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)* TPF-5(193) Suppl. #80	**Transportation Pooled Fund Program - Report Period:** ☑ 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: MGS Guardrail with an Omitted Post		
Name of Project Manager(s): Ron Faller, John Reid, Bob Bielenberg	**Phone Number:** 402-472-9064	**E-Mail** rbielenberg2@unl.edu
Lead Agency Project ID: 2611211112001	**Other Project ID (i.e., contract #):** RPFP-15-MGS-5	**Project Start Date:** 8/1/2014
Original Project End Date: 7/31/2017	**Current Project End Date:** 7/31/2017	**Number of Extensions:** 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
$99,973.00	$65,426.00	99%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	$4,026.00	

Project Description:

The objective of this research effort is to develop guidelines for MGS installations with a single omitted post for clearance of obstacles. The research would attempt to focus on the omission of a post without the use of CRT posts adjacent to the unsupported span. Full-scale crash testing would be conducted to evaluate the use of a single omitted post according to the TL-3 impact safety requirements in MASH. Following successful full-scale crash testing, additional analysis would be conducted to evaluate the potential for omission of a single post in multiple locations in a run of guardrail and the corresponding minimum spacing between the omitted posts.

The research effort will begin with the construction of the MGS with a single omitted post at the MwRSF Outdoor Test Facility for evaluation. The system will be evaluated according to the MASH guidelines for test designation no. 3-11 with the 2270P pickup truck vehicle. It is believed that the 1100C vehicle test can be waived for this system because the 2270P vehicle will provide a more stringent test of the failure modes expected in with the omitted posts such as excessive dynamic deflection, pocketing, vehicle snag, and rail rupture. The CIP for this test will be selected based on maximizing the potential for vehicle pocketing and post snag using the CIP charts in MASH and the researchers engineering judgment. The full-scale vehicle crash test will be conducted, documented, and evaluated by MwRSF personnel and in accordance with the MASH guidelines.

Following the successful full-scale crash testing, results from the crash testing will be applied to estimate potential concerns associate with multiple single omitted posts that are spaced apart in a run of MGS guardrail. Results from the full-scale test would also be analyzed to provide further guidance on allowable spacing between omitted posts based on the behavior of the guardrail system during the test.

After completion of the full-scale crash testing, a summary report of the research project will be completed detailing the tested barrier system, full-scale crash test results, evaluation of barrier performance, additional analysis, and

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

Previously, MwRSF began the research effort to investigate the MGS with a single omitted post. Prior to conducting a full-scale crash test, MASH requires selection of a critical impact point (CIP) for the test. In order to determine the CIP for the MGS with a single omitted post, BARRIER VII was used to simulate impacts a various points along an MGS system with a single post removed. The BARRIER VII analysis looked at several factors, including maximum rail deflection, maximum rail tensile forces, vehicle snag on posts, and pocketing of the barrier. Based on this analysis, it was determined that an impact ¾ of the way between post nos. 11 and 12 was critical as it displayed the highest level of vehicle snag and rail deflection and the the second highest rail forces. Pocketing was not significant for any impact point.

On April 29th, 2015, the standard MGS (6-ft W6x8.5 posts and 12” blockouts) with an omitted post was subjected to AASHTO MASH TL-3 test conditions using a 2270P pickup truck vehicle (test designation 3-11). In test no. MGSMP-1, the pickup truck impacted the system at a speed and angle of 63.4 mph and 25.3 degrees, respectively, resulting in an impact severity of 121.3 kip-ft. The system adequately contained and safely redirected the pickup truck. The occupant impact velocities and occupant ridedown accelerations were within the suggested limits provided in MASH. The maximum lateral deflection of the system and working width of the system were approximately 49 in. and 50 in., respectively. The occupant crush measurements were within the limits provided in MASH. Therefore, we can tentatively say that the test was acceptable according to the safety performance criteria of AASHTO MASH for test designation no. 3-11.

The summary report of the research was finalized and completed with state comments. Recommendations were developed for the number and spacing of omitted posts in an MGS guardrail system as well as how close omitted posts can be to special applications of guardrail such as transitions and end terminals.

MwRSF is currently completing the FHWA eligibility letter. The Task Force 13 Hardware Guide drawings for the system

Anticipated work next quarter:

In the upcoming quarter, MwRSF will complete the submission of the system for an FHWA eligibility letter in order to close the project.

Significant Results:

Test No. MGSMP-1 was conducted on April 29th, 2015. The MGS system successfully redirected the 2270P vehicle with a single omitted post.

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 and evaluation of a MGS guardrail with omitted posts would provide states with a potentially simpler and less-costly alternative for dealing with post conflicts within a run of guardrail.