

**TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT**

Date: December 31, 2012

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: 8/31/2014</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
\$600,000	\$91,357	24%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
\$----	--%	50%

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.):

- Continued review of relevant literature.
- Four fixtures for loading of specimens (load frame) were received.
- One set of load frames was erected.
- Fasteners for the built-up specimens were donated by Nucor Fastener Division and were received.
- New high-capacity hydraulic servo-manifolds (needed to accommodate the greater flow required to fracture the beam specimens) were received.
- Vern Mesler, an expert on the restoration and riveting of steel bridges from Lansing Community College, visited the laboratory to teach students the art of riveting. A day-long workshop was held in which students and other visitors were coached on the proper technique of riveting. For photographs of the first trial specimen, see below and <https://www.facebook.com/lcc.ispc/photos> for more photos of the training held at Purdue.
- The research team spent much time practicing riveting in order to ensure consistency and proficiency when riveting the test specimens.
- The Research Team has been in discussions with various owners to secure riveted built-up members from existing bridges to be used in the large-scale testing program. Eight built-up riveted floor beams from a bascule bridge in Alabama were donated by the Tennessee Valley Authority. These specimens are being modified to allow a new tension flange cover plate to be attached to the existing tension flange by means of hot riveting.
- The design of the large-scale fabricated built-up beam specimens was finalized. Quotes have been requested from fabricators. Plate material for the built-up members will be donated by Arcelor Mittal.
- Continued work on preliminary FE analysis. Models using built-up riveted plates have been created and are being used to evaluate load transfer of various surface conditions.

Anticipated work next quarter:

- Continue reviewing relevant literature.
- Continue to refine the testing plan for existing beam specimens and instrumentation.
- Receive steel plates needed for mounting hydraulic actuators to the load frames.
- Assemble remaining load frames, as well as applicable bracing, and hydraulic equipment.
- Assemble instrumentation and data acquisition systems for testing of specimens.
- Begin testing of first specimen.
- Receive quotes for large-scale fabricated built-up specimens and place orders.
- Continue to work with DOT's to obtain specific existing riveted built-up members.
- Continue FE analysis.

Significant results:

During the past quarter, the major steps forward included:

1. Four fixtures for loading of specimens were received and two have been erected.
2. Final design of test specimens were sent to fabricators for quotes.
3. Hydraulic components have been received and installation has begun.
4. Students have become proficient at riveting.
5. One specimen from an existing bridge has been completed using hot riveting.
6. FE analysis was continued.

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).

Note, the total dollars spent has decreased since the last QPR. There was an error in the Purdue accounting which led to an overestimate of funds spent.

Potential Implementation:

None at this time. Too early in the research.

