

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 # TPF-5(367)	Transportation Pooled Fund Program - Report Period: x Quarter 1 (January 1 – March 31, 2023) Quarter 2 (April 1 – June 30, 2023) Quarter 3 (July 1 – September 30, 2023) Quarter 4 (October 4 – December 31, 2023)	
Project Title: Dynamic Evaluation and Design of Prefabricated Concrete Bridge Rails		
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Lead Agency Project ID:	Other Project ID (i.e., contract #): Addendum 617	Project Start Date: 6/15/17
Original Project End Date: 9/30/18	Project End Date: 9/30/2023	Number of Extensions: 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	\$60,096	82%

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
\$246		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 Midwest Roadside Safety Facility (MwRSF) completed the assembly of the precast concrete barriers and the deck system test unit, including all the grouting. Subsequently, the crashed test was performed on Feb. 7, 2023. The test was very successful. The precast barrier withstood the impact of a 10,000-kg SUT without any significant damage. Only two hairline cracks on the back of the barriers and an interface crack at the base of the barriers where the impact occurred were observed. The participation of a long segment of the barrier and the deck in resisting the impact of the vehicle was evident. In addition to inviting to observe the test online, the members of TAC were briefed of the preliminary test results on Feb, 16, 2023.

Anticipated work next quarter:

Reconciling the test data and assisting the test team with post-test analyses.

Significant Results:

Demonstration of a successful crash test that utilized single slope precast barriers and new connections.