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

Research Notes

Development and MASH Evaluation of a Surface Mounted Double Thrie Beam Barrier

Designing and crash testing a new concrete surface mounted double thrie beam barrier.

Research Support

November 2025

Project Title: Development and MASH Evaluation of a Surface Mounted Double Thrie Beam Barrier

Task Number: 4567

Start Date: July 1, 2025

Completion Date: June 30, 2028

Task Manager:

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WHAT IS THE NEED?

The Double Thrie Beam Barrier on Bridge in the 2023 Standard Plans did not meet the Federal Aid Eligibility requirements for new installations per the Manual for Assessing Safety Hardware (MASH) and was therefore canceled by Errata No. 23-1 on January 22, 2024. The California Department of Transportations (Caltrans') policy to implement MASH for evaluating roadside safety hardware has led to several standard redesigns including modifications to the Thrie Beam Barrier. The standard railing sections and many applications of this barrier for use in soil have been replaced by the Thrie Beam Barrier (Type M) in the Standard Plans. However, an update to the surface mounted, median application on bridge decks has not been approved under the current guidelines.

Developing an acceptable replacement will require research, design and crash testing. The final design will also need to meet Caltrans design standards and stakeholder priorities.

WHAT ARE WE DOING?

Caltrans' Roadside Research Group (RSRG) completed a literature review and identified a research gap for concrete surface mounted thrie beam barriers. RSRG will develop a MASH compliant alternative to the Double Thrie Beam Barrier on Bridge shown in Cancelled Standard Plan A78D2.

A Minor B contract will be advertised to construct a double thrie beam barrier test article at the Caltrans Dynamic Test Facility. The test article will include a length of double thrie beam barrier mounted on a concrete slab and transition to standard Double Thrie Beam Barrier (Type M) in soil. RSRG will administer the contract and inspect construction activities.

RSRG will conduct a minimum of 4 full scale crash tests to

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satisfy the testing matrix found in MASH. Data from tests will be analyzed and recorded in a test report. Dissemination of results will be provided to stakeholders. Following successful research and development of a crashworthy system, Caltrans' Highway Safety New Products Committee (HSFNPC) will evaluate the system for Caltrans approval.

WHAT IS OUR GOAL?

Once approved by HSFNPC, Caltrans can implement the research through the creation of new Standard Plans, Standard Specifications, Special Provisions, or XS Sheets. This will restore the option of a surface mounted double thrie beam barrier that was removed with the canceled Standard Plan.

WHAT IS THE BENEFIT?

Designers are often seeking the most economical solution while adhering to all federal and state safety standards. Having multiple options to address a problem gives designers the greatest chance of selecting the optimal solution for the given conditions. Developing and implementing a MASH compliant concrete surface mounted thrie beam barrier will provide another solution for safely separating traffic.

WHAT IS THE PROGRESS TO DATE?

Caltrans contracted the Midwest Roadside Safety Facility (MwRSF) to develop a finite element analysis (FEA) model of a concrete surface mounted post that would behave similarly as posts embedded in soil. Slotted holes in the post flanges were implemented to reduce stiffness and preliminary results were promising. RSRG is currently planning component testing to validate the FEA model.

RSRG is also preparing a Minor B contract to construct a concrete surface mounted thrie beam barrier for full scale crash testing. Four crash tests are currently planned.

IMAGES

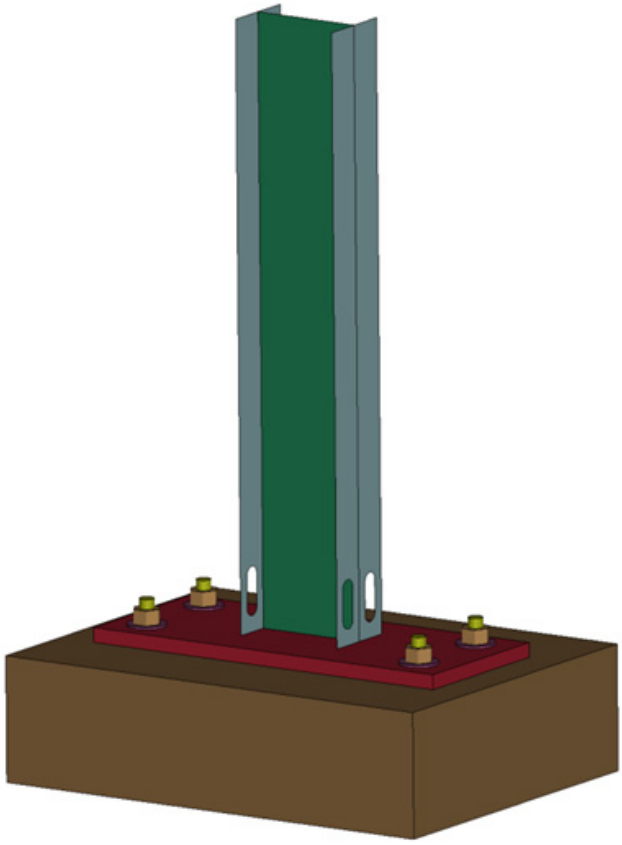

Image 1: Concrete Surface Mounted Median Post FEA Model

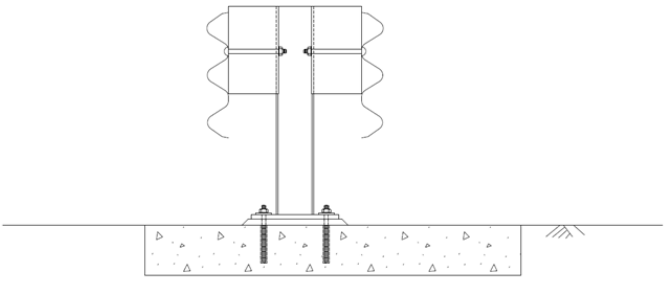

Image 2: Proposed Typical Section for Test Article