Roadside Safety Pooled Fund

Research Problem Statement

2019-36-LSRB

Project Title:	Steel Post Downstream End Anchor
Project Synopsis:	*Please describe the proposed project synopsis within 200 words.* Evaluate design alternatives for Steel Post Downstream End Anchor for 31" w-beam guardrail and conduct crash testing under MASH 2016 conditions. Project will use analysis, simulation, as required, and conduct full-scale testing necessary to obtain an eligibility letter.
Project Goal(s):	Design and test a steel post downstream end anchor as an alternative to existing MASH 2016 compliant w-beam guardrail end anchors that use timber posts. Consider steel posts as a substitute for Breakaway Cable Terminal (BCT) timber posts such as, standard W6x8.5 or W6x9 standard steel guardrail posts, or hinged, welded, drilled, or weakened breakaway steel posts. Consider installing downstream end anchor posts as direct buried posts or installed in steel tubes. Consider posts and tubes with or without soil plates and/or anchor strut and yoke.
Project Background:	*Please describe the problem you would like to address.* Downstream End Anchors are a required component of a guardrail system. As an alternative to timber BCT posts in sleeves, steel posts may be easier to maintain and more dependable than wood posts when a w-beam system is impacted. MASH and NCHRP 350 downstream end anchor designs typically rely on the Breakaway Cable Terminal anchor assembly, using BCT Timber posts in BCT Post Sleeves. In regions with sustained low winter temperatures, maintenance of downstream end anchors is hampered by wood posts frozen in soil or steel tubes, or wood posts swollen with moisture and jammed in steel tubes during any part of the year. Using steel posts, either direct bury or installed in tubes, may provide for easier replacement and maintenance. Steel posts are durable in the environment. Wood anchor posts have failed during testing in a few instances, when used as a non-tested component of a crash tested w–beam system. Utilizing a material with consistent and reliable material properties, that is more resistant to fracturing than wood, may be more dependable in supplying tension needed for proper performance of the w-beam system.
Proposed Work Plan:	*Please describe what work or test will be done and what the result will be.* **Task 1. Design Development & Finite Element Investigation.** Develop design system Conduct finite element simulation as design aid and to investigate CIP for full-scale crash testing. **Task 2. Component Testing.** Develop appropriate component testing as design aid for the proposed system, and as preliminary component behavior investigation. **Task 3. System Construction & Full-Scale Crash Testing.** Build test article. Conduct full-scale crash testing.

Deliverables:	Provide a downstream end anchor design that relies on steel posts. Provide a crash test report and supporting materials sufficient for FHWA consideration of a MASH eligibility letter.
Urgency and Expected Benefit:	*Please describe the expected benefits of the research.* The failure of a BCT timber posts in downstream end anchors when used as a non-tested component of a w-beam system during crash testing suggests that an alternative end anchor post should be investigated. Maintaining tension in a w-beam barrier system is critical to guardrail performance and reducing road user risk to an acceptable level. Improving ease of maintenance can reduce exposure of motorists to temporary work zones and equipment, and shorten the time maintenance personnel are exposed to traffic when working near open lanes of traffic. Steel posts may be showing performance advantages over wood posts for other w-beam guardrail systems. Steel posts are less prone to rot, pests, or undetected structural weakness or damage than wood posts. Reducing use of wood posts where possible may provide immediate safety and service advantages.
Problem Funding and Research Period:	*Please describe what are the estimated costs and time to complete the project* Problem Anticipated Funding: $170,000 Research Period: 18 months
Developer(s) of the Problem Statement:	Name: Jeff. Jeffers, Alaska DOT&PF Email: jeff.jeffers@alaska.gov Phone: (907) 465-8962