

Maintenance**December 2025****Project Title:** Caltrans Field Trials of the Intelligent Truck-Mounted Attenuator (ITMA)**Task Number:** 4159**Start Date:** January 2, 2023**Completion Date:** October 31, 2025**Task Manager:**Charina Guarino
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Caltrans Field Trials of the Intelligent Truck-Mounted Attenuator (ITMA)

This project performed research to evaluate the effectiveness of the Intelligent Truck-Mounted Attenuator (ITMA) in actual Caltrans operating conditions and identify any problems which arise during the on-road field trials.

WHAT WAS THE NEED?

The California Department of Transportation (Caltrans) highway maintenance and repair activities often require a shadow (trailing) truck equipped with a Truck-Mounted Attenuator (TMA) to provide impact protection for workers from errant vehicles. Shadow trucks, or TMA trucks, are intended to brace the impact of errant vehicles. While this increases the safety for the workers, each collision compromises the safety of the TMA truck driver. There is a need to remove the driver from TMA trucks and from the risks associated with errant vehicle impacts. The Intelligent TMA (ITMA) allows the operation of the TMA without the physical presence of the driver in the truck. The ITMA was successfully evaluated on closed test sites in previous research. To proceed towards deployment of the ITMA for regular Caltrans operations, controlled field trials on public roads with and without an ITMA safety operator are essential.

WHAT WAS OUR GOAL?

The goal of this research was to confirm that the Intelligent Truck-Mounted Attenuator (ITMA) is safe and effective for regular Caltrans maintenance operations and identify problems which arise during field trials on California public roads.

WHAT DID WE DO?

This project performed monitored field trials of the Intelligent Truck-Mounted Attenuator (ITMA) system on California public roads to demonstrate its feasibility. In this project, the research team from the Advanced Highway Maintenance



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and Construction Technology (AHMCT) Research Center worked with the system vendor, Kratos, on system modifications, test plan development, ITMA system training for Caltrans Maintenance personnel, and field trials. Initial field trials were performed on a remote Caltrans-operated public roadway with a safety operator in the shadow vehicle. Final trials were performed with the shadow vehicle operator moving to the leader vehicle.

WHAT WAS THE OUTCOME?

The ITMA system demonstrated strong potential for operational deployment, validated through a full lifecycle of vehicle updates, operator training, semi-intelligent operation and fully intelligent field operations in support of typical maintenance operations during Caltrans moving closures.

The research identified the following key challenges that must be addressed before transitioning the ITMA to full Caltrans deployment:

- Expanding training capacity
- Preparing crews for more complex operating conditions
- Addressing GPS-dependency
- Building a broader maintenance and support network

A research project has been executed to assess an Intelligent TMA's (ITMA) performance under a variety of Annual Average Daily Traffic (AADT) conditions and to further evaluate remote driving capabilities. Another research project has been proposed to expand on previous ITMA research and to evaluate new optical navigation of the ITMA system

WHAT IS THE BENEFIT?

The research provided an opportunity to field test the ITMA in closely monitored rural highway operations. The use of a fully intelligent TMA system in Caltrans maintenance operations could lead to significant reductions in operator injuries due to public vehicles' impacts with the TMA vehicles.

IMAGES



Image 1: ITMA System Defining Leader and Follower Vehicles