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. #103	**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: 34" Tall Thrie-Beam Approach Guardrail Transition		
Name of Project Manager(s): Rosenbaugh, Faller, Faller, and Reid	**Phone Number:** 402-472-9327	**E-Mail** srosenbaugh2@unl.edu
Lead Agency Project ID: 2611130101001	**Other Project ID (i.e., contract #):** RHE-17M	**Project Start Date:** 9/7/2016
Original Project End Date: 3/31/18	**Current Project End Date:** 3/31/18	**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
$179,936	$99,006	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
	$2,538	

Project Description:

A taller rail height approach guardrail transition (AGT) is desired to allow for future roadway overlays without modifications or retrofits to the thrie beam AGT. Ideally, a 3" overlay could be placed in front of a 34" tall AGT, thereby making it a standard 31" tall AGT. Thus, the objective of this research is to evaluate the safety performance of NDOR's approach guardrail transition (AGT) with the top mounting height of the thrie beam increased from 31" to 34". The 34" tall AGT will be evaluated according to MASH TL-3 safety performance criteria. The concrete buttress at the downstream end of the the transition will be selected to fit the needs of NDOR and ensure a crashworthy system after a 3" overlay. Finally, connection details for the MGS upstream of the thrie-beam AGT will be developed for both pre- and post-overlay situations.

Major Task List:

1. Project Planning and Correspondence
2. Design/Selection of Concrete Buttress
3. Design of MGS to 34" Transition
4. CAD Details
5. Construction of Test Article
6. Full-Scale Crash Testing - MASH 3-20
7. Full-Scale Crash Testing - MASH 3-21
8. System Removal
9. Data Analysis
10. Summary Report
11. Technical Brief and Presentation for NDOR
12. Submission of FHWA Eligibility Letter

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

Efforts focused on writing the summary report documenting all testing and results.

Anticipated work next quarter:

The summary report documenting all testing and results for the project will be completed

Significant Results:

Through multiple meetings and discussions between MwRSF and NDOR, the concrete buttress design and the upstream transition from 31" MGS to 34" AGT were finalized. The concrete buttress is a taller version of the Standardized Transition Buttress being developed through the Midwest States Pooled Fund (39" instead of 36"). The upstream MGS will connect to a symmetrical W-to-thrie transition segment that will take the top rail height from 31" to 34". Once an overlay is paved, the symmetric segment will be replaced with an asymmetrical W-to-thrie segment, and the W-beam rail and blockouts upstream of the the transition will be raised 3" to match the top rail height of the AGT (was 34" now 31" relative to the top of the roadway). Extra bolt holes were placed in the posts to accommodate the different transition segments and the raising of the W-beam.

CAD details for the system were developed and the 34" AGT system with 39" standardized buttress was constructed at the MwRSF test site. The first full-scale crash test, 34AGT-1, resulted in the 2270P being smoothly redirected with only minor contact between the vehicle and the buttress. All occupant safety criteria was satisfied, so the test passed all saftey performance criteria of MASH 3-21.

The second full-scale test, test no. 34AGT-2, was conducted on the transition system according to MASH 3-20. The small car was contained and redirected, but the front tire extended under the thrie beam rail and snagged on the upstream face of the buttress. This snag resulted in significant crush to the floorpan and toe pan. However, these deformations were within the MASH limits. The windshield was cracked and torn, which is not allowed under MASH criteria. However, the windshield damage was the result of deformations of the vehicle hood, fender, and A-frame. The test article never contacted the windshield, so the potential for penetration is negligible. Thus, this tearing was not deemed a safety hazard. Finally, the driver side door opened during the test as a result if the contact between the door and the thrie beam. MASH

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 testing of the 34" tall AGT will allow NDOR to install both their bridge rails and their adjacent AGTs in anticipation of future overlays. Both of these barrier types will now be crashworthy at the time of initial installation as well as after a 3" roadway overlay. Not having to remove and replace the AGTs after an overlay should result in significant savings in both cost and labor.