Roadside Safety Pooled Fund

Research Problem Statement

Project Title:	**Assessment of Bike Pedestrian railings attached to crashworthy barriers (**2023-03-B**)**
Project Synopsis:	Evaluating the effect of adding bike pedestrian railing on the the crashworthiness of various barrier systems under different test levels and providing design recommendations. The intent is to find the most significant modification which if it passes can validate the less significant modifications. While it is written from a WSDOT perspective currently multiple states will be quirried with unified or representative details moved forward with. The project should address the zone of intrusion (ZOI) implications from AASHTO Roadside Design Guide, 4th Edition, Chapter 7.3:
Project Goal(s):	1.) Start with a single crashworthy barrier with respect to MASH. For instance, using the successfully crash tested bicycle railing on a 39” single slope barrier evaluated under MASH TL-4: https://www.roadsidepooledfund.org/wp-content/uploads/2022/04/TRNo616221-01-Final.pdf 2.) Test or provide justification for the use of steel or aluminum rails for bike pedestrian concerns not adversely affecting the crashworthiness of the barriers. The addition of the pedestrian rail could improve the crashworthiness of the barrier and this will be considered for the barrier selected for this project. 3.) Provide recommendations for various configurations and test levels using the standard details provided by WSDOT in the Project Background below. TTI will evaluate the two Bicycle Pedestrian rail systems (1’-10” and 1’-0” high) on two selected barriers provided by WSDOT.
Project Background:	WSDOT have been using a Bike Pedestrian Rail (BP-rail) either in a 12” or an 22” configuration for multiple years with the same or similar detailing. They built them out of either aluminum or steel, the basic structures are the same, the detailing changes associated with availability of parts, welding, etc. WSDOT has provided a link to their common types of BP-rails to consider for this project. These designs have been used for years by WSDOT. These designs have been an integral part of their suite of standards to address current and future needs for BP-rails in Washington State. These two standards are provided as follows in the links below. WSDOT also has an 18” version that may be preferred over the 22” BP-rail design shown here. https://wsdot.wa.gov/publications/fulltext/Bridge/Web_BSD/10.5_A3_1.PDF https://wsdot.wa.gov/publications/fulltext/Bridge/Web_BSD/10.5_A3_2.PDF https://wsdot.wa.gov/publications/fulltext/Bridge/Web_BSD/10.5_A6_2.PDF https://wsdot.wa.gov/publications/fulltext/Bridge/Web_BSD/10.5_A6_1.PDF

	Historically, WSDOT has treated the addition of these BP-rails as being "non-significant" to the crash worthiness of the bridge railings they are attached to. Their assessment/classification of these designs are as follow. 1. The BP rail does not project, in the direction where traffic passes, past the safety shape. 2. The strength and stiffness of the BP rail does not significantly affect load path or force transfer (per judgment using strength of materials reasoning). 3. There have not been documented in-situ issues with the details we employ. 4. The BP rail is employed on otherwise crashworthy barriers determined through crash testing. 5. The above aligns with the May 2018 #3 from "Clarifications on implementing aashto MASH, 2016 update November 15, 2021."
Proposed Work Plan:	1.) Task 1 – Literature Review and State Survey The research team review previous relevant research projects and send out a survey to identify the common practice in the DOTs and prioritize selected systems to be evaluated. 2.) Task 2 – Engineering Evaluation of Selected Systems The research team will use a combination of approaches including computer simulation to evaluate the systems. The number of systems and Test Levels to be evaluated depends on the time and budget of the project. Designs developed for this project will meet the requirements of the LRFD Section 13 Specifications for Pedesttrain railings. The research team provides recommendations for the systems/condigurations that need to be evaluated through crash testing. 3.) Task 3 – Reporting
Deliverables:	A range of applications of Bike Pedestrian railings which can be used on crashworthy barriers.
Urgency and Expected Benefit:	This is currently common practice in Washington, any issues with current detailing or conversely validation of exiting details would be iterated through the system.
Problem Funding and Research Period:	**Total Estimated Cost = $~~XX,X~~106,339~~XX~~**
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