# TRANSPORTATION POOLED FUND PROGRAM
# QUARTERLY PROGRESS REPORT

Date: June 30, 2021

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 5-436*** | **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:** **Development of Criteria to Assess the Effects of Pack-out Corrosion 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:** 9/1/2019 |
| **Original Project End Date:** **8/31/2022** | **Current Project End Date:** **8/31/2022** | **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** |
|---|---|---|
| **$760,000** | **$185,226** | **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 |
|---|---|---|
| **$37,844** | **5.0%** | **50%** |

**This total budget is based on funds that are shown as "committed" on the TPF website.

**Project Description**:
This study proposes to:

1) To develop AASHTO ready specifications for the evaluation of the effects of pack-out corrosion in built-up steel tension, compression, and flexural members.
2) Provide guidance on the need for repairs and corrosion rates that can be expected in various environments in order to assist owners in programming when repairs may need to be made.
3) Identify the most effective methods of repairs and provide suggesting verbiage that could be used when preparing special provisions for repairs.
4) Develop several case-study examples, including calculations that will be used for training users on the methodologies to be developed. It is anticipated that the research team will host a number of webinars or on-site training sessions to ensure technology transfer and implementation.

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

- Prototype testing focused on the compression flange of a beam is complete. Three tests in total have been performed, with two during the last quarter. Specifically, the second test included a girder with simulated section loss with no simulated distortion (See Figure 1) and a third specimen which included a cover plate having simulated section loss and with simulated pack out distortion (See Figure 2). The section loss was simulated by machining material away in a profile similar to what has been measured from real specimens. (See Figure 3)
- The data from the two additional prototype tests were used to further calibrated the FEA studies. As with the other tests, excellent agreement between the laboratory measured data and the FEA results have been observed.
- An entire truss has been obtained from INDOT which *included* members with moderate to severe pack-out that has been taken out of service. (See Figure 4 for a photograph of some typical members with section loss and pack-out). Work is underway to develop tests which will utilize these members to evaluate the strength as well as fatigue/fracture performance.
- A second student (PhD candidate) has been added to the project. Mr. Sean McGuinness came to Purdue from Washington State Univ. in late June and he has considerable experience in large-scale testing.

**Anticipated work next quarter**:

- Continue with the finite element studies and based on the results of the prototype test, develop the detailed experimental program for compression flanges;
- Develop test specimens/approach for members with real pack-out damage.
- Machine plates to simulate section loss to study the effect of section and section loss combined with pack-out distortion in compression flanges.
- Begin analytical and experimental studies on tension flanges with pack-out corrosion.
- Obtain additional members with pack-out corrosions. **If a state has such members available or coming out of service in the near future, the RT requests that they contact Robert Connor to discuss the potential for obtaining the members for the research.**

**Significant Results:**

1. None to date

**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 to date

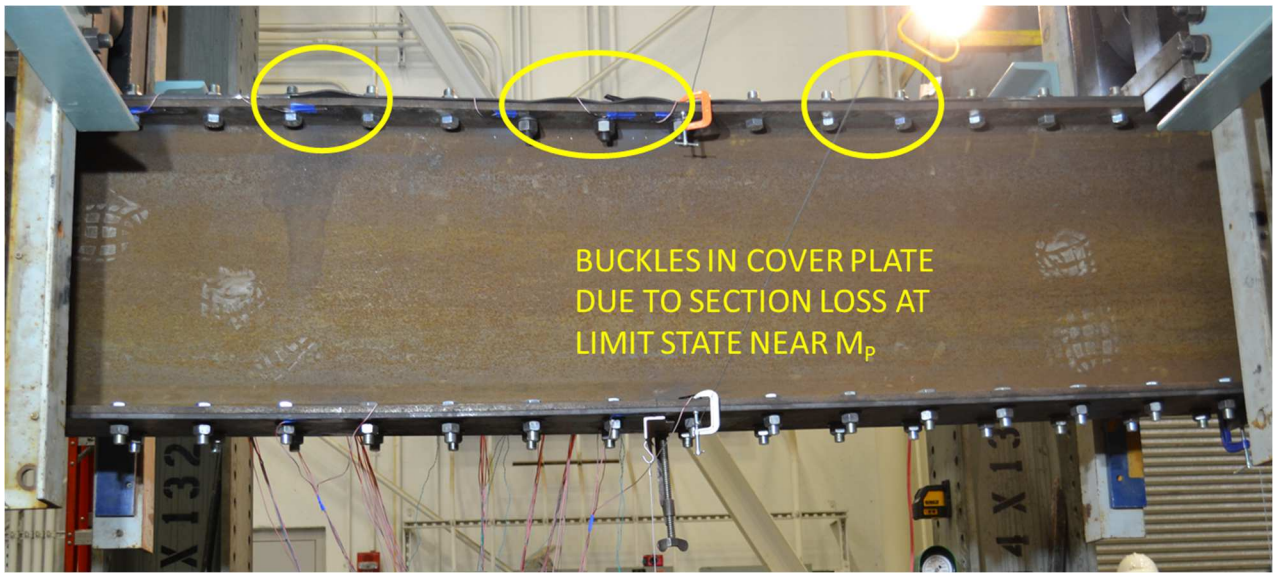
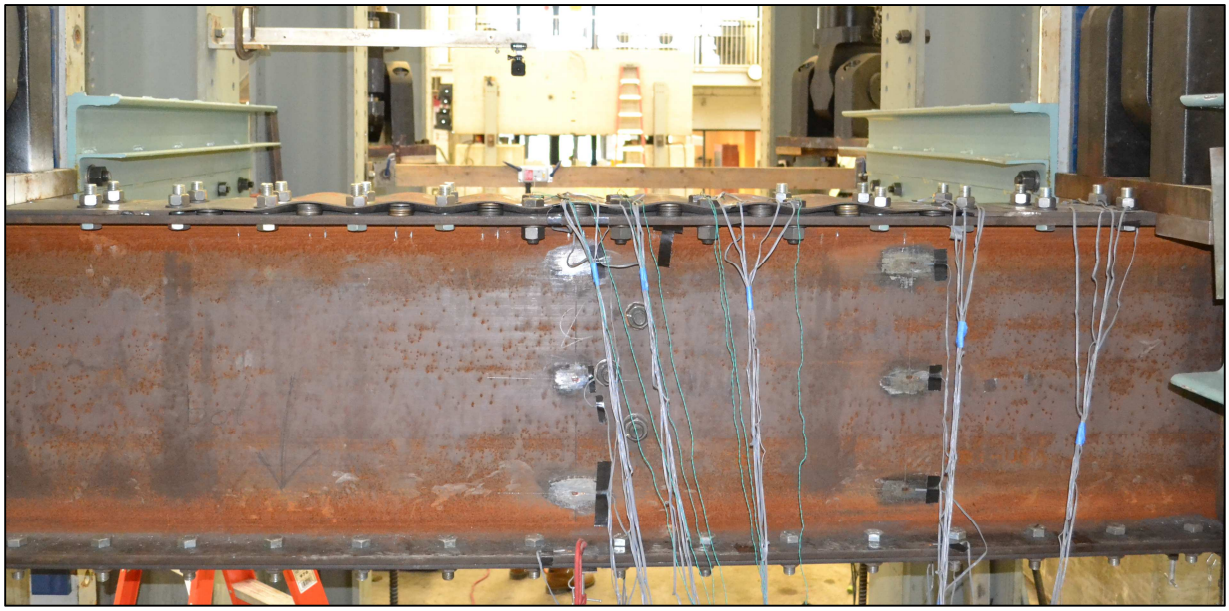



**Figure 1 – Photograph of Specimens 2. Coverplate included simulated section loss but no simulated pack-out. Buckles in the coverplate were due to applied flexural compressive stress in the top flange.**



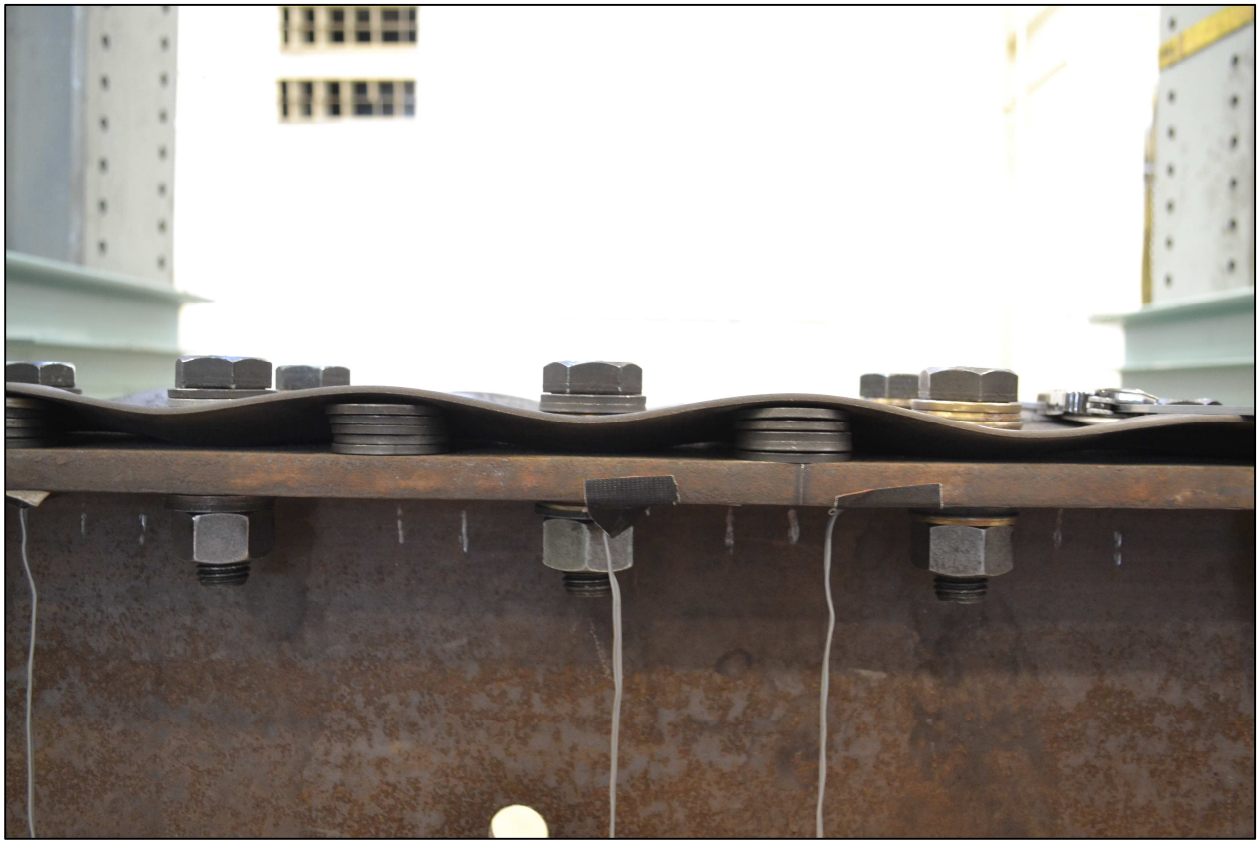


**Figure 2 – Photographs of Specimen 3 showing simulated pack-out distortion and section loss. There was no load applied when this photograph was taken.**

**Figure 3 – Photograph of portion of coverplate in which edges are machined away to simulate section loss. The plate was originally 3/8 inches thick and is machined down to 1/8 inch at tips. Middle third is full thickness of 3/8 inch. Extension plates are then CJP welded onto each end so that the plate will run full length of the specimens.**

**Figure 4 - Typical truss members obtained from INDOT with “real” pack-out and section loss**