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

Research Notes

Virtual Weigh Station Pilot System in California

Virtual Weigh Stations (VWS) collect truck data for law enforcement, providing size, weight, license plate information, physical characteristics, possible violations/hazards, and images via a secure web interface.

Traffic Operations

MAY 2026

Project Title: Virtual Weigh Station Pilot System in California

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WHAT IS THE NEED?

Overweight trucks exponentially accelerate the deterioration of pavement and bridges. Oversized trucks can strike bridges, overpasses, and falsework, potentially causing death or injury, damaging infrastructure, and resulting in delays. Commercial Vehicle Enforcement Facilities (CVEFs) are currently used for the enforcement of overweight trucks and early detection of safety violations. However, these facilities require a significant capital investment and cannot be widely deployed. A Virtual Weigh Station is a Weigh-in-Motion (WIM) system utilizing proven technologies to capture weight, speed, and axle data, as well as Light Detection and Ranging (LIDAR) and cameras, which can be installed at existing WIM sites. The Virtual Weigh Station can provide real-time information on the weight, speed, image, license plate, potential violations/ hazards, and height of passing commercial motor vehicles to a database and law enforcement without requiring the vehicles to pull off for inspection at a conventional CVEF. This would allow officers to focus their efforts on non-compliant vehicles. Virtual Machines (VMs) have been shown to discourage overweight vehicles and will generate much-needed truck traffic data to better understand freight movement and assist planning. California has yet to implement a functional Virtual Weigh Station for use as a screening tool for enforcement purposes. This project proposes to investigate the functionality and feasibility of these systems.

WHAT ARE WE DOING?

Installing the virtual weigh station at established WIM sites. Within seconds of a truck passing over one of the virtual weigh stations, data on the truck's size and weight, along with an image of the vehicle, are stored and made available

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to law enforcement via a secure, web-based user interface.

One goal of this project is to research new vehicle screening technologies that can flag potential issues with commercial trucks.

WHAT IS OUR GOAL?

The goal of this project is to develop a cost-effective system using in in-ground and off off-pavement road sensors and cameras to provide real time data on vehicle weight, size, and classification. This information will be transmitted to a centralized system capable of issuing real time violations to the California Highway Patrol (CHP) and storing the data for use in construction, design, and planning efforts. The primary issue being addressed is the presence of overweight vehicles on highways, which can cause significant damage to infrastructure. By identifying where and when these violations occur, the system can help discourage such abuse. The project will involve installing two VWS sites, one in an urban area and another in a rural area, to evaluate the performance of the sensors and systems under different traffic conditions.

WHAT IS THE BENEFIT?

There are two primary reasons for VWSs: Increasing highway safety for the public and infrastructure preservation. Overweight trucks are potentially operating beyond the design capacity of the vehicle and will negatively impact brake, handling, and tire performance. These factors will limit the driver's ability to react to unforeseen situations. Highway pavement and structure life depend upon the weight and frequency of truck traffic. Heavy trucks cause far greater impact on pavement and bridges compared to passenger cars. To illustrate the difference between cars and trucks, a road test sponsored by the American Association of State Highway and Transportation Officials (AASHTO) established that it takes the passage of approximately 9,600 cars to equal the pavement damage caused by one legal truck weighing 80,000 pounds. Studies on pavement damage indicate that a 10 percent overload increases the pavement damage by as much as 40 percent. It is imperative to monitor overweight truck traffic to preserve and extend pavement life.

WHAT IS THE PROGRESS TO DATE?

The research contract was executed in November 2025. The research team has completed field evaluations of the candidate sites and submitted a final recommendation for the testbed location, which has been determined to be located at the new southbound Cajon Pass PrePass WIM site along the Interstate 15 freeway. The team has also begun evaluating several advanced sensors and traffic monitoring technologies for installation at the testbed, including thermal imaging cameras, tire pressure sensors, LiDARs and video cameras..

IMAGES

Image 1: Proposed testbed location at the southbound Cajon Pass WIM site along the Interstate 15 freeway.