# TRANSPORTATION POOLED FUND PROGRAM
# QUARTERLY PROGRESS REPORT

Date: _September 30, 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)* <br> ***TPF 5-238*** | **Transportation Pooled Fund Program - Report Period:** <br> ☐Quarter 1 (January 1 – March 31) <br> ☐Quarter 2 (April 1 – June 30) <br> XQuarter 3 (July 1 – September 30) <br> ☐Quarter 4 (October 1 – December 31) |
|---|---|

| **Project Title:** <br> **Design and Fabrication Standards to Eliminate Fracture Critical Concerns in Steel Members Traditionally Classified as Fracture Critical** | | |
|---|---|---|
| **Name of Project Manager(s):** <br> **Tommy E. Nantung** | **Phone Number:** <br> **(765) 463-1521 ext. 248** | **E-Mail** <br> tnantung@indot.in.gov |
| **Lead Agency Project ID:** | **Other Project ID (i.e., contract #):** | **Project Start Date:** <br> 8/1/2011 |
| **Original Project End Date:** <br> **7/31/2014** | **Current Project End Date:** <br> **7/31/2014** | **Number of Extensions:** <br> 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** | **$371,100** | **40%** |

***Quarterly*** Project Statistics:

| Total Project Expenses and Percentage This Quarter | Total Amount of Funds Expended This Quarter | Total Percentage of Time Used to Date |
|---|---|---|
| **$53,581** | **6.7%** | **68%** |

**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. Advancements in NDT techniques along with technologies not regularly used, such as phased array UT have the potential further reduce the chance of a defect being missed.

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

- The literature review continues.
- Research Team meeting held at Virginia Tech over July 8 and 9.
- Received repaired actuator.
- Assembled second test setup – actuators mounted and calibrated (see photograph below).
- Small-scale material testing (CVN, CTOD, pre-cracked CVN) continues.
- Legacy CVN data continues to be evaluated using Master Curve.
- FE benchmarking study performed and compared to a NASA Round Robin to evaluate how the results of the Research Team compare to industry. The results from the Research Team fell in the scatter of industry.
- J-Integral FE studies performed to estimate tolerable crack size for penny-shaped center crack.
- Planning for Status Meeting in October.

**Anticipated work next quarter**:

- Continue reviewing relevant literature.
- Continue refining test matrix for large-scale experimentation and FE work.
- Hold Status Meeting #1 at Purdue University on October 29, 2013.
- Finalize testing matrix with input of sponsor representatives.
- Finalize design of large-scale specimens.
- Begin planning instrumentation layout for large-scale specimens.
- Continue with small-scale material testing.
- Continue evaluating legacy CVN data with Master Curve.
- Continue to work with DOT's to obtain more "drops".
- Continue J-Integral studies for various crack geometries; specifically, a through-thickness center crack and through-thickness edge crack.
- Begin FE modeling of large-scale specimens.
- Place order for large-scale specimens.

**Significant Results:**

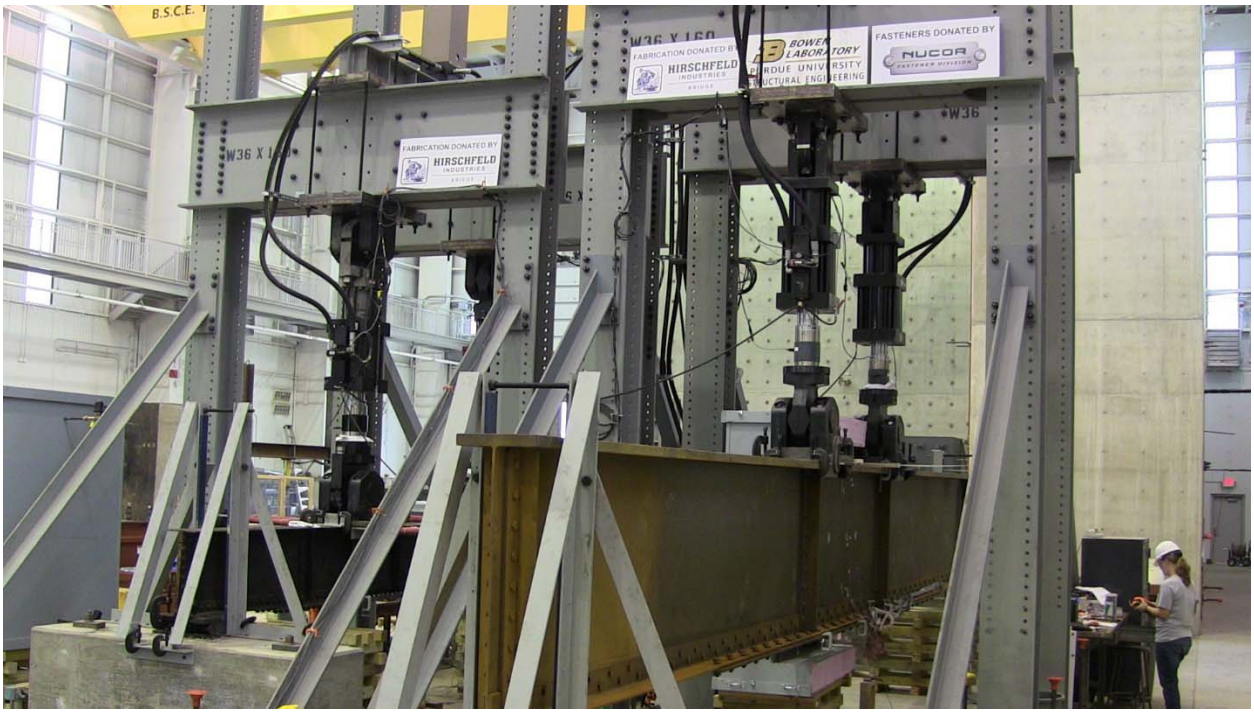
During the past quarter, the major steps forward included:

1. Second setup is complete and functional.
2. Small scale testing thoroughly underway.
3. J-integral studies validated with NASA Round Robin results.
4. Estimates made with FE of tolerable crack size for penny-shaped center crack.

**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.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