# TRANSPORTATION POOLED FUND PROGRAM
# QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): IOWA 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 #**<br>*TPF-5(367)* | **Transportation Pooled Fund Program - Report Period:**<br>**X** Quarter 1 (January 1 – March 31, 2022)<br>Quarter 2 (April 1 – June 30, 2022)<br>Quarter 3 (July 1 – September 30, 2022)<br>Quarter 4 (October 4 – December 31, 2022) |
|---|---|

| **Project Title:**<br>Dynamic Evaluation and Design of Prefabricated Concrete Bridge Rails | | |
|---|---|---|
| **Project Manager:**<br>Jim Hauber<br>Brian Worrel | **Phone:**<br>239-1393<br>239-1471 | **E-mail:**<br>james.hauber@dot.iowa.gov<br>brian.worrel@dot.iowa.gov |
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| **Lead Agency Project ID:** | **Other Project ID (i.e., contract #):**<br>Addendum 617 | **Project Start Date:**<br>6/15/17 |
|---|---|---|
| **Original Project End Date:**<br>9/30/18 | **Project End Date:**<br>2/28/2022 | **Number of Extensions:**<br>Pooled fund project – yearly budgets |

X On schedule ☐ On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Project Statistics:

| Total Project Budget | Total Cost to Date for Project | Total Percentage of Work Completed |
|---|---|---|
| $75,000 | $59,850 | 82% |

***Quarterly*** Project Statistics:

| Total Project Expenses This Quarter | Total Amount of Funds Expended This Quarter | Percentage of Work Completed This Quarter |
|---|---|---|
| $0 | | 1% |

**Project Description:** Iowa State University researchers have developed precast concrete barriers that can be rapidly implemented. This initial research was funded by the Accelerated Bridge Construction-University Transportation Center (ABC-UTC) housed at Florida International University, who leads the ABC-UTC university consortium. The research project considered two different barriers to deck connection details that were designed and tested under quasi static loads to understand the load distribution and evaluate the connection performance. The first connection utilizing inclined reinforcing bars promotes durability and reparability but its initial cost is higher than the second alternative. The second connection that utilizes U-shaped reinforcing bars for connecting the precast barriers to the bridge deck is durable and cost effective, but replacement cost will be higher than the first alternative.

The scope of work outlined below in task form builds upon the results of the ABC-UTC research project noted above (to be noted for this proposed Pool Fund Plan as Phase I). It is noteworthy that there have been prior presentations/discussions with the AASHTO Subcommittee on Bridges and Structures (SCOBS T-04) and with the Transportation Research Board Subcommittee on ABC (the parent committee is AFF00) regarding the proposed work, and both groups support the need for the work and have endorsed the general scope of work outlined below.

Task 1: Review of ABC-UTC Project (Phase I) and Finalize Details for Two Precast Barrier Concepts for Dynamic Evaluation and Development of Design Methodology

Task 2: Conduct Numerical Modeling and LS-DYNA Simulation using Phase-I data

Task 3: Perform Impact Load Investigation on Two Prototype Designs

Task 4: Refine of Designs based on outcomes of from Task 3

Task 5a: Perform Full-Scale Crash Tests on a Concrete Barrier-Deck Subassembly for Loads Corresponding to TL-4 and TL-5

Task 6: Calibrate Numerical Models

Task 7: Complete Parametric Study and Design Optimization

Task 8: Development Design, Construction and Implementation Guidelines

Task 9: Conduct Life-Cycle Performance and Cost Analysis

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

The final set of drawings was prepared by the testing team for crash testing. The first review was done by the ISU team. Following further updates, a final set of drawings was prepared for TAC and submitted for review. A few comments have been received and responses were prepared. No major changes to the details are expected at this time. The discussion with the special rebar fabricator has also taken place.

**Anticipated work next quarter:**

Manufacturing of all special hardware and construction of the test unit.

**Significant Results:**

The crash test will be performed on a single slope barrier with inclined tied-down bars having a yield strength of 80 ksi. The change in bar strength reflects the current industry standard for high-strength reinforcing bars. The pretest analyses show large stresses in the inclined bars. Details of the test unit give consideration for these results though some of the numbers are unusually high. Following the test, appropriate modifications can be made based on the performance of the barrier, connections and critical stresses.