

Research in Progress

Improved Load Rating Procedures for Deteriorated Steel Beam Ends with Deteriorated Stiffeners

Research Need

MassDOT is increasingly witnessing instances of extensive corrosion at steel beam ends on certain bridges. The purpose of this study will be to experimentally test real corroded deteriorated beams, analyze the stiffened beam-end corrosion topologies utilizing high-fidelity Finite Element Models (FEM) and update the Bridge Manual accordingly.

Goals/Objectives

This project will yield guidelines for the case of deteriorated beam ends with deteriorated stiffeners for introduction into the MassDOT Bridge Manual.

The project has four objectives:

1. Identify the most common shapes and locations of stiffened steel beam end deterioration processing data from inspection reports across the state.
2. Experimental testing of real corroded stiffened beams from replacement or rehabilitation projects.
3. Extensive computational work to validate the experimental findings and sensitivity analysis using a high-fidelity numerical simulation procedure.
4. Update the current guidelines as they appear in the MassDOT Bridge Manual with new web load rating procedures for deteriorated steel beam ends.

Project Information

This project is being conducted as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

Principal Investigators:

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Performing Organization:

University of Massachusetts Amherst

Project Champion:

Alexander Bardow, MassDOT

Project Start Date:

June 2019

Expected Project Completion Date:

September 2020

Methodology

This research will develop a new methodology for the accurate assessment of the remaining load carrying capacity of steel bridges with deteriorated stiffened beam ends based on real corrosion data. In this project:

1. Corrosion data will be gathered from through inspection reports across all the districts of the state and corrosion topologies will be studied and identified.
2. Experimental testing of real corroded stiffened beams will be conducted at the Brack Structural Testing Lab at Umass.
3. From high-fidelity finite element analysis, a correlation will be sought between the defined corrosion configurations and the beam's remaining load capacity.
4. A new set of equations will be developed to accurately assess the bridge capacity and be included in the Bridge Manual.

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