

# I-66 highway uses smart shoulder to move traffic.

Automatic Incident Detection helps smooth the process.



**Organization:**

VDOT

**Location:**

Virginia, USA

**Industry segment:**

Transportation

**Application:**

Traffic monitoring

**In collaboration with Axis:**

Citilog (an Axis company)

## Mission

Since I-66 is the only Interstate Highway running west from Washington, D.C., into Northern Virginia, traffic on the road is often extremely heavy. In order to improve traffic flow, the Virginia Department of Transportation has implemented a number of initiatives such as HOV (high occupancy vehicle) lanes and allowing vehicles to drive on the shoulder at set times during morning and evening rush hours. With the continuous increase of traffic, VDOT has been looking for solutions to open the shoulder to traffic dynamically, i.e. depending on actual traffic conditions.

## Solution

VDOT installed dynamic message signs on gantries along I-66 using a red cross or a green arrow to indicate whether the shoulder is open to traffic or not. VDOT also deployed Citilog's video-based Automatic Incident Detection (AID) system to monitor the shoulders. The AID system uses video streams from fixed traffic cameras in order to identify incidents and accidents.

The system then alerts operators in real time. The shoulder is now opened for travel by the operators when the speed drops, indicating that traffic is congested, and closed again when traffic lightens up.

## Result

Citilog's AID systems detect incidents and accidents more effectively, thus ensuring that those incidents are cleared faster and traffic is returned to normal as quickly as possible.

The system also made it easier to open the shoulder on demand by monitoring the shoulder 24/7 for stopped vehicles and making sure the shoulder is available when it needs to be opened.

**“The Citilog Automatic Incident Detection system made it easier to open the shoulder on demand which has been increasingly needed to face the increase of traffic.”**

Mr. Kamal Suliman, ITS Manager, Virginia Department of Transportation.

The McConnell Safety and Transportation Operations Center in Fairfax, Virginia (USA) is a high-tech complex that brings Fairfax County's 911 services, Virginia State Police, the Virginia Department of Transportation's traffic management center and other agencies together under one roof. This joint facility has been in operations since 2008 and the State DOT is responsible for monitoring and operating all roads in the county. The Transportation Operations Center (TOC) is particularly responsible for the interstate highways I-95, I-495, I-395 and I-66 which total nearly 100 miles. Since 1992, VDOT has authorized drivers to use the shoulder on I-66 at set times during the morning rush hours east bound and in the evening west bound.

When the left HOV lane was added in 1992 outside the Beltway, there was no possibility to widen the road and hence the road capacity was restricted. As a consequence, the shoulder was increasingly opened to traffic, still at fixed times: initially opened from 6 to 9 am (Eastbound), now opened from 5:30 to 11 am.

As part of the I-66 Active Traffic Management System project, VDOT decided to open the shoulder dynamically when traffic was very dense or congested outside of the fixed times defined.

In order to achieve a safe operation, VDOT deployed a set of dynamic message signs and a video-based Automatic Incident Detection (AID) system. The dynamic message signs are mounted on gantries and indicate via a red cross or a green arrow whether the shoulder is open to traffic or not.

The AID system uses 112 fixed cameras on the I-66 and 22 cameras on sections of the I-495 to monitor the shoulders. The system uses video streams from traffic cameras. Those video streams are processed by a Video Detection Unit by means of an algorithm that identifies and tracks moving objects (vehicles), computes their trajectories and identifies stopped vehicles.

The system catches incidents in real time and alerts operators both with audible alarms and with on-screen highlighting of the incident. The incident is currently displayed using Citilog Graphical User Interface. The Citilog AID system will soon interface with VDOT's statewide Traffic management system.

The shoulder is opened by the action of the VDOT TOC operator. When the speed drops below 45 mph the operator is notified and opens the shoulder. When the speed goes over 55 mph, the shoulder is closed.

VDOT used to have a PTZ (pan-tilt-zoom) camera tour to "sweep" the entire I-66, and a highway patrol vehicle would drive along the shoulder to check for obstacles or vehicles that would prevent the shoulder from opening.

Now that the shoulder is opened on demand whenever there is congestion, VDOT cannot afford to wait 10 minutes for the tour with PTZ camera to be completed. The AID system monitors the shoulder 24/7 for stopped vehicles and makes sure the shoulder is available when it needs to be opened. The shoulder is still opened at fixed times, and outside of these times it is opened dynamically.

"Now that the shoulder opening is automated, it is opened a lot more than before, even on the weekends: last month it opened every weekend on Saturday and 6 hours on Sundays a day. Before the automation there was no shoulder opening on the weekends," says Kamal Suliman, ITS Manager, Virginia Department of Transportation.



Transportation Operations Center (TOC)



Shoulder open to traffic (green arrow dynamic sign)



Shoulder closed to traffic (red cross dynamic sign)



Highway patrol on site to clear incident



Detection of an accident



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