

## TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Date: December 31, 2013

Lead Agency (FHWA or State DOT): Indiana DOT

**INSTRUCTIONS:**

*Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.*

<b>Transportation Pooled Fund Program Project #</b> <i>(i.e., SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</i>  <u><b>TPF 5-253</b></u>		<b>Transportation Pooled Fund Program - Report Period:</b> <input type="checkbox"/> Quarter 1 (January 1 – March 31) <input type="checkbox"/> Quarter 2 (April 1 – June 30) <input type="checkbox"/> Quarter 3 (July 1 – September 30) <input checked="" type="checkbox"/> Quarter 4 (October 1 – December 31)	
<b>Project Title:</b> <b>Evaluation of Member Level Redundancy in Built-up Steel Members</b>			
<b>Name of Project Manager(s):</b> Tommy E. Nantung		<b>Phone Number:</b> (765) 463-1521 ext. 248	<b>E-Mail</b> <a href="mailto:tnantung@indot.in.gov">tnantung@indot.in.gov</a>
<b>Lead Agency Project ID:</b>		<b>Other Project ID (i.e., contract #):</b>	<b>Project Start Date:</b> 9/1/2011
<b>Original Project End Date:</b> 8/31/2014		<b>Current Project End Date:</b> 8/31/2014	<b>Number of Extensions:</b> None

Project schedule status:

On schedule     
  On revised schedule     
  Ahead of schedule     
  Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date
<b>\$600,000</b>	<b>\$297,000</b>	<b>40%</b>

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
<b>\$72,000</b>	<b>12.0%</b>	<b>73%</b>

**Project description:**

The objective of this research project is to quantify the redundancy possessed by built-up members. For example, a riveted built-up member will not typically “fail” if one of the components fractures. However, there is very little experimental data which is available to quantify the remaining fatigue life or 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, when significant member redundancy can be shown the bridge may not need to be classified as FC. However, doing so would release these members from the more rigorous arms-length inspection currently required. As a result, should a component fail, it may go undetected for an extended interval. Thus, a portion of the project is devoted to setting rational inspection intervals for these members. Lastly, the advantages of using built-up members fabricated with HPS components fastened using HS bolts in new construction will also be explored.

**Progress this quarter (includes meetings, work plan status, contract status, significant progress, etc.):**

- Held interim progress meeting (see Figure 1).
- Fractured cover plate of specimen 46-3. Fracture did not propagate into remaining components (see Figure 2).
- Completed fatigue testing of the following specimens: 46-3, 36-1 (see Figure 3).
- Began investigation of methods for fabricating specimens with brittle welds at fracture location for higher energy release.
- Ordered additional flange angle and cover plate material for 2 additional 46” specimens (will reuse welded top flange and web from previous 46” specimens).
- Sent faulty actuator valve in for repair.
- Continued work on FE analysis. FE Models using built-up riveted plates have been created and are being compared with experimental data.

**Anticipated work next quarter:**

- Continue reviewing relevant literature.
- Finalize testing matrix.
- Test 3 large scale specimens.
- Receive and install faulty actuator valve.
- Material testing on recently received flange angle and cover plate material.
- Instrumentation of specimens.
- Place orders for remaining built-up specimens.
- Continue FE analysis.

**Significant results:**

During the past quarter, the major steps forward included:

1. Two additional specimens have been tested.
2. Held interim progress meeting.
3. Continue FE analysis.

**Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints set forth in the agreement, along with recommended solutions to those problems).**

**Potential Implementation:**

None at this time. Too early in the research.



Figure 1: Interim progress meeting: riveting demonstration

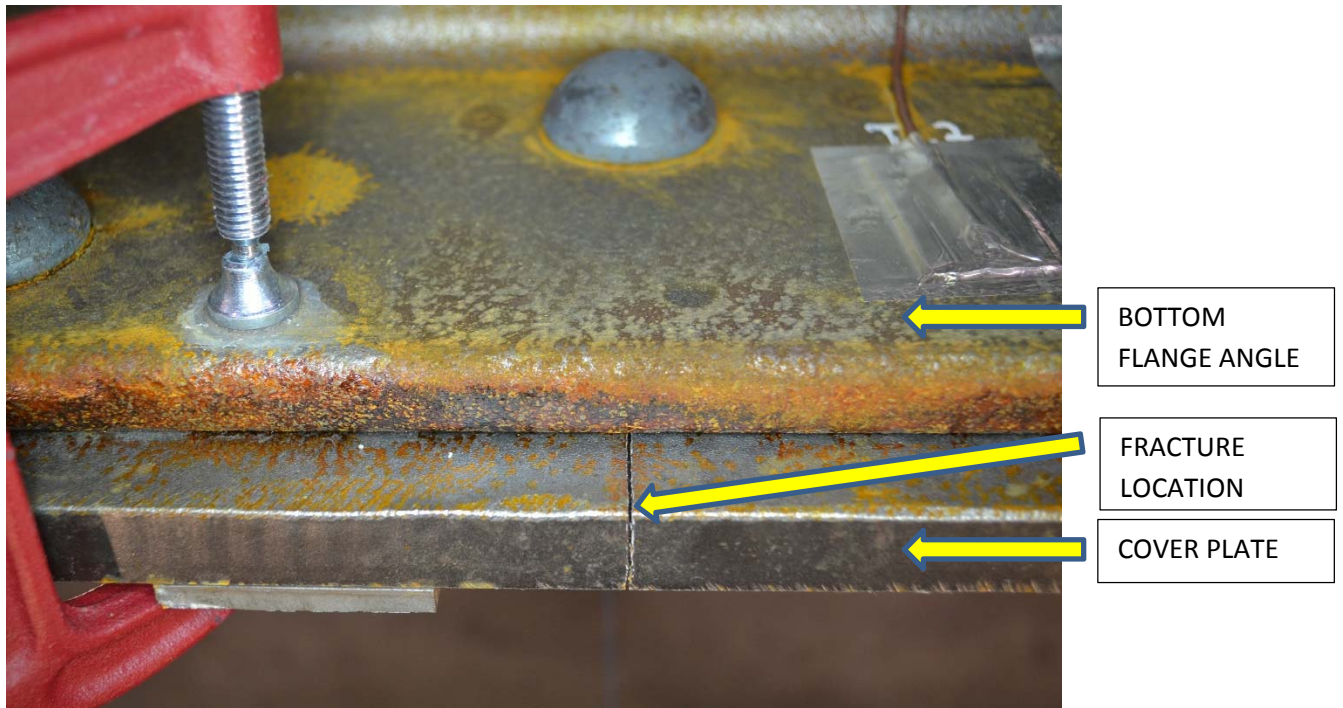


Figure 2: Fractured cover plate of specimen 46-3



Figure 3: Specimen 36-1 fatigue test setup