review of existing structures	<b>100</b>
<b>3</b>	Laboratory testing	<b>75</b>
<b>4</b>	Calculate and validate/update the new load rating procedures	<b>50</b>
<b>5</b>	Draft final report, presentation	<b>10</b>
<b>6</b>	Final report	<b>0</b>

**M. PERCENT COMPLETION OF TOTAL PROJECT: 75%**

**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: 6/30/23**

**Total Project Budget: \$179,995.15**

**Total Expenditures : \$130,164.74**

**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.**