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. #108	**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: MASH Testing of the Thrie Beam Bullnose System – Phase I		
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: 2611211136001	**Other Project ID (i.e., contract #):** RPFP-17-BULLNOSE-1	**Project Start Date:** 10/1/2016
Original Project End Date: 9/30/2019	**Current Project End Date:** 9/30/2019	**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
$275,477.00	$162,239	80%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	$9,637	

Project Description:

The research objective is to conduct full-scale vehicle crash testing on the thrie-beam bullnose median barrier system according to Test Level 3 (TL-3) of the MASH 2016 impact safety standards. The research effort will focus on either the timber CRT post or the UBSP steel-post variation of the barrier system.

The research effort for this study will focus on the evaluation of the thrie-beam bullnose system to the MASH 2016 criteria through a series of full-scale crash tests. The thrie-beam bullnose system is classified as a non-gating crash cushion for the purposes of evaluation. In MASH 2016, as many as ten full-scale crash tests are potentially required to evaluate this type of hardware. Those tests are listed in Table 11.

Out of the ten required crash tests, two tests may potentially be deemed non-critical. Test no. 3-36 on the transition to the rigid structure may not be required as it is assumed that the bullnose will use MASH TL-3 approved thrie-beam approach guardrail transitions for attachment to any rigid structures. Test no. 3-38 is intended to evaluate the performance of mid-sized sedan vehicles with terminals and crash cushions. However, MASH uses an analytical estimation of 1500A vehicle decelerations based on the results of test no. 3-31 to determine whether or not this test is required. Thus, test no. 3-38 may potentially be deemed non-critical as well. MwRSF would need to consult with FHWA officials prior to omitting either test. All ten tests are included herein for completeness.

Due to the extensive number of crash tests required to evaluate the thrie-beam bullnose, MwRSF will phase the full-scale crash testing in order to more efficiently determine the potential for the system to meet the MASH TL-3 criteria. Phase I will consist of evaluation of the bullnose with three of the potentially most critical crash tests, while Phase II will be funded at a later date if the three initial full-scale crash tests are successful.

Phase I

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

MwRSF surveyed the sponsoring states to determine whether they preferred the steel post or timber post version of the bullnose system be evaluated. The responses indicated that steel post version of the system was preferred.

CAD details for the steel post bullnose system were developed and parts were ordered and fabricated. The base plate of the lower portion of the UBSP post was increased in thickness by 1/8" to prevent damage and allow it to be more reusable following an impact. Critical impact points for each of the three tests were also selected.

On March 3, 2017, MwRSF conducted test no. MSPBN-1 according to MASH test designation no. 3-35. For non-gating crash cushions, this test is designed to evaluate a CIP where the crash cushion behavior transitions from capture to redirection with the 2270P vehicle. The critical impact point (CIP) for test designation no. 3-35 was selected at post no. 3, which is halfway between the cable anchor at post no. 1 and the assumed beginning of LON/redirection point at post no. 5. In test no. MSPBN-1, a 5,001 lb. Dodge Ram Quad Cab pickup truck impacted the thrie beam bullnose at a speed of 62.9 mph and an angle of 26.7 degrees. Initial impact occurred, 4 in. downstream of the targeted impact point at post no. 3. After initial impact, the vehicle was captured and safety redirected by the bullnose system. As the vehicle redirected UBSP post nos. 5 through 8 were fractured and disengaged. This created some pocketing and snag at post nos. 9 and 10, which were the first two W6x8.5 posts in the system. However, this behavior did not compromise vehicle capture or stability and did not negatively affect the occupant risk values. Occupant risk values for the test were well below the MASH limits and occupant compartment deformations were minimal. Based on these values and the safe capture and redirection of the 2270P vehicle, this test was deemed acceptable under the MASH TL-3 criteria for test designation no. 3-35.

The second test of the system was conducted on March 22, 2017. Test no. MSPBN-2 was conducted according to MASH

Anticipated work next quarter:

In the upcoming quarter, MwRSF will work towards completion of the summary report of the three full-scale crash tests.

Significant Results:

CAD details of the bullnose system were developed and system fabrication and construction is underway.

Three successful full-scale crash tests were completed to MASH TL-3.

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 thrie-beam bullnose system provides a safe, cost effective, non-proprietary option for shielding of median piers and other median hazards. Evaluation of the barrier system to the MASH 2016 criteria will allow the state DOTs to continue to use this system on their roadways and ensure that its safety performance will remain adequate with respect to the current vehicle fleet.