

## 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.*

<b>Transportation Pooled Fund Program Project #</b> TPF-5(367)	<b>Transportation Pooled Fund Program - Report Period:</b> Quarter 1 (January 1 – March 31, 2021) X Quarter 2 (April 1 – June 30, 2021) Quarter 3 (July 1 – September 30, 2021) Quarter 4 (October 4 – December 31, 2021)	
<b>Project Title:</b> Dynamic Evaluation and Design of Prefabricated Concrete Bridge Rails		
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<b>Lead Agency Project ID:</b>	<b>Other Project ID (i.e., contract #):</b> Addendum 617	<b>Project Start Date:</b> 6/15/17
<b>Original Project End Date:</b> 9/30/18	<b>Project End Date:</b> 2/28/2022	<b>Number of Extensions:</b> Pooled fund project – yearly budgets

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 analyses results were presented to the pool fund Technical Advisory Committee (TAC). It was agreed to proceed to the test phase with the following features. The test will be conducted on a single slope barrier which will be tied to the bridge deck using 75-ksi inclined tie-down rods. These bars will be spaced at 24 in as opposed to 30 in. due to the increased demand expected from a 10000S vehicle. Based on the experimental and analytical results, the TAC requested that some recommendations justifying the use of near-vertical barriers be incorporated in the final recommendations. The test drawing has been updated to reflect the changes.

**Anticipated work next quarter:**

Construction of the test unit is expected during the next quarter, with the test anticipated in Q4 2021.

**Significant Results:**

The analysis has confirmed the need to use 75 ksi tie-down bars at 24 in. spacing to limit the damage during the crash test involving a 10000S vehicle. The modified details will be evaluated during crash tests and appropriate recommendations will be made for practical use.