TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Wisconsin DOT

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 # 78	☐ 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:		
Transition from Free-Standing TCB to Reduced Deflection TCB		
Name of Project Manager(s):	**Phone Number:**	**E-Mail**
Pajouh, Schmidt, Bielenberg, Faller, and Reid	(402) 472-0870	jennifer.schmidt@unl.edu
Lead Agency Project ID:	**Other Project ID (i.e., contract #):**	**Project Start Date:**
2611130090001		6/30/2014
Original Project End Date:	**Current Project End Date:**	**Number of Extensions:**
6/30/2017	6/30/2017	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
$95,852	$43,881	60%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	$12,253	

Project Description:

Recently, the Wisconsin Department of Transportation sponsored a research project to develop a retrofit design for reducing deflections for temporary concrete barriers (TCB) without anchoring the barriers to the bridge deck or roadway. This research was successful in reducing the deflection of the TCB system, as the addition of steel tubes to both the front and back sides of the barrier reduced the deflection of the TCB system by roughly 50 percent. However, the effort was focused on developing the length-of-need of the system and did not include design of a transition between the reduced deflection TCB system and standard F-shape TCB segments. Thus, a need exists to develop a transition between the new reduced deflection system and free-standing TCB segments.

The objective of this research effort is to develop a MASH TL-3 transition between the recently developed reduced deflection TCB system and free-standing, F-shape TCB segments. The research effort will focus on development of a design that safely transitions between the stiffness and deflection of the two barrier systems while maintaining vehicle stability. The design will also focus on minimizing the length of the transition and additional hardware components. Phase I of this project will involve initial development and computer simulation of the transition design (work described herein). Phase II of the project (currently unfunded) will include full-scale crash testing to evaluate the transition.

Main Objectives/Tasks

1. Literature Review
2. Concept Development
3. Selection of Transition Design
4. LS-DYNA Analysis and Evaluation
5. Project Report

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

A 3.5" x 3.5"x1/4" tube spacer was previously modeled and added at the base of the two adjacent PCBs that form larger angles and can create a "knee". Since an improvement was observed in the vehicle and barrier performance with tube spacers at two joints, various alternatives including utilizing thicker tubes (a 3.5"x3.5"x3/8" tube), utilizing two concentric tubes (a 3.5"x3.5"x1/4" tube with a 2.5"x2.5"x1/4" tube inside), utilizing a stack of two smaller tubes (a 3.5"x1.5"x1/4" tube at the base and a 3.5"x1.5"x1/4" tube on top) were investigated through simulations. All three alternatives indicated a promising improvement in performance in terms of decreased potential of vehicle snag, decreased ORAs, smoother vehicle redirection, mitigation of knee angle concern, and moderate deflection. Among these options, it was suggested to pursue the option of thicker tubes due to its easy installation. Further simulations investigated various impact points with a 3.5"x3.5"x3/8" tube located at the two joints between barriers upstream of where the reduced-deflection PCB system starts to determine the critical impact locations for tests 3-20 and 3-21 for the selected design.

Writing continued on the report.

Anticipated work next quarter:

As utilizing one 3/8-in. thick tubes at two joints gave higher confidence in a successful MASH 3-21 test, and it is an easy fix in terms of installation, further simulations will be evaluated to determine the critical impact point. Additionally, impact locations with the selected design of one tube at two joints will be evaluated with the small car for MASH 3-20. Recommendations about the concept and recommended crash testing matrix will be provided. A meeting with the sponsor will be arranged for further discussion on the simulation results and the suggested options. Report writing will continued.

Significant Results:

Several candidate design measures were successfully evaluated and the optimum design (utilizing two 3/8-in. tubes at tow adjacent PCBs) was proposed for further evaluation.

Main Objectives/Tasks	% Complete
1. Literature Review	100%
2. Concept Development	80%
3. Selection of Transition Design	75%
4. LS-DYNA Analysis and Evaluation	90%
5. Project Report	18%

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.

Note, this progress report only includes labor charges from September, October, and November.

Potential Implementation:

Development of a crashworthy transition system between the reduced-deflection TCB system and freestanding TCBs would provide states with a robust TCB system capable of reducing deflections without anchoring to the road surface. In addition, the system can be used in median applications and could be attached to standard, free-standing TCB segments on each end to allow for easier implementation and integration with existing work zones.