

Research Results

Geotechnical/ Structures

APRIL 2025

Project Title: MASH 2016
Compliance of Roadside Safety
Features

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Develop MASH Bridge Railing That Satisfies State and Federal Historic Preservation Requirements [Type 86H Bridge Rail]

A new historic-appearing concrete baluster bridge rail has been developed to replace existing concrete baluster bridge railings on rehabilitation and replacement projects for California bridges on the State and National Historic Registers.

WHAT WAS THE NEED?

There are many bridges within the State of California and National Historic Register that were built with the aesthetically pleasing concrete baluster rail. These historic baluster bridge rails do not meet the current Manual for Assessing Safety Hardware (MASH) 2016 standards. The need for this research project was to have an alternative historic appearing bridge rail (Type 86H Concrete Barrier Rail) that would be capable of supporting MASH 2016 TL-4 impact loads and meet current MASH crash testing guidelines. A new design was needed to replace existing concrete baluster bridge railings on rehabilitation and replacement projects for California bridges on the State and National Historic Registers. This task required preliminary investigation, review of state and federal requirements for historic structures (State Historic Preservation Office and Federal Secretary of the Interior), analysis, design, crash testing, stakeholder review, and publication of revised standards.

WHAT WAS OUR GOAL?

The objective of this research project was to design, construct, and crash test a section of Type 86H Concrete Barrier Rail.

WHAT DID WE DO?

The Type 86H Concrete Barrier Rail was designed by Structures. The California Department of Transportation (Caltrans) Roadside Safety Research Group (RSRG) then oversaw the construction of a test section of bridge rail at the Caltrans



DRISI provides solutions and knowledge that improves California's transportation system.

Dynamic Test Facility in West Sacramento. The RSRG research team conducted the three required crash tests for TL-4 longitudinal barriers. They were:

1. A 2,420 pound small car impacting at 62 miles per hour (mph) and 25°.
2. A 5,000 pound pickup truck impacting at 62 mph and 25°.
3. A 22,000 pound single-unit truck impacting at 56 mph and 15°.

The Type 86H Concrete Barrier Rail was presented to the Highway Safety Features New Products Committee and was approved for use in California's Highway System. A final report describing the results of the crash testing was completed and was posted on the DRISI Roadside Safety Research Group website.

WHAT WAS THE OUTCOME?

All three crash tests successfully met the updated crash test criteria. Structures will have a MASH 2016-compliant, historic looking bridge rail that can be selected to replace existing non-MASH compliant historic concrete baluster rails. The bridge rail plans are currently available as Bridge Standard Details (XS) and likely will be added to Caltrans Standard Plans in the future.

WHAT IS THE BENEFIT?

Caltrans and the public will both benefit by having safer, historic looking bridge rail on California roadways. Other State Department Of Transportations may also elect to use this bridge rail as well so the public in other states may benefit as well.

LEARN MORE

<https://dot.ca.gov/programs/research-innovation-system-information/roadside-safety-research-group/type-86h-concrete-post-and-beam-bridge-rail>

IMAGES



Image 1: Front View of The Type 86H Concrete Barrier Rail



Image 2: Backside View of The Type 86H Concrete Barrier Rail



Image 3: A 2,420 pound small car impacting at 62 miles per hour (mph) and 25°.



Image 4: A 5,000 pound pickup truck impacting at 62 mph and 25°.



Image 5: A 22,000 pound single-unit truck impacting at 56 mph and 15°.

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