MEMBER-LEVEL REDUNDANCY IN BUILT-UP STEEL MEMBERS

Matt Hebdon
Robert Connor

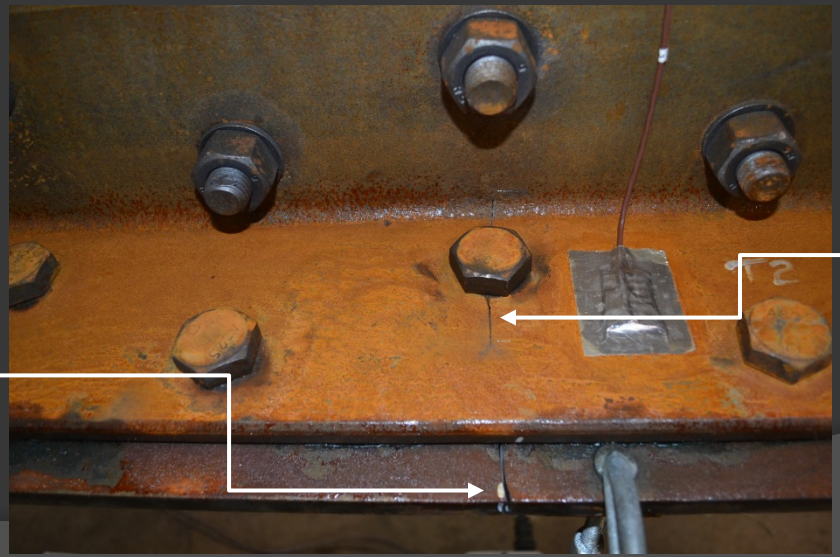
Transportation Pooled Fund-5(253)

BOWEN LABORATORY

PURDUE UNIVERSITY

Research Objectives

- Determine ‘after-fracture fatigue capacity’ of built-up steel girders
  - Riveted and bolted specimens
- Measure effects of energy release in girder components
- Evaluate effect of fracture on remaining fatigue life



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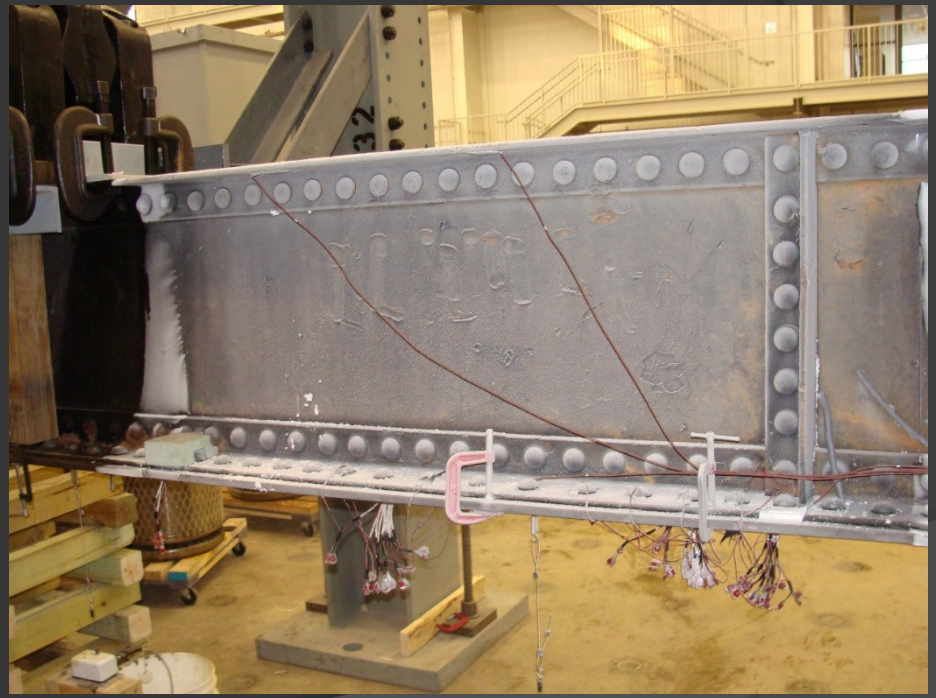
Research Tasks

- Pre-crack full-scale specimens
  - Grow cracks through fatigue to critical crack length
- Cool to AASHTO Zone III temperature (-60°F)
  - Brittle steel behavior
- Overload to induce fracture in single component
  - Measure stress redistribution
  - Evaluate member-level redundancy
- Test for ‘after-fracture’ fatigue life



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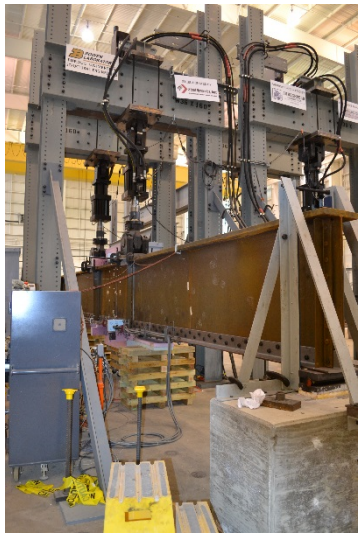
Member-level Redundancy in Built-up Steel Members

The objective of this research is to quantify the redundancy possessed by built-up steel members (bolted or riveted). Typically, built-up members will not 'fail' if one of the components fails (whether through fatigue or fracture). However, there is very little experimental data quantifying the remaining fatigue life and strength of a member in which one of the components has failed. Furthermore, if built-up members are located in bridges classified as fracture critical, evidence of sufficient member redundancy may allow the bridge to be reclassified as non-fracture critical. Reclassification would release these members from the more rigorous arms-length inspection currently required. More rational inspection intervals for these members will then be permissible. These intervals will be addressed through the outcomes of this research.



Sponsors: Transportation Pooled Fund (Federal Highway Administration, Indiana DOT, Iowa DOT, Minnesota DOT, New York DOT, Oregon DOT, Wisconsin DOT, Wyoming DOT, US Army Corps of Engineers)

Faculty Investigator: Robert Connor

Graduate Student: Matt Hebdon