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 #104	☐ 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:**
2611211133001	RPFP-17-CONC-2	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
$247,654	$6,582	5%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	$6,582	

Project Description:

Historically, rigid concrete barriers satisfying TL-4 criteria have typically been 32 in. tall. However, with the adoption of MASH and an increase in both mass and impact speed for the single-unit truck, TL-4 tests on 32-in. tall barriers have repeatedly resulted in the 10000S vehicle rolling over the barrier. As such, barriers taller than 32 in. are now required to meet the MASH TL-4 criteria.

Past research has indicated that certain barrier shapes, such as safety-shapes, increase the propensity for vehicle climb, instability, and rollover. An optimized barrier shape would minimize vehicle instabilities by utilizing a flat, near vertical face. However, tall vertical faced barriers pose the risk of occupant head slap during impact events. Thus, an optimized geometric shape that considers vehicle containment, vehicle stability, and occupant head ejection is desired for new taller TL-4 barriers. Additionally, the increased impact severity associated with MASH TL-4 criteria will increase impact loads to the deck and could lead to deck damage. Retrofitting stronger barriers onto existing bridge decks not designed for these increased loads may lead to deck damage during severe impacts.

The objective of this research effort is to develop a MASH-compliant TL-4 bridge railing. The railing will be optimized for strength, vehicle stability, installation costs, and head slap mitigation. Efforts will also be made to minimize load transfer into the deck and determine the minimum deck capacity, thereby minimizing the risk of deck damage.

Objectives / Tasks:

1. Literature Review
2. State Survey of TL-4 deck designs
3. Barrier Design and Structural Analysis
4. Deck Design and Structural Analysis
5. CAD Details
6. Development of Barrier End Sections and Transitions

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

A literature review has been conducted on concrete barrier analysis tools, previous TL-4 barriers, and the current performance criteria for MASH TL-4.

Anticipated work next quarter:

An investigation into the costs for material and labor for both casting concrete and assembling steel rebar cages for barriers will be conducted. Initial designs for the optimized TL-4 barrier will be developed (geometry and reinforcement concepts). Also, the sponsors will be surveyed to gain an understanding of common dimensions and strengths for bridge decks supporting TL-4 barriers

Significant Results:

Objectives / Tasks:	% Complete
1. Literature Review	80%
2. State Survey of TL-4 deck designs	0%
3. Barrier Design and Structural Analysis	0%
4. Deck Design and Structural Analysis	0%
5. CAD Details	0%
6. Development of Barrier End Sections and Transitions	0%
7. Construction of Test Article (barrier and deck)	0%
8. Full Scale Crash Test - MASH 4-12	0%
9. Data Analysis	0%
10. System Removal and Disposal	0%
11. Summary Report	0%
12. FHWA Eligibility Letter	0%

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).

None

Potential Implementation:

Successful development of this optimized bridge railing would provide states with a MASH TL-4 bridge rail option when constructing new bridges or upgrading existing bridges. The barrier will provide unique benefits in that it will be optimized for vehicle containment and stability, load distribution into the deck, head slap mitigation, and cost while also allowing for future roadway overlays.