

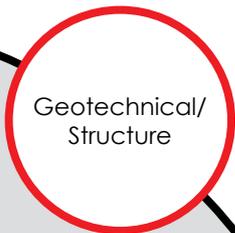


Caltrans Division of Research,  
Innovation and System Information

# Research



# Results



Geotechnical/  
Structure

## JUNE 2020

**Project Title:**

Development and crash testing of a steel post-and-beam bridge railing, ST-75, in compliance with MASH 2016, Test Level 4, for use in California

**Task Number:** 3033

**Start Date:** January 1, 2017

**Completion Date:** June 30, 2020

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## ST-75 Bridge Rail Crash Testing

A new, safer steel post and beam bridge rail was developed and crash-tested.

### WHAT IS THE NEED?

California Department of Transportation (Caltrans) has used the steel tube (ST-) 20S and ST-70 since the mid-2000s as steel post-and-beam bridge railings. The ST-20 was tested in the early 2000's by Caltrans and meets Test Level 4 (TL-4) crash test requirements of the National Cooperative Highway Research Committee Report 350 guidelines. The tested version of the ST-20 was modified to improve performance and renamed to ST-20S. The ST-20S bridge rail has the same details as ST-70, except the CA ST-20S has a bicycle railing mounted on the top.

With the adoption of a new set of crash test guidelines - Manual for Assessing Safety Hardware 2009, and later the revised Manual for Assessing Safety Hardware (MASH) 2016, there is a need for new bridge rails that meet the requirements of the new crash test guidelines. Caltrans has adopted recommendations from the Federal Highway Administration and the American Association of State Highway Transportation Officials that all bridge rail projects advertised on or after October 31, 2019 must meet the MASH criteria.

### WHAT WAS OUR GOAL?

The objective of this research was to construct a test section of the CA ST-75 and then conduct the required crash tests for MASH TL-4 for longitudinal barriers.



Caltrans provides a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

## WHAT DID WE DO?

With input from the Caltrans Roadside Safety Research Group, Structures developed a new steel post and beam bridge rail design that was expected to meet the updated crash testing standards. The research team conducted three required crash tests on a test section of the bridge rail. 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 a 15°.

## WHAT WAS THE OUTCOME?

All three crash tests successfully met the updated crash test criteria. Caltrans now has a MASH-compliant bridge rail in the toolbox. The bridge rail plans are currently available as Bridge Standard Details (XS) and will be added to Caltrans Standard Plans in 2021.

## WHAT IS THE BENEFIT?

Caltrans and the public will both benefit from having safer bridge rails on California roadways. Other State Department of Transportations may also elect to use this bridge rail to benefit the public in other states.

## IMAGES



Image 1: A 2,420 pound small car impacting at 62 miles per hour (mph) and 25°



Image 2: A 5,000 pound pickup truck impacting at 62 mph and 25°.



Image 3: A 22,000 pound single-unit truck impacting at 56 mph and a 15°.