

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Date: December 31, 2014

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.

<p>Transportation Pooled Fund Program Project # (i.e. SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</p> <p><u>TPF 5-253</u></p>	<p>Transportation Pooled Fund Program - Report Period:</p> <p><input type="checkbox"/> Quarter 1 (January 1 – March 31)</p> <p><input type="checkbox"/> Quarter 2 (April 1 – June 30)</p> <p><input type="checkbox"/> Quarter 3 (July 1 – September 30)</p> <p><input checked="" type="checkbox"/> Quarter 4 (October 1 – December 31)</p>	
<p>Project Title: Evaluation of Member Level Redundancy in Built-up Steel Members</p>		
<p>Name of Project Manager(s): Tommy E. Nantung</p>	<p>Phone Number: (765) 463-1521 ext. 248</p>	<p>E-Mail tnantung@indot.in.gov</p>
<p>Lead Agency Project ID:</p>	<p>Other Project ID (i.e., contract #):</p>	<p>Project Start Date: 9/1/2011</p>
<p>Original Project End Date: 8/31/2014</p>	<p>Current Project End Date: 7/31/2016</p>	<p>Number of Extensions: None</p>

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
\$700,000	\$450,521	70%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
\$65,167	9.3%	100%

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.):

- Successfully fractured bottom cover plate of Specimen 36-4
- Completed fatigue test of Specimen 36-4 at stress range of 8.9 ksi in the 'failed' state (with bottom cover plate fractured). Specimen reached runout value of 12,000,000 cycles with no cracks found in any other components (both flange angles, upper cover plate, and web plate).
- Performed quasi-static testing of Specimen 46-5 for out-of-plane bending with an asymmetrical net cross section.
- Preparation of Specimen 30-1 for fracture test using thicker cover plate.
- Continued work on FE analysis. FE models using built-up riveted plates have been created and are being compared with experimental data.
- Initial FE models for parametric study are being developed.
- Initiated fabrication of tensile testing frame.

Anticipated work next quarter:

- Finish fabrication of Specimen 30-1 with 1" cover plate to test larger energy release during fracture event.
- Continue FE model development and validation with experimental results.
- Continue FE parametric study.
- Receive tensile testing frame and begin erection.
- Receive repaired MTS actuator (failed seals) for West test setup.

Significant results:

During the past quarter, the major steps forward included:

1. Two additional specimens were tested.
2. Submission of tensile testing frame design for fabrication.
3. Continued 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, with recommended solutions to those problems).

Potential Implementation:

Working with T-18 to develop specification language for implementation of results into MBE for riveted members subjected to flexure