Systemic Approach to Wrong Way Driver Detection and Deterrence

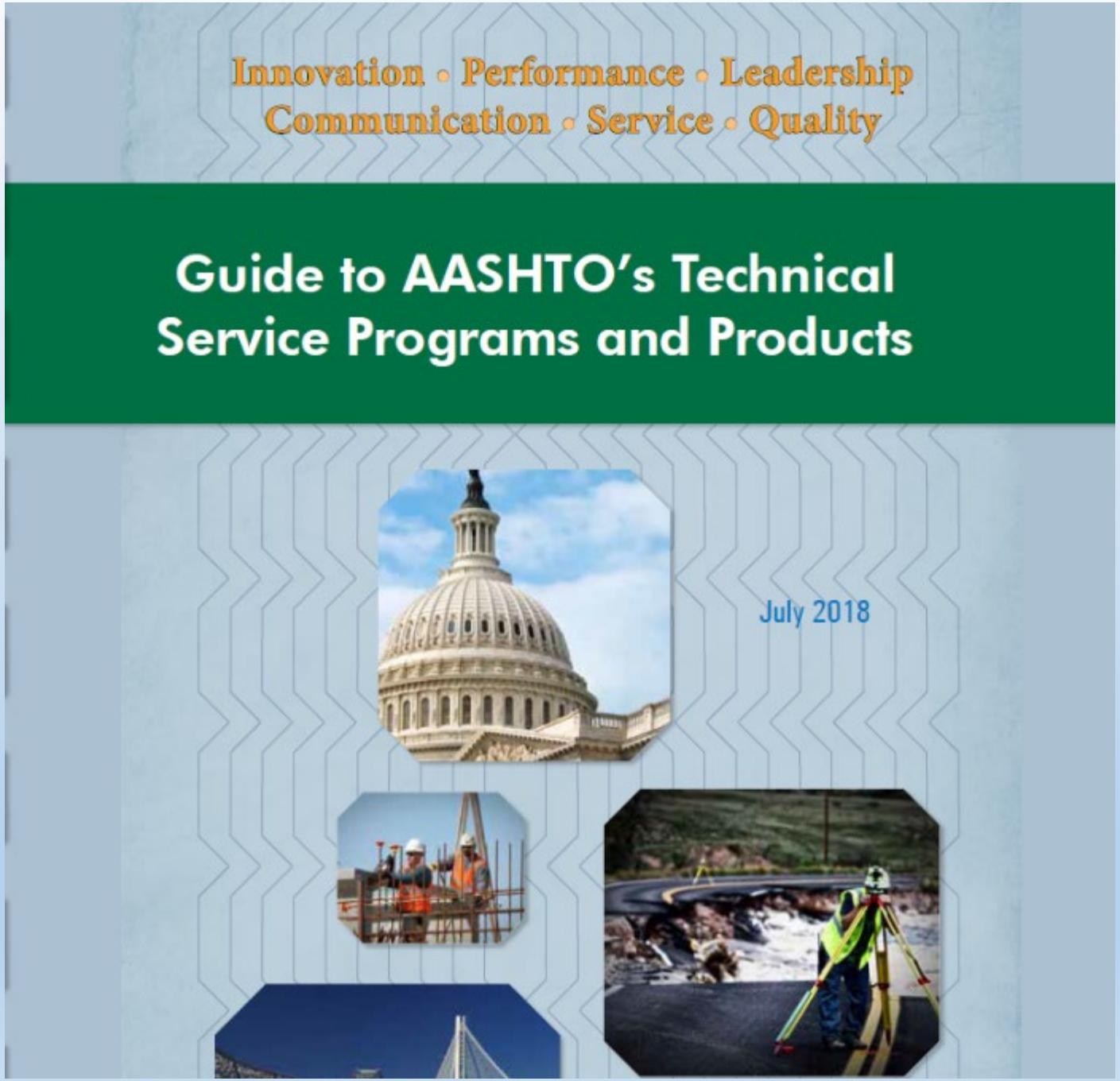
Zoom Meeting Platform User Information

- Participants are currently muted
- Question and Answer Session will follow presentations
- Use Chat function to ask questions
- The meeting is being recorded and will be shared on the AII website

AASHTO
Innovation Initiative

Agenda

1. Overview of AII Program
2. Speaker Introductions
3. Introduction and Overview to a Systemic Approach to Wrong Way Driver Detection and Deterrence
4. Florida Department of Transportation
5. California Department of Transportation
6. Iowa Department of Transportation
7. Michigan Department of Transportation
8. Question and Answer Session



AASHTO Innovation Initiative (A.I.I.)

AASHTO Re:source

AASHTOWare

National Transportation Product Evaluation Program (NTPEP)

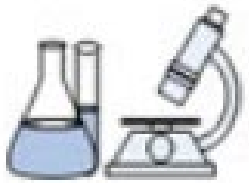
Development AASHTO Materials Specifications (DAMS)

All about All – *The AASHTO Innovation Initiative*

- Established in 1999 & Operating since 2000
- Previously called the *Technology Implementation Group (TIG)*
- Facilitate the implementation of **high-payoff**, **ready-to-use**, **innovative technologies**
  - Focus Technologies
  - Additionally Selected Technologies

Support the implementation of 100+ technologies since 2001

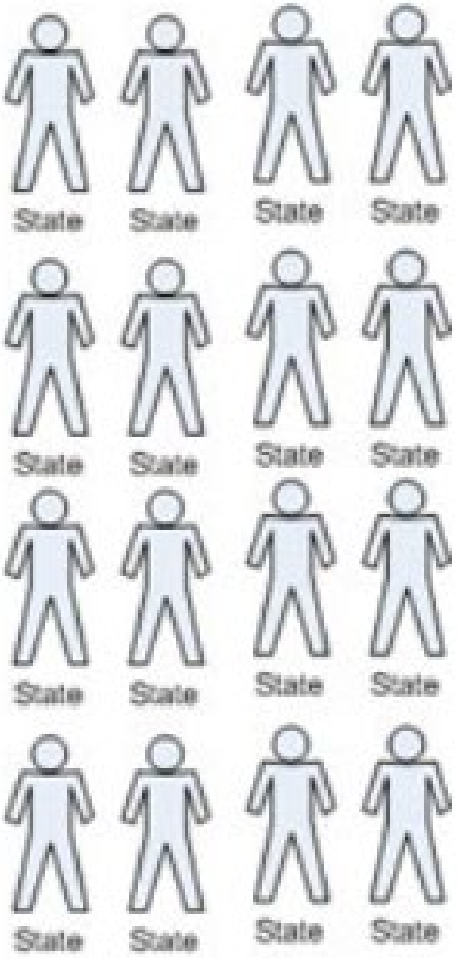
AII's Role in the Technology Lifecycle



Research

Lead States Pursue Practical Applications

AII



Industry Practice

Current Active Focus Technologies

- Saw Cut Vertical Curb
- Freight Operations eXchange
- Hydrogen Fuel Cell Technology
- Electrically Conductive Concrete Heated Pavement System
- Steel Press Brake Formed Tub Girder
- Improved Project Delivery Using GIS
- Wrong Way Driving Systemic Approach
- Laser Ablation Coating Remove
- Beam End Repair with Ultra High Performance Concrete

Focus Technologies

What is AII?

Formerly the AASHTO Technology Implementation Group, AII advances innovation from the grassroots up: by agencies, for agencies, peer-to-peer. More >>

Active Focus Technologies | **Previous Focus Technologies** | **Additional Technologies**

Nominate a Technology | **Contact Us**

Submit Your Nomination Today!

Active Lead States Teams Focus Technologies

- Saw Cut Vertical Curb
- Steel Press-Brake-Formed Tub Girder
- Beam End Repair Using Ultra-High Performance Concrete
- Improved Project Delivery with GIS & Surveying
- Laser Ablation Coating Removal
- Systemic Approach to Wrong Way Driver Safety
- Electrically Conductive Concrete (ECON) Heated Pavement System (HPS)

Resources

- Florida Wrong Way Driver Presentation (pdf)
- Caltrans Wrong Way Driver Presentation (pdf)
- Michigan Wrong Way Driver Presentation (pdf)
- Iowa Wrong Way Driver Presentation (pdf)
- Florida DOT Wrong Way Driving Webpage includes the following:
  - Statewide Wrong Way Crash Study (website)
  - A Data-Driven Approach to Implementing Wrong-way Driving
  - Strategies to Mitigate Wrong-way Driving Incidents on Arteria
  - Section 230.4 of the Florida Design Manual (Wrong Way Sign
  - Traffic Control Devices and Measures for Deterring Wrong-Wa
- Caltrans Wrong Way Pilot Projects Webpage (website)
- AASHTO Innovation Initiative Wrong Way Driver Detection Systems

aii.transportation.org

Expert Panel

Reno Giordano, WSP
Director, Advisory Services
Wrong Way Driver Webinar Facilitator

Raj Ponnaluri

John Slonaker

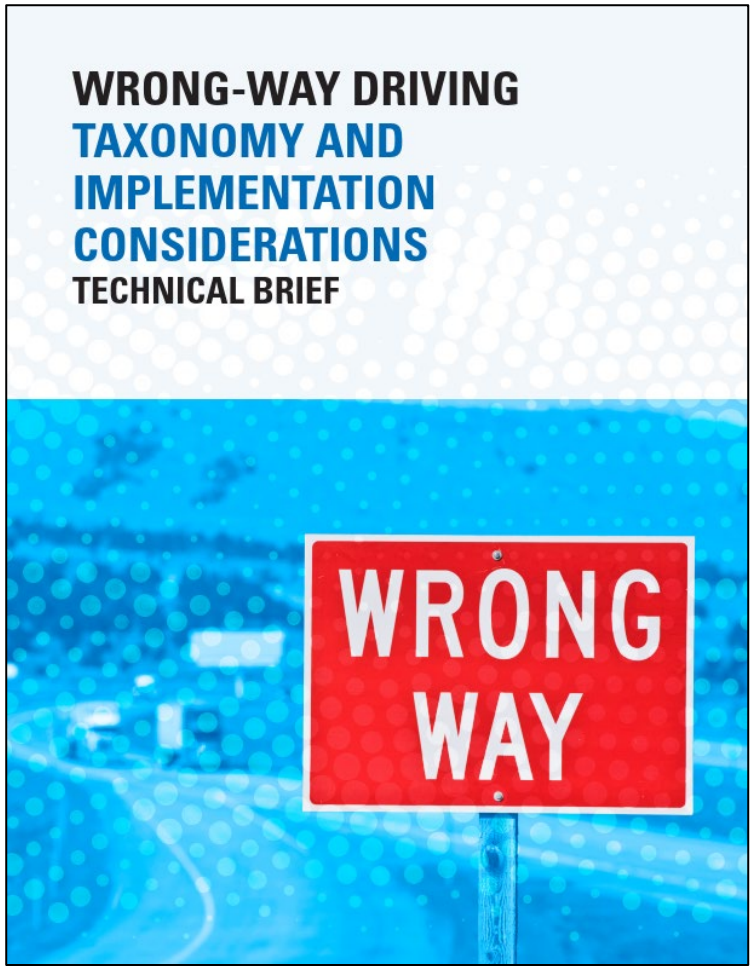
Willy Sorenson

Mark Bott

Participant Poll #1

Introduction and Overview to a Systemic Approach to Wrong Way Driver Detection and Deterrence

Previous AII Focus on Wrong Way Driving



Taxonomy	Definition
Detection and Surveillance	**Identification and monitoring of WWD event**
Fixed	***WW vehicle entry point detection***
Vehicle Identification	Method of initial detection/imaging
WWD Alert Trigger	Ability to alert for self-correction
TMC/Law Enforcement Trigger	Ability to alert TMC/law enforcement for awareness and countermeasure activation
Moving	***WW vehicle path monitoring***
Secondary Confirmation	Method of WWD confirmation
Tracking	Method of tracking path; trigger of other Traffic Control Devices (TCD)/ITS devices along path
Notification	**Message transmission to predetermined location(s)**
Communication Media	***Communication network options***
Alerts	***Notification alert characteristics***
Recipients	Alert recipients for countermeasure
Modes (e.g. email, text)	Method of alert
Additional ITS Device Activation	Automated actions tied to alert
Response/Countermeasure	**Actions taken by alert recipients**
Warning	***Method of driver information***
To the WW Driver	Method of information to WWD
To Correct-Way Drivers	Method of information to correct-way drivers
Broadcast	Amber alert type area broadcast
Interception	***Law enforcement action to stop WWD***
Enforcement/Control	***Use of methods to control potential upstream traffic***

The Problem

- 432 deaths annually on controlled-access highways (2010-2018)
- 20% increase over previously reported data (2004-2009)
- Though infrequent, resulting serious injuries and fatalities exact a high cost

What Do We Know?

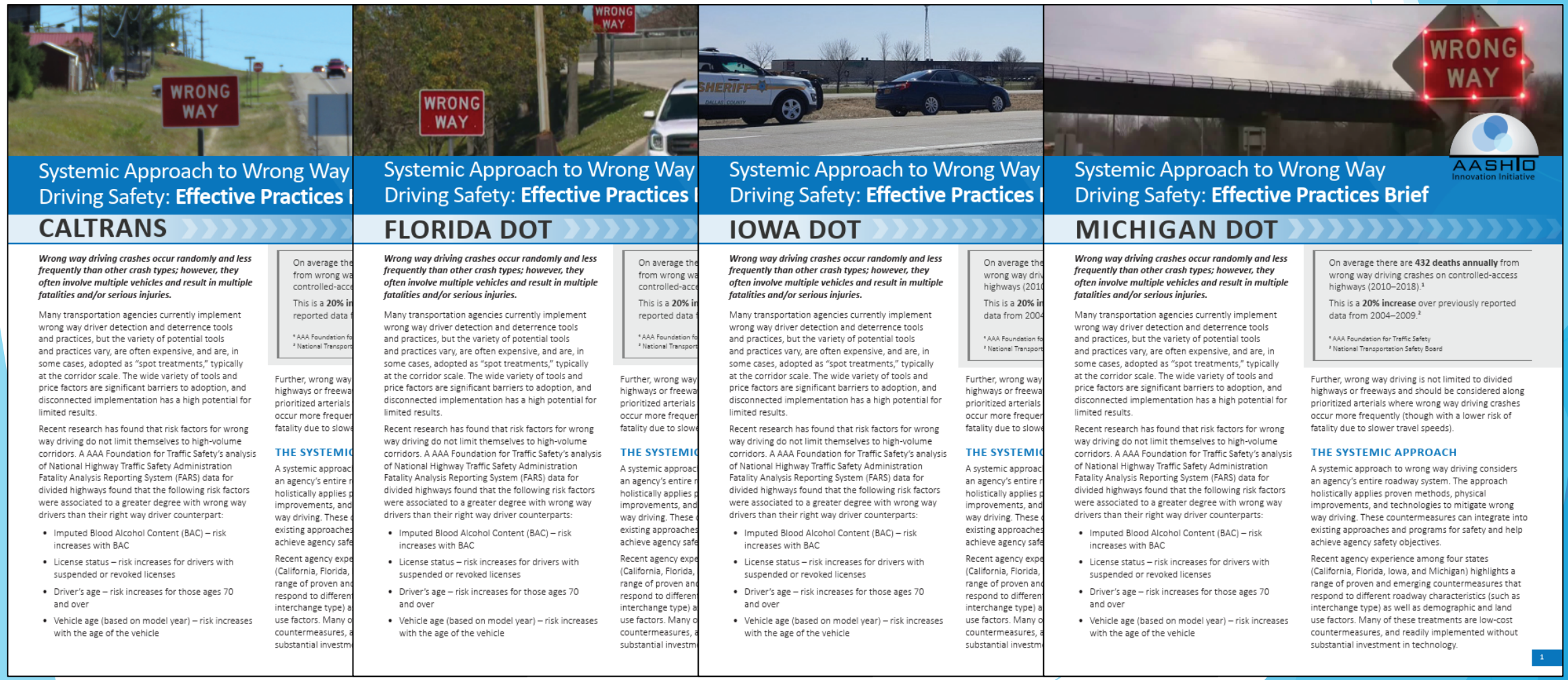
- Tools and practices vary around the country
- Often can be expensive
- Typically, corridor focused (spot treatments)
- Risk factors not limited to high-volume corridors
- Occurrences not limited to divided highways/freeways

The Systemic Approach

- Considers an agency's entire roadway system
- Holistically applies proven methods, physical improvements, and technologies
- Integrates with agency safety programs
- Implements a variety of low-cost countermeasures

Effective Practices Briefs

https://aii.transportation.org/Pages/Systemic-Approach-to-Wrong-Way-Driver-Safety.aspx

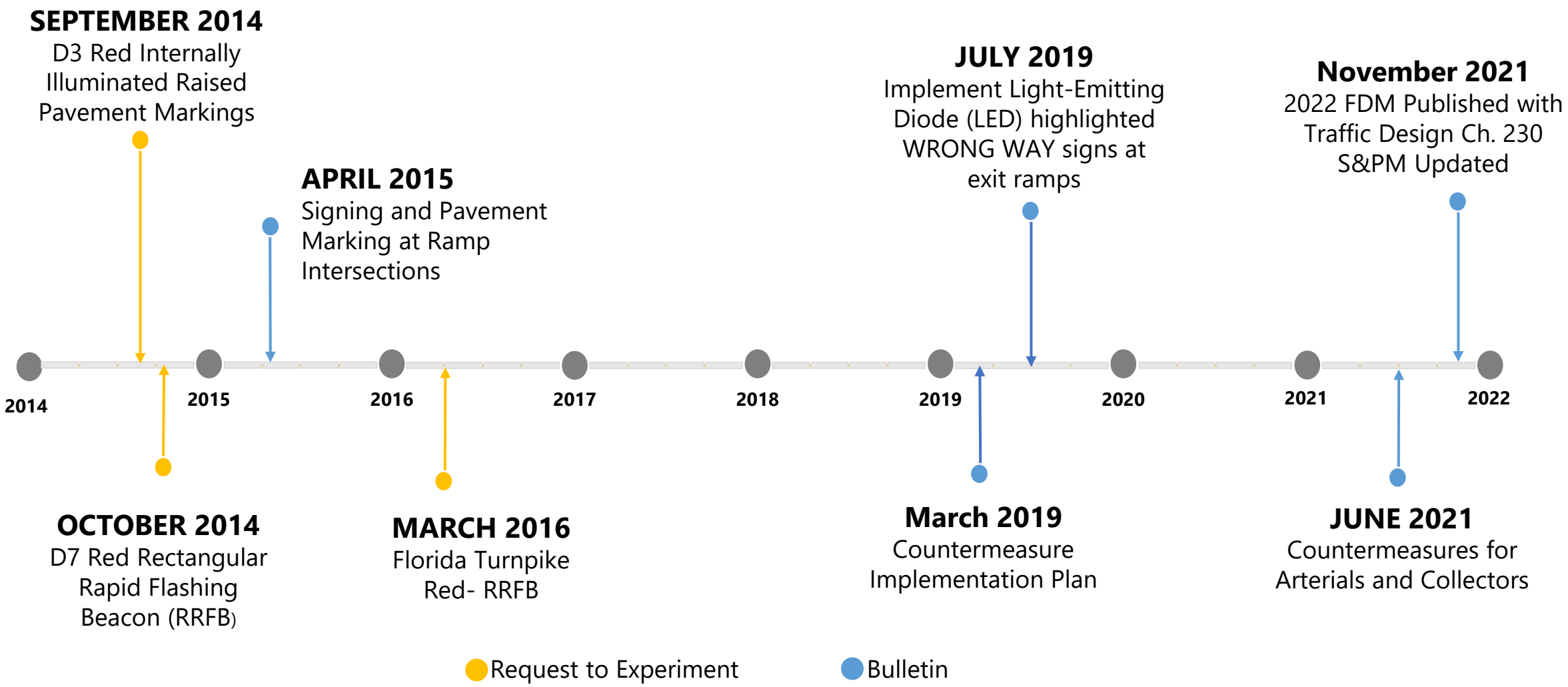


AASHTO Wrong-Way Driver Effective Practices Webinar

Raj Ponnaluri, PhD, PE, PTOE, PMP

June 22, 2023
Transportation Technology

FDOT's WWD Timeline & Initiatives

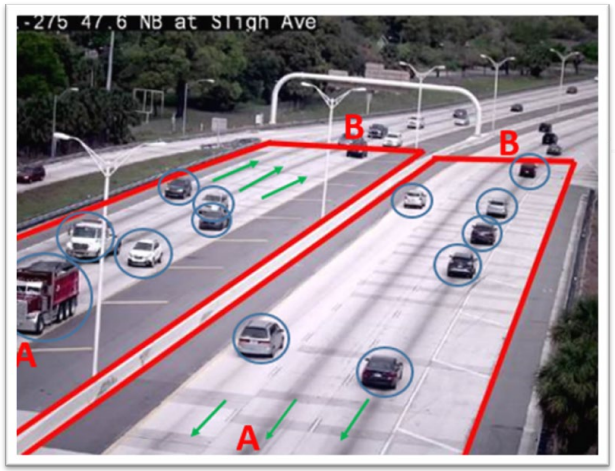


Crashes and Research

- 280 Statewide freeway wrong-way crashes (2009-2013)
  - 30% Property Damage Only (PDO)
  - 52% Injury
  - 18% Fatality

➢ Crash severity type trend has held over decade

- Research Studies
  - Statewide Wrong Way Driving Crash Study
  - Driving Simulator Studies on Human Factors
  - Comparing Seven Countermeasures
  - Testing and Evaluating Video Detection Systems for Freeway Mainlines
  - Data-Driven Approach for Identifying Hotspots
  - Strategies to Mitigate Wrong-Way Driving Incidents on Arterials

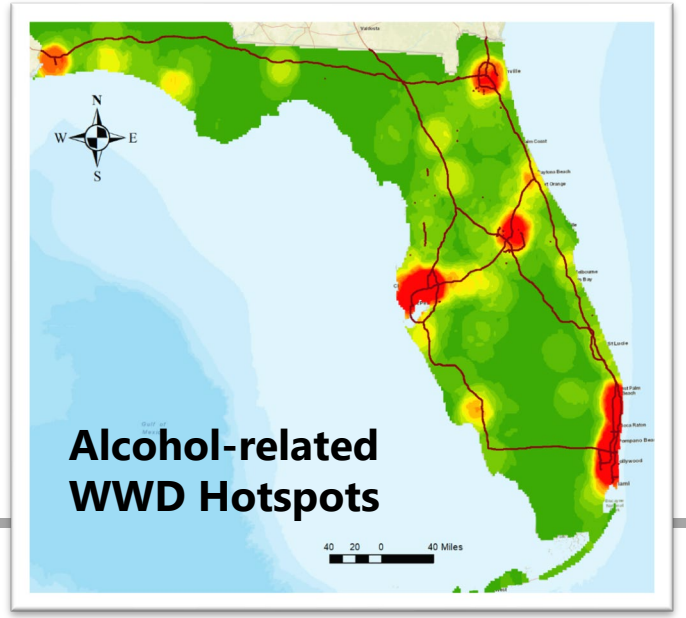


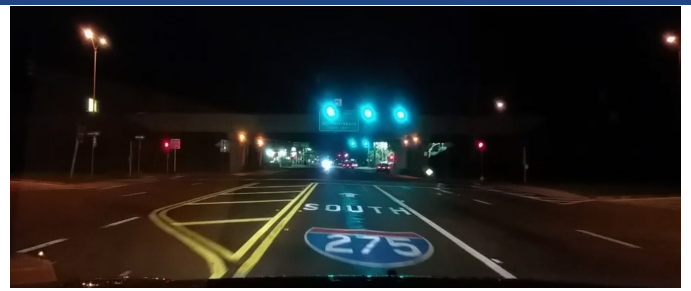
Mainline Video analysis

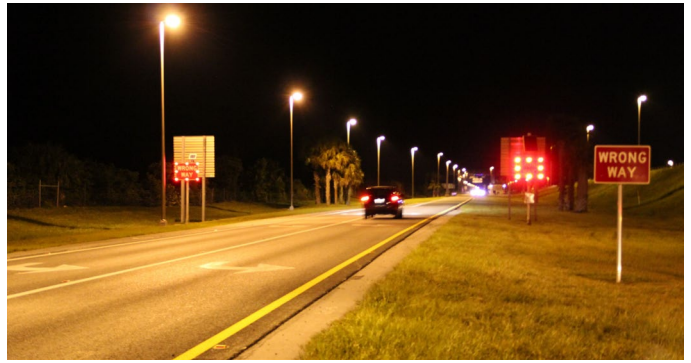
Research and Implementation

Hotspot Research Analysis for advanced countermeasures

- Identified exit ramps in Florida
- Demographic and land-use factors including:
  - Impaired Driving
  - Drivers > 65 years old
  - Tourist
  - Density of alcohol establishments
  - Density of Health care facilities



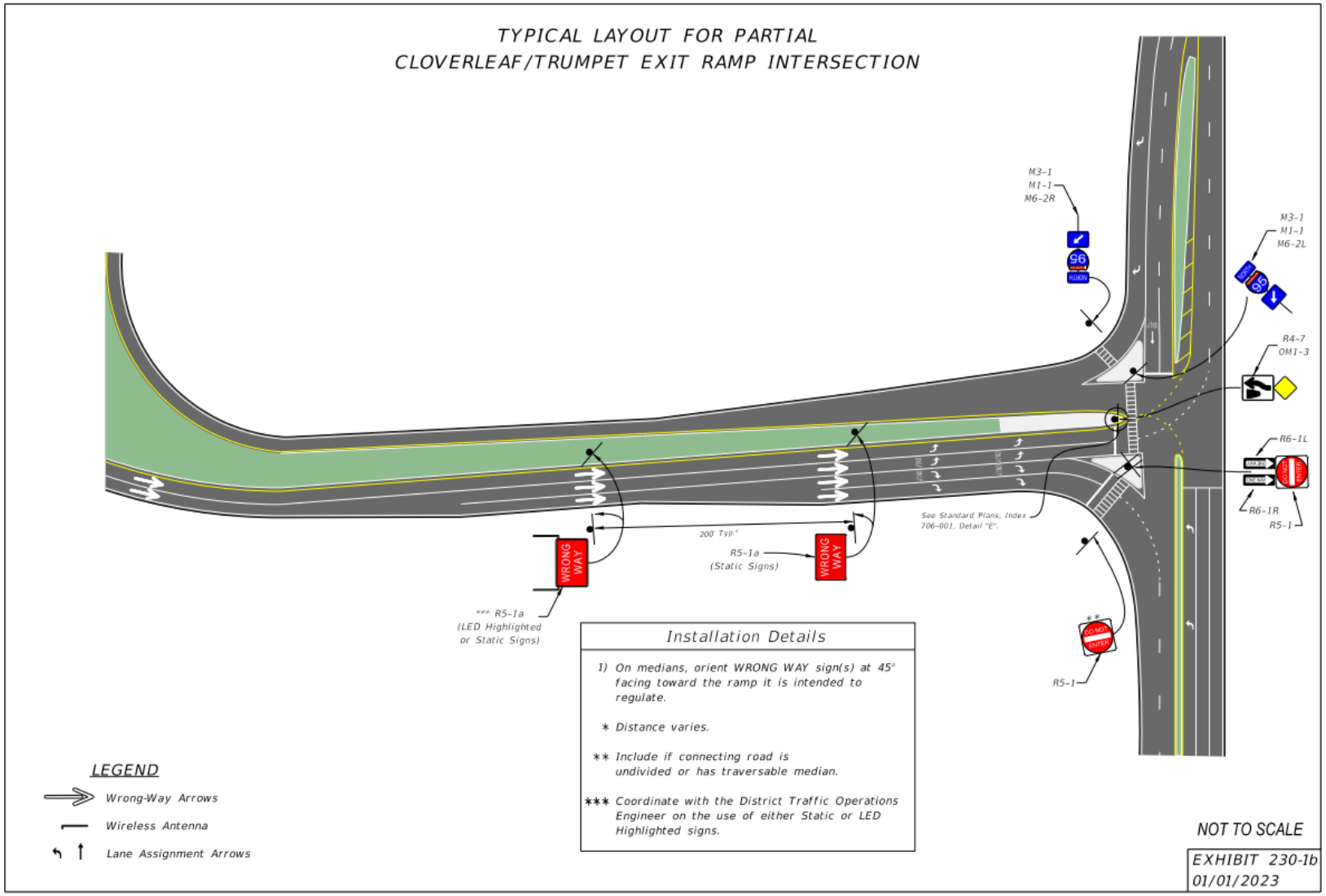




Countermeasures

Freeway

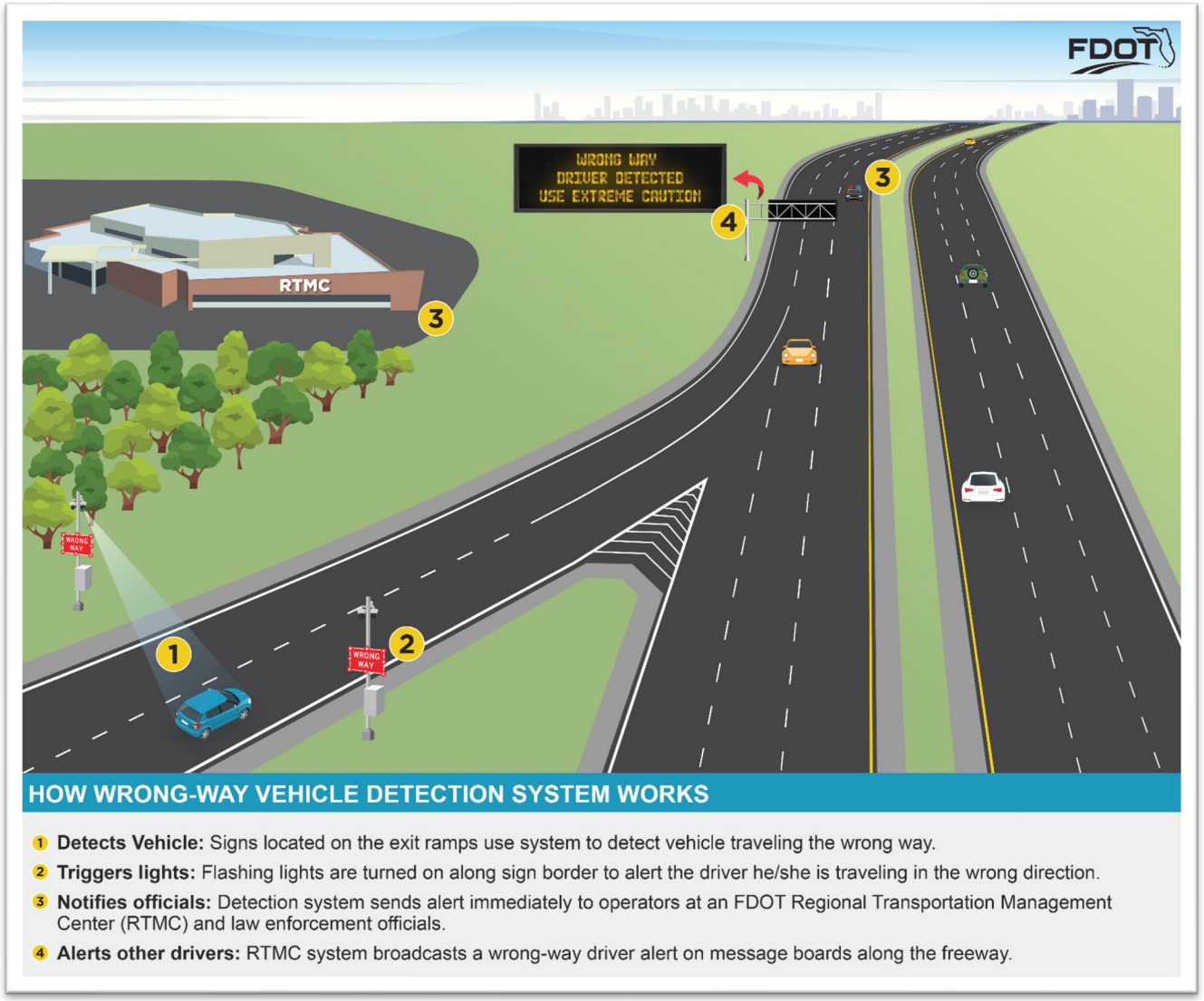
Signing and Pavement Marking (S&PM) Countermeasures Deployments –FDM 230.4



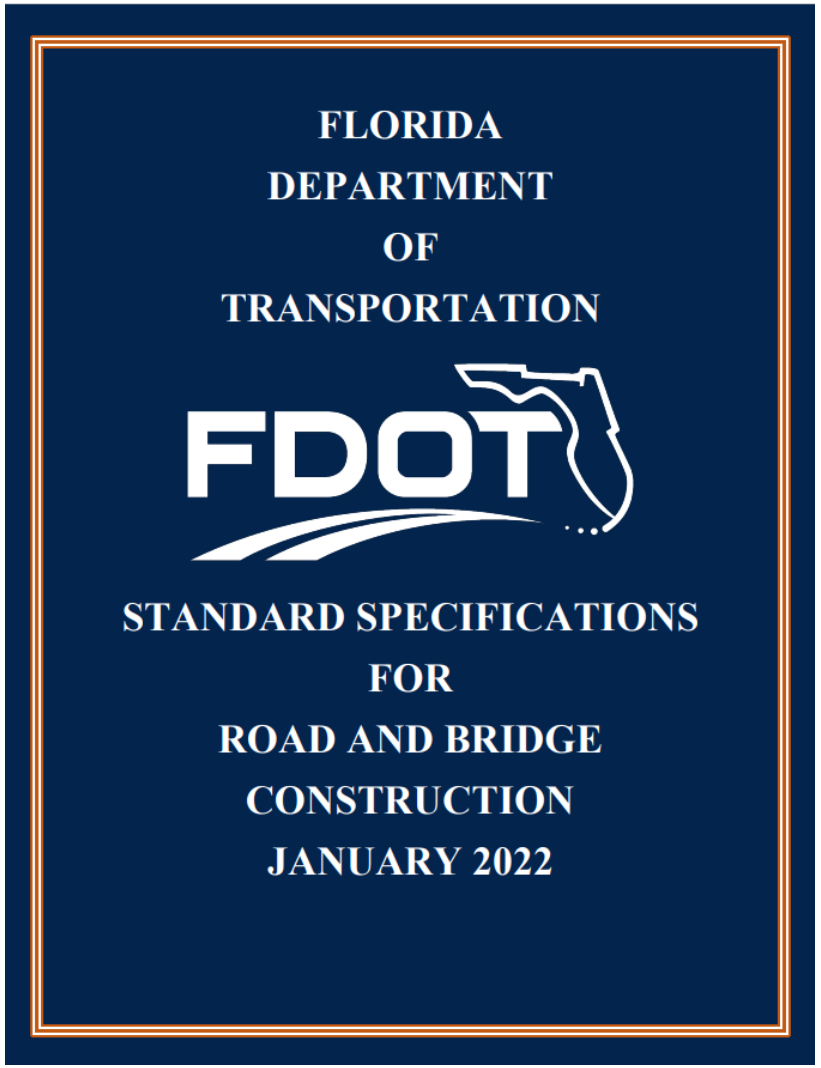
Wrong-Way Vehicle Detection System (WWVDS)

How Wrong-Way Vehicle Detection System Works

1. Detects Vehicle
2. Triggers Lights
3. Notifies Officials
4. RTMC Alerts Other Drivers



FDOT's Standard Specifications and Approved Product List



Wrong Way Vehicle Detection Systems fall in two specification sections and must meet all relevant subsections within **SECTION 660 VEHICLE DETECTION SYSTEM** and **SECTION 995 TRAFFIC CONTROL SIGNAL AND DEVICE MATERIALS** including **supplemental requirement, SR-995-2.7.2-01**.

- **Section 995-2.11: Wrong Way Vehicle (WWVDS) Detection System Performance**

Requirements:

"To verify conformance with the accuracy requirements in this Section and as a precondition for listing on the APL, the wrong way detection system will be evaluated at the FDOT Traffic Engineering Research Lab (TERL). Under controlled conditions at the TERL facility, the wrong way detection system must be capable of meeting the detection accuracy of 100% and zero false positive readings, using a sample size of 200 vehicles."

- **660-4.4 Wrong Way Vehicle (WWVDS) Detection System:**

"Submit a test plan for the field acceptance test (FAT) to the Engineer for approval. The test plan must include a detection accuracy test and false positive test for each location in the project. The Engineer reserves the right to witness all FATs."

Wrong Way Vehicle Detection System (WWVDS) Testing Resources

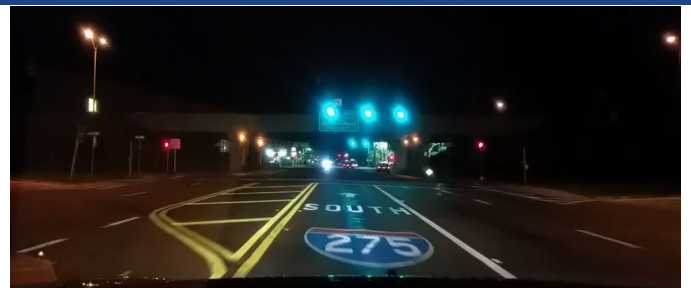
- WWVDS Standard Specifications
  - 2023 Standard Specification for Road and Bridge Construction
    - 660 Vehicle Detection System
      - 660-2.2.1.4 Wrong Way Vehicle Detection Systems
      - 660-3.7 Wrong Way Vehicle Detection Systems (WWVDS) Installation
      - 660-4.4 Wrong Way Vehicle (WWVDS) Detection System
    - 995 Traffic Control Signal and Device Materials
      - 995-2.7 Wrong Way Vehicle Detection Systems (WWVDS)
      - 995-2.7.1 Configuration and Management
      - 995-2.7.2 Communications
      - 995-2.7.3 Electrical Specifications
- WWVDS Product Compliance Matrix: CM-995-1.1-09 Rev 5.0
- Protocols to send WWD info to the SunGuide: Supplemental Requirements SR-995-2.1-01 Rev 2.0

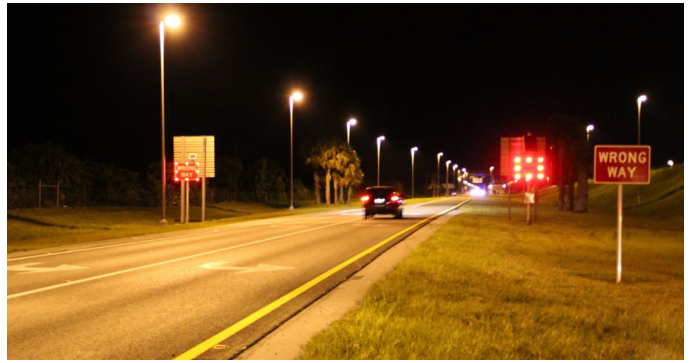
Standard Specifications	Product Compliance Matrix	Approved Products List	Supplemental Requirements

Common Features of WWVDS APL Products

- APL WWVDS has five (5) vendors and five (5) products as of 6/1/23
- Suppliers' product features:
  - AC or Solar Power
  - Thermal or Radar Detectors
  - Cameras for Verification
  - Alert System

Resource link:
https://fdotwp1.dot.state.fl.us/ApprovedProductList/ProductTypes/Index/317





Countermeasures

Arterials

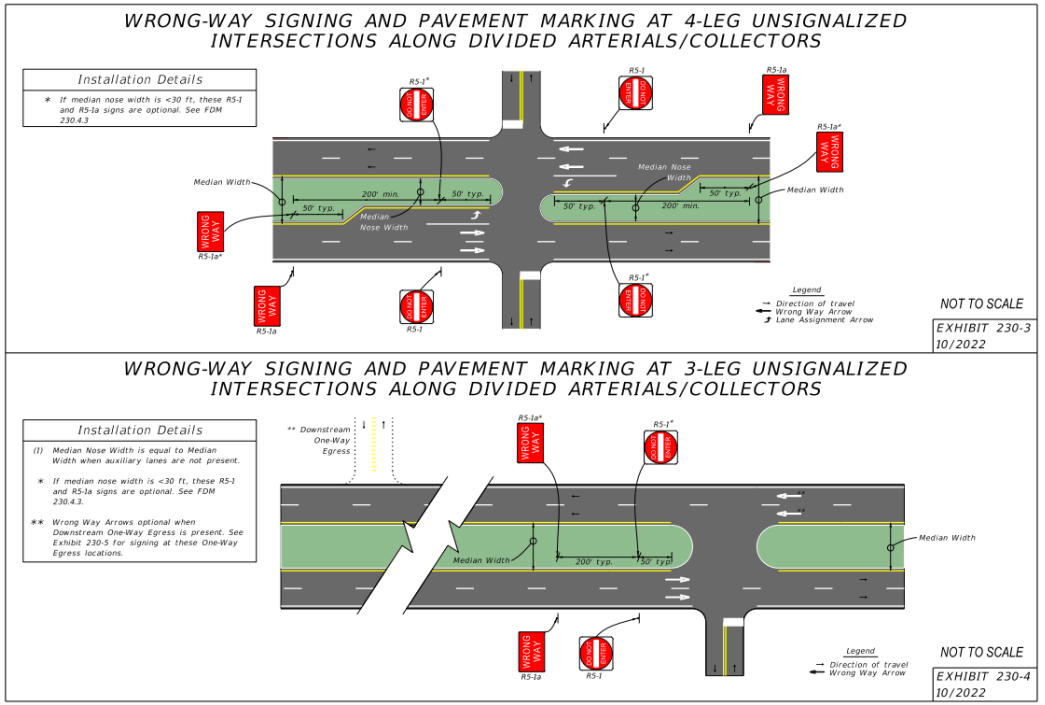
Arterial Design Guidance to Deter WWD

Summary of major changes to:

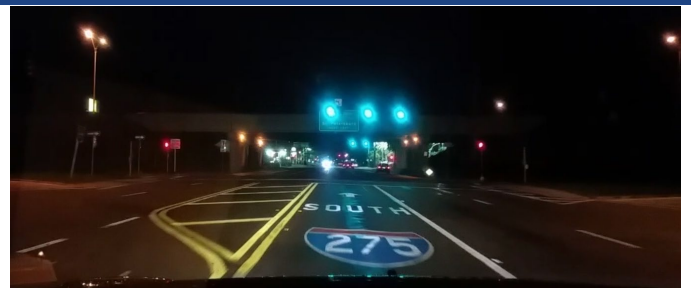
FDOT Design Manual (FDM) 230 Signing and Pavement Marking

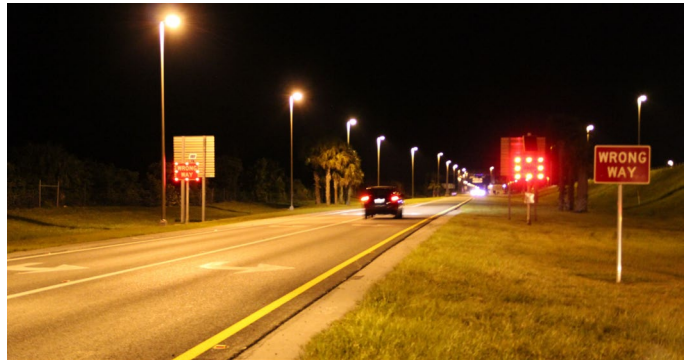
- FDM 230.4: Converted to **Wrong-Way Signs and Pavement Markings**

230.4.3 **Divided Arterials and Collectors**	230.4.4 **One-Way Pairs and Divided Arterials/Collectors with One-Way Egress**
230.4.5 **Undivided One-Way Streets**	230.4.6 **Two-Way Signalized Intersections**



Link: https://www.fdot.gov/roadway/fdm/default.shtm



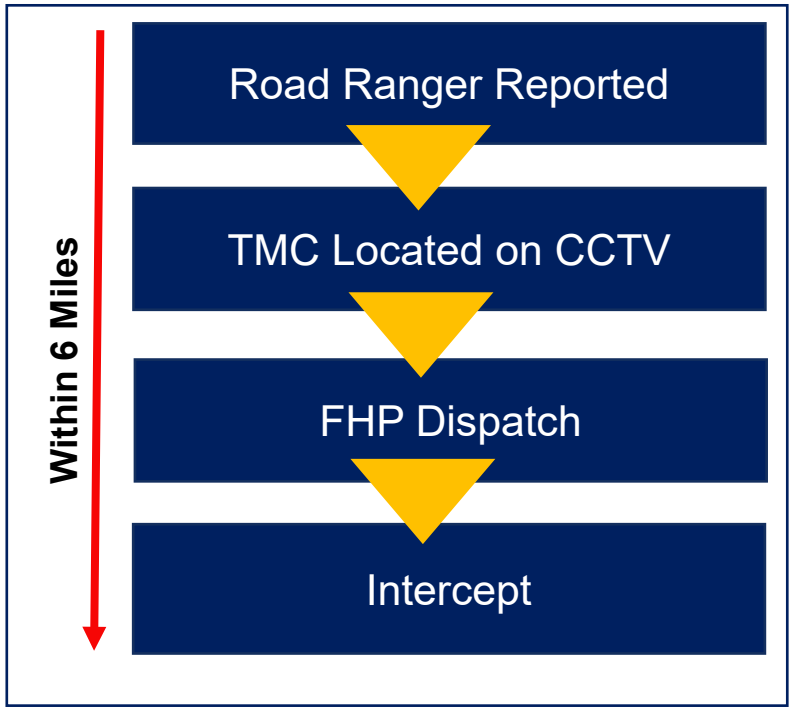


Countermeasures

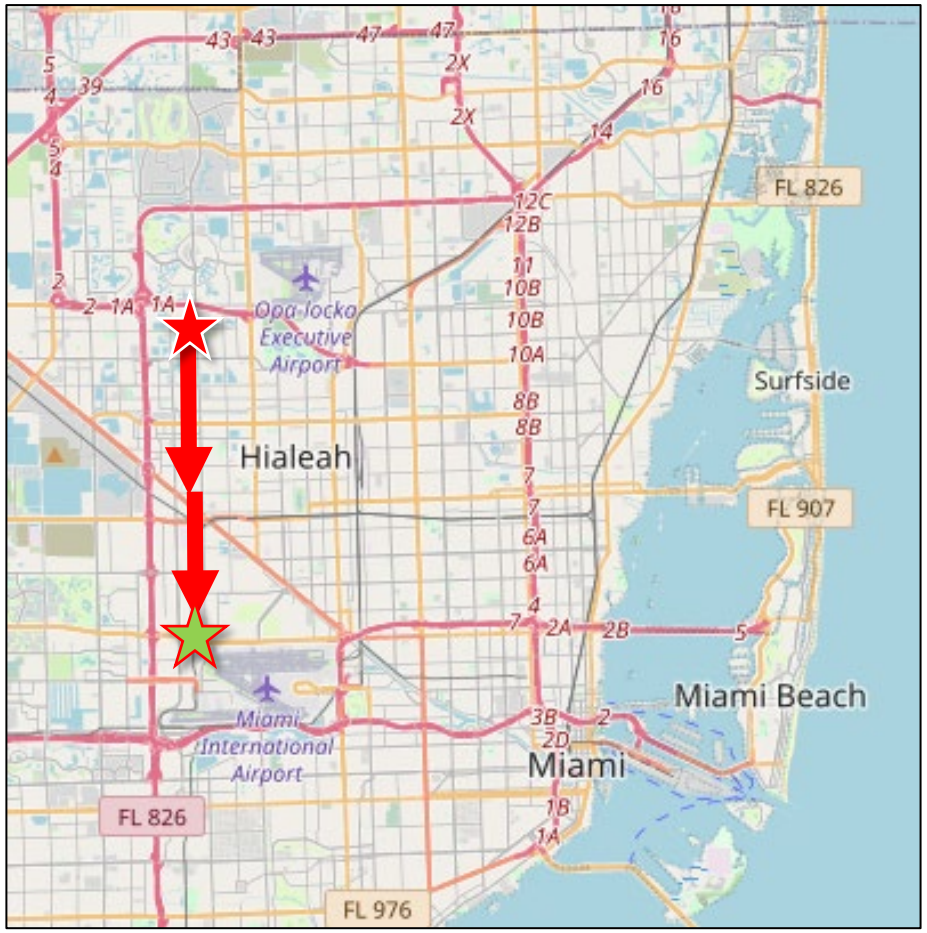
Success Story

Success Story

Wrong-Way Driver Stopped by Florida Highway Patrol (FHP)



No incident or crashes due to interception!



RR and TMC Detected WWD Vehicle
FHP Stopped Vehicle
Wrong-way Direction

Thank You!


WRONG WAY
DRIVER REPORTED
USE EXTREME CAUTION


FLORIDA
ARRIVE ALIVE
THIS SUMMER
flhsmv.gov/SafeSummerTravel
FLHSMV

DRISI

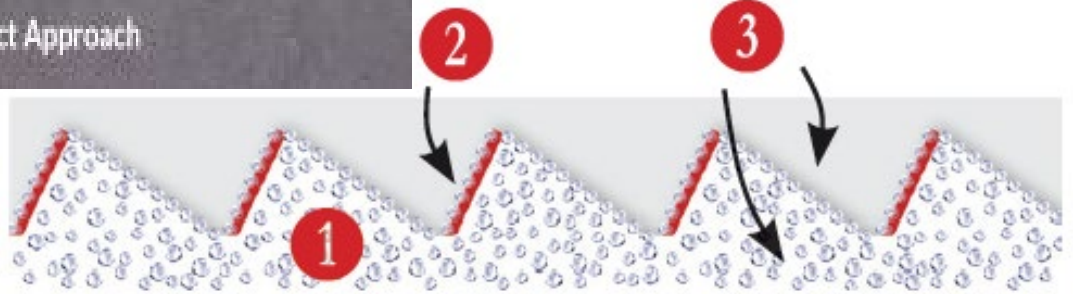
CALTRANS DIVISION OF RESEARCH, INNOVATION, AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

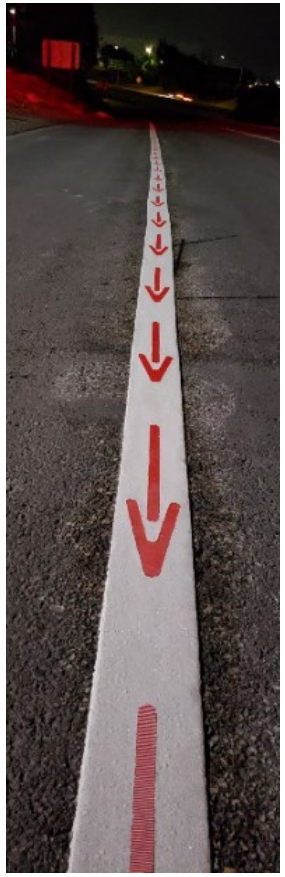
Developing Engineering Countermeasures for Wrong Way Driving

Bidirectional pavement markings

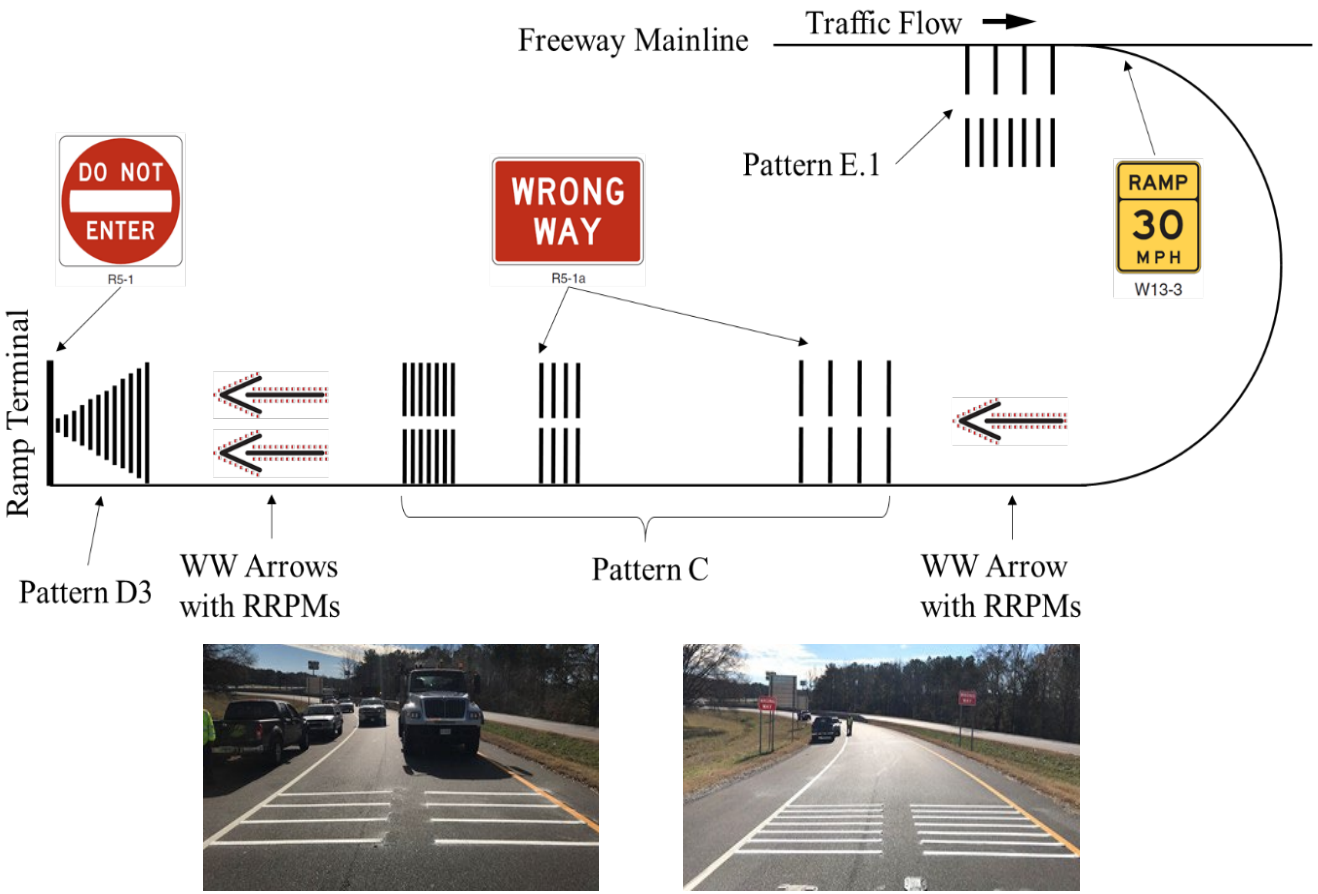
1. Bi-angular profile produces unidirectional messaging
2. Pigmented coating provides high contrast visibility for messaging
3. Base color coated with glass beads for high visibility



Bidirectional pavement markings

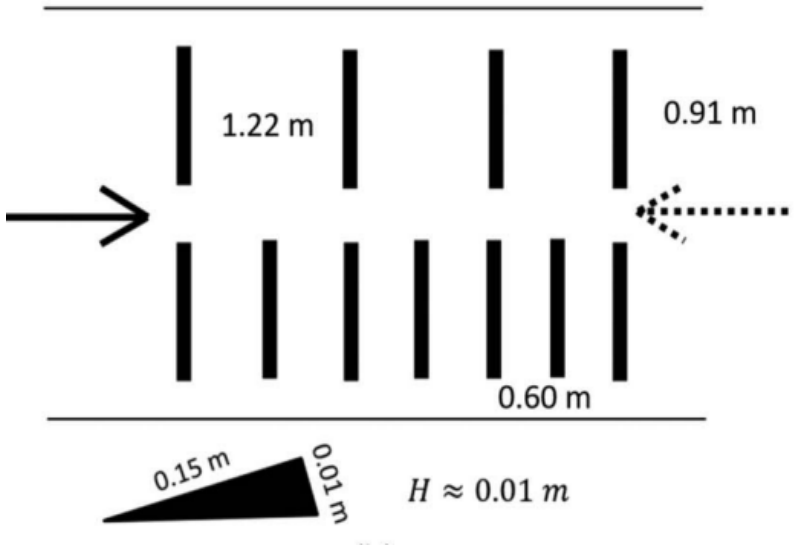


Directional rumble strips

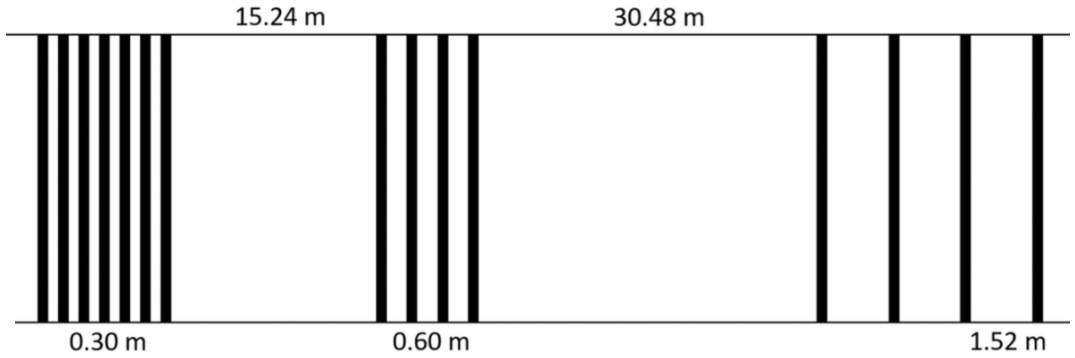


Directional rumble strips

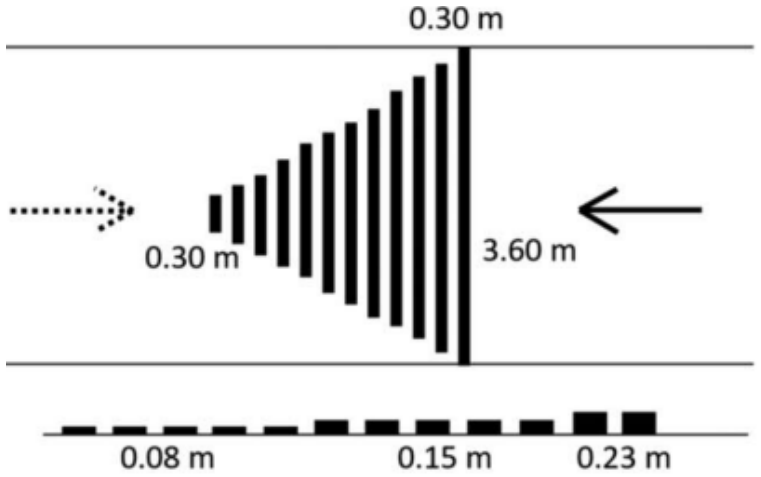
Pattern E.1



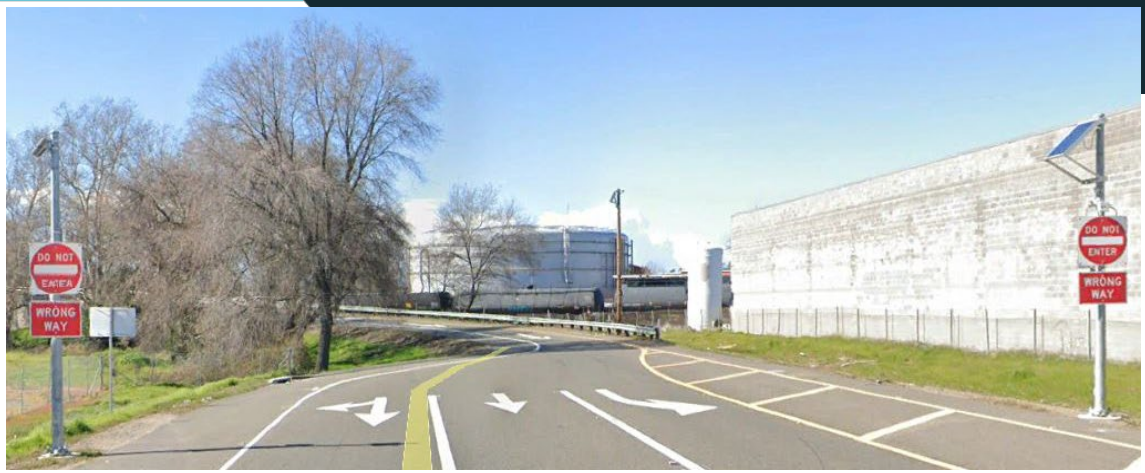
Pattern C



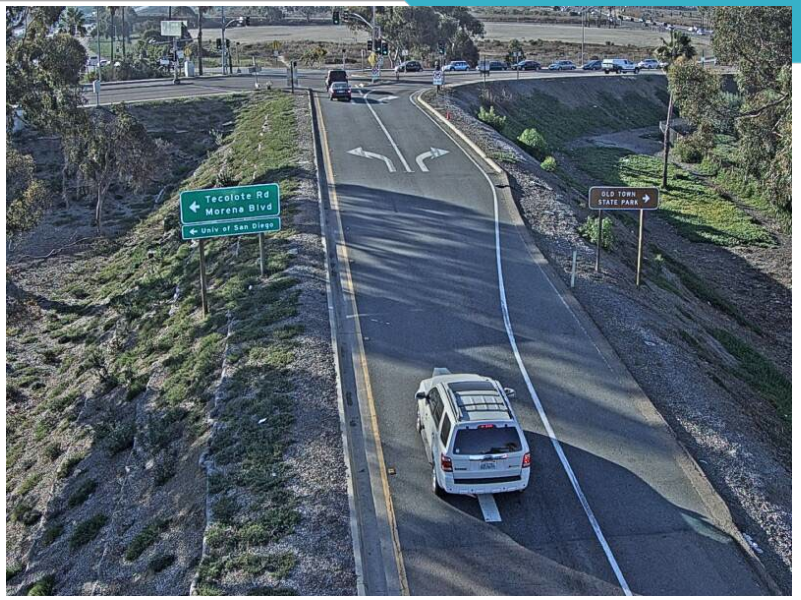
Pattern D3



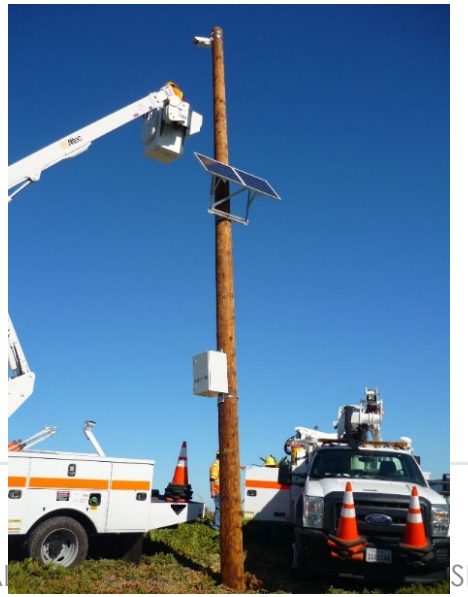
TraffiCalm systems on San Diego exit ramps

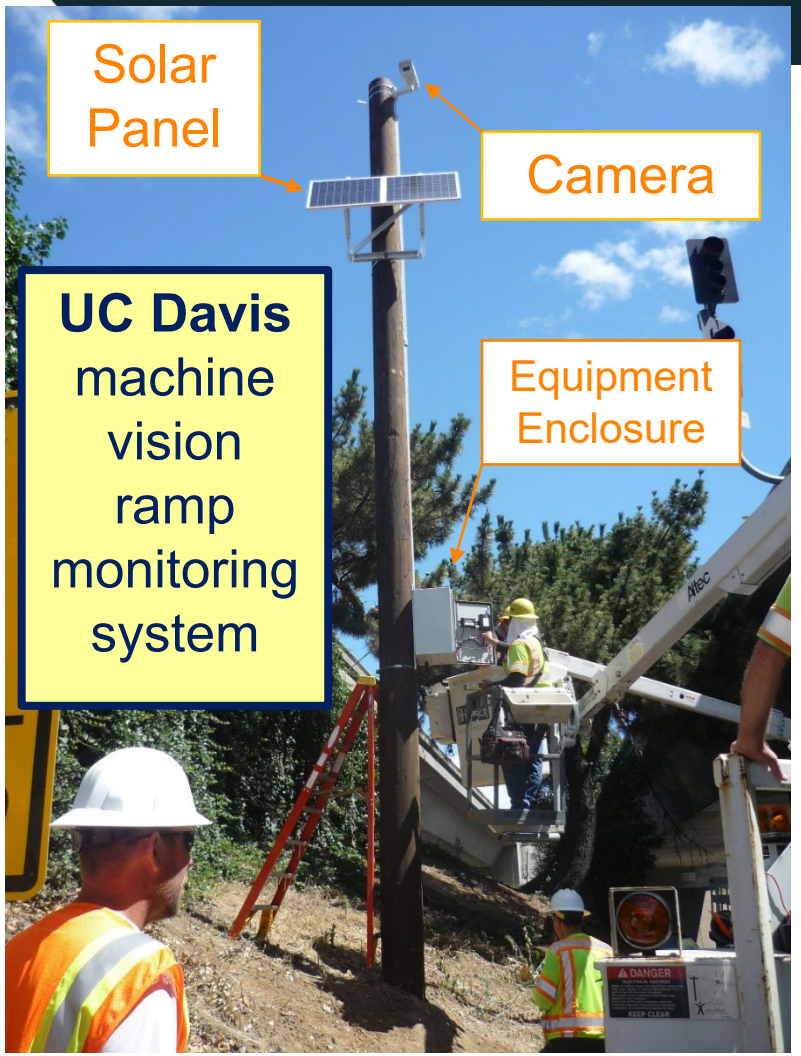


TAPCO systems on Sacramento exit ramps



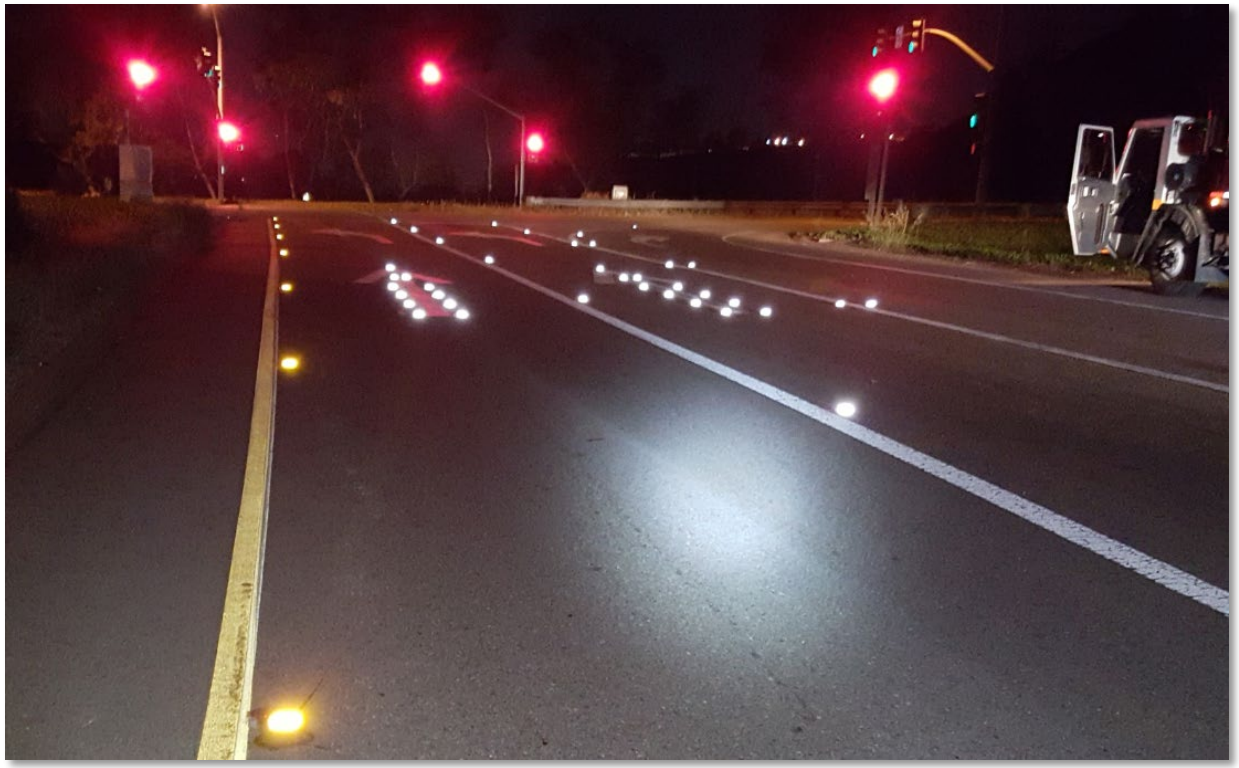
UC Davis systems and their views of the San Diego exit ramps



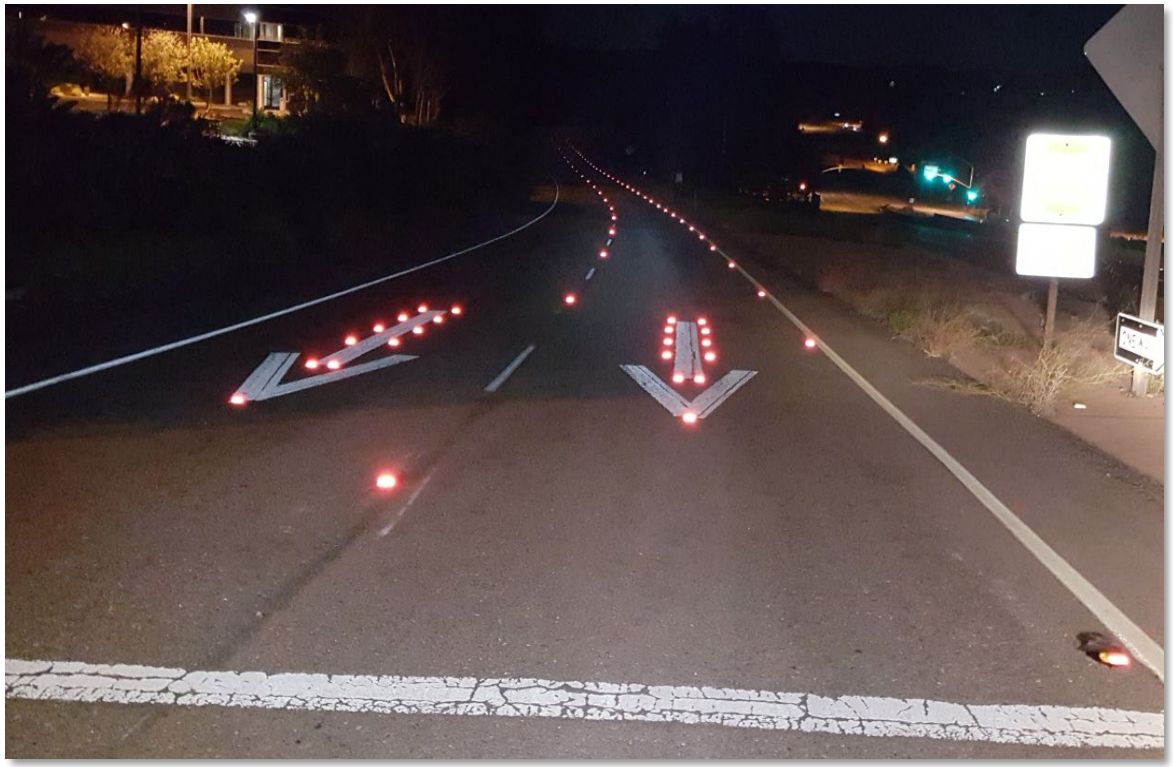


Two-Way Retro-Reflective Pavement Markers

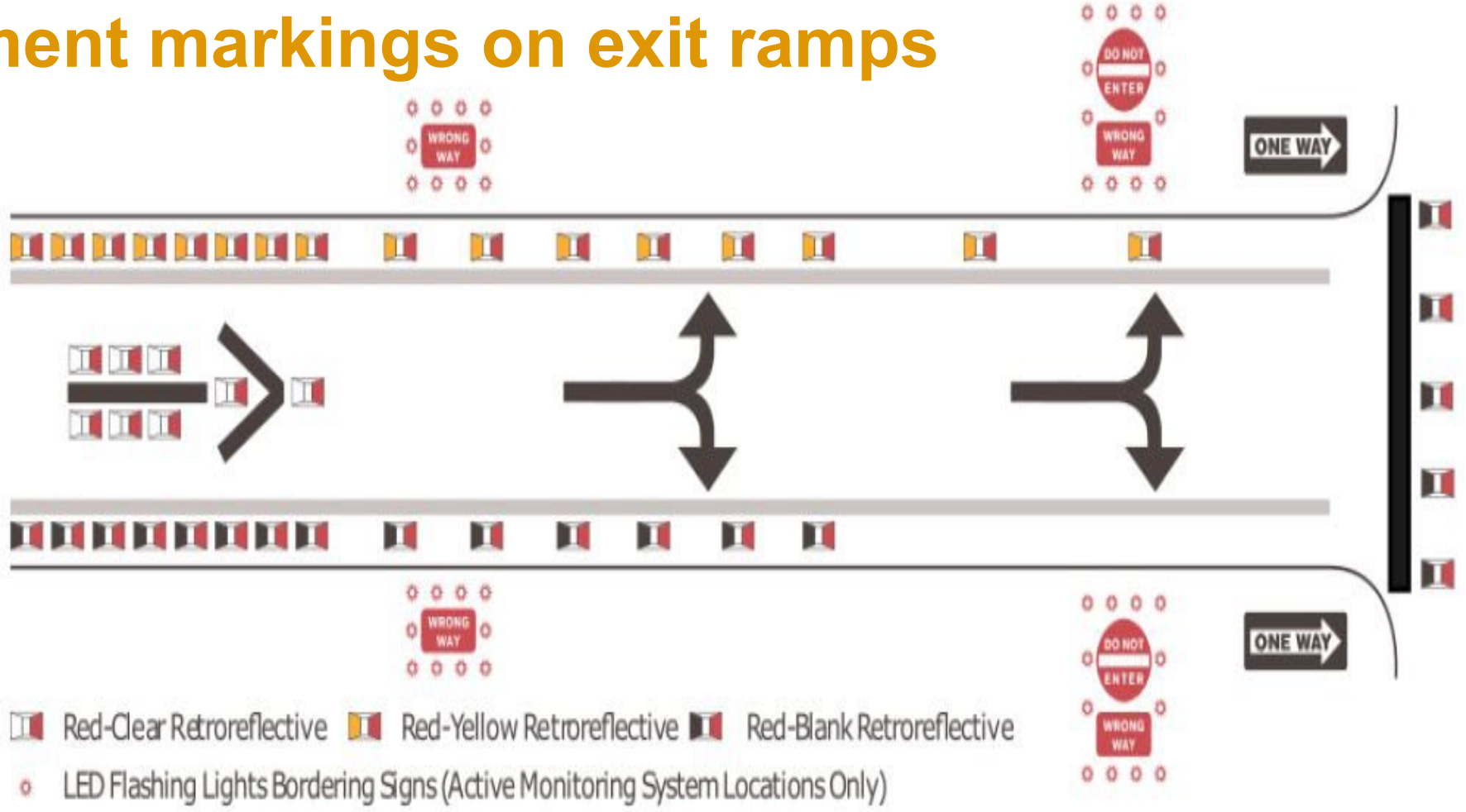
Right-Way Driver View



Wrong-Way Driver View



Additional retroreflective raised pavement markings on exit ramps



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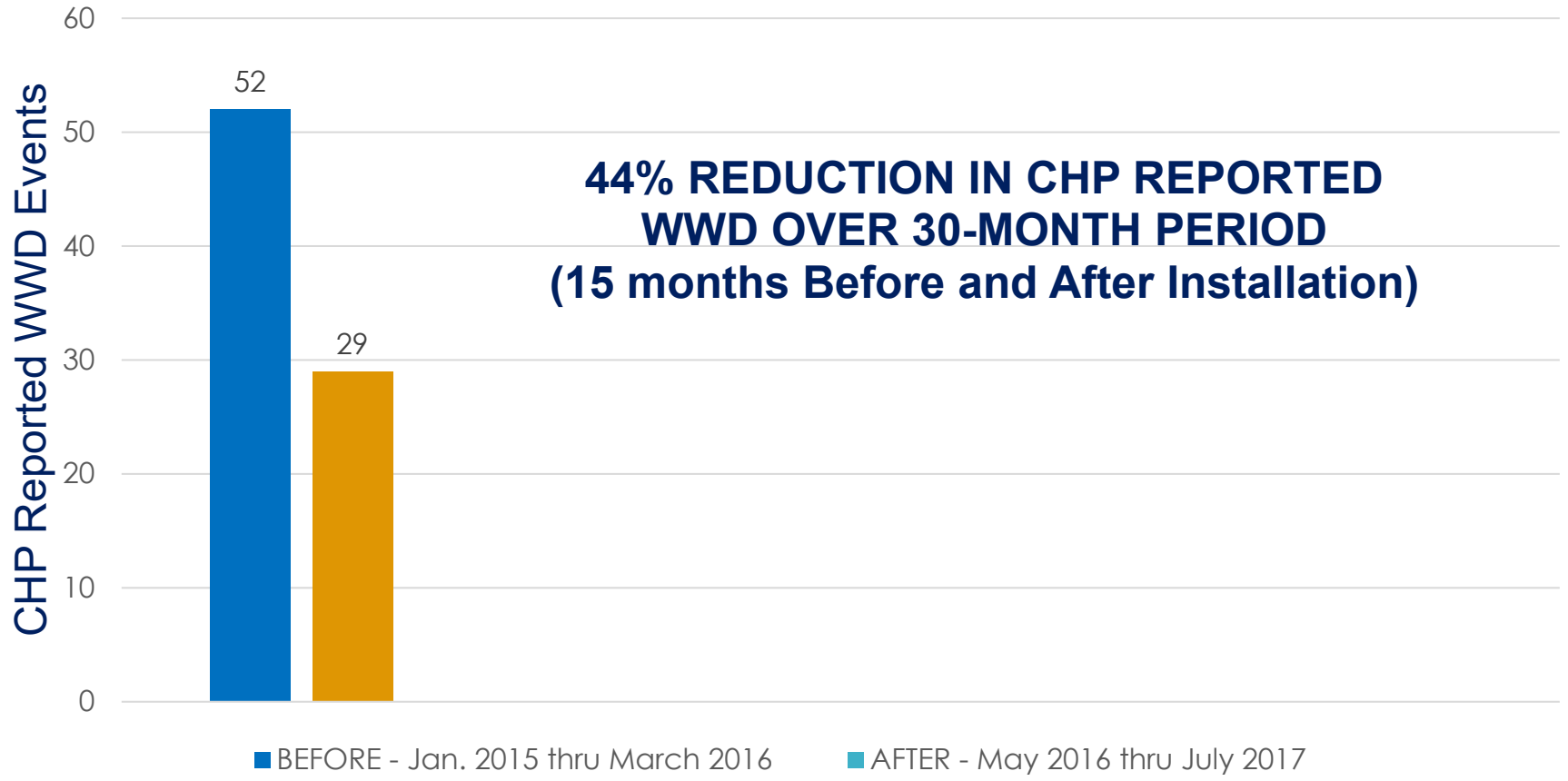

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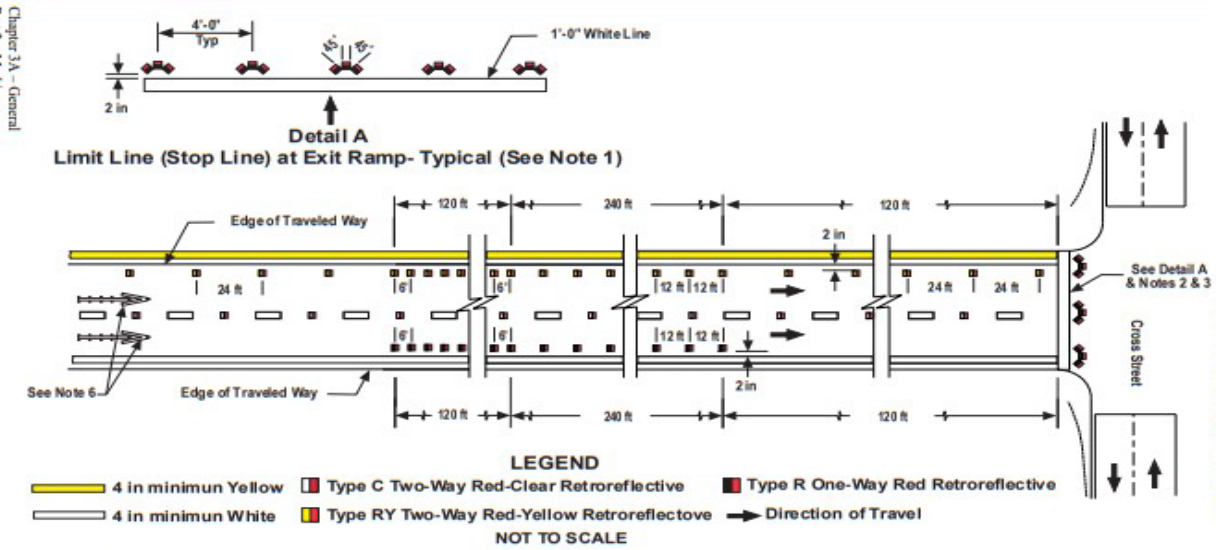
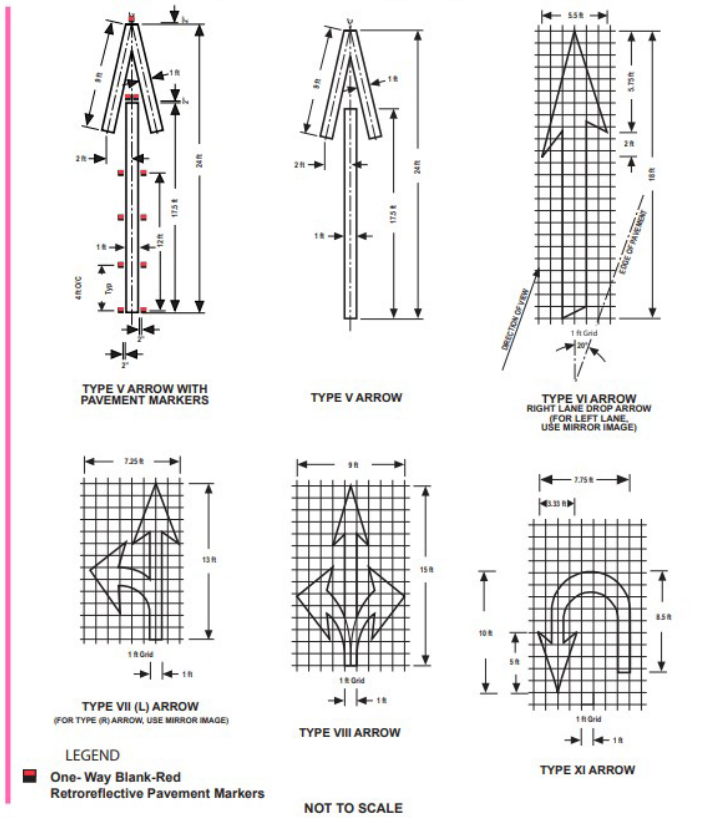


NOTES:

1. May be a limit line or crosswalk.
2. Place Type R one-way red retroreflective markers on outermost limit line or crosswalk line with red facing the intersection.
3. If there is crosswalk at the end of the exit ramp, place Type R markers in front of the first line for wrong way vehicle that travels up the ramp with the red reflective side facing the intersection.
4. The distances and marker spacings may be adjusted based on site specific conditions or exit ramp geometry.
5. The layout shown is a typical detail of an exit ramp, see Figure 3B-24 of the CA MUTCD for exit ramp configuration and arrow placement and spacing.
6. See Figure 3B-24 for Type V arrow detail with Type R one-way red retroreflective markers

Figure 3A-114 (CA). Exit Ramp with Enhanced Pavement Markers for Wrong Way Details

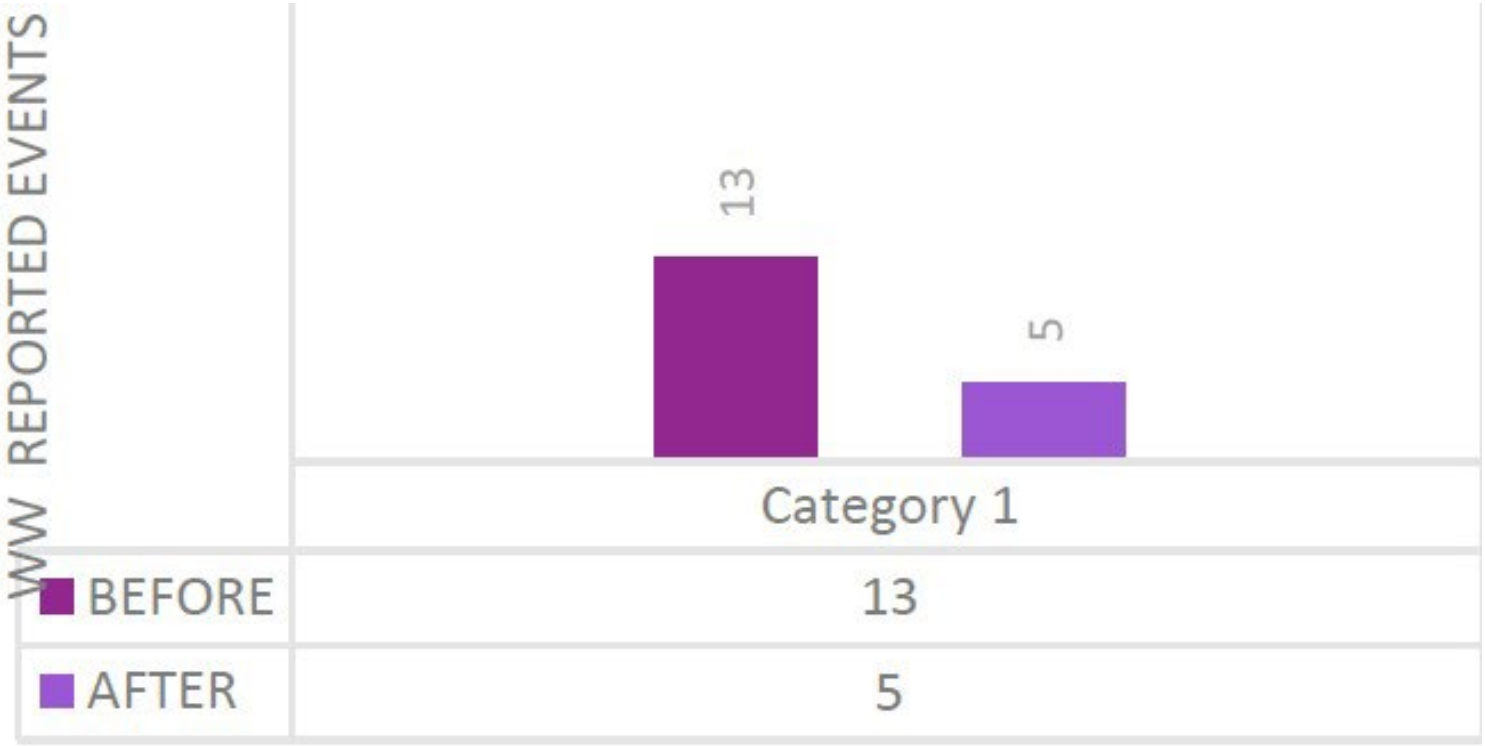
Figure 3B-24 (CA). Examples of Standard Arrows for Pavement Markings (Sheet 2 of 8)



NOTE: The design details for various arrows are also shown in Department of Transportation's Standard Plans.

Additional retroreflective raised pavement markings on exit ramps

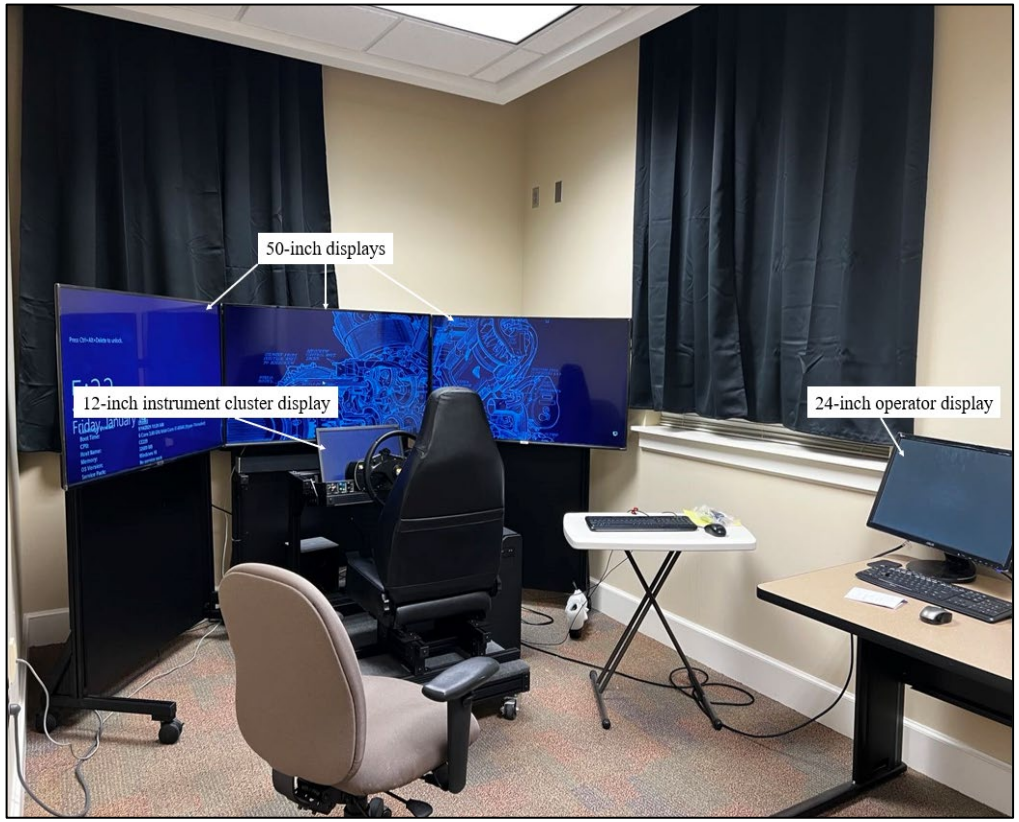
LED-illuminated flashing border WRONG WAY signs



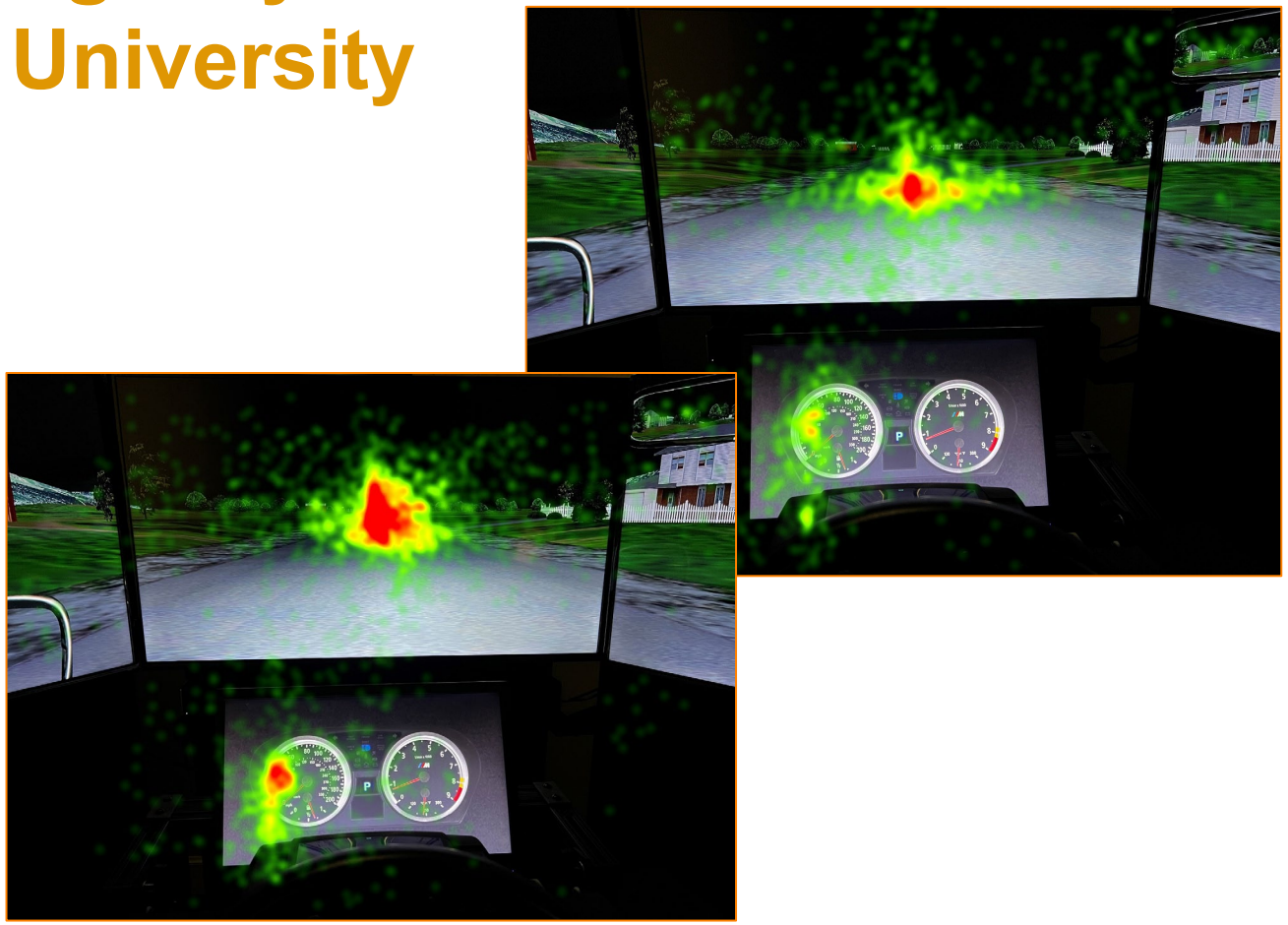
CATEGORY 1
60% REDUCTION IN REPORTED WRONG WAY EVENTS
LED ILLUMINATED SIGNS

Caltrans-sponsored Wrong Way Driving study at Auburn University

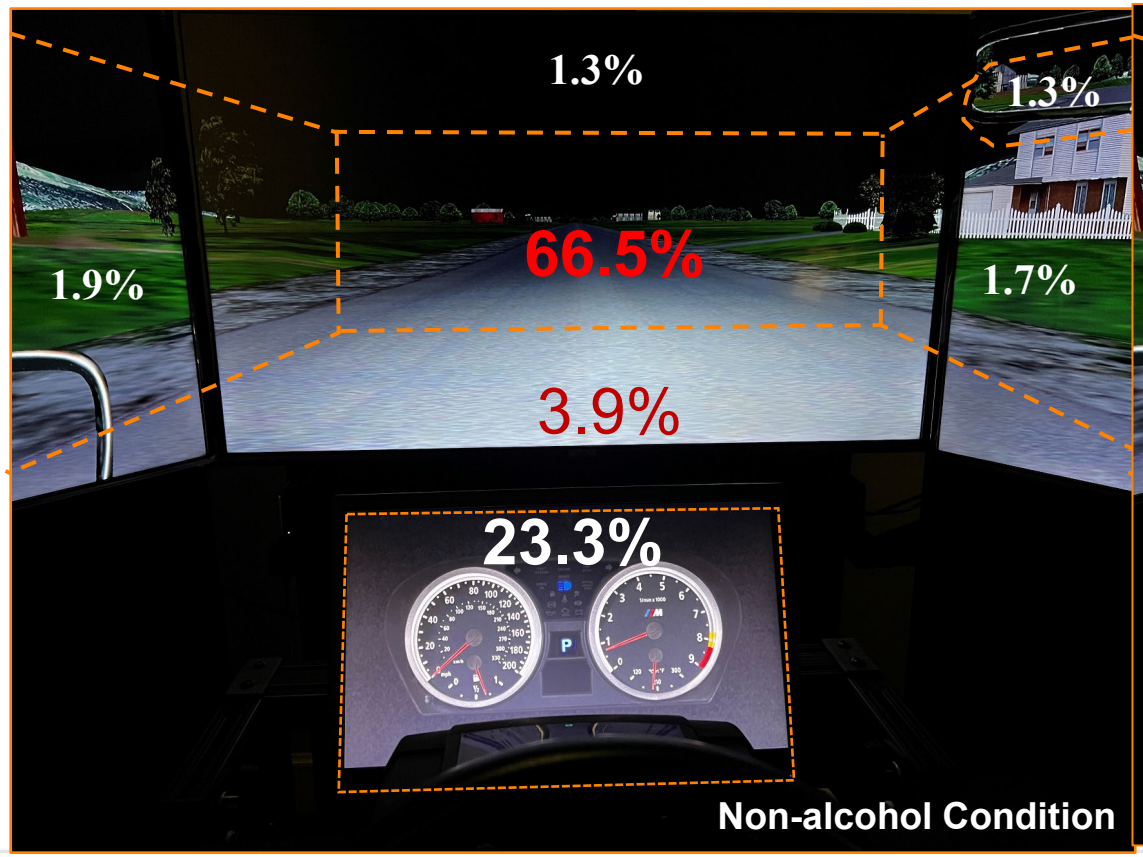
Caltrans-sponsored Wrong Way Driving study at Auburn University

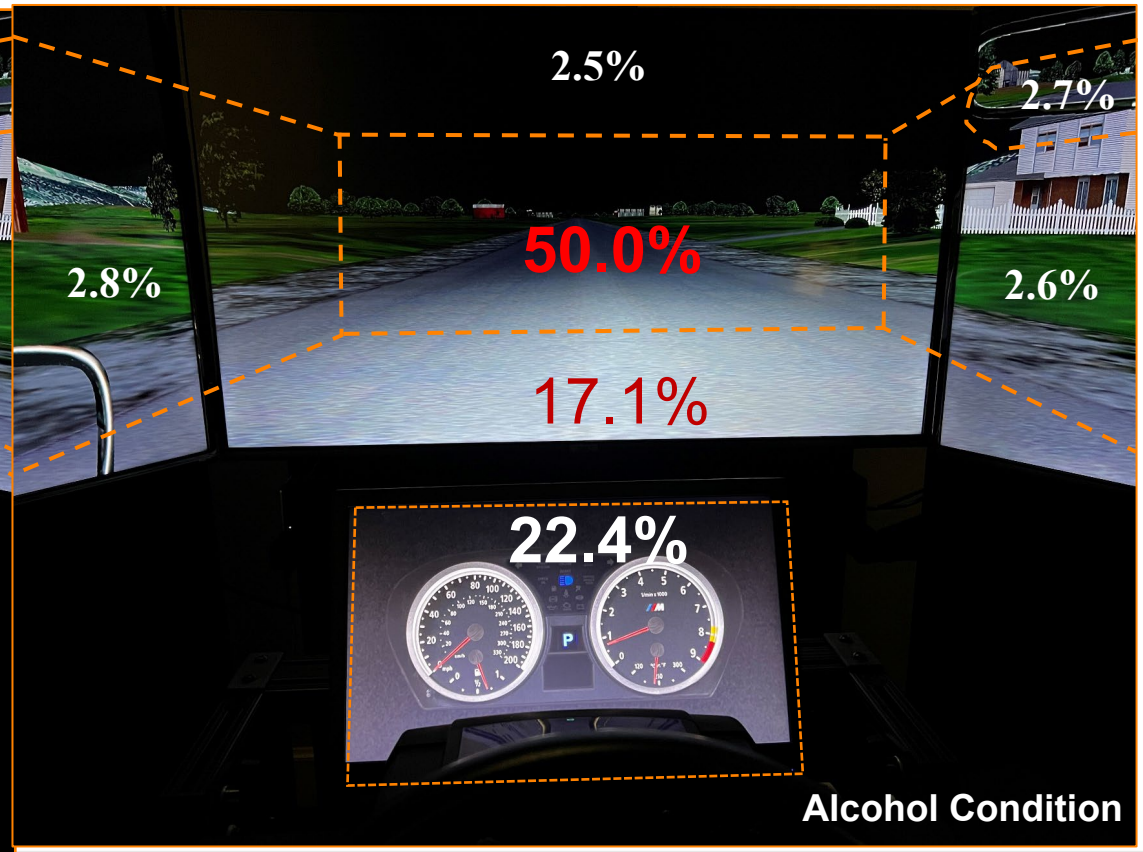


Caltrans-sponsored Wrong Way Driving study at Auburn University

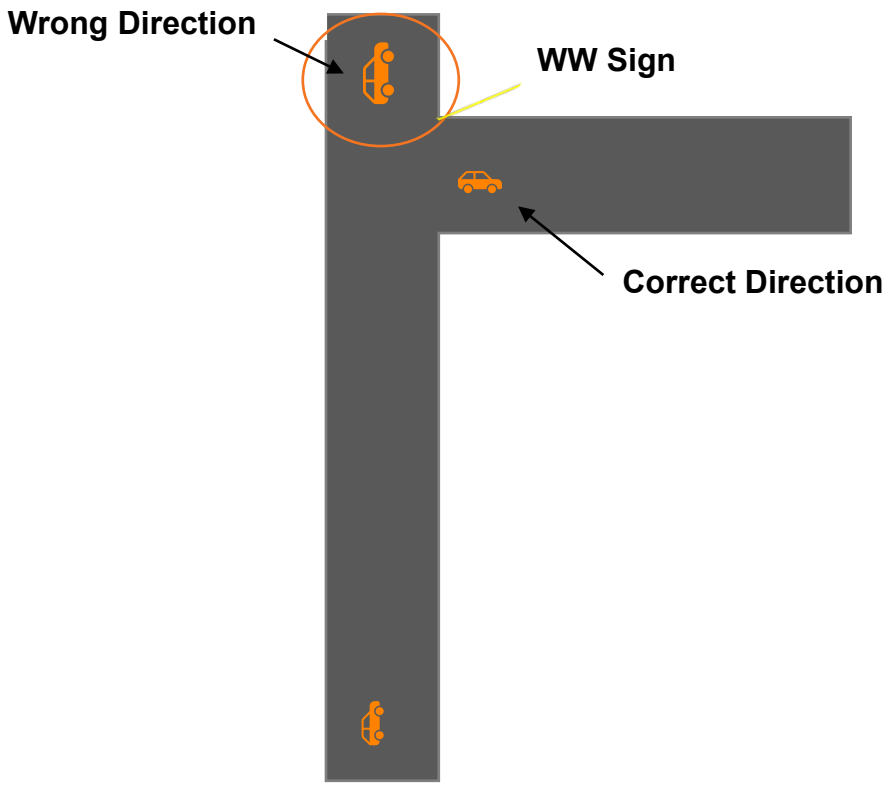


Caltrans-sponsored Wrong Way Driving study at Auburn University

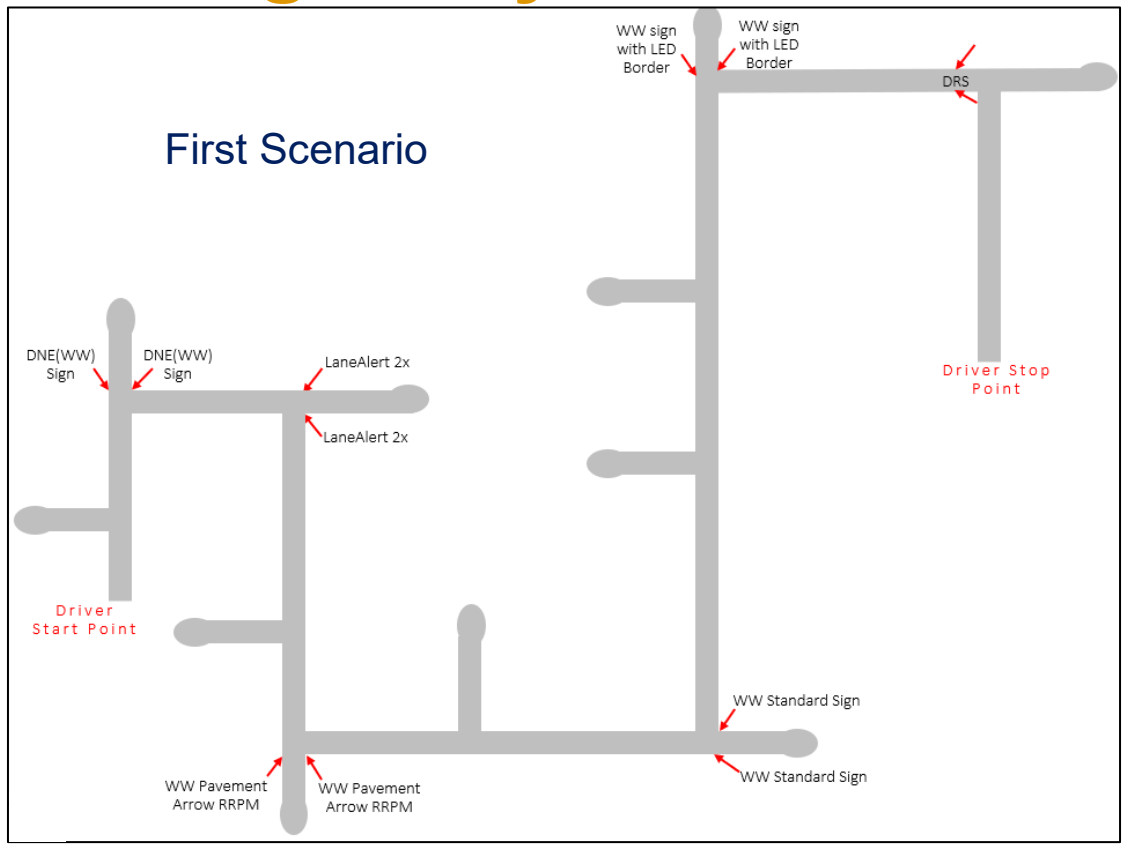




Caltrans-sponsored Wrong Way Driving study at Auburn University

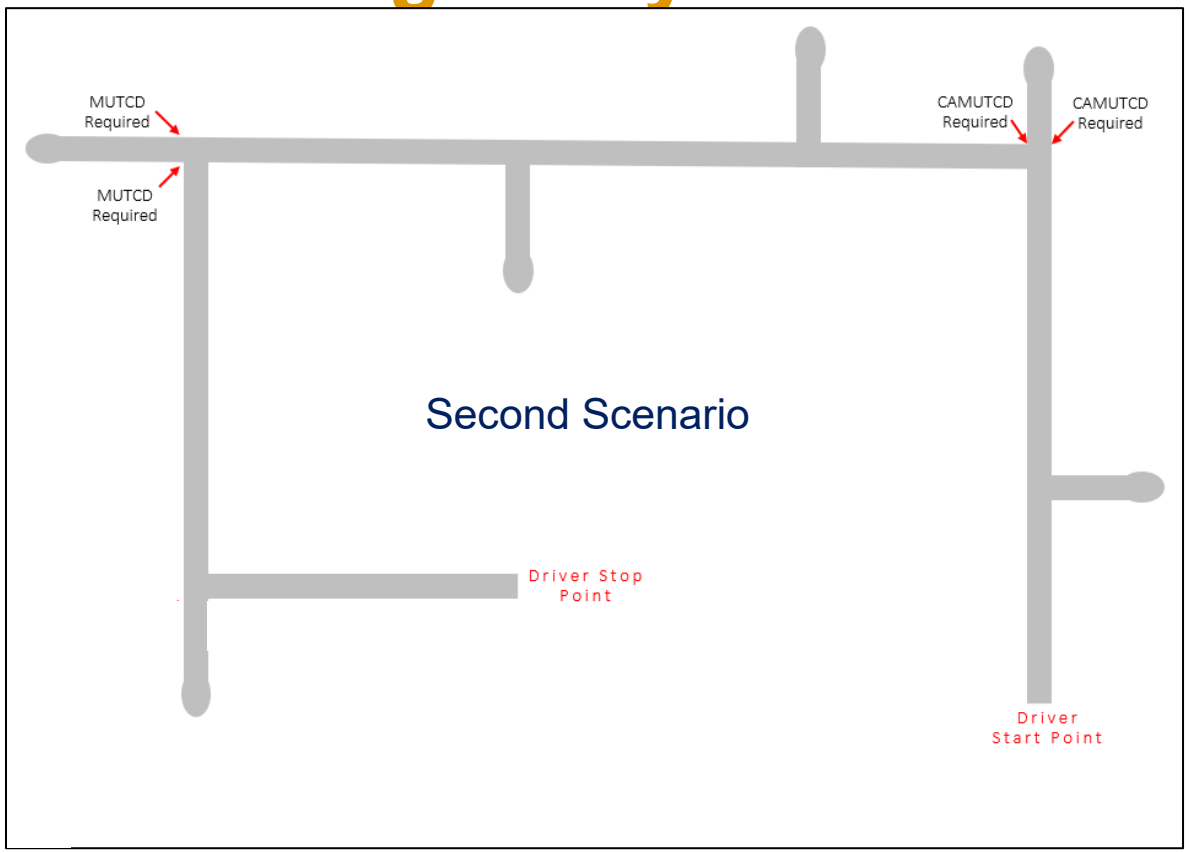


Caltrans-sponsored Wrong Way Driving study at Auburn University



- DO NOT ENTER/WW Sign
- WW Sign with flashing LED Border
- WW Sign
- RRPMs
- Directional Rumble Strips
- Bidirectional Pavement Markings

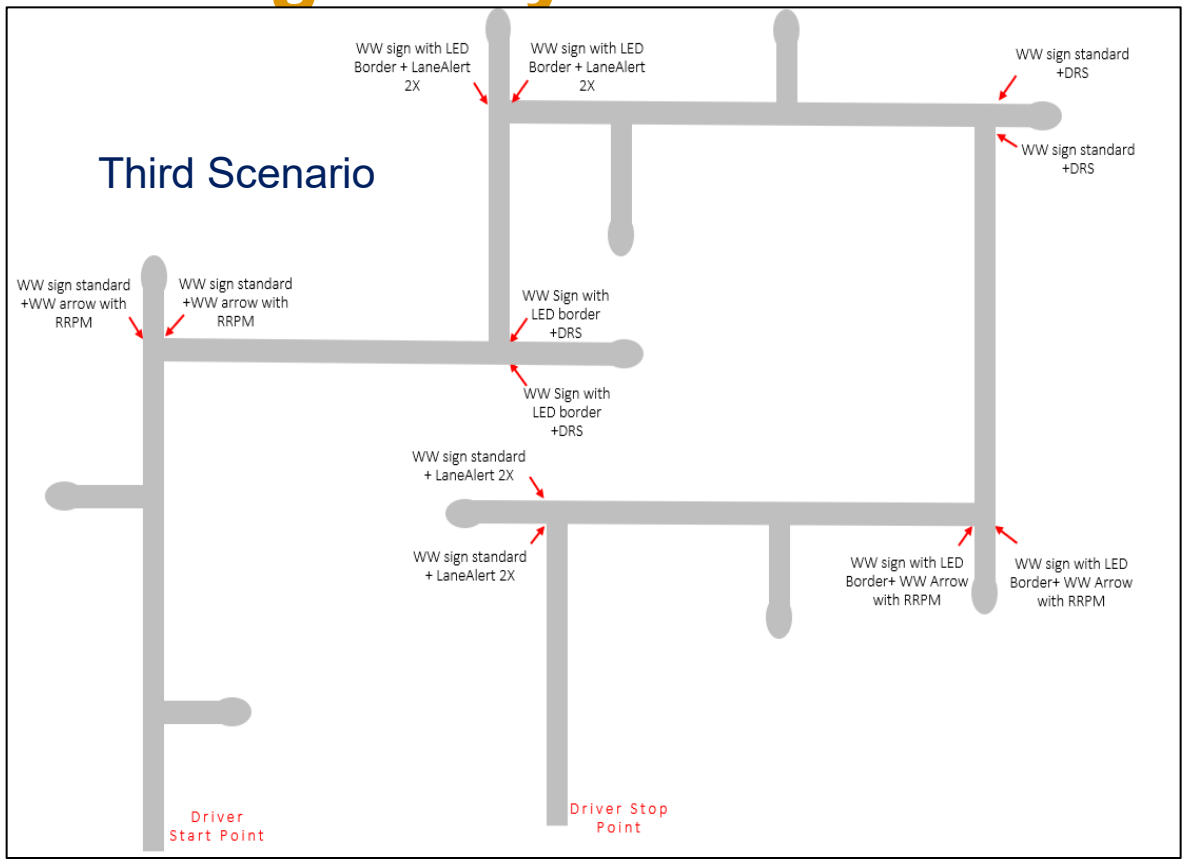
Caltrans-sponsored Wrong Way Driving study at Auburn University



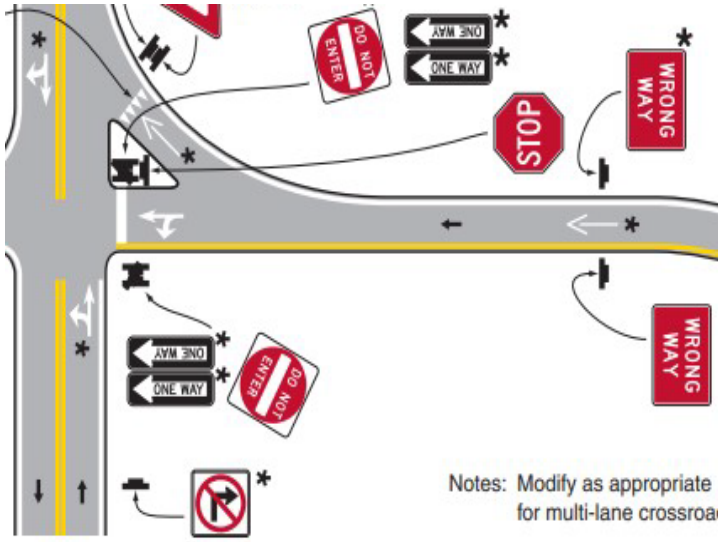
MUTCD Required

CAMUTCD Required

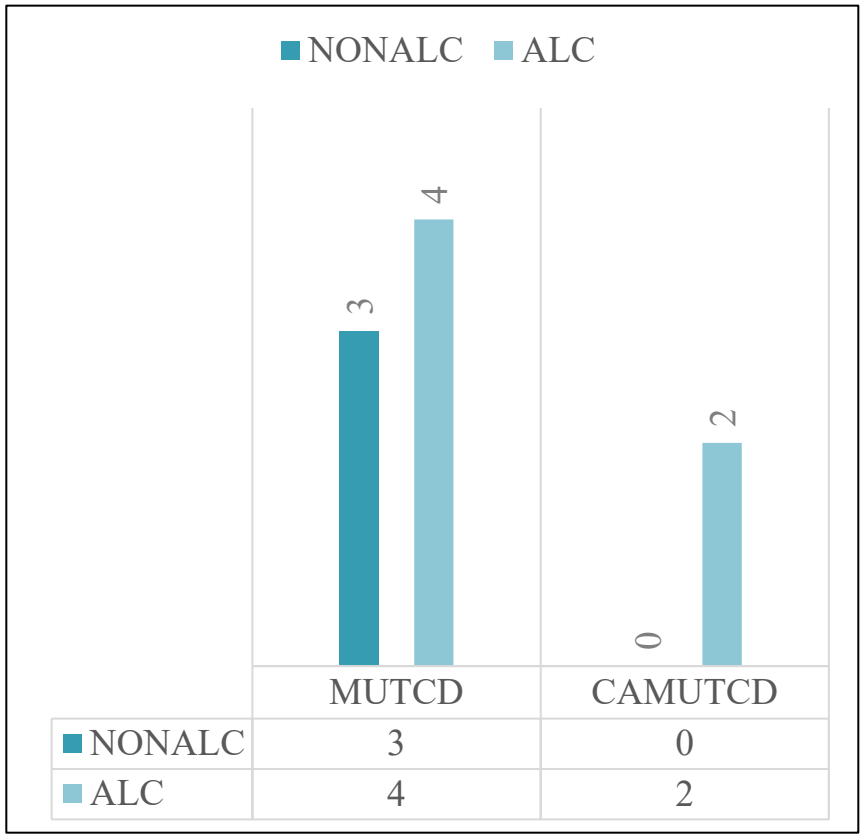
Caltrans-sponsored Wrong Way Driving study at Auburn University

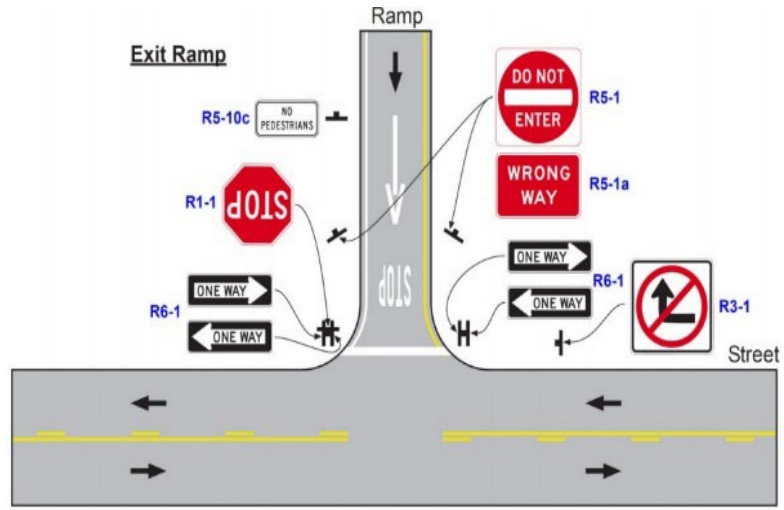


Caltrans-sponsored Wrong Way Driving study at Auburn University



MUTCD requirements

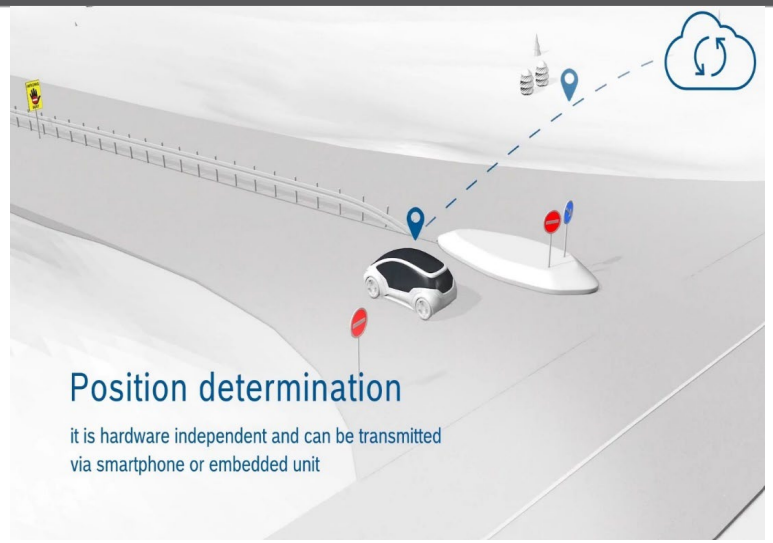


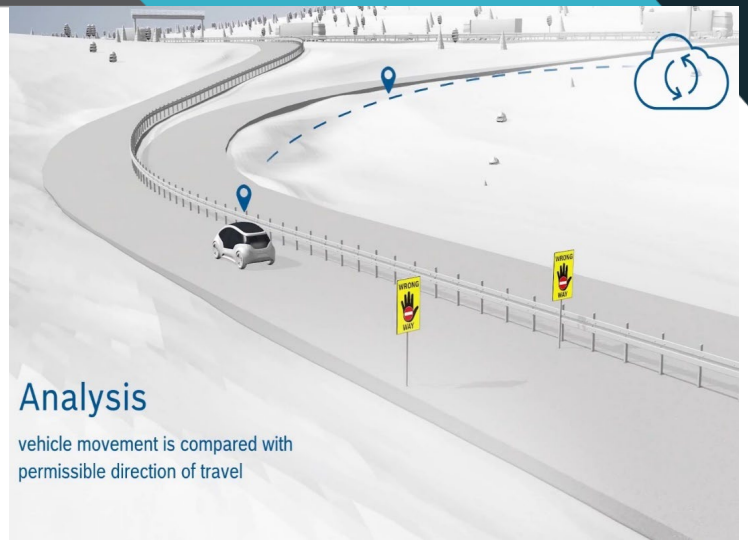


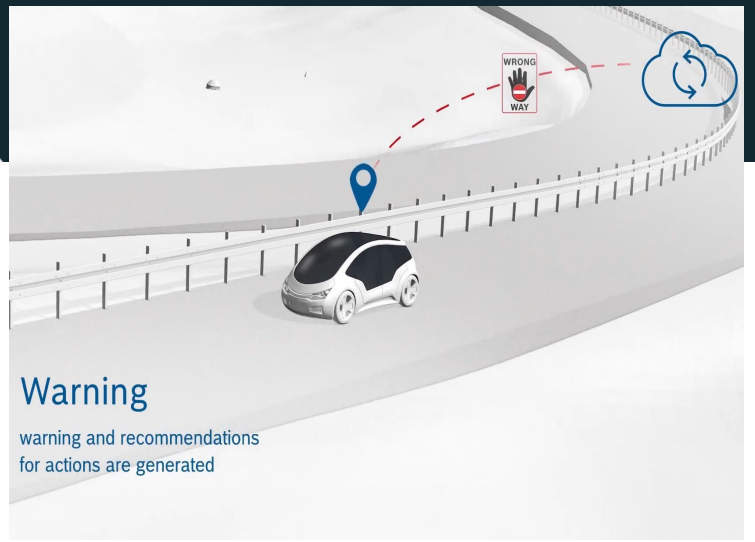
CAMUTCD requirements

Caltrans-sponsored Wrong Way Driving study at Auburn University

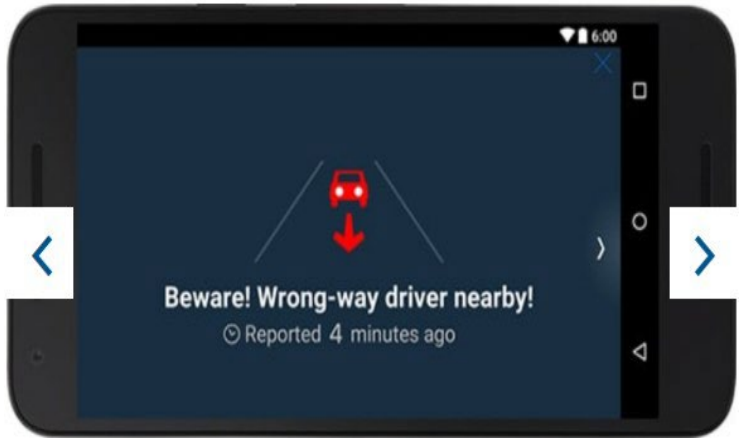
	TCDs	#Num	Rank
Scenario 1	WW flashing	1	1
	DNE/WW sign	2	2
	LaneAlert2X	3	3
	RRPM	6	4
	WW sign	6	4
	DRS	13	5
Scenario 3	WWflashing+RRPM	1	1
	WWflashing+DRS	1	1
	WWflashing+LaneAlert2X	1	1
	WW+LaneAlert2X	1	1
	WW+DRS	2	2
	WW+RRPM	3	3

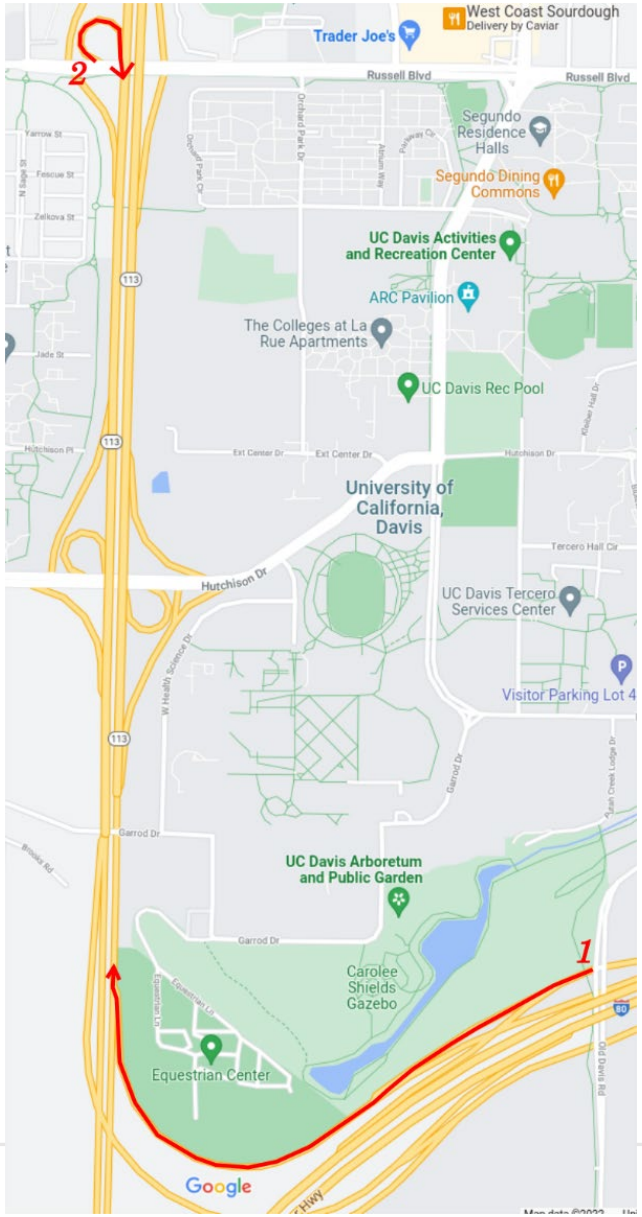






Bosch's software integrates into a third-party provider's existing mobile device app and uses the devices' GPS data to detect wrong way movements and send out a warning to the driver, proximate vehicles and interested government agencies.





Bosch reversed the permitted directions of travel in its database for these test ramps in Sacramento and Davis so researchers could receive and log “wrong way” alerts when traversing the ramps in the correct direction.

Thanks for Listening

Curbing Wrong Way Movements onto Michigan Freeways

Mark Bott, PE (MDOT)
Engineer of Traffic and Safety

Why the Interest?

Police: Wrong-way teen causes crash

Five Killed in wrong-way crash on Michigan

3 Dead, 3 Critical In Wrong-Way Head-On Crash

A driver from Nebraska was traveling the wrong direction down I-96

Five Killed in Wrong-Way Car Accident Near Detroit

WRONG-WAY DRIVER JAILED AFTER CRASH

09/11/2009 Kalamazoo Gazette

GALESBURG -- A wrong-way driver who police say appeared to be under the influence of prescription medicine or narcotics was jailed Wednesday on interstate 94.

Gazette Staff Reports

Study Details

Only included crashes caused by

WRONG WAY ENTRY

Onto the freew

110 Crashes

ded:

Crashe ving vehicle loss of control

or

Vehicles that crossed the median

Wrong Way Crash Severity

32% of crashes resulted in K or A

(35 of 110)

Comparison: 2% of all freeway crashes result in K or A

The 35 K/A crashes severely affected 66 people:

30 Fatalities

36 Serious Injuries

Crash Location

Exit ramp - 6% of crashes resulted in a K/A

Freeway mainline - 42% of crashes resulted in a K/A

Crash occurred on:
exit ramp – 31
mainline – 71
- entry ramp unknown – 67
- entry ramp known – 4
freeway-to-freeway ramp – 6
entrance ramp – 2

35 Known Entry Points

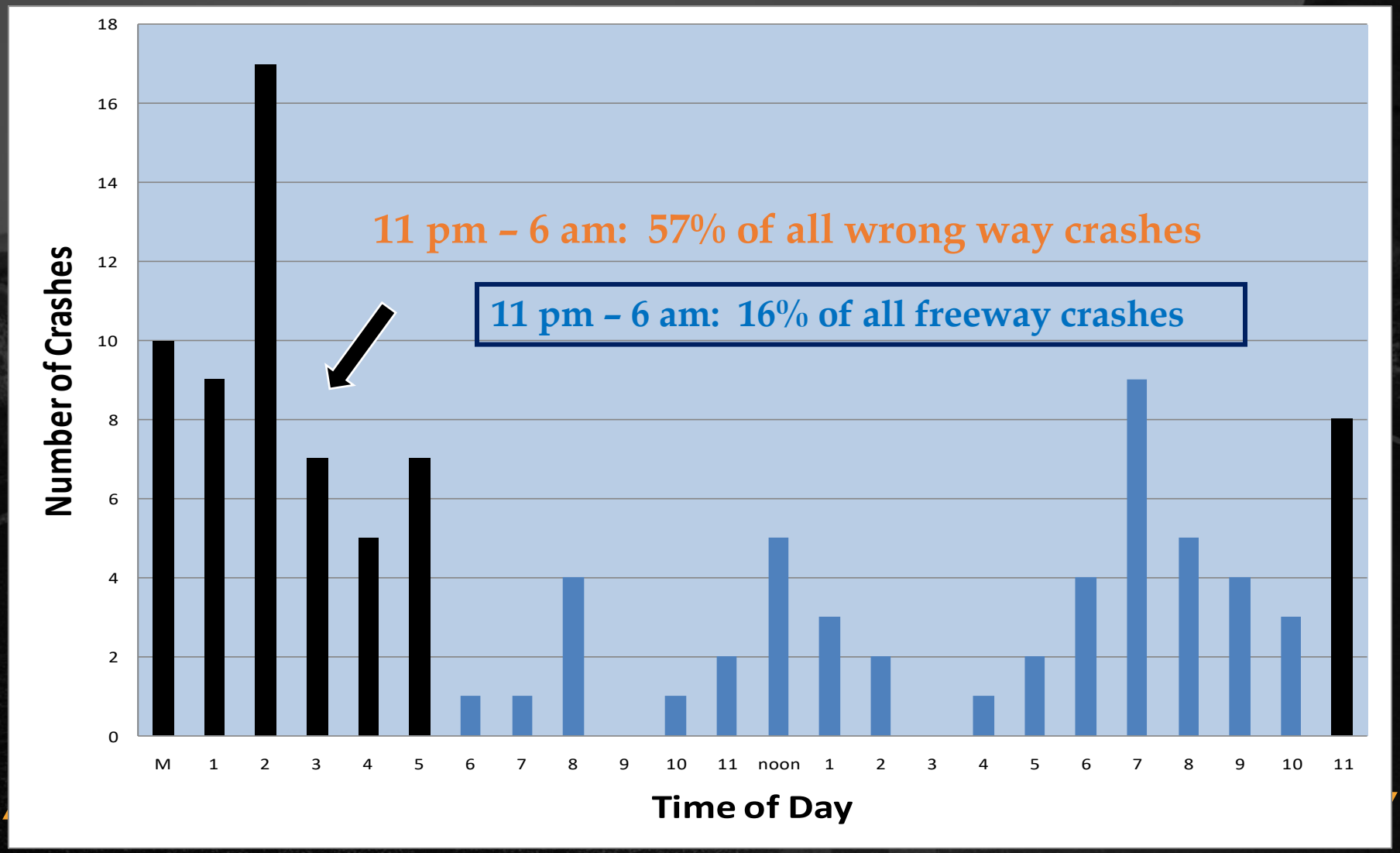
Interchange Types

791 Interchanges

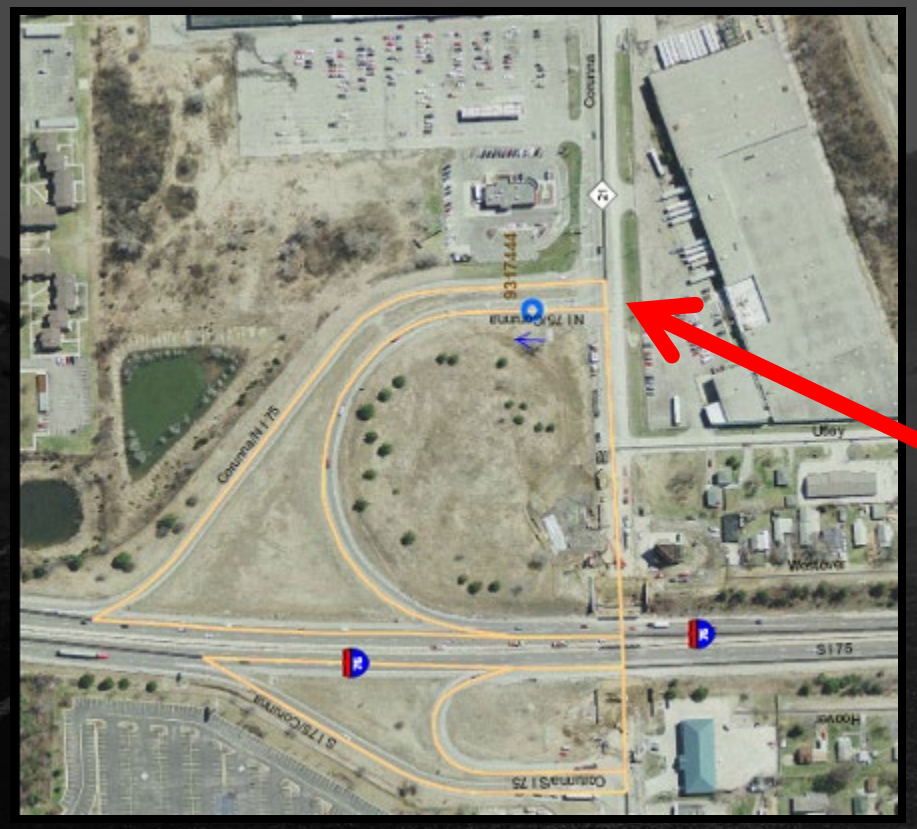
35 Known Wrong Way Entries

Diamond – 340			6
Partial Cloverleaf – 163	60% / 21%		21
Directional – 206			2
Full Cloverleaf – 20			1
Trumpet – 23	11% / 3%		4
Other – 39			1

By Time of Day



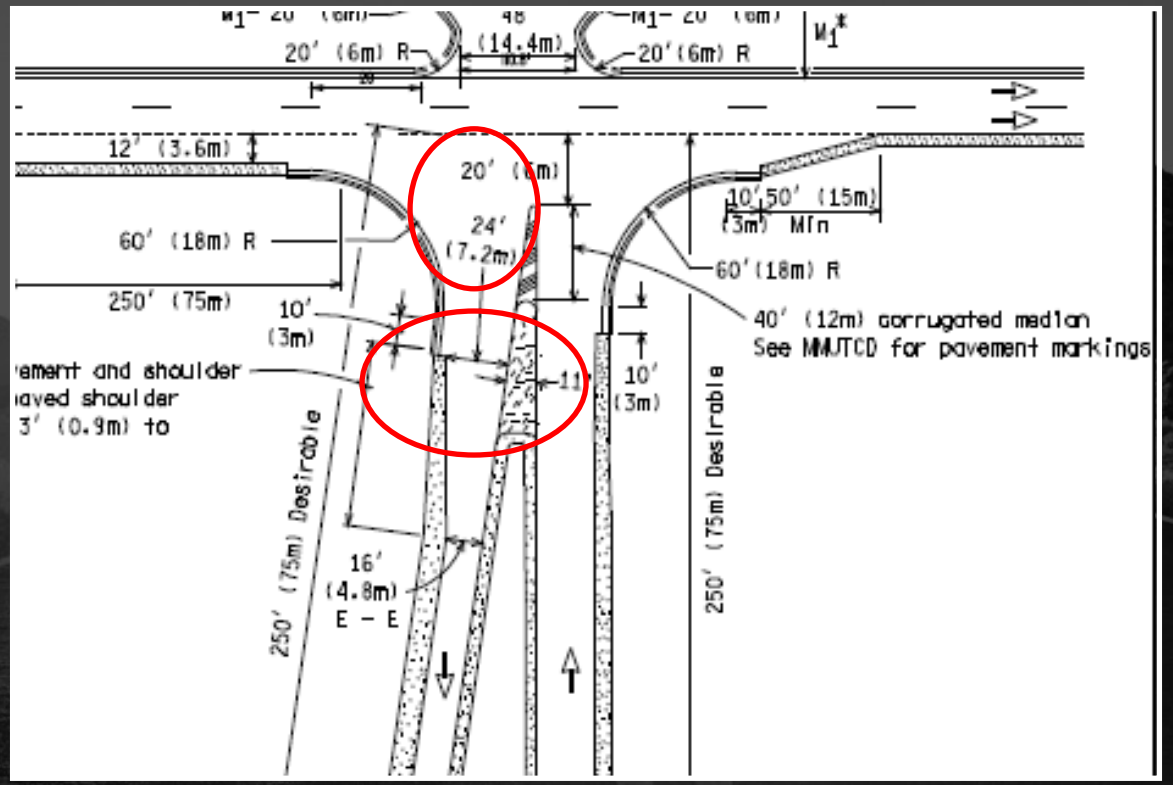
The Culprit - PARCLOS



What to do?

Low-Cost Safety Improvements

Was in the works



From 8° angle between ramps to 11° angle

From 30 ft setback to 20 ft setback for the corrugated island

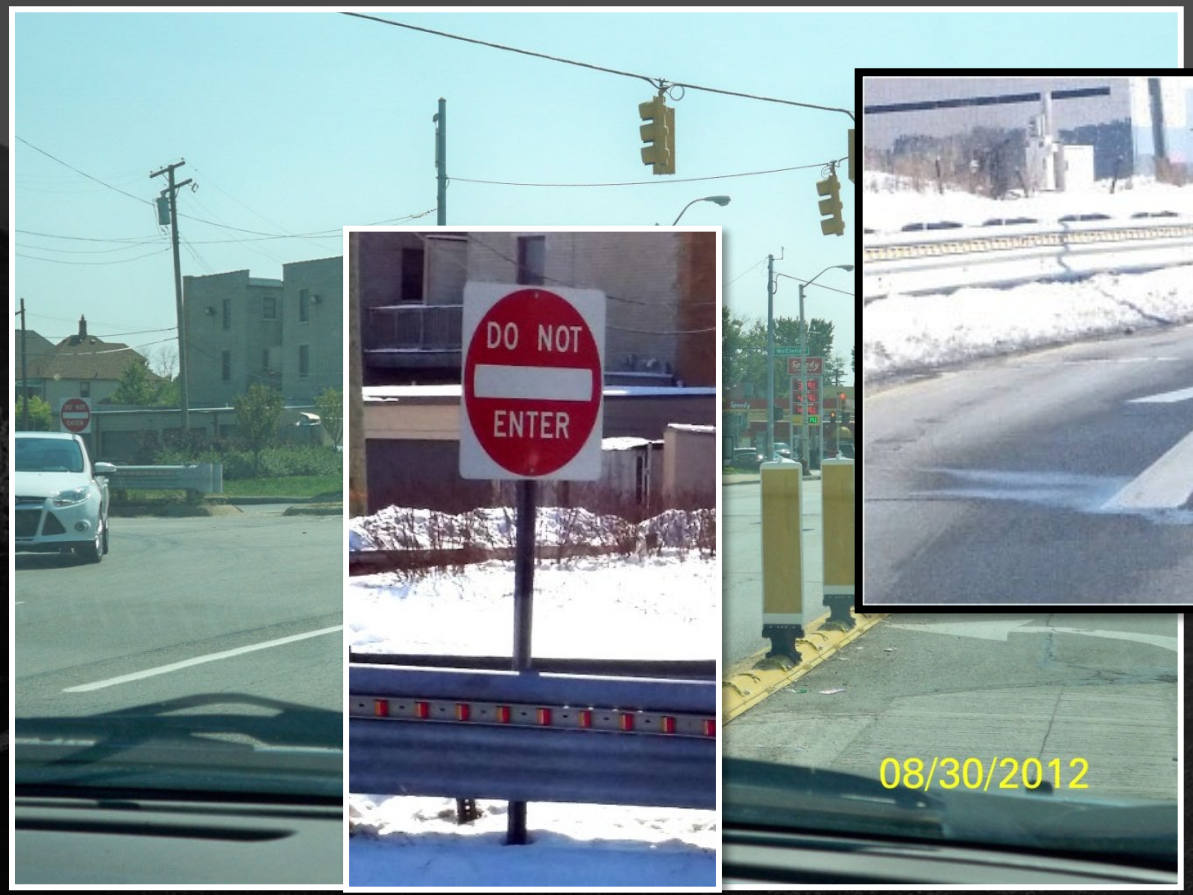
Pick List

- Lower DO NOT ENTER/WRONG WAY sign height (4-foot bottom height) Standard
- Reflective sheeting on signposts Standard
- Stop bars placement at exit ramp
- Wrong way pavement markings (off ramp wrong way arrow) Standard
- Pavement marking extensions through intersection (turning guidelines)
- Painted islands between exit and entrance ramps
- Wrong way delineation on exit ramp (red reflectors) Standard - post mounted

Examples

Gratiot Ave at I-94 (Detroit)

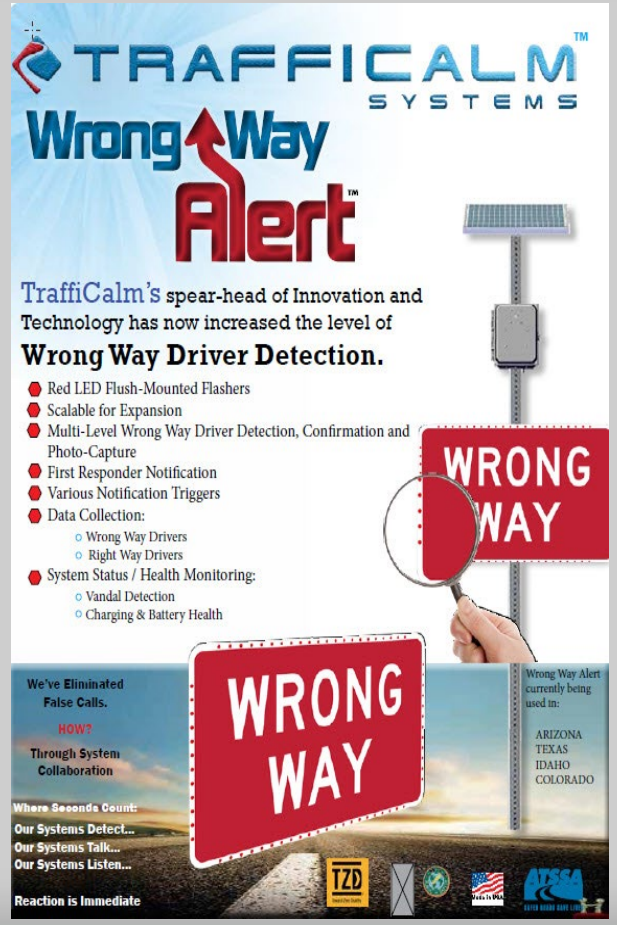
Gratiot Ave at I-94 Improvements



- Qwick Kurb
- Lower Signs
- Pavement Markings
- Delineation


Looking Toward the Future

I-94 at Sargent Road



- **Location 1 & 2: 36” Wrong Way Sign w/red flasher ring**
- **Locations 3, 5, 6: 48” Wrong Way Sign w/red flasher ring**
- **Location 4: 48” Wrong Way Sign w/red flasher ring and controller**

Wrong Way Driving Methodology Assessment

Evaluate the influence of each countermeasure

Initial and life cycle costs

Compatibility with MDOT Operations Centers

Benefit Cost Analysis Tool

Guidance Selection Matrix

WILLY SORENSON, P.E.
TRAFFIC & SAFETY
IOWA DOT

IOWA'S WWD PROGRAM
AASHTO INNOVATION
INITIATIVE

JUNE 22
2023

IOWA DOT
SMARTER | SIMPLER | CUSTOMER DRIVEN

Agenda

- Network Screening
- Systemic Treatments
- $1.5 Million for 2021 Deployment of Enhanced Signing, Pavement Markings & Cameras
- Initial results after 1 year

Level of Effort for WWD

After collection WWD Data for 10 years with $0 budget…

I got $1.5 Million of HSIP funding for enhanced signing and pavement markings.

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Where to Spend?

467 Interchanges in Iowa

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Network Screening

- By Dr. Huaguo Zhou Md Atiquzzaman of Auburn University

Article

TRR

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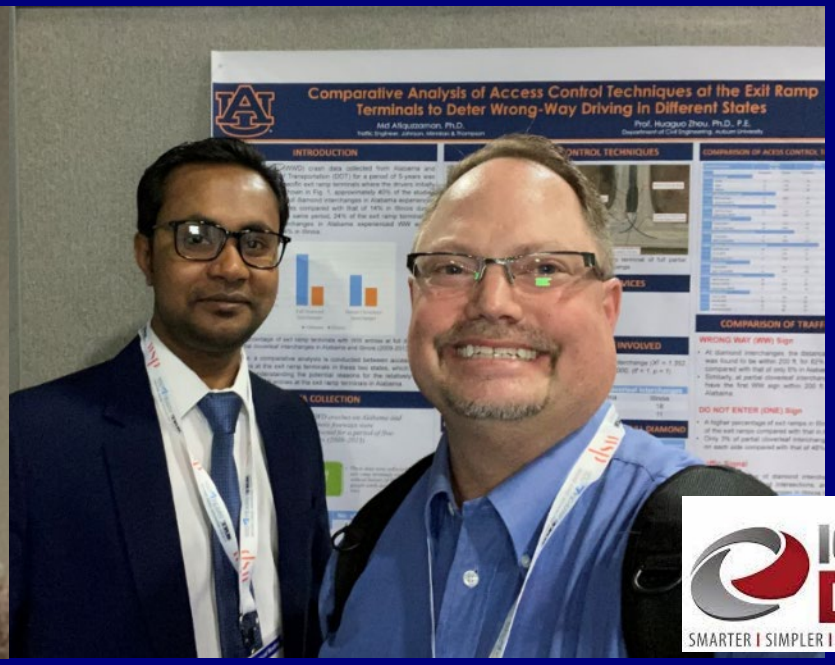
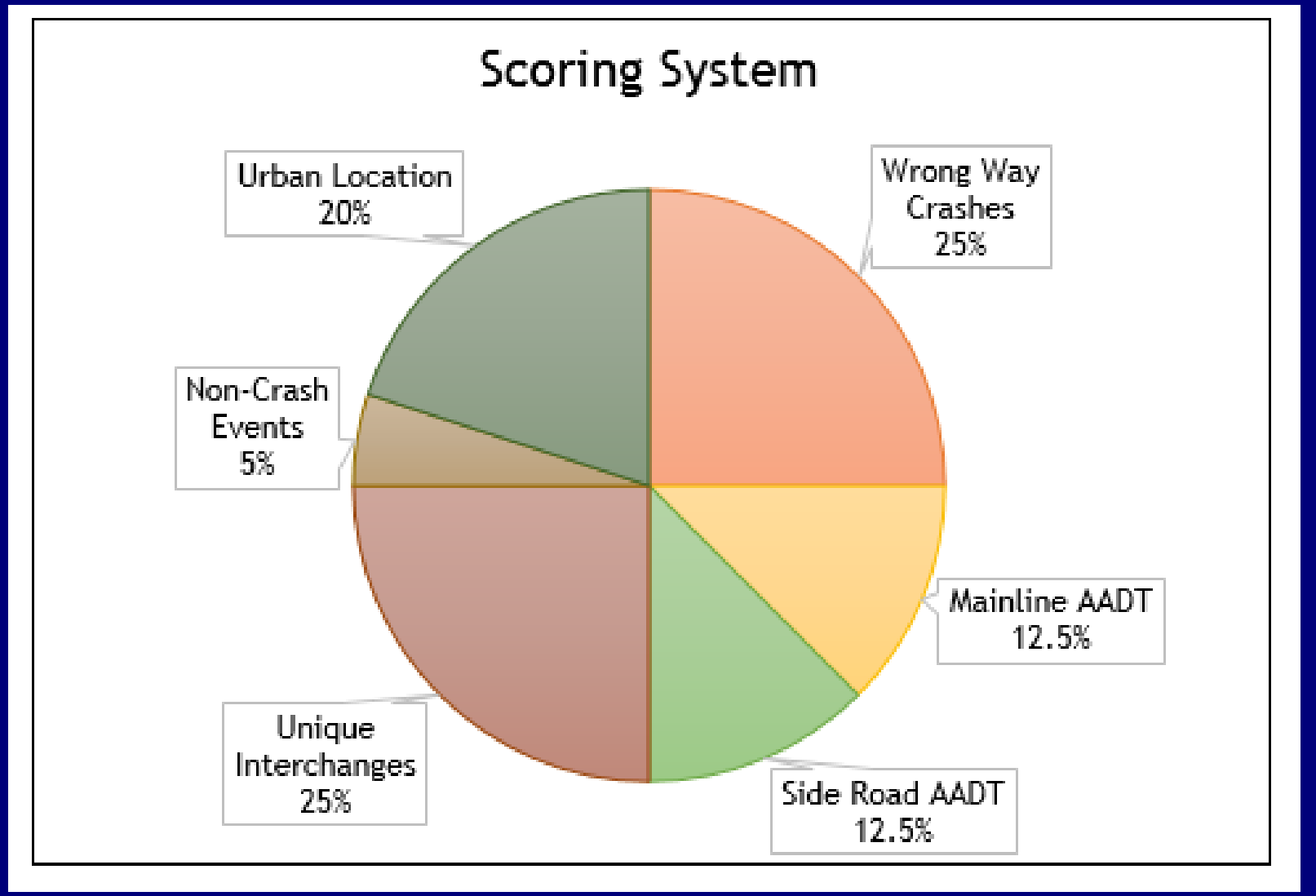
Modeling the Risk of Wrong-Way Driving Entry at the Exit Ramp Terminals of Full Diamond Interchanges

Md Atiquzzaman[1] and Huaguo Zhou[1]



https://journals.sagepub.com/doi/pdf/10.1177/0361198118

Iowa's Modification Scoring System



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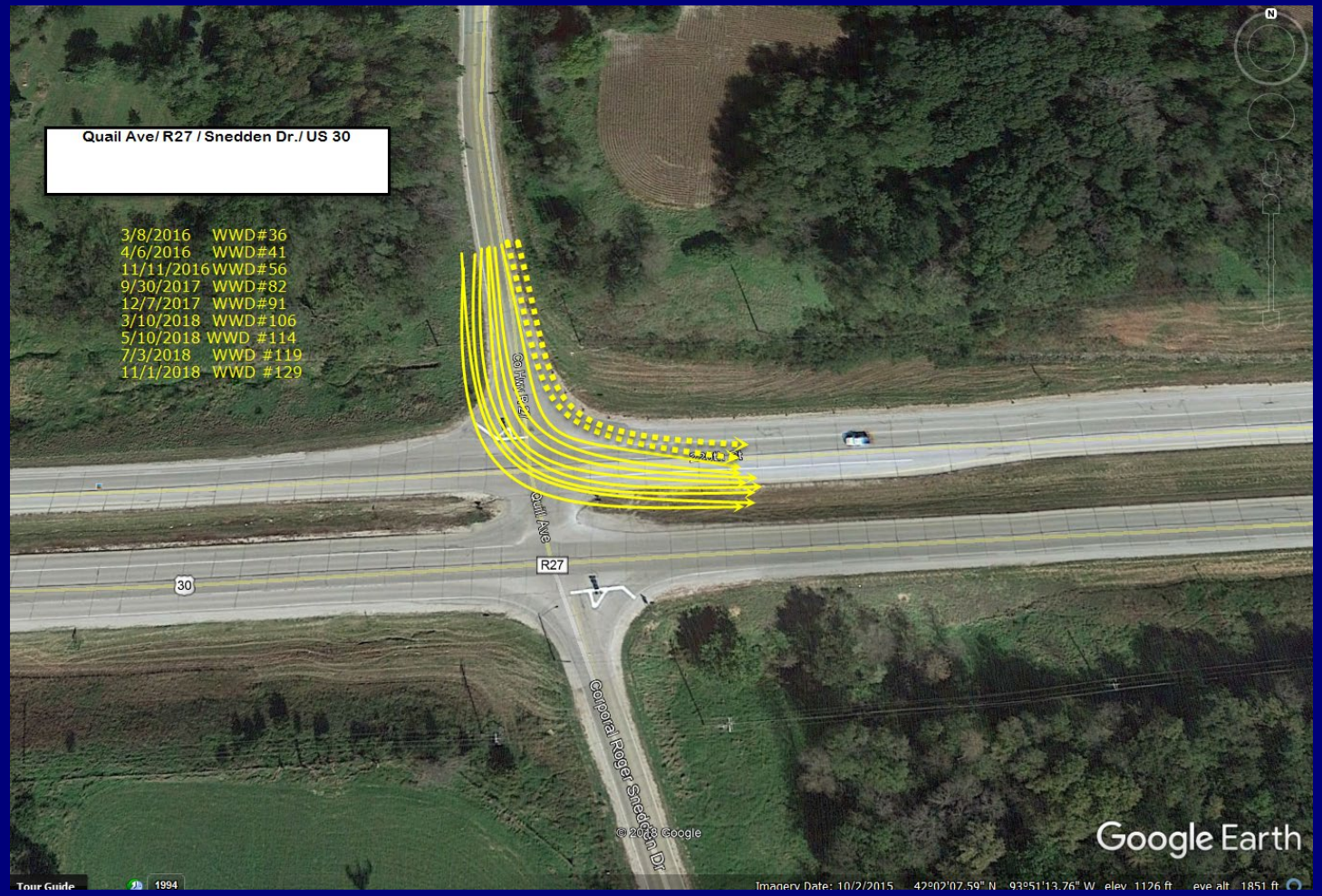
Started with 472 interchanges and then Multiplied by 100 “points”

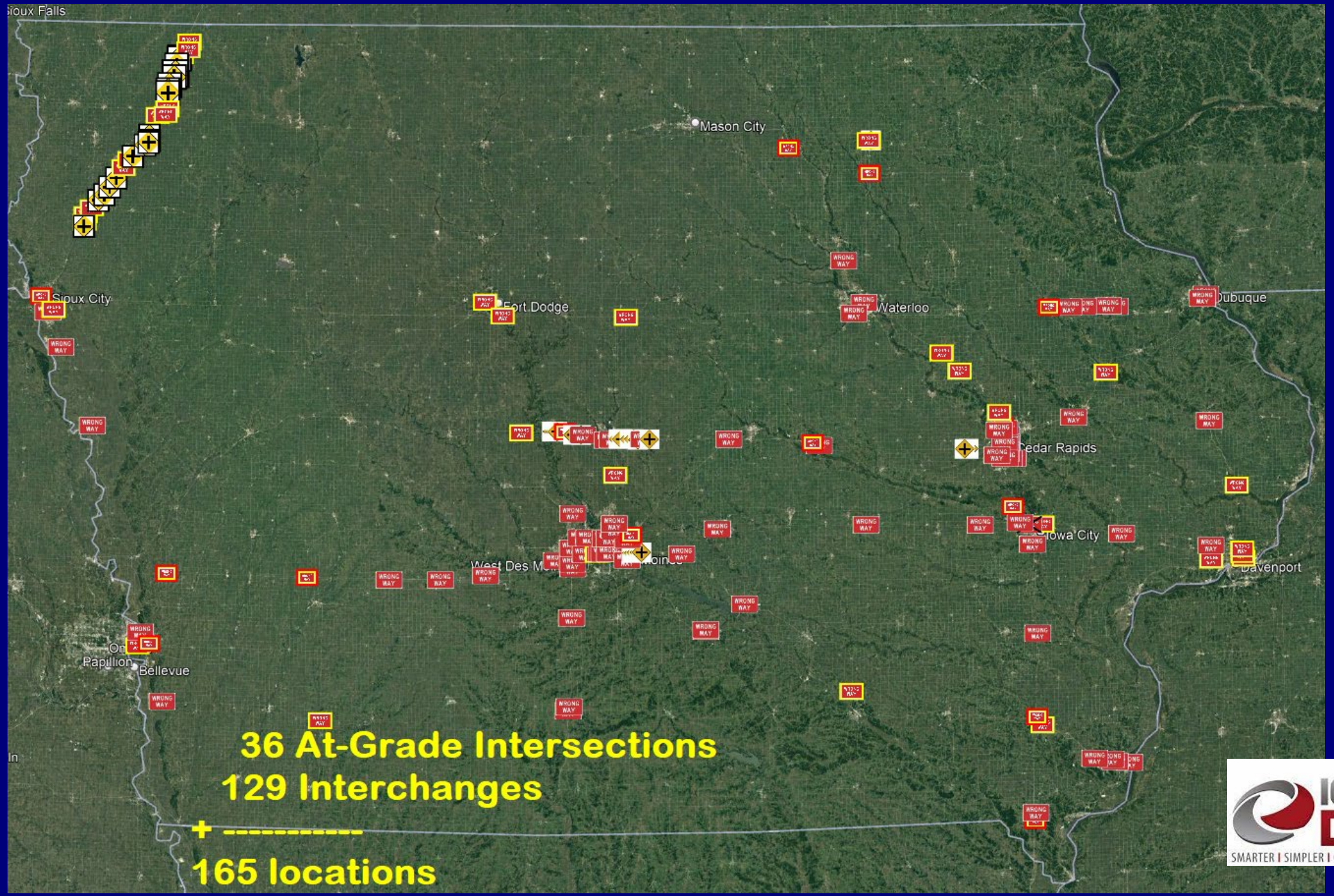
Distribution of Points

- Crashes (25%) - 11,800 points
- Volume (25%) – 11,800 points
  - Mainline (12.5%)
  - Sideroad (12.5%)
- Geometry (25%) – 11,800 Points
- Urban/Rural (20%) – 9,440 Points
- Non-Crash WWD Events (5%) – 2,360 Points

Don’t forget about At-Grades

- Not part of the network screening



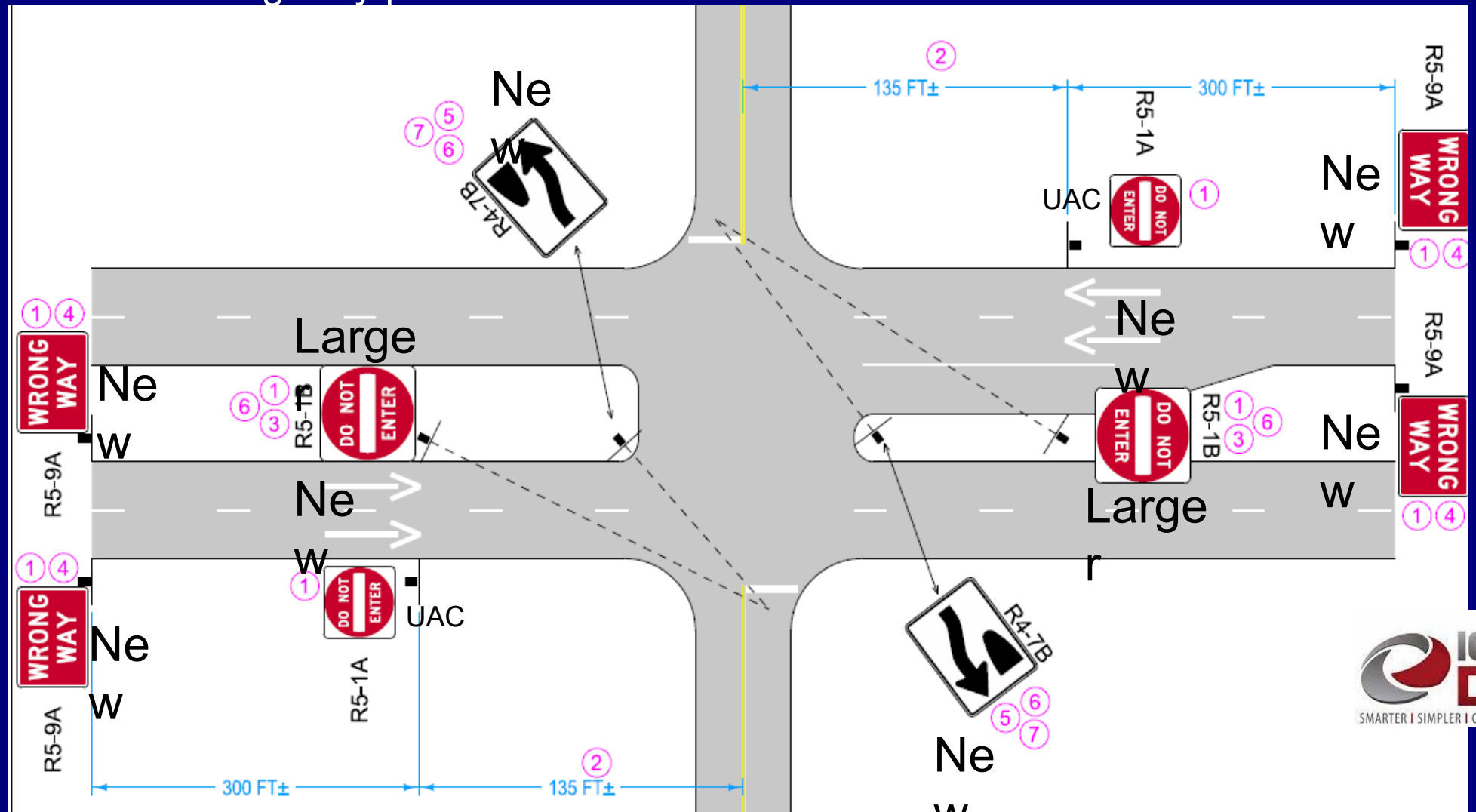

Sioux Falls
Mason City
Sioux City
Fort Dodge
Waterloo
Dubuque
Cedar Rapids
Iowa City
Davenport
Papillion
Bellevue
36 At-Grade Intersections
129 Interchanges
+ ----------
165 locations

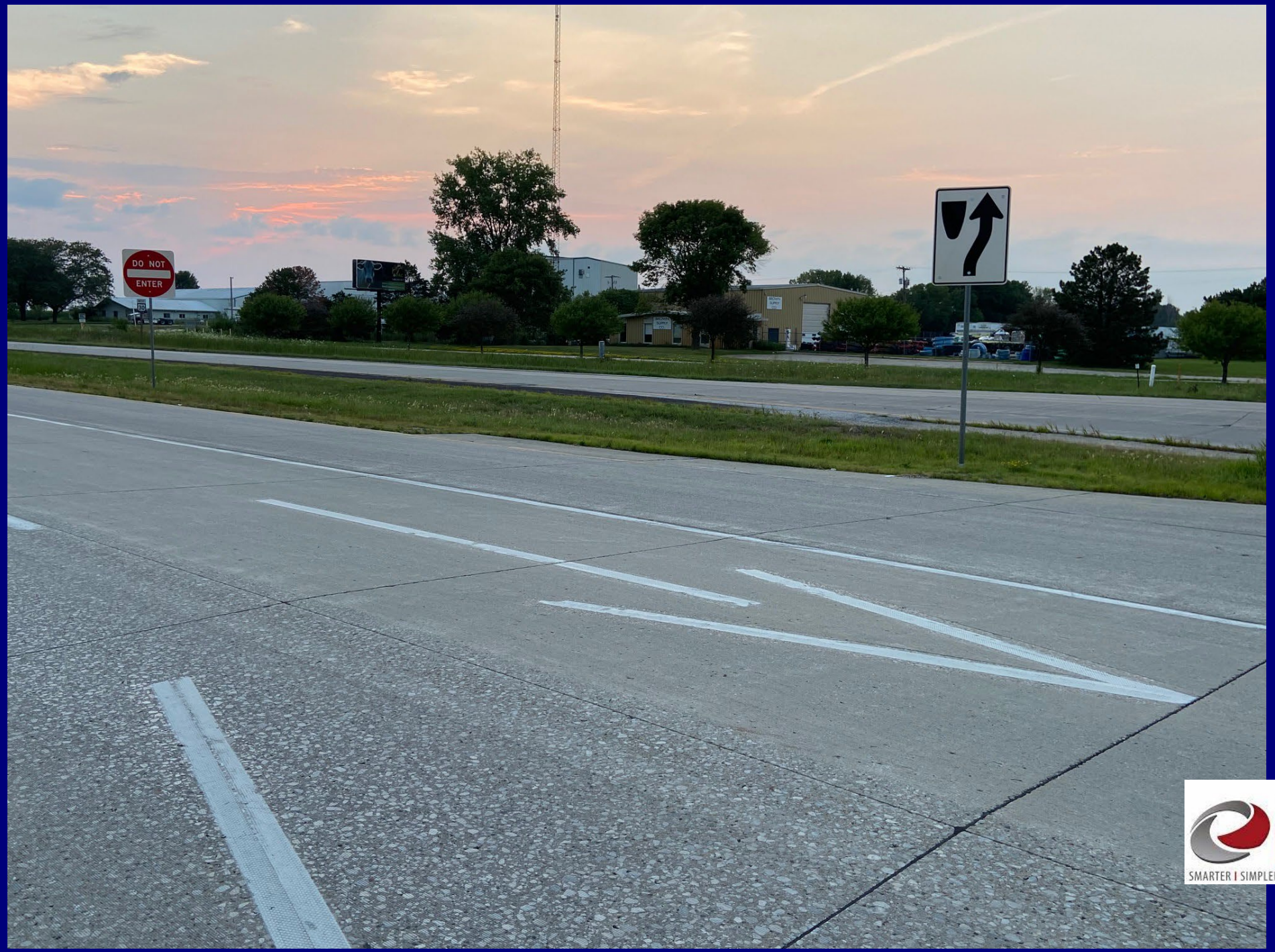
Common Philosophy for Signs

- Larger signs
  - 36” x 36” → 48” x 48” (78% increase)
- Strategically Placed
  - Install sign where a potential WWD is looking
  - Stop placing signs where it is convenient
    - (like on the back of Stop sign)
- Aim (angle) the sign for intended audience
  - Think about who (why) you are doing this.
- Left and Right sides
  - 2 is better than 1

At-Grade Intersection

- New Signs/Pavement Markings
- Larger Signs
- Strategically placed & aimed




DO NOT
ENTER

Before (MUTCD)

Good (w/ Systemic Treatments)

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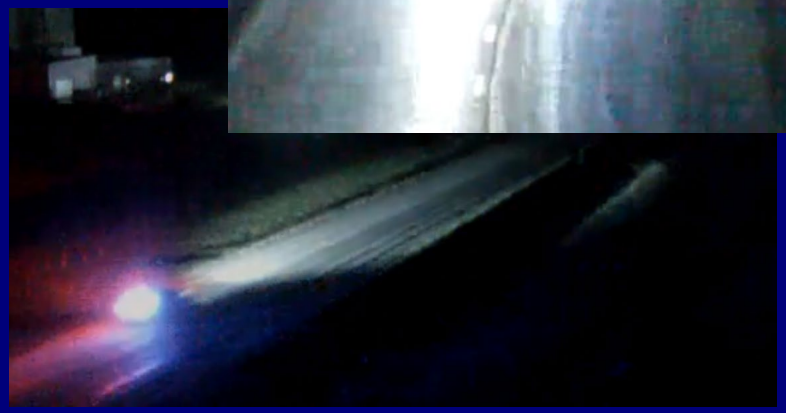
Had a few WWD, but this one…

1 mile further down the road…



- Was stopped by Police
- Blood Alcohol Concentration (BAC) = 0.206

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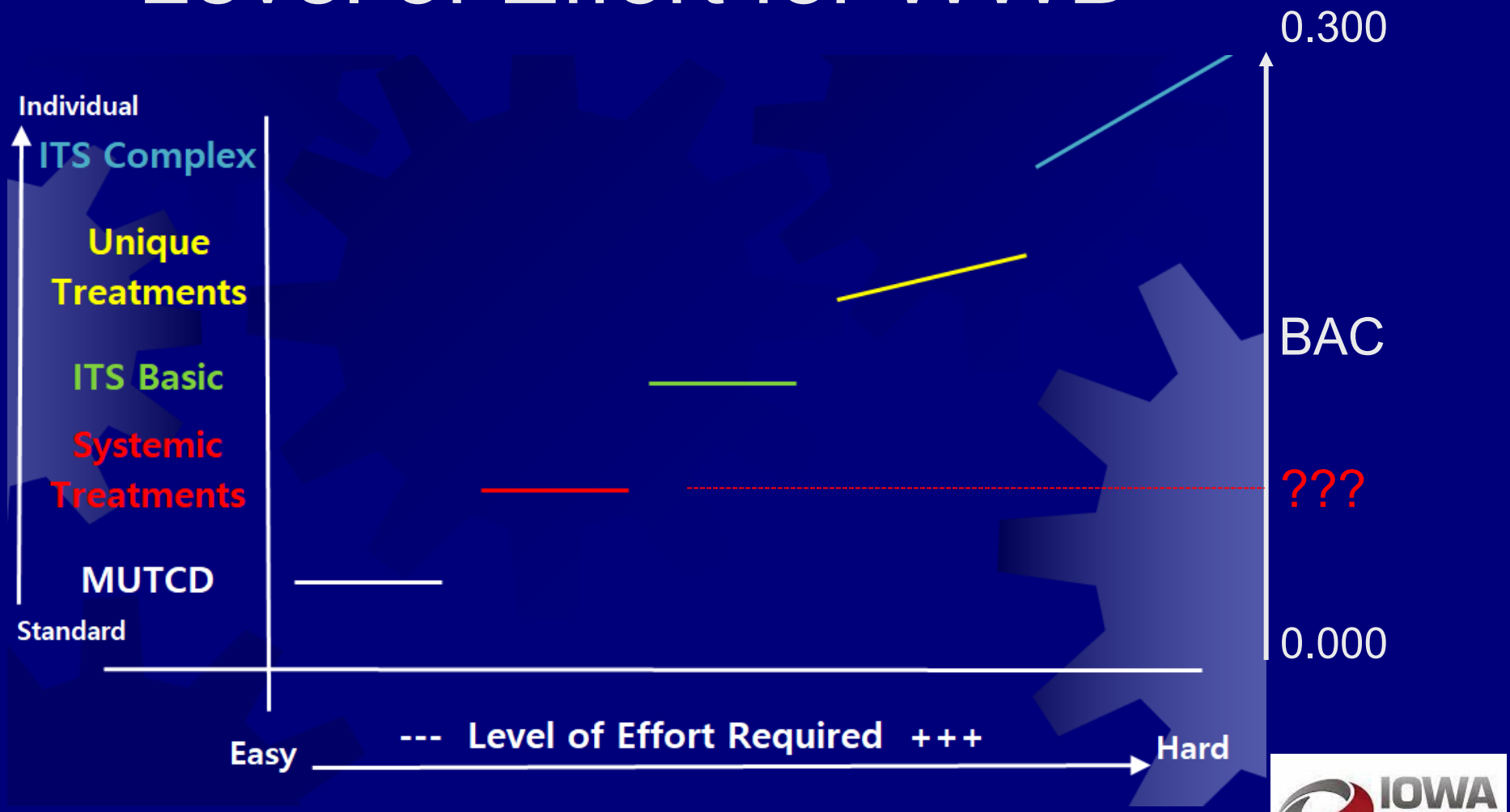
Good (w/ Systemic Treatments)

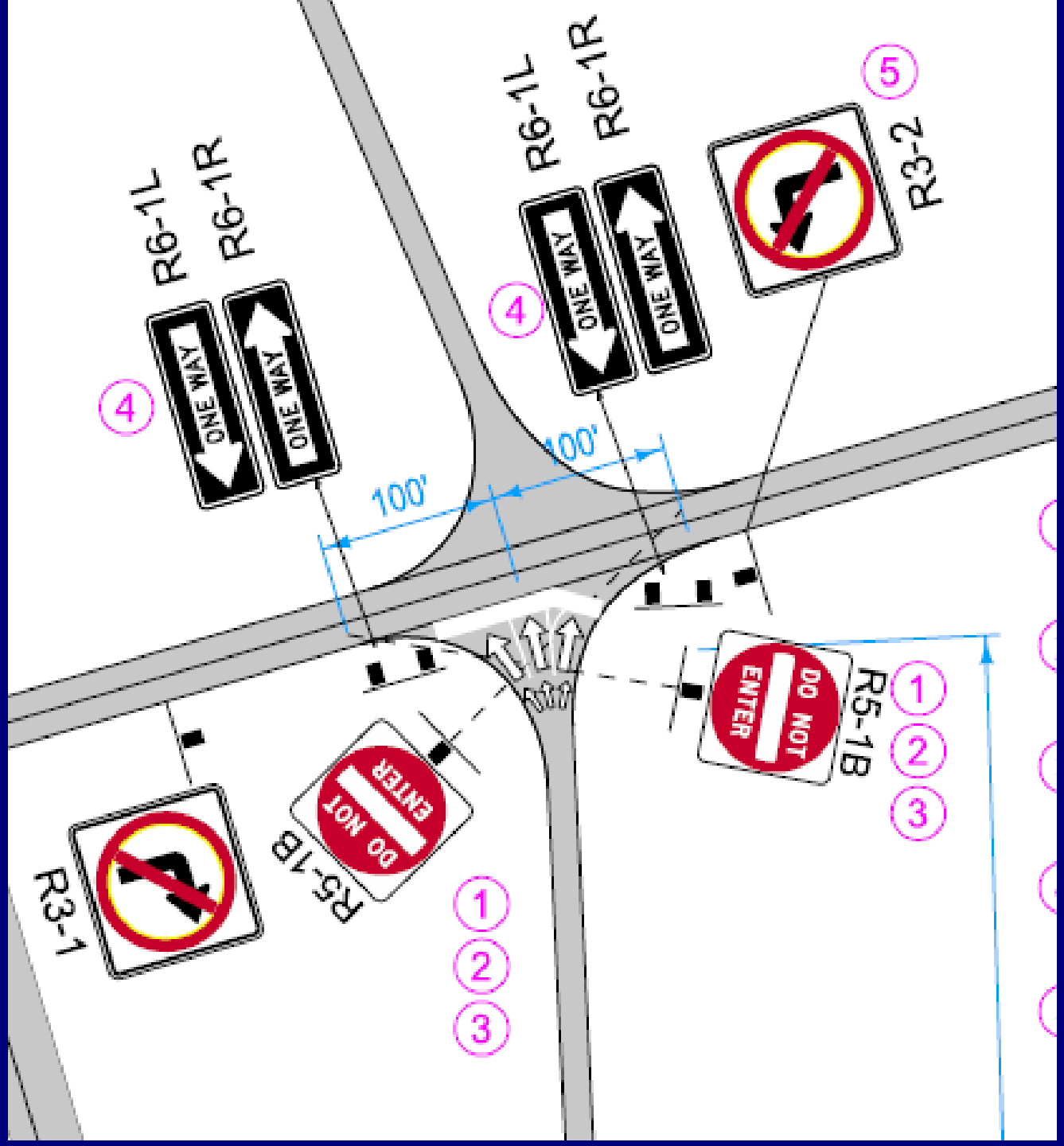
Added 6/1/23

Better (I think)… w/ Text Version of Keep Right

Level of Effort for WWD



Standard Diamond Interchange



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Be Careful with Do Not Enter & Stop Signs

Do Not Enter Was Blocking the STOP Sign.

We fixed by moving DNE out further.

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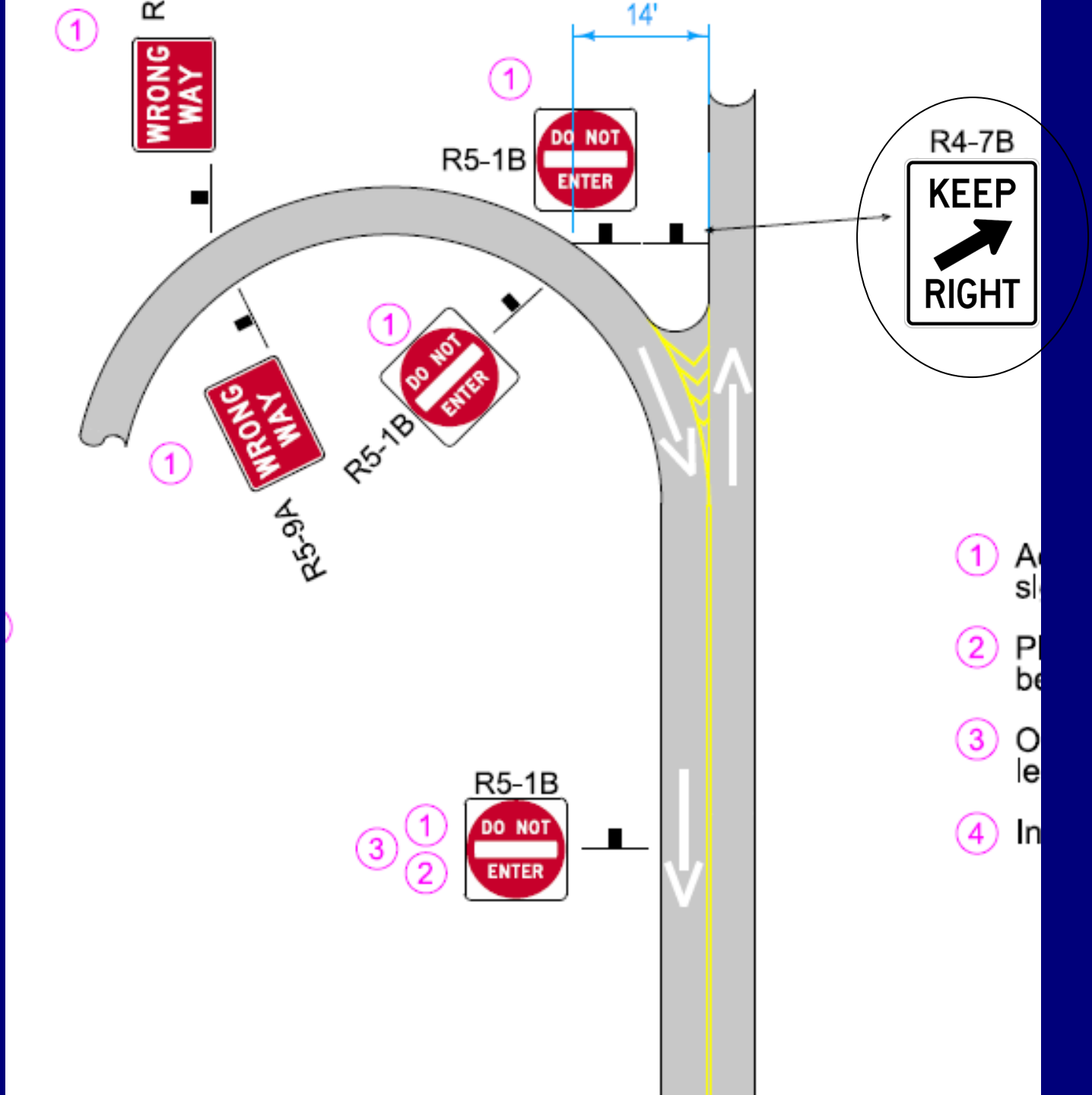
Folded Diamond Interchange



Interesting Countermeasure #1

“Gateway” for Folded Diamonds

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Interchange	Type of Uniq	Camera	# Months "Before" Signing Added *	# WWD Events Before Signing Adde	# Months "After" Signing Added	# WWD Events After Signing Adde
I-35 & US-34	Parc-Lo "AB"	WWD55	1	1	18	0
US-151 & IA-1	Parc-Lo "B"	WWD04	1	1	15	1
US-30 & C St (WB Exit loop)	Parc-Lo "B"	WWD18	2	2	19	1
US-30 & C St (EB Exit Loop)	Parc-Lo "B"	WWD19	2	0	19	0
US-30 & WACONIA AVE/6TH ST SW	Parc-Lo "AB"	WWD09	3	4	18	4
IA-141 & IA-415	Parc-Lo "AB"	WWD40	1	2	19	0
US-30 & 19th St	Parc-Lo "AB"	WWD62	6	2	23	0
* Only the months where the WWD detection camera		Totals	16	12	131	6
detection camera was installed before signing added.						
			Before		After	
			WWD/Month		WWD/Month	
			0.76		0.05	
			94%	Decrease	Updated	1/17/2023

- Between 2010-2020, there were 36 WWD crashes associated with a Parclo "B" or "AB."
- January 1, 2021 to October 1, 2022, there have been 0 WWD crashes where the POE was from one of these 43 treated interchanges.

WWD Events Recorded using Video Analytics

- In Summer 2021, cameras with the ability to detect WWD were installed at 7 locations and record constantly.

- Adding all of the months where a camera was monitoring existing conditions and comparing to approximately 18 months of monitoring after enhanced signing was added shows a 93.9% decrease of WWD events.

93.9%↓
DECREASE IN WWD EVENTS

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Zac's Sign

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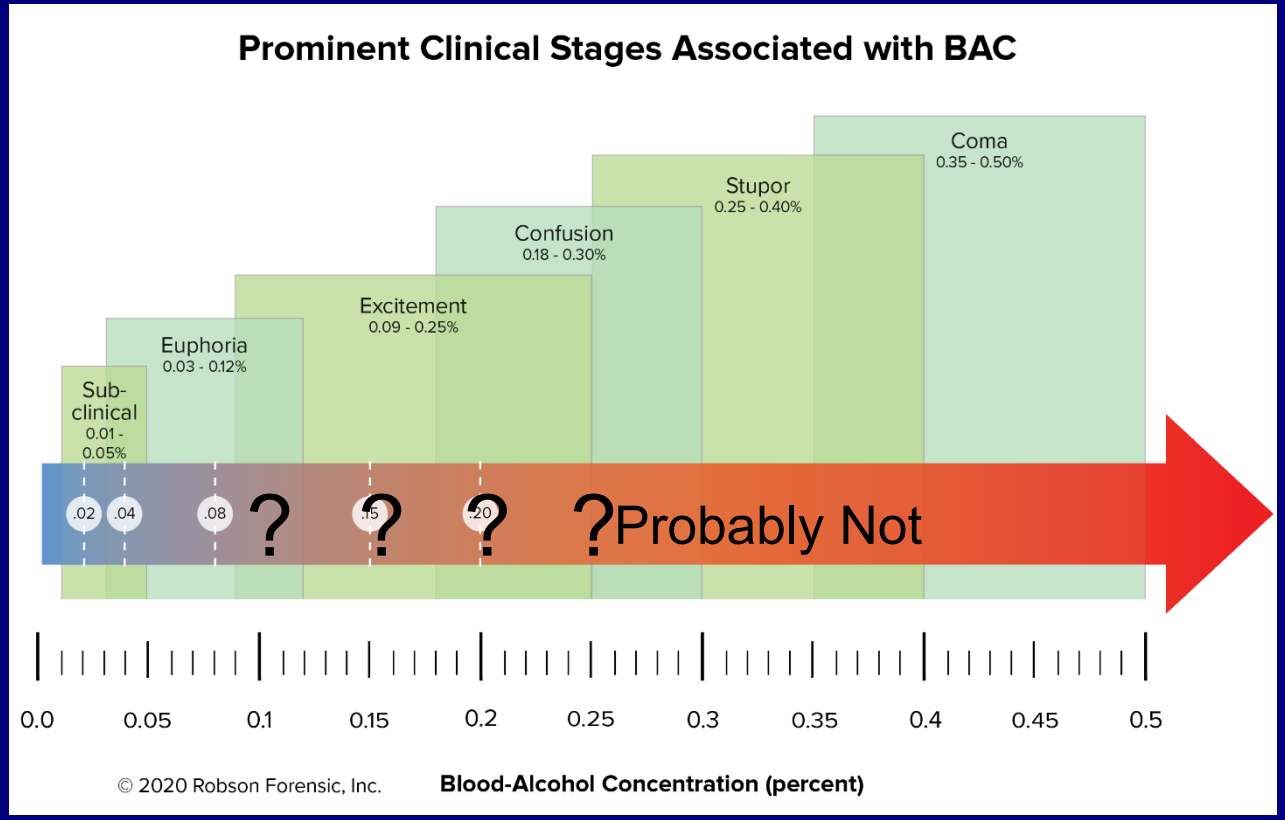
Hypothesis….

If you can solve the WWD problem for Daytime, non-drunks…. (85% that self correct)…. Will it reduce the nighttime intoxicated WWD problem, (the other 15%)?



Preliminary Results

(Interstates, Freeways & Expressways speed limit of 60, 65 or 70 MPH
Currently too hard to review 55 MPH highways)

- 2023 (as of 6/20) 10 crashes
  - Only 1 might have been at a location that had systemic countermeasures
  - BAC unknown
  - 4 with BAC (Average was 0.194)
- 2022 19 crashes
  - Only 4 may have been from a location with systemic countermeasures
  - Only 1 (of the 4) recorded a BAC. It was 0.144
  - 6 with a BAC (Average was 0.176)
- 2021 8 Crashes
  - None from a location with Systemic Countermeasures
  - 4 w/ a BAC (Average was 0.147)

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To wrap things up, there is 1 more thing that I'd like you to know and share with your family, friends and co-workers.




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Question and Answer Session

Thank you!

aii.transportation.org