

# THERMAL IMAGING WRONG WAY VEHICLE DETECTION SYSTEM

BY: ARIZONA DEPARTMENT OF TRANSPORTATION

## IN THIS CASE STUDY YOU WILL LEARN:

1. How the coordinated use of thermal imaging cameras, software and processes can detect wrong way vehicles for quick alerts and response.
2. How agencies partner together to be an effective team.
3. How the system creates data for research to prevent future wrong way driving.

The Arizona Department of Transportation (ADOT) implemented a \$3.7 million first-in-the-nation pilot system to detect wrong way vehicles by using thermal imaging cameras. The ADOT Transportation Systems Management and Operations (TSMO) Division completed the installation of 90 thermal cameras along a 15 mile stretch of I-17 between I-10 and Loop 101 in November 2017. The pilot system also incorporated a warning system to notify the ADOT Traffic Operations Center (TOC) and Arizona state troopers of a wrong way vehicle, hopefully prior to an emergency.

ADOT installed the thermal cameras at planned locations to detect a wrong way vehicle at I-17 off ramps. The thermal cameras are connected to software that enables quick response and deploys countermeasures to reduce the chance of a crash caused by wrong way driving. The system initially triggers an illuminated wrong way sign with flashing lights to alert the wrong way driver. The wrong way detection system simultaneously alerts the ADOT TOC and the Arizona Department of Public Safety when a wrong way vehicle is detected to allow for faster response times to the scene by state troopers. The ADOT TOC is staffed around the clock by TSMO control room operators and sworn officers of the Department of Public Safety to improve traffic incident management, including wrong way driving in the pilot area. The wrong way detection system automatically turns cameras in the opposite direction to allow TOC operators to better track the wrong way vehicle in the area. The TOC operators also send real-time alerts via the ADOT ALERTS app when a wrong way driver is detected by the pilot system.

The pilot system is intended to automate warnings and response to wrong way driving incidences on a freeway prior to a crash occurring. Typically, emergency response to wrong way driving is initiated by 911 calls from other motorists, and TOC operators notify emergency personnel and post wrong-way vehicle warnings on overhead message boards to warn other



drivers. Crashes associated with wrong way driving typically happen within a few minutes and 25 percent of them are fatal, thus an automated detection system reduces the risk of a fatal crash.

The wrong way detection system mitigated several wrong way driver incidents during the pilot phase. In one example, the TOC was immediately alerted by the detection system to a wrong way driver, and a response was initiated four minutes prior to the first 911 call. Law enforcement personnel stopped the wrong way driver six minutes after being alerted by the pilot system and prior to a crash.

In the past, ADOT only had records of 911 calls and crash locations to determine engineering measures to prevent wrong way driving. This wrong way detection system provides TSMO staff with a video log of the wrong way entries to determine the cause and pattern of the wrong way driving in the pilot area. The video log data allows TSMO staff to determine the cause of wrong way driving and implement the appropriate geometric improvements to discourage future wrong way driving incidences.

The pilot system was initially designed to prevent wrong way drivers from entering the freeway system. However, the wrong way detection system has proven to reduce risk, improve response, and provide critical data that can prevent wrong way driving from happening in the first place. In September 2018, the wrong way detection system received a Government Innovation Award from GCN, an information technology industry magazine.

## FURTHER INFORMATION

NOCoE Knowledge Center: <https://transportationops.org/knowledge-center>

[www.azdot.gov/projects/central-district-projects/i-17-wrong-way-detection-system](http://www.azdot.gov/projects/central-district-projects/i-17-wrong-way-detection-system)