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) Suppl. #92 MwRSF Project No. RPFP-16-MGS-3	☐ 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:		
Steel Post Version of Downstream Anchorage System		
Name of Project Manager(s):	**Phone Number:**	**E-Mail**
Reid, Faller, Bielenberg, Lechtenberg, Rosenb	402-472-9070	kpolivka2@unl.edu
Lead Agency Project ID:	**Other Project ID (i.e., contract #):**	**Project Start Date:**
2611211122001	RPFP-16-MGS-3	10/1/2015
Original Project End Date:	**Current Project End Date:**	**Number of Extensions:**
9/30/2018	9/30/2018	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
$162,219	$127,698	65%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	$59,655	

Project Description:

Component testing has shown that the performance of the new Universal Breakaway Steel Post (UBSP) compares very well with that of the wood CRT post. As a result, the MwRSF concluded that the UBSP may be a viable option to replace CRT posts in various systems including bullnose systems, long-span guardrail systems, and guardrail end terminals. Although most guardrail end terminals are proprietary, MwRSF has recently developed a non-proprietary downstream anchorage system for the MGS that utilizes two wood Breakaway Cable Terminal (BCT) posts. For state DOTs that primarily utilize steel posts, it is desirable to find a steel post alternative for BCT posts utilized in the MGS downstream anchorage. Although BCT posts differ in function and design from CRT posts, they have similar cross sections and weakening holes at groundline. Thus, modifications to the UBSP may result in performances similar to that of a BCT post. Therefore, an adaptation of the UBSP is desired for use in a new steel post version of the MGS downstream anchorage system.

The objective of this research effort is to develop a steel post version of the MGS downstream anchorage system that satisfies the MASH TL-3 safety performance requirements. Note, this project was divided into two phases. Phase II has yet to be funded, and only Phase I is shown herein.

Objectives / Tasks:

1. Literature Review
2. Development of Design Concepts
3. Design and Analysis
4. CAD Details
5. Component Fabrication
6. Component Testing
7. Data Analysis
8. CAD Details of Recommended System Design

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

Construction of the three system concepts was completed. Three bogie tests, tests nos. SPDA-1, SPDA-2, and SPDA-3 were conducted on the three concepts of the steel-post MGS end anchorage system. These options include modifications to the current UBSP design that allow anchor cable to pass through top post (concept 1), through bottom post (concept 2 and 3) and properly provide a breakaway mechanism. In test nos. SPDA-1 and SPDA-2, the anchorage system held a maximum force of 36.5 and 44 kips, respectively. However, in test no. SPDA-3, the early cable released from the angled bearing plate and the system sustained a maximum load of 29.7 kips. After reviewing the bogie tests results, several design refinements were suggested for concept 1 and concept 3.

Bogie test no. SPDA-4 was conducted on the refined concept 1 (height of bearing plate was decreased) and the anchorage system sustained 49.3 kips. The modifications for concept 5 (revised design concept 3) included changing the angle of the bearing plate, welding the angled bearing plate to the foundation tube, and adding a brass keeper rod to better anchor the bearing plate. Bogie test no. SPDA-5 was conducted on revised design concept 3 and the anchorage system sustained 49.5 kips.

Further analysis of all five concepts was initiated.

Draft report on the literature review, patent search, and concept development continued to be reviewed. Documentation of the component tests in the report was initiated.

Anticipated work next quarter:

Further analysis of all five concepts will be completed.

Findings and recommended system will be presented to the member states for feedback and comment. After a meeting with the member states, the preferred design concept will be further developed.

Internal review of the literature review, patent search, and concept development will be continued. Documentation of the component tests will continue.

Significant Results:

Five design concepts were developed and component tested.

Objectives / Tasks:	% Complete
1. Literature Review	95%
2. Development of Design Concepts	90%
3. Design and Analysis	80%
4. CAD Details	80%
5. Component Fabrication	100%
6. Component Testing	100%
7. Data Analysis	80%
8. CAD Details of Recommended System Design	0%
9. Summary Report	40%

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:

The successful development of a steel post downstream anchorage system would provide states with a second non-proprietary option for the downstream anchorage of MGS. State DOTs that regularly use steel posts instead of wood posts would find implementation of the new system much easier than having to justify wood post use for this special application.