TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Date: _September 30, 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 5-238***	**Transportation Pooled Fund Program - Report Period:** ☐Quarter 1 (January 1 – March 31) ☐Quarter 2 (April 1 – June 30) XQuarter 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	**$730,000**	**85%**

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$87,000	**11%**	**100%**

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.
- Completed design of axial test specimens
- Received 2.5" Grade 50 bending test specimens: Specimens 50_2-5_1B and 2B (See Figure 1 below)
- Ordered and received 1.5" Grade 50 axial test specimens: Specimens 50_1-5_1A and 2A (See Figure 2 below)
- Attempted large-scale fracture on current specification Grade 50 specimen: Specimen 50_2-0_1B
- Performed preliminary axial experiment on Specimen 50_1-5_1A with no notch to evaluate test frame and check for specimen bending (see Figure 3 below)
- Designed, fabricated, and erected fatigue test frame to precrack axial test specimens (see Figure 4 below)
- Continued small-scale fracture mechanics testing of large-scale test specimen material.
- Completed report on small-scale material testing (see attached).
- Continued FE modeling of large-scale specimens.

Anticipated work next quarter:

- Continue reviewing relevant literature.
- Complete large-scale bending testing of Specimens 50_2-0_1B and 2B
- Begin large-scale bending testing of Specimens 50_2-5_1B and 2B
- Receive Grade 70 bending test specimens: Specimens 70_1-5_1B and 2B
- Begin large-scale bending testing of Specimens 70_1-5_1B and 2B
- Begin large scale axial testing of Specimens 50_1-5_1A and 2A
- Receive axial test Specimen 50_2-5_1A from fabrication
- Receive quotes for axial test Specimens 70_1-5_1A and 2A
- Continue fracture mechanics testing of small-scale specimens
- Continue FE modeling of large-scale specimens

Significant Results:
During the past quarter, the major steps forward included:

1. Began large-scale bending testing program
2. Received Specimens 50_2-5_1B and 2B
3. Verified axial test frame

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).

THE RESEARCH TEAM WILL BE REQUESTING A NO COST TIME EXTENSION. THERE HAVE BEEN CONSIDERAB DELAYS DUE TO PROBLEMS OBTAINING THE GRADES OF STEEL WITH THE LEVELS OF TOUGHNESS NEEDED PROBLEMS WITH EQUIPMENT (I.E., HYDRAULIC ACTUATORS NEEDED TO BE REBUILT CAUSING SEVERAL MO OF DELAY)

Potential Implementation:
None to date

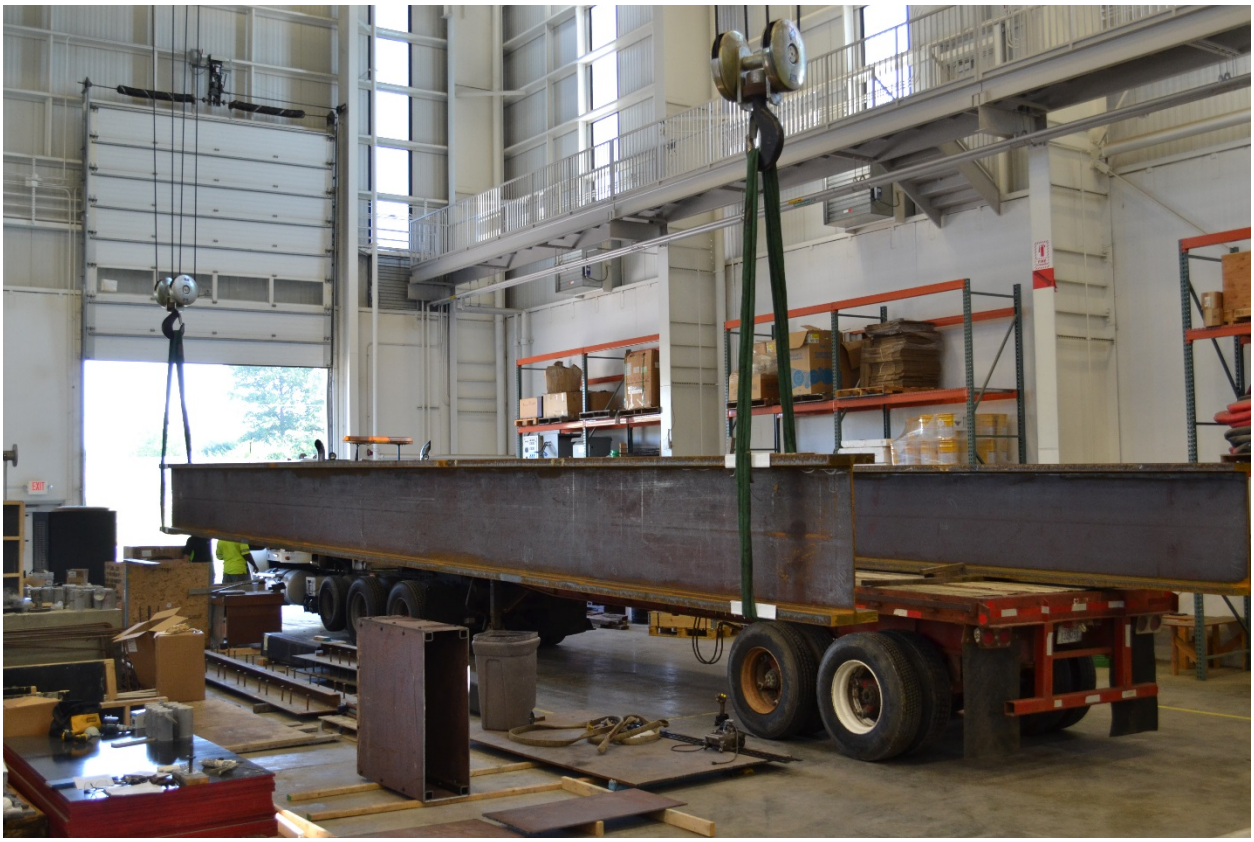

Figure 1: Specimens 50_2-5_1B and 2B

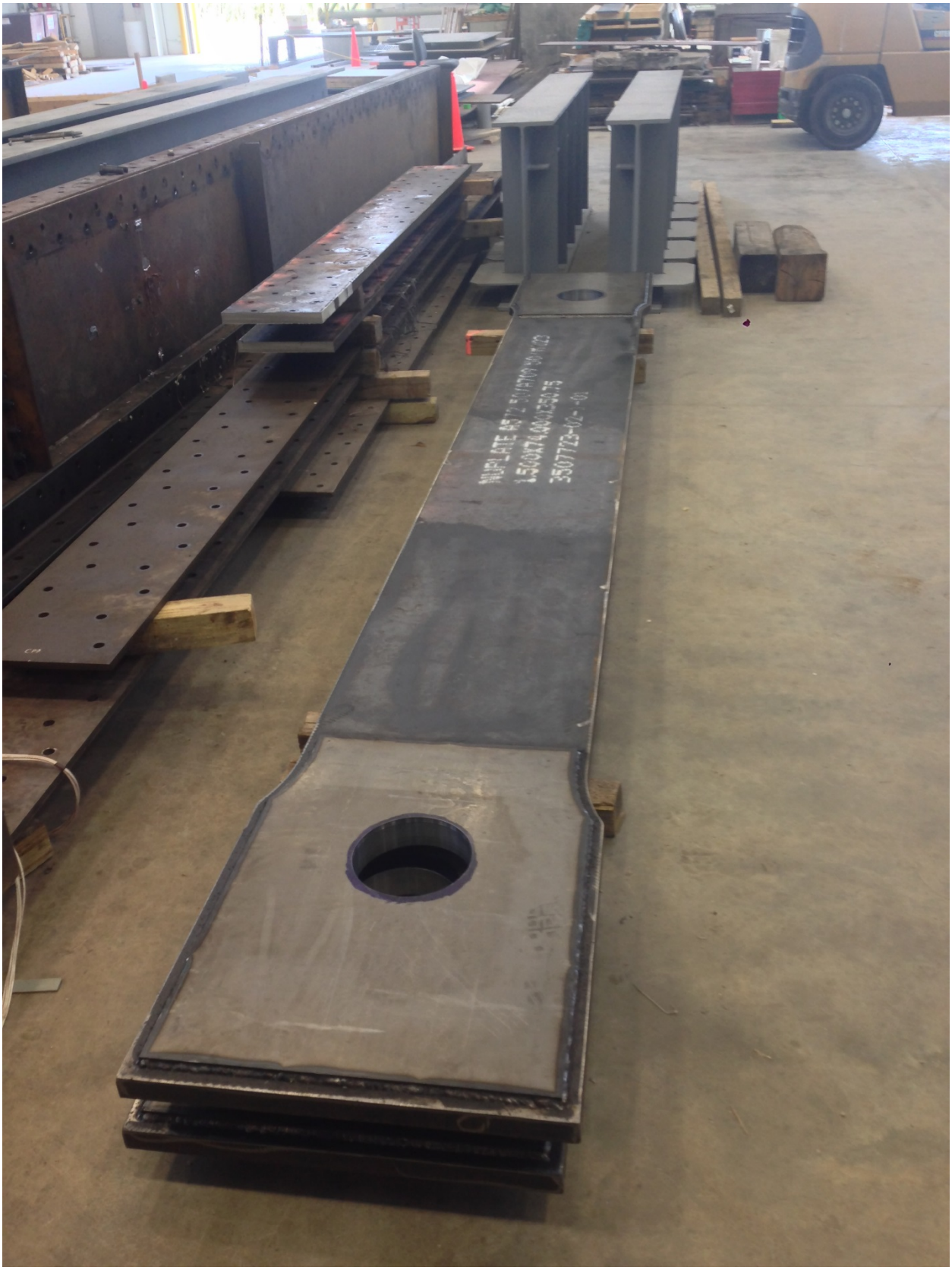

Figure 2: Specimen 50_1-5_1A

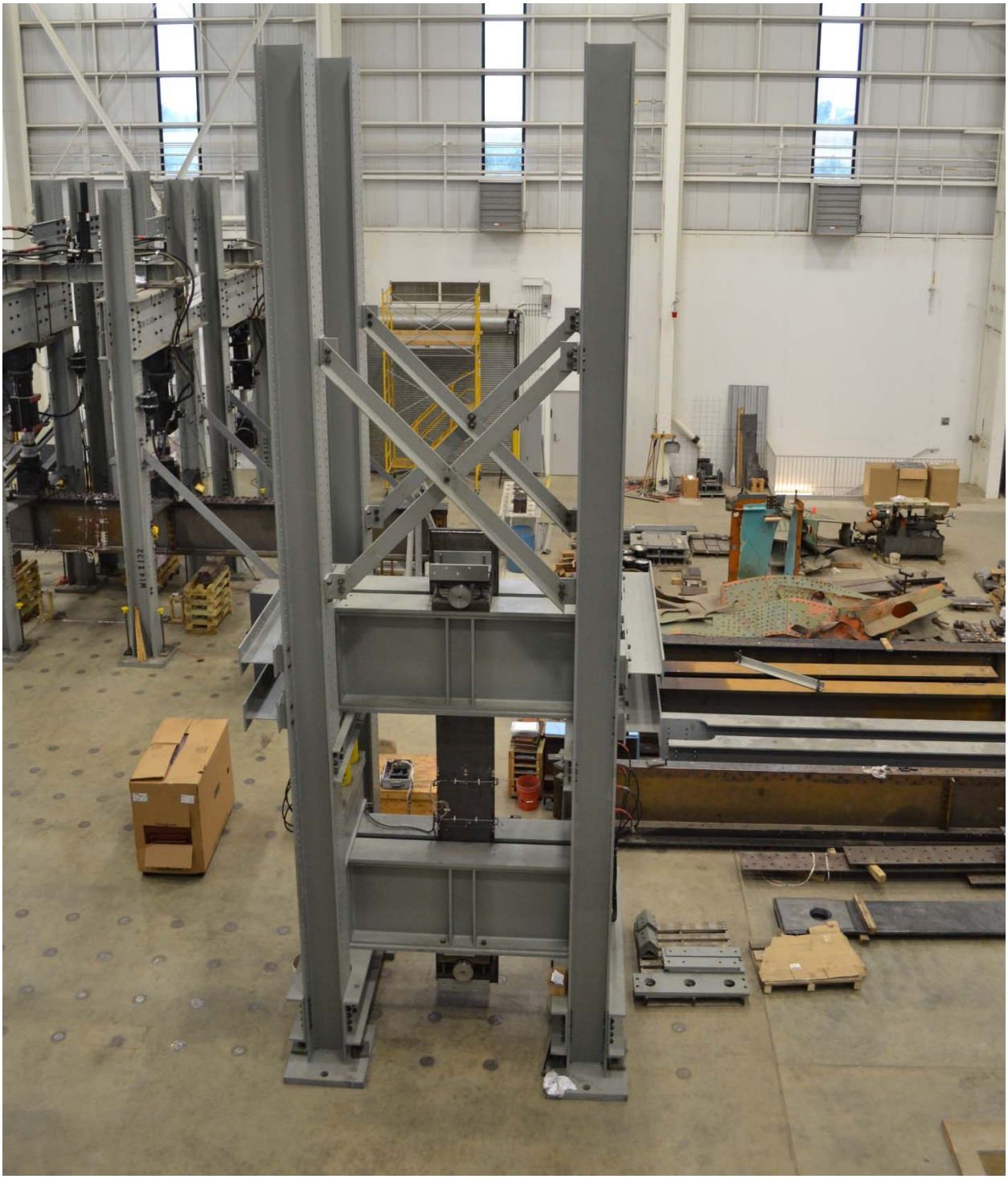

Figure 3: Specimen 50_1-5_1A in test frame

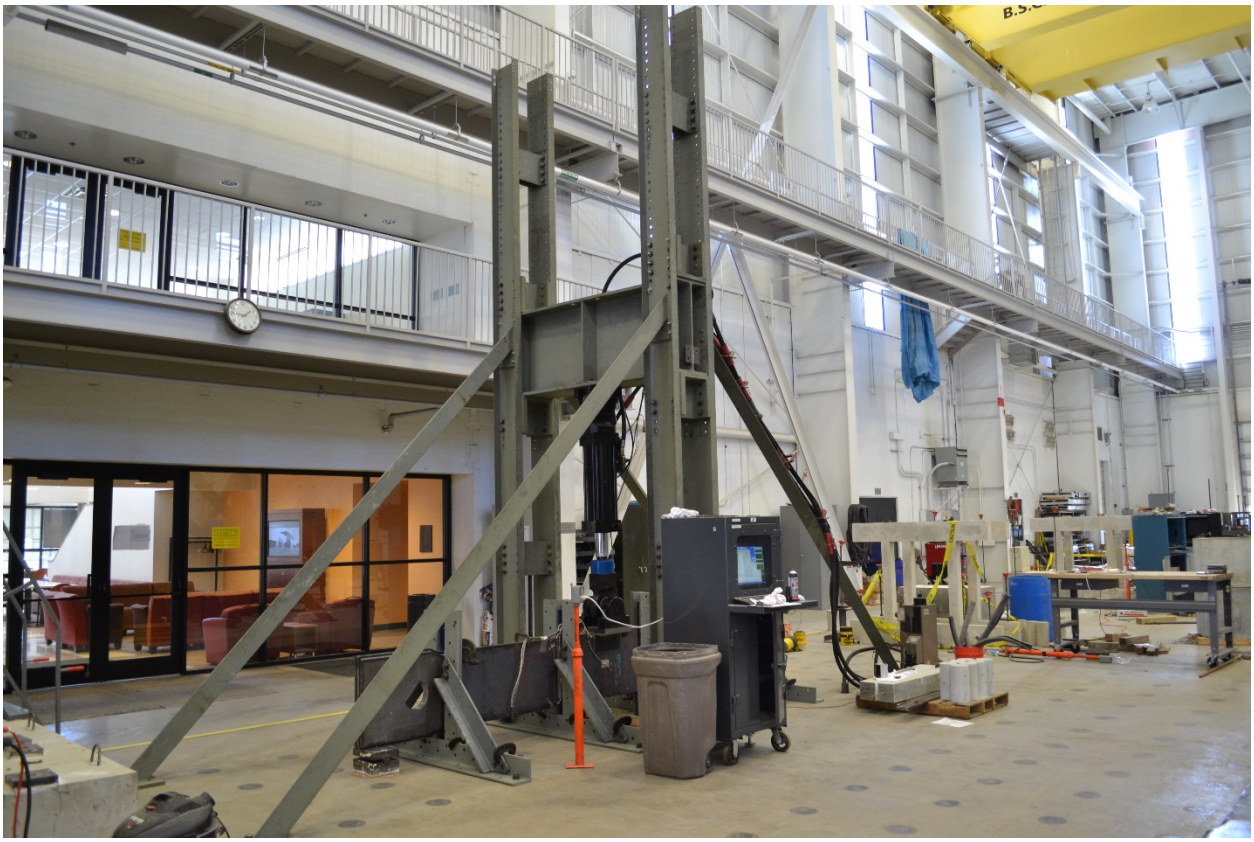

Figure 4: Axial test setup precrack test frame