Research in Progress

Development of Load Rating Procedures for Deteriorated Steel Beam Ends

Research Need

MassDOT is witnessing more and more instances of deterioration of the web at steel beam ends. The purpose of this study is to update the current MassDOT Bridge Manual guidelines with new web load rating procedures for deteriorated steel beam bridge ends.

Goals/Objectives

This project aims to develop a set of recommendations that better reflects the capacity of bridges containing beams with ends that are damaged. The project has four objectives:

1. Identify the most common configurations (shapes and locations) of steel beam end deterioration by reviewing detailed inspection reports from various bridges across the state.
2. Experimental testing of real corroded beams gathered from replacement or rehabilitation projects. This is the first time real corroded beams are tested.
3. Extensive computational work to validate the experimental findings and development of a high-fidelity numerical simulation procedure to capture the failure observed in the experiments.

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.

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Performing Organization:
University of Massachusetts Amherst

Project Champion:
Alexander Bardow, MassDOT

Project Start Date:
August 2017

Expected Project Completion Date:
July 2019

Methodology

The research will provide new methodologies to determine the remaining load carrying capacity of steel bridges with deteriorated beam ends based on real corrosion data. In this project:

1. Real corrosion data have been acquired through inspection reports across all the districts of the state and corrosion patterns were studied and identified.
2. A new experimental configuration has been built in the Brack Structural Testing Lab at UMass Amherst to test real corroded steel beams.
3. High-fidelity finite element modeling and analysis simulations are conducted to validate the experimental observations and findings.
4. Based on the findings from experiments and simulations, a new methodology is developed to accurately assess the capacity.