TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Date: March 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.

Transportation Pooled Fund Program Project # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* ***TPF 5-253***	**Transportation Pooled Fund Program - Report Period:** X Quarter 1 (January 1 – March 31) ☐ Quarter 2 (April 1 – June 30) ☐ Quarter 3 (July 1 – September 30) ☐ Quarter 4 (October 1 – December 31)

Project Title: **Evaluation of Member Level Redundancy in Built-up Steel Members**		
Name of Project Manager(s): Tommy Nantung	**Phone Number:** 765-463-1521	**E-Mail** tnantung@indot.in.gov
Lead Agency Project ID:	**Other Project ID (i.e., contract #):**	**Project Start Date:** 9/1/2011
Original Project End Date: 8/31/2014	**Current Project End Date:** 8/31/2014	**Number of Extensions:** None

Project schedule status:

X 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	**$127,541**	**29%**

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$36,184	**6%**	**56%**

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.
- The second set of load frames was erected. (See photos)
- The new high-capacity hydraulic servo-manifolds (needed to accommodate the greater flow required to fracture the beam specimens) were installed on the load frames.
- The attachment plates for the actuators were received and the actuators were hung in the test fixtures.
- The hydraulic system to run one full setup was assembled.
- Bracing to prevent lateral torsional buckling has begun to be assembled.
- The first specimen donated from the Tennessee Valley Authority was assembled with a new tension flange cover plate. The cover plate was attached using rivets in the area of interest.
- The first specimen was instrumented in anticipation preparation to assemble beneath test fixtures.
- 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.
- Calibrate instrumentation (load cells, string potentiometers).
- Assemble trial test specimen to verify that the test setup is performing as planned.
- Assemble instrumentation and data acquisition systems for testing of specimens.
- Begin testing of first specimen.
- Resume assembly of second test setup (halted due to necessary repairs to hydraulic actuator).
- Begin assembly of other specimens from retired bridge.
- Instrumentation of specimens.
- 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. The second set of fixtures was erected.
2. Hydraulic components have been received and installation has begun.
3. One specimen from an existing bridge was finished and instrumented.
4. 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).

Potential Implementation:

None at this time. Too early in the research.

Figure 1: Assembled specimen above, with two additional specimens being prepared below

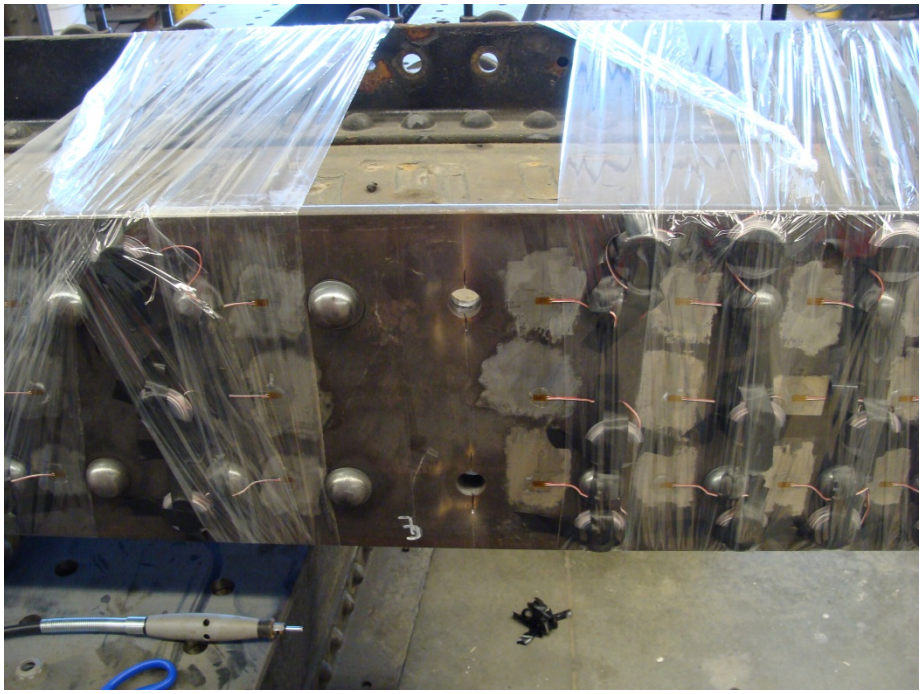

Figure 2: Instrumented beam with pre-cracks at center of beam

Figure 3: Load Frame setup before completion of hydraulics