TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Nebraska Department of Roads

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)*	**Transportation Pooled Fund Program - Report Period:**
TPF-5(193) Supplement #107	☐ Quarter 1 (January 1 – March 31) ☐ Quarter 2 (April 1 – June 30) ☑ Quarter 3 (July 1 – September 30) ☐ Quarter 4 (October 4 – December 31)

Project Title:		
Top Mounted Socket for Weak Post Bridge Rail		
Name of Project Manager(s):	**Phone Number:**	**E-Mail**
Reid, Faller, Bielenberg, Lechtenberg, Rosenb	402-472-9324	srosenbaugh2@unl.edu
Lead Agency Project ID:	**Other Project ID (i.e., contract #):**	**Project Start Date:**
2611211132001	RPFP-17-AGT-3	10/1/2016
Original Project End Date:	**Current Project End Date:**	**Number of Extensions:**
9/30/2019	9/30/2019	0

Project schedule status:

☐ 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
$128,145	$38,619	75%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	$27,447	

Project Description:

Although most approach guardrail transitions (AGTs) look similar, each AGT has a unique combination of features including rail thickness, post size and spacing, use of a hydraulic curb, and downstream parapet or bridge rail in which it attaches to. However, due to the sensitivity of transition regions, these variables are not interchangeable between AGTs. Thus, each AGT is specific to its own features as well as the bridge railing or parapet to which it is anchored.

Crash testing has illustrated the sensitive nature of these AGT designs with recent failures occurring due to an alteration of an AGT feature (e.g., addition/removal of a curb or changes to the rigid parapet geometry and attachment hardware). The majority of these failures have been the result of excessive vehicle contact on the lower, upstream corner of the rigid parapet. This result indicates that the parapet toe and end geometry may be even more critical than previously believed. Thus, there exists a need to develop a standard concrete parapet end geometry for use with all thrie beam AGTs.

The objective of this research effort is to develop a standardized concrete parapet end section for attachment of various thrie beam AGTs. A prior project (Pooled Fund YR 25 - TPF-5(193): Development of a Standardized Concrete Parapet for AGTs) ultimately resulted in an unsuccessful full-scale crash test. This project is a continuation of that effort and will utilize the knowledge obtained from the previous crash test.

Objectives / Tasks:

1. Redesign of Standardized Parapet
2. CAD Details
3. Construction of Test Article
4. Full-Scale Crash Testing - MASH 3-21
5. Data Analysis

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

The full-scale crash test, test no. AGTB-2, was conducted on the revised version of the standardized buttress according to MASH 3-21 impact criteria. During the test, the 2270P pickup truck was smoothly redirected by the guardrail transition with limited snag on the standardized concrete buttress. Data analysis showed all accelerations fell within acceptable limits, so the test satisfied the MASH criteria. After the test, test installation was removed and materials were disposed of.

Work to complete the project summary report, which will detail all design and testing of the standardized buttress, has begun. Additionally, a journal paper was written and submitted to the Transportation Research Board. The paper submission will be presented at the 2018 annual TRB meeting in Washington D.C. and was accepted for publication in 2018.g.

Anticipated work next quarter:

Work will continue to complete the project summary report.

Significant Results:

Following the unsuccessful full-scale crash test, work this quarter consisted of redesigning the geometry of the standardized buttress to improve the safety performance of the system. The size of the lower taper was increase from a 4"12" taper to a 4.5"x18" taper. Also, the height of this lower taper was increased from 11" to 14". these changes were done to reduce wheel snag and loads into the axle of the vehicle. The upper taper was changed from 4"x4" to a 3"x4". this reduction in slope was intended to reduce snag on the vehicle bumper and quarter-panel.
The second full-scale crash test, test no. AGTB-2, was conducted on the revised version of the standardized buttress according to MASH 3-21 impact criteria. During the test, the 2270P pickup truck was smoothly redirected by the guardrail transition with limited snag on the standardized concrete buttress. Data analysis showed all accelerations fell within acceptable limits, so the test satisfied the MASH criteria.

A journal paper on the development of the standardized buttress was written and submitted to the Transportation Research Board. The paper submission will be presented at the 2018 annual TRB meeting in Washington D.C. and was accepted for publication in 2018.

Objectives / Tasks:	% Complete
1. Redesign of Standardized Parapet	100%
2. CAD Details	100%
3. Construction of Test Article	100%
4. Full-Scale Crash Testing - MASH 3-21	100%
5. Data Analysis	100%
6. System Removal	75%

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).

All labor costs are currently being charged to the original project (Pooled Fund YR 25 - TPF-5(193): Development of a Standardized Concrete Parapet for AGTs). Once the YR 25 project funds have been exhausted, charges will be made to this YR 27 continuation project. Test and materials charges were still applied to this YR 27 project.

In a May 2017 memo, the FHWA declared that eligibility letters will now only be granted to systems that have completed the entire suite of tests within the MASH testing matrix. Since the small car test (MASH 3-20) was previously deemed non-critical by MwRSF and the Pooled Fund States, it will not be conducted as part of this project. Thus, the transition buttress will not meet FHWA's new criteria to qualify for a letter, and an application for a letter will not be submitted. Instead, MwRSF's opinion on the crashworthiness of the buttress will be explicitly written in the report and supported with details and references.

Potential Implementation:

A single design for the concrete parapet end section at the downstream end of AGTs will simplify state design standards. No longer will transitions be associated with only a single concrete parapet shape. All thrie beam transitions will be able to connect to the new parapet. The designer then only needs to transition the parapet to the proper shape and height of the bridge rail.