Roadside Safety Pooled Fund

Research Problem Statement

2020-02-LSRB

Project Title:	Determine MASH compliance of placing guide rail in rock.
Project Synopsis:	Evaluate current guidance for placing guide rail in rock as shown in the Roadside Design Guide and potentially develop guidelines for using guide rail in rock if current guidance is not MASH compliant.
Project Goal(s):	Evaluate current guidance and potentially develop new MASH guidelines for using guide rail in rock.
Project Background:	PennDOT's standards currently uses the guide rail in rock detail found in the 2011 edition of the Roadside Design Guide, Figure 5-51(b), pg 5-63. It is not currently known if this design is MASH compliant. There is a desire to determine if this is MASH TL-3 compliant, and if not, what must be changed to make the design MASH compliant.
Proposed Work Plan: Work with TTI	**Tasks:** 1. **Task 1: Past Testing Review and Wood Post System Design** Recent TTI/TxDOT project has successfully tested a steel post W-beam guardrail installed in simulated rock. Results of this testing will be used in this project to develop guideline for guardrail installation in rock for the steel post W-beam guardrail. The wood-post W-beam guardrail, however, has not been successfully tested to MASH. Thus, the focus of the testing in this project will be the wood-post guardrail system. Once the wood-post guardrail testing is also successful, the final guideline developed under this project will incorporate both the steel and wood-post W-beam guardrail systems. In this task, the research team will evaluate past testing of the wood post system in simulated rock and develop design details that are expected to MASH TL-3 testing. Among the design features to be evaluated under this testing review will be the size / shape of hole (round vs. oval), embedment depth of post, placement of post in the hole relative to walls. Based on this review the research team will propose a wood-post W-beam guardrail system for full scale testing. The team will develop test installation drawings and present them for approval of the Technical Representative. 2. **Task 2: Construction** In this task the research team will construct a test installation for full-scale crash testing. This task will also cover making repair to the test installation prior to performing the second test, and demolishing and disposing the test installation after the project has been completed. 3. **Task 3: Crash Testing and Final Report** The research team will perform MASH Test 3-11 (with pickup truck) and Test 3-10 (small car) to evaluate the performance of the proposed guardrail design in simulated rock. Based on the results of these tests, the research team will develop guidance for the W-beam guardrail installation in rock. A final report will also be prepared under this task, which will include the details of the testing, and the desired installation guidelines. The installation guidelines will include steel-post and wood-post guardrail systems. The guidance for the steel-post system will be developed based on testing performed by TTI for TxDOT. The guidance for the wood-post system will be based on testing performed under this project.

Deliverables:	A report documenting work performed under the project, including design details, crash testing results, and if successful, new guidelines for guide rail installation in rock. The installation guidelines will include steel-post and wood-post guardrail systems. The guidance for the steel-post system will be developed based on testing performed by TTI for TxDOT. The guidance for the wood-post system will be based on testing performed under this project.
Urgency and Expected Benefit:	Rock is often encountered when installing guide rail. PennDOT currently follows the guidance in the Roadside Design guide under the assumption that it is still good. This design needs to be confirmed to know whether it should remain or be removed from PennDOT's standards. If the design is currently not MASH compliant then all states should benefit from a newer design that is MASH crashworthy.
Problem Funding and Research Period:	**Total Cost Estimate = $145,503** *Task 1 - $13,218* *Task 2 - $45,957 (includes repairs prior to second test and demolition & disposal after project)* *Task 3 - $86,328 (Test 3-11 and Test 3-10)* **Work Schedule:** (Project Duration = 12 months from initiation of the project)
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