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:** Quarter 1 (January 1 – March 31, 2021) Quarter 2 (April 1 – June 30, 2021) **X** Quarter 3 (July 1 – September 30, 2021) Quarter 4 (October 4 – December 31, 2021)	
Project Title: Dynamic Evaluation and Design of Prefabricated Concrete Bridge Rails		
Project Manager: Khyle Clute	**Phone:** 515-239-1646	**E-mail:** khyle.clute@iowadot.us
Project Investigator: Sri Sritharan	**Phone:** 294-5238	**E-mail:** sri@iastate.edu
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:** 2/28/2022	**Number of Extensions:** 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 testing team presented the results of the new set of analyses and obtained approval to move forward with the planning and construction of the test unit. Accordingly, the test will be planned on a single slope barrier with inclined bar connections. The connecting bar (#8) will have yield strength of at least 75 ksi and be spaced at 24 in. The test plan is being designed with appropriate input from a fabricator who will produce all the special reinforcement hardware. The team has developed a draft drawing for the test unit. Once some of the critical details have been finalized with respect to the special hardware, the updated plan will be shared with the Project Advisory Panel prior to beginning the construction.

Anticipated work next quarter:

Finalizing the drawing and begin construction of the test unit.

Significant Results:

Finalizing the test unit, which will utilize a single slope barrier with inclined tied down bars having a yield strength of 75ksi. Though the forces in the near-vertical barrier are expected to be higher than expected in a comparable single slope barrier, the single slope was preferred since many DOTs are likely to use this option. It is anticipated that the post-test analyses can justify the use of the near-vertical barrier with appropriate connections.