

Research Support

October 2025

Project Title: TTI (Texas Transportation Institute) Roadside Safety Research Pooled Fund Project

Task Number: 4195

Start Date: October 1, 2022

Completion Date: Pending

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Roadside Safety Research for MASH Implementation: TTI (Texas Transportation Institute) Pooled Fund Project TPF-5(501)

The objective of the Roadside Safety Pooled Fund Program is to provide a cooperative approach to conducting research on roadside safety hardware. Emphasis will be placed on assisting State Departments of Transportation (DOTs) with their implementation of Manual for Assessing Safety Hardware (MASH) and addressing other roadside safety needs of common interest.

WHAT IS THE NEED?

The implementation of the American Association of State Highway and Transportation Officials (AASHTO) MASH by State DOTs necessitates the examination and evaluation of roadside safety hardware currently being used by the State DOTs. It is already known that some currently used roadside safety hardware will not meet MASH requirements. The federal compliance dates for MASH roadside safety hardware have already passed and research is needed to meet California's safety goals.

WHAT ARE WE DOING?

This project creates a consortium of states that will cooperatively fund and oversee MASH implementation and roadside safety research needs identified and prioritized by its representatives. The pooled fund research program will identify, analyze, and develop solutions for roadside safety problems with the goal of reducing the tremendous loss of life that occurs on our highways each year as a result of roadway departure crashes. Specific research activities addressed within the program will include the design, analysis, testing, and evaluation of roadside safety hardware, and the development of guidelines for the use, selection, and placement of these features.

Research problem statements will be developed by



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participating member state representatives. The members will rank and select specific projects to be funded each fiscal year. Additionally, member states may independently develop and fund research projects through the Roadside Safety Pooled Fund Program through a reimbursable agreement with Washington DOT.

WHAT IS OUR GOAL?

The goal of this research is to provide roadside safety solutions to member states and improve the safety of roadway departure crashes. Reaching this goal will improve the safety of California road and bridges.

WHAT IS THE BENEFIT?

Each year state transportation agencies are faced with unresolved issues regarding roadside safety features. Research conducted under this program will enable California to leverage funds to address these important safety issues. The pooled fund program will be particularly valuable with regard to addressing needs associated with the implementation of MASH. The continuity provided by the multi-year format will permit research problems to be solved in much less time than would normally be required if each issue was individually contracted. Safety research needs of an individual participating state may be addressed through additional funds to the program. The benefits are reduced cost and expedited contracting.

The result of this work will be a reduction in fatalities and serious injuries associated with run-off-road crashes in California and other participating states. Further, the California will save money through the development and implementation of more cost-effective roadside safety hardware and more efficient procedures and guidelines for their use.

WHAT IS THE PROGRESS TO DATE?

See the following links for pooled fund quarterly reports and the Roadside Safety Research for MASH Implementation TPF-5(343) and TPF-5(501) website

for on-going projects and completed research:

<https://www.pooledfund.org/Details/Study/592>

<https://www.pooledfund.org/Details/Study/730>

<https://www.roadsidepooledfund.org/>

<https://www.roadsidepooledfund.org/mash-implementation/search/>

In addition to the pooled fund projects, Caltrans initiated a project with TTI to research a new temporary portable F-Shape Pin and Loop Concrete Barrier with vertical anchors. For this project, barrier details have been developed by TTI and a Caltrans portable barrier working group. TTI conducted four crash tests of the new barrier design, all of which have tentatively met MASH crashworthiness criteria and are being evaluated as part of the Highway Safety Features New Product Committee process. All four were 3-11 (pickup) tests, see photos below. The first test was the barrier staked to Asphalt Concrete (AC) on the traffic side with 36" long stakes. The second test used stakes in the four corners of each barrier segment, in a median barrier configuration. In the third test the barrier was drill and bond anchored on the traffic side to un-reinforced Portland Cement Concrete (PCC) for use on PCC pavement and bridge decks. The anchor was a 1 1/8" diameter B7 threaded rod, embedded 6" with epoxy adhesive. The fourth test was conducted using a shallow embedded anchor in PCC, intended for use in thin bridge decks. The embedment depth was 5" and each segment was anchored at all four corners.

A test report has been drafted to document the results of the four crash tests described above and is in the process of being remediated for Section 508 compliance.

IMAGES



Image 1: Test 616811-01-1 Asphalt Roadside Configuration 2023_01_13



Image 2: Test 616811-01-2 PCC Bolted Roadside Configuration 2023_03_13



Image 3: Test 616811-01-3 Asphalt Median Configuration 2023_01_19



Image 4: Test 616811-01-4 PCC Bolted Median Configuration with 5 inch embedment 2023_09_29

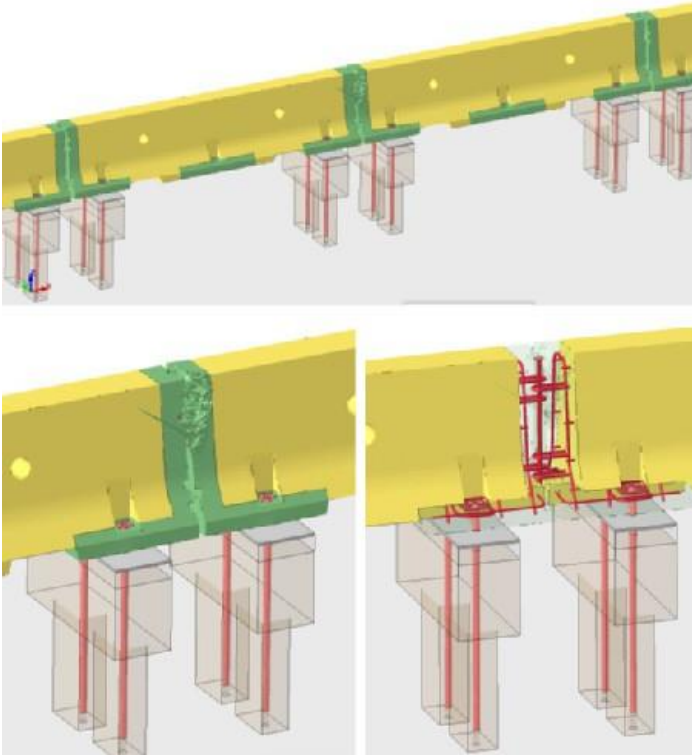


Image 5: Pooled Fund Example Project: Portable Temporary F Shape Concrete Barrier with vertical anchorage Finite Element Model and Simulation Results