

# Virtual Weigh Stations and Weigh-in-Motion (WIM) Technology in Maryland and New York

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## Overview

The Maryland State Highway Administration (MSHA) is using weigh-in-motion (WIM) technology at ten “virtual” weigh stations to support law enforcement activities and generate traffic data for use in future highway and congestion planning. New York City Department of Transportation (NYCDOT), in cooperation with New York State DOT (NYSDOT) and the Port Authority of New York and New Jersey, is using three WIM sites to collect and analyze truck weight data. NYCDOT is also using the information from these sites to inform its management of truck routes.

## Background

Overweight trucks accelerate the deterioration of pavement, and overheight trucks can strike bridges and overpasses, damaging infrastructure and causing traffic delays from strike incidents. Law enforcement agencies traditionally have used permanent (or “fixed”) roadside stations to weigh and inspect trucks. Fixed stations are expensive to construct, and trucks can bypass them by using alternate routes. In response to these challenges, some jurisdictions are installing “virtual” weigh stations comprised of WIM scales and other sensors in or along roadways. WIM scales can capture axle weights and gross vehicle weights as vehicles drive over them at highway speeds. Other sensors can be deployed at the same sites to detect the height of passing vehicles.

These installations can provide real-time information on the weight, speed, and height of passing commercial motor vehicles to law enforcement. Access to real-time information allows law enforcement officers to focus their efforts on non-compliant vehicles. Some States or localities are prohibited by law from using WIM sites for enforcement purposes. These jurisdictions may find it worthwhile to install WIM sites solely for gathering information on the trucks traveling on particular roadways. For example, California has deployed more than 100 WIM sites across the State for data collection purposes. According to the State, the information gathered is essential for pavement studies, highway monitoring and capacity studies, and crash rate calculations.<sup>1</sup>

## Key Accomplishments

- Allow to better target enforcement activities by conducting a pre-screening of a truck’s size and weight.
- Stations extend the reach of law enforcement.
- Deployment is less costly than fixed weigh stations.
- Stations generate valuable truck traffic data.

## Process

Maryland’s virtual weigh stations consist of an inductive loop, two pairs of WIM sensors, a camera, an overheight detector, and associated information technology systems. When installing the stations, MSHA selected sites that are located a few miles before a fixed weigh station or along routes known to serve as bypasses to fixed weigh stations. Within seconds of a truck passing over one of the virtual weigh stations, data on the truck’s size and weight and an image of the vehicle are made available to law enforcement via a secure, web-based user interface. If the system indicates potential size or weight violations, law enforcement can target the truck for an inspection along the roadside or at a weigh station further ahead on the truck’s route.

An information system developed by the University of Maryland integrates multiple virtual weigh station feeds, data archival capability, and reporting and analysis capabilities. The cumulative data gathered indicates when and where there are high frequencies of non-compliant vehicles, which allows for better targeting of enforcement. In addition, data collected by the WIM scale on traffic volumes, speeds, and vehicle class can be used by MSHA to support future highway and congestion planning.

The cost of each MSHA virtual weigh station is approximately \$600,000 for a two-lane site and \$400,000 for a one-lane site, compared to approximately \$2-3 million for a fixed weigh station. For its initial deployment of virtual weigh stations, MSHA received partial funding from

<sup>1</sup> State of California, “Data WIM,” accessed April 2016, <https://dot.ca.gov/programs/traffic-operations/wim>

## WIM Sites Generate Data for New York City DOT (NYCDOT)

NYCDOT, in cooperation with New York State DOT (NYSDOT) and the Port Authority of New York and New Jersey, installed three truck WIM sites between 2013 and 2016 to collect and analyze truck weight data. The WIM sensors weigh each truck that travels over it and electronically transfers the resulting data to NYCDOT. The agency uses the data to assess the number of overweight trucks and the resulting impacts of those trucks on bridge structures. NYCDOT is also using the information from these sites to inform its management of truck routes. The agency is not currently authorized to use the WIM sensors for enforcement, but the WIM devices would be capable of supporting enforcement if permitted.



Figure 1. Pre- and post-installation of a WIM scale by NYCDOT (photos by NYCDOT)

the Federal Commercial Vehicle Information Systems and Networks (CVISN) program. This program, administered by the Federal Motor Carrier Safety Administration (FMCSA), is a discretionary grant program that provides funding for States and the District of Columbia to deploy, operate, and maintain elements of their CVISN programs.

In the near future, MSHA plans to deploy 10 additional weigh stations and to add technology for reading license plates at highway speeds. That technology will enable law enforcement to cross-check non-compliant vehicles against other enforcement databases.

### Lessons Learned and Recommendations

MSHA has found that it is important to have smooth pavement 200 feet in advance of and 100 feet beyond the WIM sensors. This high quality paved surface ensures the entire vehicle or combination being screened is on the same level surface plane and minimizes the vehicle's bounce, which could otherwise reduce the accuracy of the weight and classification reading. MSHA also recommends posting signs instructing truck drivers not to change lanes while crossing over WIM sensors to ensure accurate weight

detection. Agencies considering virtual weigh stations should also be prepared to calibrate the sensors at least every six months and keep the equipment on a regular maintenance schedule.

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