TEXAS DEPARTMENT OF TRANSPORTATION

OVERHEIGHT VEHICLE DETECTION SYSTEM (OVDS)

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WHY ?

- In 2014
  - 35 reported bridge hits due to overheight loads.
  - 11 during peak hours
  - more than any of previous 3 years for ALL types of bridge hits.
  - Majority occurred INSIDE 610 Loop, primarily along I-10 & I-45 near downtown.
- Avg. cost to repair = $200K-$300K.
- Since 2012, overheight permitting (required for loads higher than 14 feet) has become an online, self-reporting process.

“Near Misses”

WHERE ?

Selected TWO project demo sites,
outside Loop 610 (inbound) along I-10

OVDS Demo Sites

WHAT ?

- Dual-beam, active infrared, direction-discerning system manufactured by Trigg Industries.
- Dedicated camera and dynamic message sign integrated with each OVDS demo site.
- TTI completed performance evaluation study.

OVDS Sensor Spec Sheet

Industries TRIGG International

SYSTEMS AND SIGNS

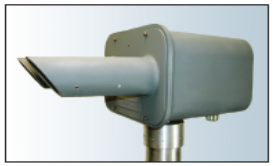
Specifications

Model # 3403-Z
Double Eye Z-Pattern®*
Visible Red / Infrared
Overheight Vehicle Detection System

CE

* PATENTED
Z-Pattern®

Remote



Master

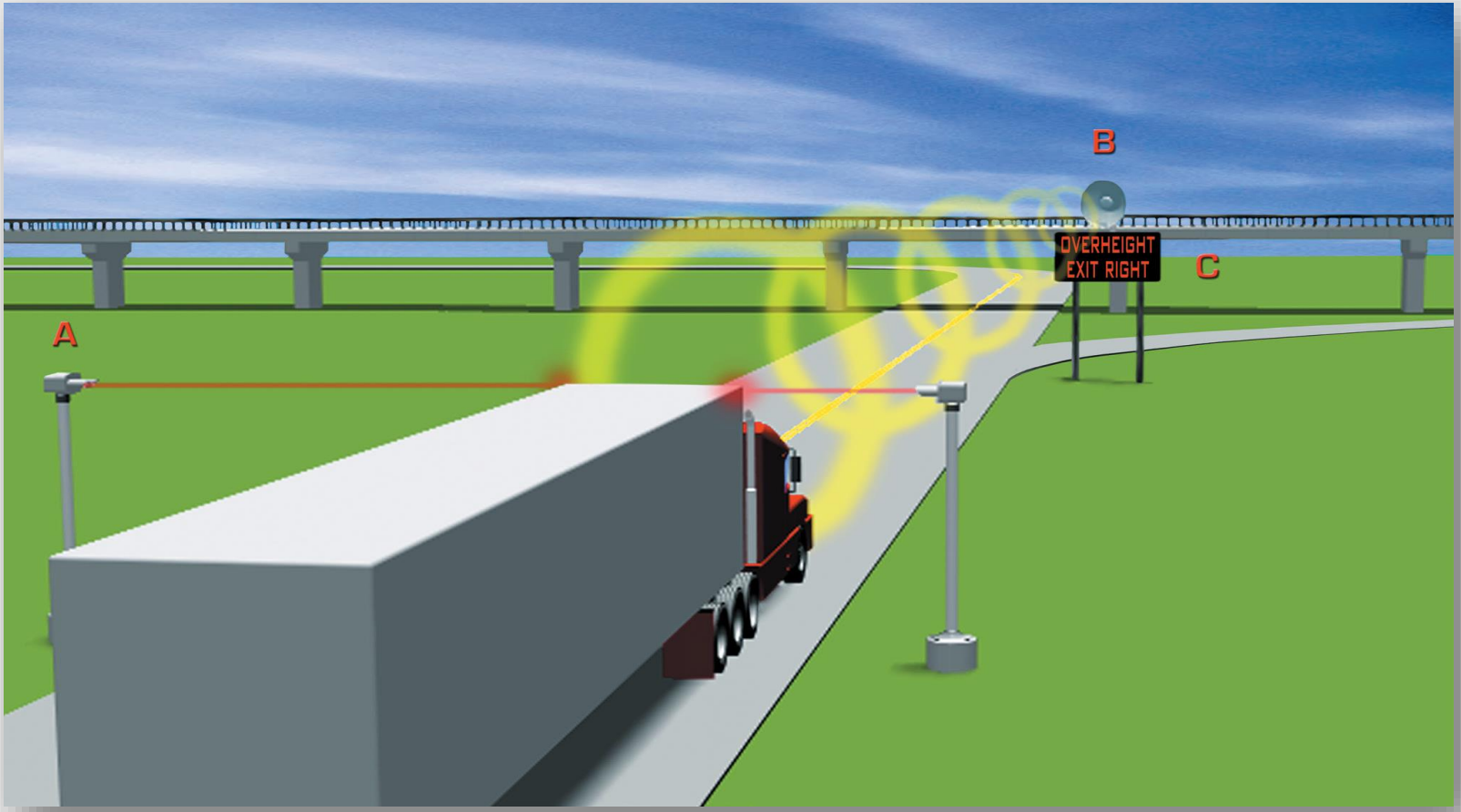
INPUT POWER	115 VAC, +/- 20%, 50/60 Hz. Other options include 24 VDC solar or 230 VAC, +/-10%, 50/60 Hz operation.
OUTPUT	Two Form C, dry relay contact closures for Overheight Alarm Functions. One Form C, dry relay contact closure for Fault Reporting. Contacts rated 240 VAC 10A, protected by 8A circuit breakers.
CERTIFICATIONS	CE Marking.
FAULT REPORTING	Factory configuration per customer selection of operational mode, loss of source/detector/power or total failure. See Options and Accessories section.
ALARM TIME	Adjustable by customer from 5 to 60 seconds.
ELECTRONICS	Sensors are NEMA 6P enclosure rated.
EFFECT OF AMBIENT LIGHT	Use of Dual Beam RED/IR Z-Pattern® provides automatic switch to Single Beam Detection Mode of Overheight Protection if the sun or other interference saturates one detector.
MAXIMUM RANGE	700 feet (213 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination.
DIRECTION SELECTION	Selection switch. No tools or adjustment required.
ALIGNMENT	Four LEDs and meter (GO-NOGO functions) provided for ease of alignment and testing.
REACTION SPEED	1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C).
ENVIRONMENTAL CONTROL	Internal thermostat with heater and fan controls air flow which reduces moisture and maintains internal temperature during cold weather.
HOUSINGS	External housing is heavy ALMAG casting and sheet aluminum (not less than 1/8 inch or .318 cm thickness) for rugged durability and extended life. Cabinet design minimizes effects of vandalism and provides rigid mounting. NEMA 3R Certified.
MOUNTING	The pole cap serves as a mounting bracket and sighting base with our poles, or a 3-Axis mount is available. See Options and Accessories section.
DIMENSIONS	Remote Cabinet: 12¾ x 16½ x 8½ inches (32 x 42 x 22 cm). Master Cabinet: 12¾ x 18¾ x 8½ inches (32 x 48 x 22 cm).
SHIPPING WEIGHT	60 lbs (27 kg).

208 East Mercury Boulevard, Hampton, Virginia 23669 Tel 757.851.8744 Fax 757.851.6588
7007 Willoughby Avenue, Los Angeles, California 90038 Tel 323.545.9390 Fax 323.545.9503

HOW ?

- Infrared beams are aligned across inbound lanes at a threshold height of 14 feet.
- Whenever threshold height is met or exceeded, an automatic alert of violation will be texted, emailed (w/5 sequential photos), and video archived.
- Additionally, downstream flashing beacons and warning message will automatically be activated.

Detection Concept



A = Overheight vehicle is detected by OVDS
B = Alarm bell triggered (NOT selected) upon detection
C = Warning sign activated upon detection

I-10 East Demo Site

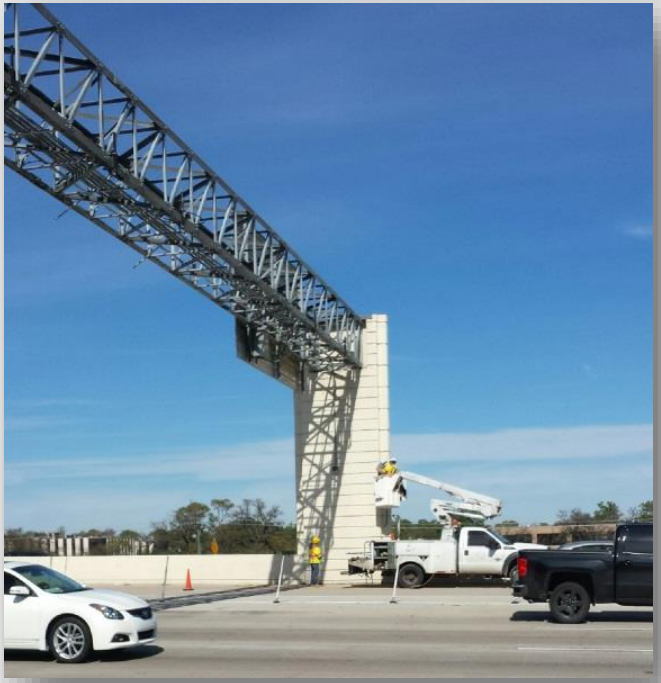
I-10 West Demo Site

OVDS Components

OVDS Components

Project Timeline

Installation: January 5, 2015



Pre-Deployment Testing: February 7-8

Final OVDS Performance Evaluation & Recommendations Report: August 31

Evaluation Goals

- Identify any technical concerns with the OVDS
- Document institutional lessons learned
- Document general characteristics of overheight vehicles
- Effectiveness of OVDS in diverting overheight vehicles
- Document any changes in bridge hits as a result of OVDS
- Cost effectiveness of the system.

Evaluation Process

- Collect Before and After data
  - Alarm emails
  - Video data at the interchange (> 10 days)
  - Video clips from OVDS Camera
  - Bridge hits data
  - OVDS Cost data
  - Modem logs for alarms

Action	I-10 West	I-10 East
Before Data	March 12	March 4
DMS Activation	April 15	April 7
After Data	April 16	April 8

Sample Violators – I-10 East

Sample Violators – I-10 West

General Characteristics - Overheight Vehicles

- Proportion in heavy vehicles per day
  - Average 0.5% at Mercury
  - Average 0.87% to 0.7% at Wirt
- At I-10 East (Mercury Site)
  - On average 18 to 23 alarms/day
  - 24 violations/avg. weekday
  - 15 violations/day on weekends.
- At I-10 West (Wirt Site)
  - On average 49 to 55 alarms/day at Wirt

Evaluation Findings - OVDS Operations

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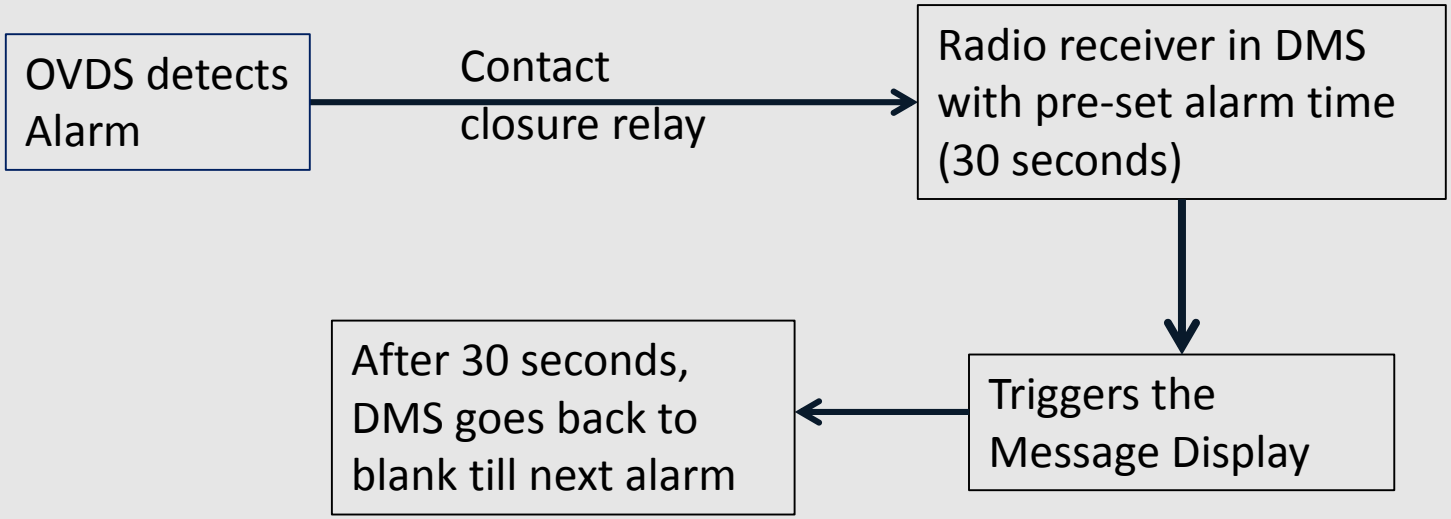
- 10-12 seconds of alarm state
- Doesn’t measure actual vehicle height

DMS Integration

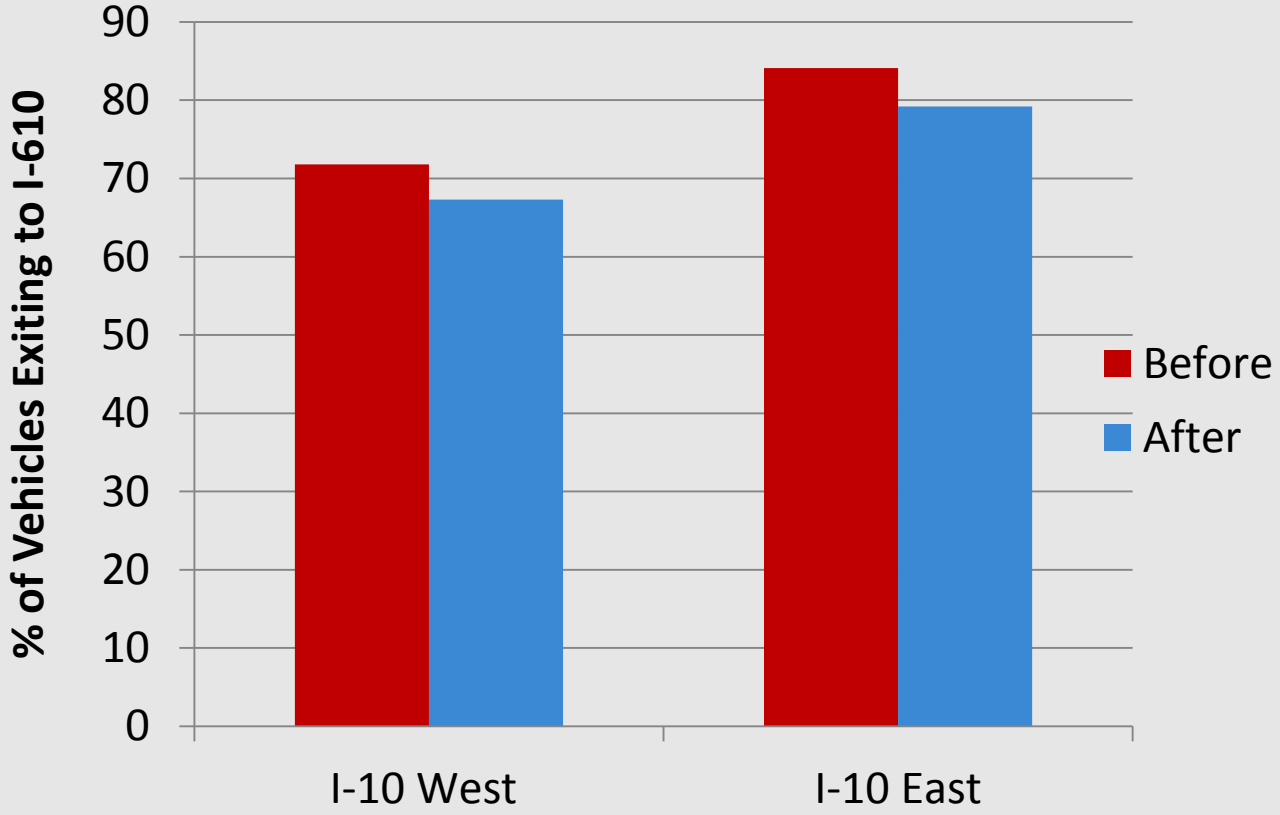


OVDS Findings - Institutional Lessons Learned

- Plan additional time and budget for procurement when procurement needs to be sole source, particularly when the product does not have standard/special specifications for reference and is not on the TxDOT QPL.
- Very important to know actual bridge clearance versus marked bridge clearance
  - reasonable threshold height
  - integration with an enforcement program.
- Cell communications in the urban areas
  - quite reliable
  - provide a convenient and less expensive way to deploy similar systems.

Effectiveness in Diverting Overheight Vehicles

- Increased ~5% at both sites
- Statistically significant at 90%, but not at 95% confidence level.



Bridge Hits Findings

- Bridge hits possibly detected at Mercury
  - Before period (April 7, 2014 thru July 28, 2014) -4
  - After period (April 7, 2015 thru July 28, 2015) -0

- Bridge hits possibly detected at Wirt
  - Before period (April 15, 2014 thru July 28, 2014) -2
  - After period (April 15, 2015 thru July 28, 2015) -1

- Overall Bridge hits in Houston District
  - Before period (April 7, 2014 thru July 28, 2014) -13
  - After period (April 7, 2015 thru July 28, 2015) -2

Cost Effectiveness of OVDS

- Costs - $135k per demo site for equipment, labor, and installation
- Average cost of bridge hit -$200k to $300k
- Savings of $65k to $165k
- B/C = 3.7 (low estimate) and =5.5 (high estimate)if we attribute the reduction in bridge hits solely to OVDS
- It is likely that overheight vehicle drivers have learned of the presence of OVDS and possibility of enforcement, therefore are paying more attention to their vehicle heights and bridge clearances resulting in fewer bridge hits in the After period.

Going Forward - Recommendations

- Develop a plan to integrate the OVDS system with an enforcement program including identification of any technical, funding, and legal impediments to the integration.
- Continue monitoring bridge hits in order to better document the benefits of the OVDS.
- Need to develop an updated and accurate bridge clearance inventory.
- Conduct a study to determine if OVDS should be deployed at other locations.

Contact

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