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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Evaluation of Textured Surfaces for MASH Compliance

Develop updated MASH 2016 guidance for applying texture patterns to reinforced concrete single slope and post-and-beam barriers.

Research Support

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Project Title: MASH 2016 Compliance of Roadside Safety Features.

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WHAT IS THE NEED?

Local agencies and the public are increasingly requesting that the California Department of Transportation (Caltrans) Designers and Landscape Architects incorporate standard and site-specific textured designs and patterns in new barrier designs to make state highways more aesthetically pleasing. The Federal Highway Administration (FHWA) requires that all new longitudinal barrier installations on the National Highway System comply with the crash testing criteria embodied in MASH (Manual for Assessing Safety Hardware). In addition, Caltrans policy stipulates that newly installed barriers anywhere on the state highway system meet the MASH 2016 criteria.

In 2001 and 2002, prior to the implementation of MASH, Caltrans crash tested several patterns per NCHRP (National Cooperative Highway Research Program) Report 350 crashworthiness guidelines and came up with use guidelines. However, very little testing has been performed on textured barriers under current MASH 2016 guidelines. Furthermore, the research performed in early 2000s was limited to use on single slope concrete barriers and not on post-and-beam concrete bridge rails. Concrete post-and-beam bridge rails are frequently selected for improved aesthetics because they are partially see-through and are also in need of texture guidance.

WHAT ARE WE DOING?

The Division of Research, Innovation and System Information (DRISI) Roadside Safety Research Group (RSRG) is working with Bridge Design and Landscape Architecture to develop guidelines for adding textures to both single slope and post-and-beam concrete barriers. In order to reduce project costs, rather than building entirely new test articles RSRG is repurposing two existing concrete post-and-beam bridge rail

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test articles with new textures on the faces. One of the bridge rails will receive texturing just on the curb and beam faces while the other will receive a new single slope face with texturing. Each test article will have several segments with different textures.

Textures will be strategically chosen such that: 1) currently used designs can be evaluated for MASH crashworthiness, and 2) to provide information to develop guidelines for designers to determine crashworthiness of future desirable textures. RSRG will conduct multiple crash tests to determine crashworthiness of the textures and to develop updated design guidelines.

WHAT IS OUR GOAL?

This research project will evaluate and crash test both single slope concrete barriers as well as concrete post and beam bridge rails with textures or patterns that envelope textures commonly requested by our customers. Several specific textures will be deemed crashworthy but those textures will have been selected with the end goal of also providing updated texture guidelines for designers.

WHAT IS THE BENEFIT?

This project will provide crashworthy, aesthetic texture solutions for single-slope concrete barriers and single-slope and post-and-beam bridge rails. It will also give designers a needed tool in the toolbox to evaluate potential future textures for crashworthiness before their use. The project includes the design, construction, testing, analysis, reporting requirements and submission to FHWA for Federal Aid Eligibility. The Federal Aid Eligibility will allow the construction of concrete barriers and bridge rails with MASH compliant textures meeting both project development goals and safety goals for the department.

WHAT IS THE PROGRESS TO DATE?

Our customers, Landscape Architecture and Bridge Architecture, have been contacted and have provided desirable textures to use under the updated MASH 2016 Texture Guidelines. These textures have been evaluated and critical features have been identified. This has aided in developing a draft work plan on possible texture configurations that may be tested to provide validation for both single slope and post and beam concrete bridge rails. We have started to generate form construction details that will aid our group in the construction of test panels for textures on single slope barriers.

IMAGES

Image 1: Example of Textured Single Slope Barrier

Image 2: Example of Textured Post and Beam Bridge Rail