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

Research Notes

Designing Roadside Safety Hardware for Emerging Vehicle Types, TPF-5(553)

Designing safe, reliable, and efficient transportation infrastructure for the ever-growing Emerging Vehicle fleet.

Research Support

November 2025

Project Title: Designing Roadside Safety Hardware for Emerging Vehicle Types, TPF-5(553)

Task Number: 4527

Start Date: July 8, 2025

Completion Date: TBD

Task Manager:

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WHAT IS THE NEED?

Emerging vehicle (EV) types, including hybrid and battery electric, are rising in sales and comprise a larger share of the total vehicle fleet each year. The characteristics of these emerging vehicle types pose many challenges to our transportation system moving forward. For example, their effect on roadside safety hardware has the potential to be significant based on their increased weight, lower center of gravity, and different crush stiffness. The objective of this Pooled Fund is to assist transportation agencies in designing a safe, reliable, and cost-efficient transportation network for the ever-growing emerging and heavy vehicle fleet.

One primary focus of this research program will be to improve roadside safety hardware to address identified performance limitations. This program will support the next important research step of improving the design of hardware found to be noncompliant with the Manual for Assessing Safety Hardware (MASH) criteria when tested with emerging vehicles.

WHAT ARE WE DOING?

The California Department of Transportation (Caltrans) is one of 10 state departments of transportation (DOTs) participating in this pooled fund project to improve the safety of the national transportation network. For the duration of the pooled fund, Caltrans contributes funding to the lead organization, Texas DOT. At annual meetings, Caltrans presents research needs, prioritizes research tasks and provides oversite of the research conducted by Texas A&M Transportation Institute (TTI).

Caltrans' Roadside Safety Research Group will facilitate communication between its internal customers and the

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

pooled fund to ensure that the needs of California are recognized.

WHAT IS OUR GOAL?

Caltrans' goal for participating in this pooled fund is to stay up to date with the latest research efforts involving the impacts of EVs on roadside safety hardware. Through mutual sharing of expertise, Caltrans can be influential in the development of guidance for EV crash testing and research. Successful outcomes can produce cost saving solutions in the form of new nonproprietary roadside safety hardware that will improve safety for the increased loading of EVs.

WHAT IS THE BENEFIT?

Participation in this pooled fund will allow Caltrans to engage at the national level with a focus on Safety First, one of our Strategic Plan Goals, and ultimately assist with developing a roadmap for testing facilities, DOTs, and other transportation agencies to implement solutions to the increased loading of emerging vehicles. Direct involvement from Caltrans can produce cost saving solutions by improving safety, reducing injuries and deaths. These safety improvements will also reduce Caltrans' tort exposure related to accidents involving EVs.

WHAT IS THE PROGRESS TO DATE?

TTI held a virtual kickoff meeting on July 8, 2025, where the state of research of roadside safety hardware with EVs was summarized. Currently, only 5 full scale crash tests have been made public.

The first annual pooled fund meeting was held on September 18, 2025. For Caltrans, Thomas Mar attended in person and presented 3 problem statements for consideration to the pooled fund technical committee. At the end of the meeting, the top 3 projects prioritized and funded for Fiscal Year 26 were: Tesla Model 3 Finite Element Analysis (FEA) Model Development, Develop EV Design Impact Loads, and Midwest Guardrail System (MGS) Retrofit.

IMAGES

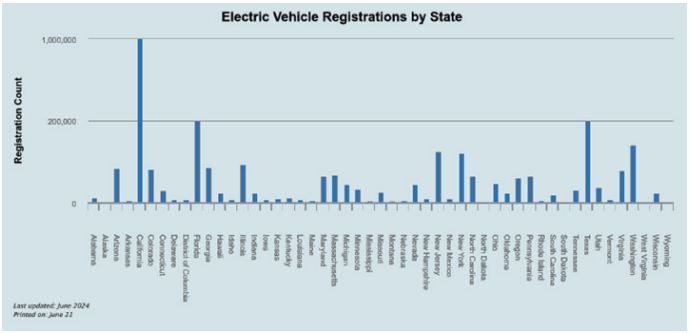

Image 1: Electric Vehicle Registrations by State