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 #105	☐ 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 with Curb and an Omitted Post		
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:**
2611211134001	RPFP-17-MGS-1	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
$164,855	$58,453	50%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	$39,451	

Project Description:

Curbs located along roadways can adversely affect the interaction of errant vehicles with roadside barriers. Although the two are commonly used in combination, when curbs are placed near guardrail systems, the propensity for vehicle underride, override, and instability increases. The MGS with a curb offset 6 in. from the front face of the guardrail was successfully crash tested to NCHRP Report No. 350 TL-3 requirements. However, the MGS with curb has not yet been evaluated to MASH TL-3.

In addition, roadside obstructions may frequently occur that prevent proper post placement within a run of guardrail. To avoid small obstructions, a single post may be left out of system creating a single enlarged span length of 12.5 feet. The MGS with an omitted post was crash tested to MASH test no. 3-11 and adequately redirected the 2270P pickup truck. However, the introduction of a curb below to the elongated span of an omitted post length may lead to vehicle capture and/or stability issues. omitted posts has never been crash tested to the safety performance criteria of MASH.

Thus, the objective of this research is to evaluate the performance of the MGS with a single omitted post installed with the face of the rail offset 6-in. from the face of the 6-in. tall AASHTO Type B curb. The evaluation of the barrier system behind curb will be undertaken according to the MASH TL-3 safety criteria through two full-scale crash tests with both the 1100C and 2270P vehicles.

Objectives / Tasks:

1. Determination of CIPs
2. CAD Details
3. Construction of test article
4. Full-Scale Testing - MASH 3-10
5. Full-Scale Testing - MASH 3-11
6. Data Analysis
7. System Removal

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

Previously, full-scale crash test, test no. MGSCO-1, was conducted on the MGS with an omitted post placed 6" behind a 6" curb. The test was conducted in accordance with MASH test 3-10 with the 1100C small car. During impact, the W-beam rail was torn at the splice located within the elongated span length created by the omitted post. As a result, the vehicle penetrated through the barrier system.

In this quarter, a summary presentation was given to the sponsor DOTs. A number of possible retrofits for the system were suggested and discussed during the meeting as well. Through a survey of the sponsor DOTs following the meeting, the project scope was changed to include a second MASH 3-10 test on the MGS with curb and an omitted post - only this time nested w-beam rail would be placed in the region of the omitted post. The CAD details were completed reflecting this retrofit. The full-scale installation was constructed and is in queue for testing.

Anticipated work next quarter:

Full-scale testing will commence on the system. The MASH 3-10 test will be conducted on the nested system.

Significant Results:

BARRIER VII analyses were utilized to determine the CIPs for MASH TL-3 impacts on the MGS placed 6" behind a 6" curb and with an omitted post. The CIP for the 1100C was determined to be 122" upstream of the first post downstream of the elongated span, while the CIP for the 2270P was determined to be 131" upstream of the first post downstream of the elongated span.

Full-scale crash test, test no. MGSCO-1, was conducted on the MGS with an omitted post placed 6" behind a 6" curb. The test was conducted in accordance with MASH test 3-10 with the 1100C small car. During impact, the W-beam rail was torn at the splice located within the elongated span length created by the omitted post. As a result, the vehicle was not captured, but instead penetrated through the barrier system.

A number of possible retrofits for the system were discussed with the sponsoring DOTs. Through a survey of the Pooled Fund members, the project scope was changed to include a second MASH 3-10 test on the MGS with curb and an omitted post - only this time nested W-beam rail would be placed in the region of the omitted post. The damaged system was then rebuilt with 37.5-ft of nested rail around the omitted post location.

Objectives / Tasks:	% Complete
1. Determination of CIPs	100%
2. CAD Details	100%
3. Construction of test article	100%
4. Full-Scale Testing - MASH 3-10	100%
5. Full-Scale Testing - MASH 3-10 (retest)	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).

Due to the failure of test MGSCO-1, the project scope was changed. The second budgeted crash test (MASH 3-11 with the 2270P) was changed to a 2nd MASH 3-10 test on the nested rail retrofit to the system. Since the MASH 3-11 test will not be conducted as part of the existing project, hardware guide drawings and an FHWA eligibility letter will not be completed as part of this project.

To complete the evaluation of the MGS with curb and an omitted post, a new project will need to be funded. Thus, a proposal for project extension funds was added to the year 29 Midwest Pooled Fund pre-proposal. The member states will vote on whether to fund the extension project at the annual meeting in April 2018 .

Potential Implementation:

The successful testing and evaluation of an MGS guardrail system with curb and omitted post will allow state DOTs to eliminate one post to avoid an obstruction in a guardrail run installed adjacent to curbs and ensures that its safety performance remains adequate with respect to the current vehicle fleet.