TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Date: _June 30, 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.

Transportation Pooled Fund Program Project # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* ***TPF 5-238***	**Transportation Pooled Fund Program - Report Period:** ☐Quarter 1 (January 1 – March 31) XQuarter 2 (April 1 – June 30) ☐Quarter 3 (July 1 – September 30) ☐Quarter 4 (October 1 – December 31)

Project Title: **Design and Fabrication Standards to Eliminate Fracture Critical Concerns in Steel Members Traditionally Classified as Fracture Critical**		
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:** 8/1/2011
Original Project End Date: **7/31/2014**	**Current Project End Date:** **7/31/2014**	**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
$790,000	**$469,648**	**57%**

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$14,611	**1.8%**	**97.2%**

Project Description:
The objective of this research project is to take advantage of the major advances that have occurred in the past 30 years in the following areas related to fracture control in steel bridges:

1. The very high toughness of high performance steel (HPS), which was not available 30 years ago, can be used to take brittle fracture off the table so to speak. Crack arrest and very large defect tolerance can be ensured in these steels. Similar strategies have been employed by other industries for several years.
2. Modern fatigue design and detailing can ensure fatigue cracking does not occur.
3. Modern fabrication, shop inspection and the AWS FCP, greatly reduces the likelihood that defects are not introduced during fabrication. Advancements in NDT techniques along with technologies not regularly used, such as phased array UT have the potential to further reduce the chance of a defect being missed.

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

- Continued literature review.
- Continued to work with steel producers to find plates with appropriate toughness for large-scale testing.
- Completed all Master Curve testing for the pre-cracked Charpy single edge bend HPS specimens (at both static and dynamic rates)
- Continued crack arrest specimen testing.
- Completed compiling data for the historic fracture database.
- Completed static testing of specimens from structures sustaining fractures.
- Completed preliminary design of tensile testing frame (see Figure 1) capable of 2,000 kips. Design of this testing setup was requested during fall 2013 pooled fund panel meeting.

Anticipated work next quarter:

- Continue reviewing relevant literature.
- Locate appropriate material from steel producer for the first round of large-scale test specimens.
- Order the first round of large-scale specimens.
- Plan instrumentation layout for large-scale specimens.
- Complete crack arrest testing.
- Complete data analysis of small-scale testing.
- Continue J-Integral studies for various specimen geometries; specifically, a through-thickness center crack and through-thickness edge crack for an I-shape subjected to axial load.
- Begin FE modeling of large-scale specimens.
- Refine design of tensile testing frame.

Significant Results:

During the past quarter, the major steps forward included:

1. Completion of major portion of small-scale testing.
2. Completion of historic fracture database and specimen testing of structures sustaining fractures.
3. Advances with steel producers.

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).

Similar to last quarter, a great deal of time this quarter has been spent working with steel producers to obtain plate donations for the large-scale test specimens. This process continues to take longer than anticipated; however, the Research Team is hopeful plate donations will be provided early in the next quarter and specimen fabrication can commence.

A no-cost time extension is being requested due to unforeseen project delays.

Potential Implementation:

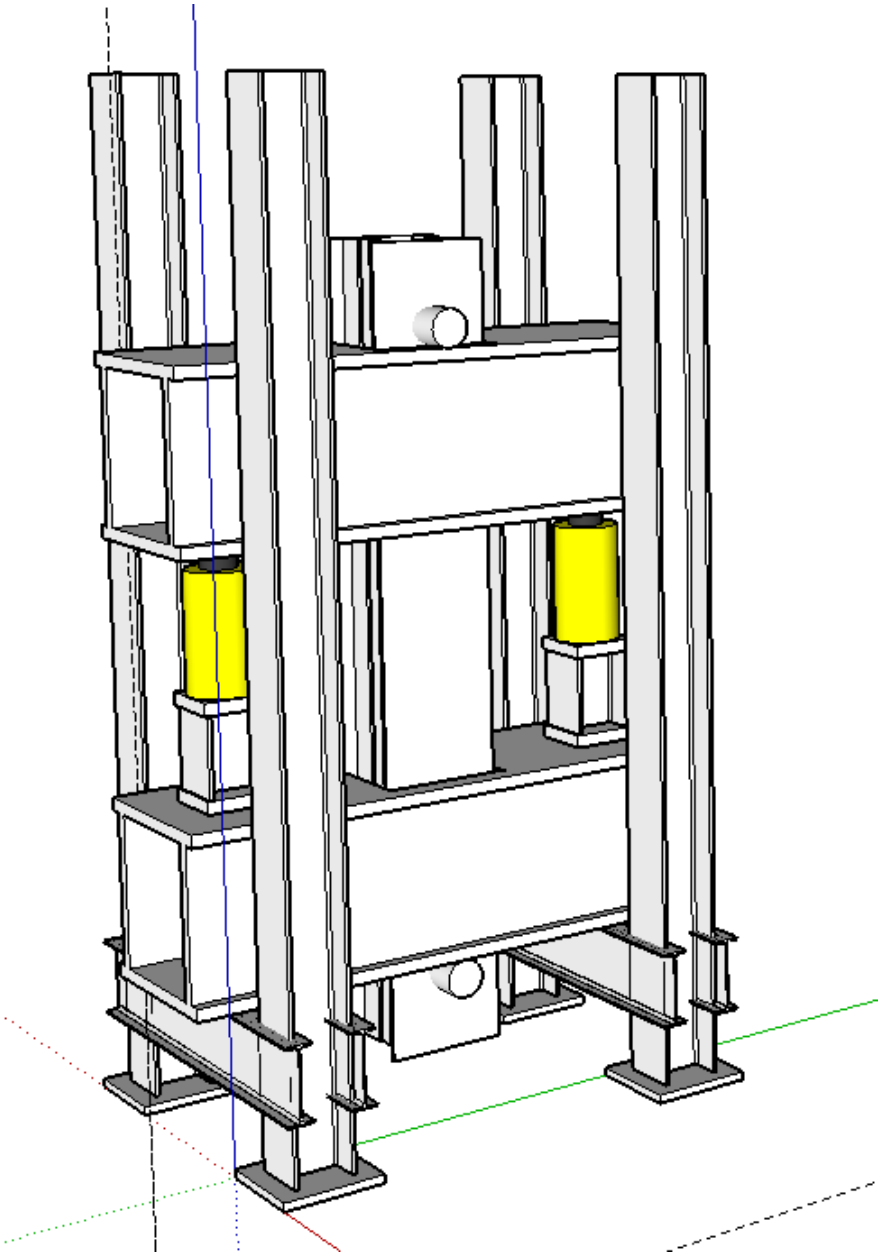

Figure 1: Axial load frame concept design