TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Date: June 30th, 2015

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:** ☐ Quarter 1 (January 1 – March 31) X 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 E. Nantung**	**Phone Number:** **(765) 463-1521 ext. 248**	**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:** 7/31/2016	**Number of Extensions:** None

Project schedule status:

☐ On schedule X 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	**$523,039**	**80%**

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$35,516	**5.1%**	**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.):

- Fracture test of Specimen 30-1 with thicker (1") cover plate. No fracture propagation to adjacent components.
- Fatigue test of Specimen 30-1. 1.4 Million cycles at calculated net-section stress range of 8.3 ksi.
- Continued work on FE analysis. FE models using built-up riveted plates have been created and are being compared with experimental data.
- Development of simplified models for characterization of load distribution of partially failed built-up sections were benchmarked with experimental data.
- FE parametric study was performed evaluating non-symmetric cross sections, tension flange unbraced length, web height, and the effect of sections with multiple cover plates.
- Developed draft of evaluation guidelines for built-up members in bending.
- Began assembly of 2,000,000 lb testing machine.
- Reassembled West test setup load frame with repaired MTS actuator.

Anticipated work next quarter:

- Finish fabrication of Specimen 36-5 and test with 1-1/2" cover plate to test larger energy release during fracture event.
- Prepare initial tensile specimens for evaluation of tensile testing machine.
- Begin design of tensile specimens to evaluate axially loaded built-up cross-sections.

Significant results:

During the past quarter, the major steps forward included:

1. Completion of FE parametric study
2. Development of evaluation guidelines
3. Test of Specimen 30-1 to evaluate a specimen with a thicker cover plate
4. Erection of tensile testing machine.

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