



Research Problem Statement

2021-01-BD

Project Title:	Evaluation of Four Bolt Slip Base for Breakaway Luminaire Supports for Various Pole Configurations
Project Synopsis:	MASH crashworthiness research and evaluation of Four Bolt Slip Base for breakaway luminaire supports for various pole configurations
Project Goal(s):	The goal of this research effort is to evaluate the MASH TL-3 crashworthiness for critical configurations of a non-proprietary four-bolt slip base luminaire support.
Project Background:	<p>To date, limited full-scale testing has been conducted to MASH on non-proprietary luminaire supports. Many states use a slip base luminaire pole, similar to the Utah Four Bolt Slip Base Design, shown in the drawings below. It is not possible to test all possible configurations. Therefore, research is needed to identify and evaluate critical luminaire pole configurations with the four bolt slip base to MASH TL-3, such that other, less critical configurations can be reasonably assumed to also meet MASH TL-3.</p> <p>A set of MASH crash tests for a similar support were conducted by Caltrans. Two tests were performed with an 1100C vehicle on a slip base sign support with an aluminum sign and flashing beacons. The test was successful for the 32.2 mph test, but failed to activate during the 19 mph test. This enhances the need for more research of these types of systems. Other notable research projects are NCHRP 03-119, NCHRP 22-43 and Midwest Pooled Fund RFPF-21-POLE-1. MwRSF is also currently conducting research with the Wyoming Department of Transportation to evaluate a luminaire pole mounted drop-arm road closure gate, as shown in Figure 34. This system utilizes a 29-ft tall luminaire pole mounted on a four-bolt omni-directional slip base. The four-bolt slip base used in the road closure gate appears to be nearly identical to the Utah slip base design in the proposed research effort. MASH test nos. 3-60, 3-61, and 3-62 are planned for this system, and the results may provide additional insight into the research proposed herein</p>
Proposed Work Plan:	<p>Task 1: Literature Review and State Survey <i>The research team will review previous relevant research projects and distribute a survey to the Roadside Safety Pooled Fund members. This survey will collect information regarding common luminaire pole configurations and slip base designs.</i></p> <p>Task 2: Engineering Analysis <i>The research team will use a combination of approaches to determine critical configurations of slip bases and luminaire poles. These approaches may include traditional analytical approaches, detailed finite element analyses, and simplified computer simulations.</i></p> <p>Task 3: Full-scale Crash Testing <i>The research team will evaluate a critical configuration of slip base and luminaire pole with full-scale crash testing according to MASH criteria.</i></p>

Deliverables:	Compile final report to document research effort, including literature review, CAD details, crash testing, and recommendations for further research in the event of the system failing testing criteria.
Urgency and Expected Benefit:	This project would provide additional hardware variations that meet MASH criteria for use on projects.
Problem Funding and Research Period:	\$205,000 and 15 months
Developer(s) of the Problem Statement	Name: Justin Wilstead, Shawn Debenham Email: jwilstead@utah.gov, Sdebenham@utah.gov Phone: 801-910-2507, 801-971-9575