NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: The Right Ways to Deter, Detect, and Prevent Wrong Way Driving

September 17, 2024

12:00 – 1:30 PM

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.

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Purpose Statement

This webinar will share practitioners' experiences with wrong-way driving and solutions including deployment of effective countermeasures. Presenters will discuss changes to the U.S. Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD).

Learning Objectives

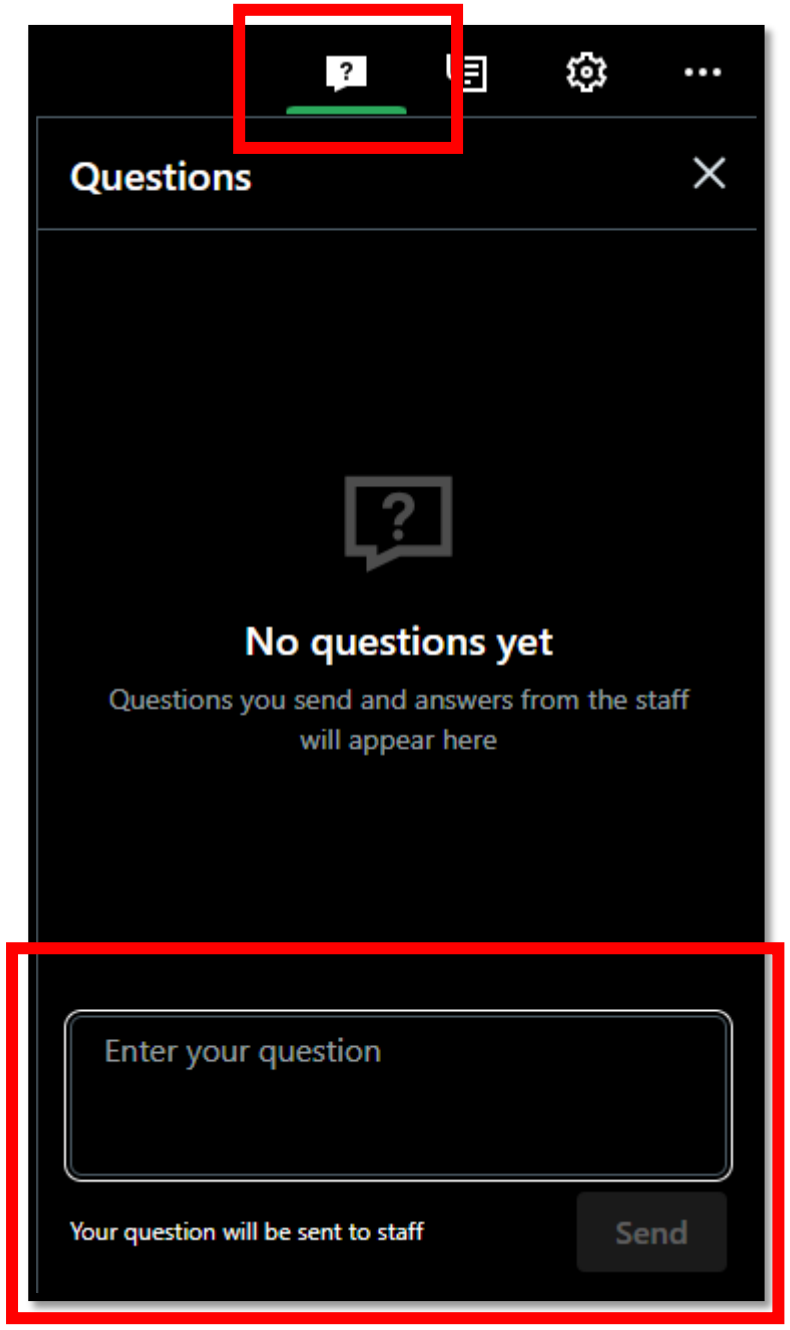
At the end of this webinar, you will be able to:

(1) Identify factors that play into wrong way driving and how technology and other improvements can help in providing solutions

(2) Implement countermeasures from real-world deployments and experiences

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



NCHRP Project 03-117 and Related MUTCD Changes

Melisa D. Finley, P.E.
Texas A&M Transportation Institute (TTI)

September 17, 2024

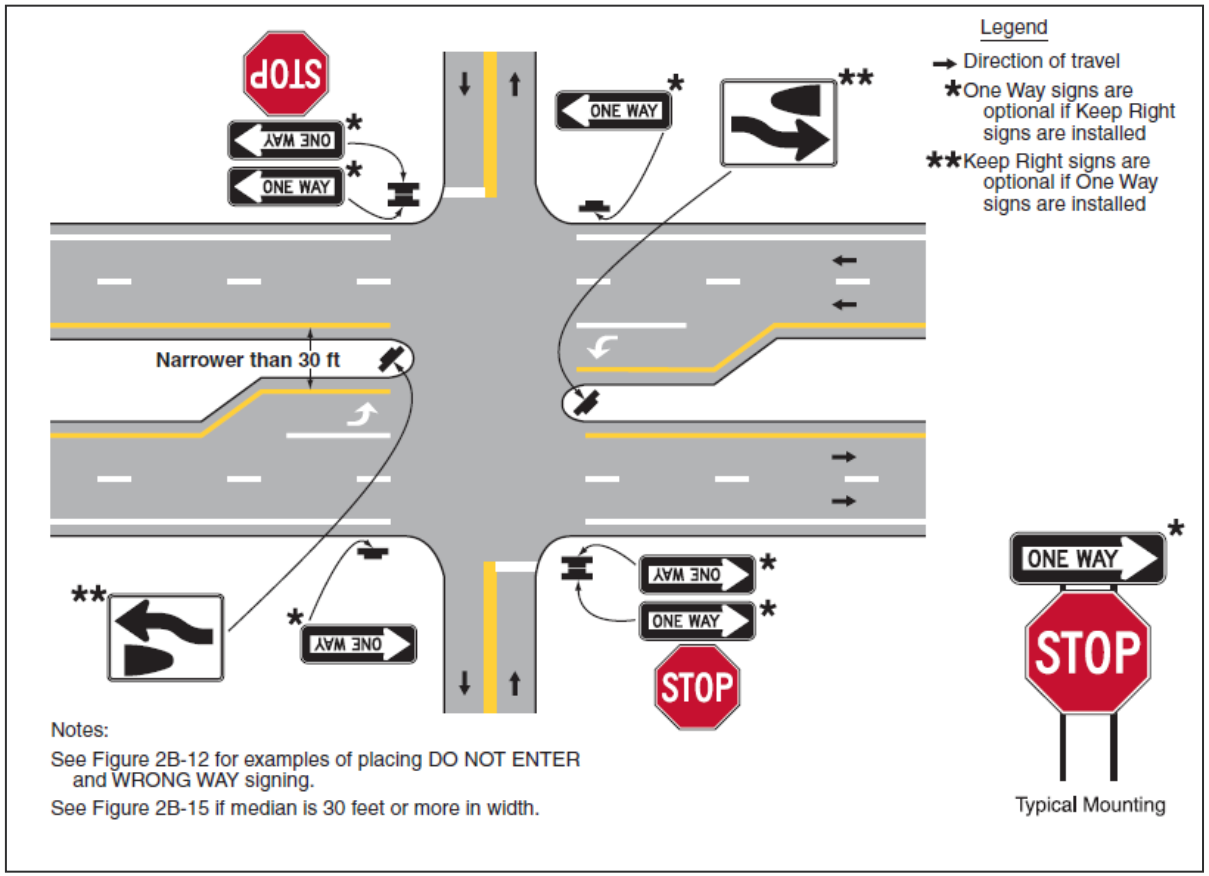
NCHRP Project 03-117

- Conducted in 2015–2018 by TTI and UCF
- Main objectives
  - Examine characteristics of wrong-way crashes on high-speed, divided highways
  - Determine the impact of median width and select traffic control devices on their occurrence

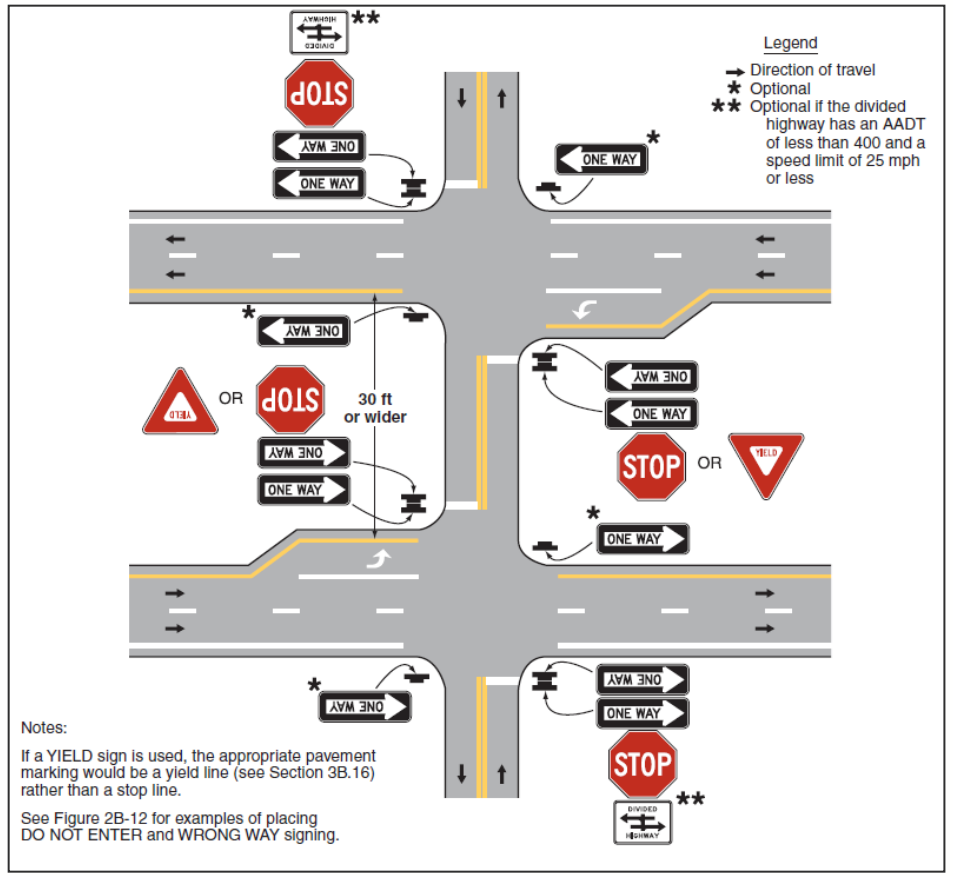
Source: TTI

Source: TTI

2009 MUTCD Median Width Threshold



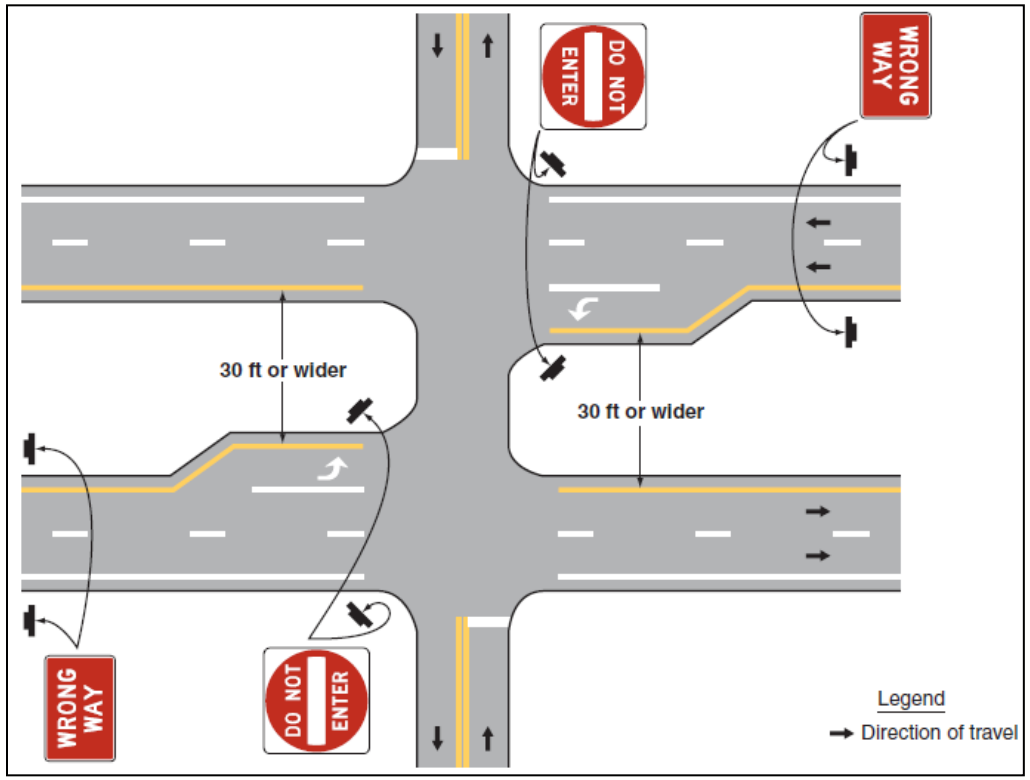
Source: 2009 MUTCD, FHWA



Source: 2009 MUTCD, FHWA

2009 MUTCD
DO NOT ENTER and WRONG WAY signs

- Figure 2B-12 only for median widths ≥ 30 ft and does not indicate required versus optional signs
- Ambiguity surrounding side of road for DO NOT ENTER and WRONG WAY signs



Source: 2009 MUTCD, FHWA

High-Speed Divided Highway Multistate Dataset

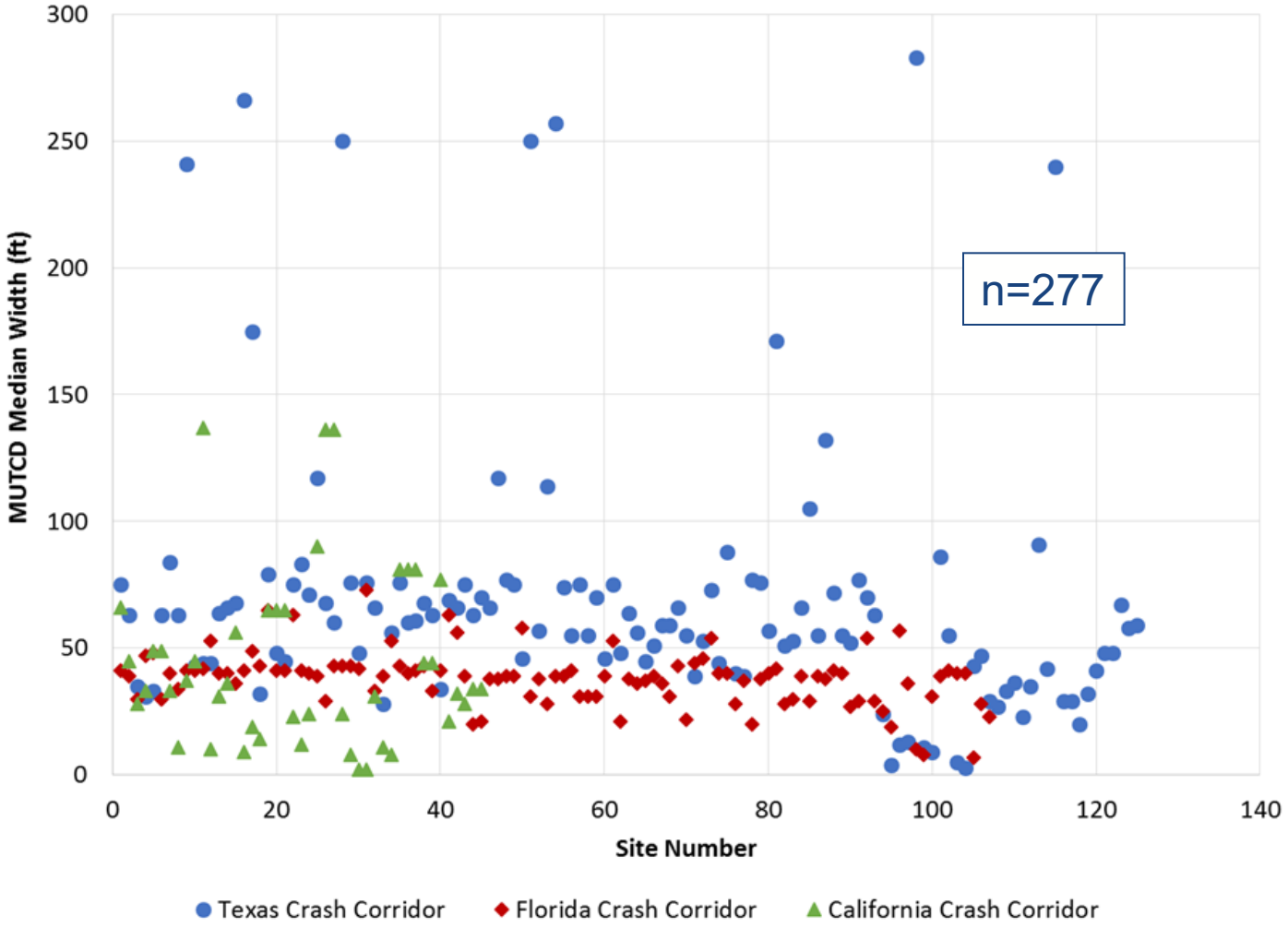
Area	Texas (2012-2014)	Florida (2010-2013)	California (2008-2011)	Overall
Number of Wrong-Way Crashes				
Urban	66	101	28	195
Rural	117	59	38	214
Total	183	160	66	409
Number of Wrong-Way Corridors				
Urban	57	94	21	172
Rural	111	48	27	186
Total	168	142	48	358
Number of Control Corridors				
Urban	57	93	42	157
Rural	65	44	7	151
Total	122	137	49	308

Exploratory Analysis Results

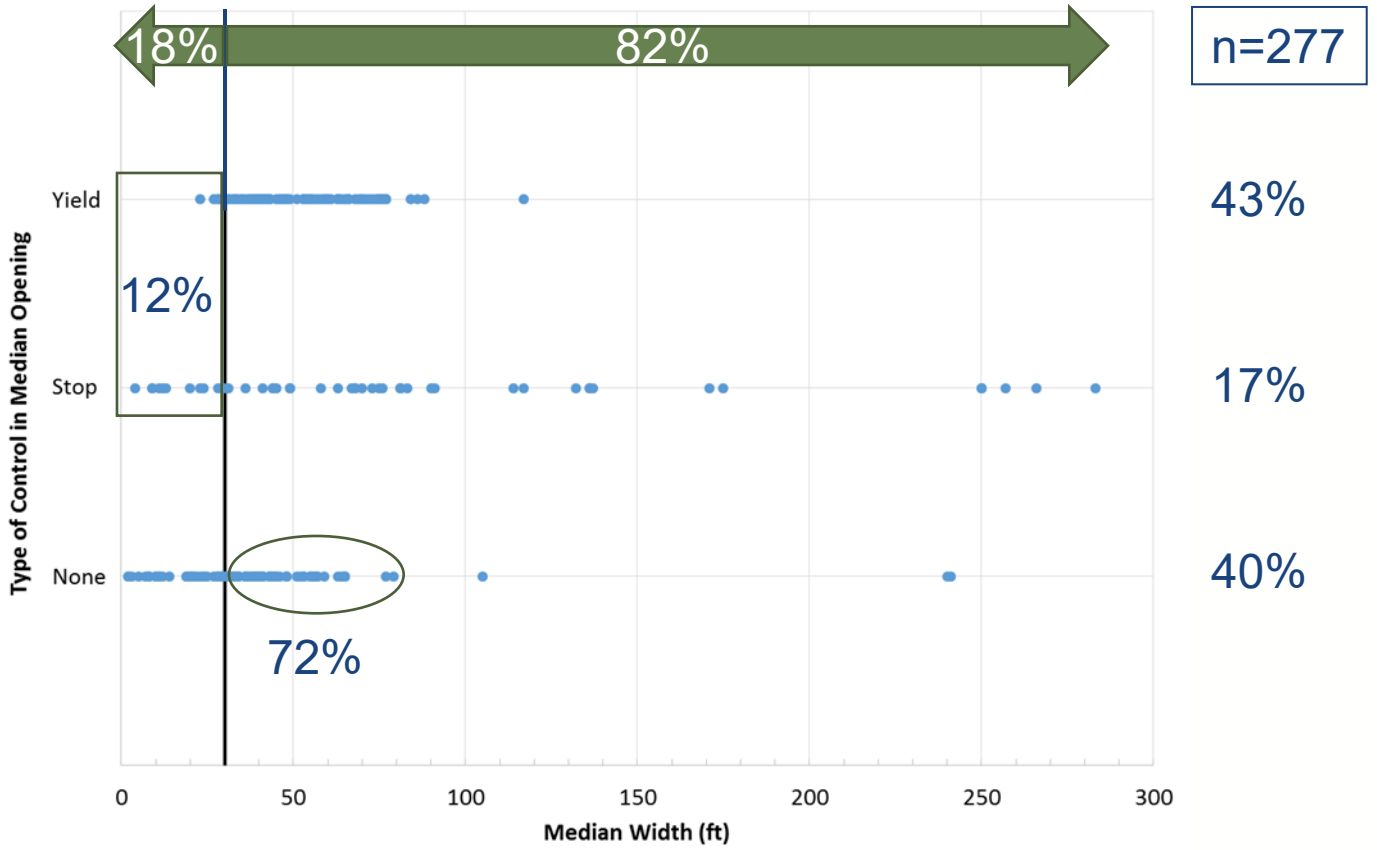
- 54% of crashes resulted in serious injury
- 62% of crashes occurred at night

Intersection Type	Wrong-Way Entry Points (n=409)
At-grade with Median Opening	68%
At-grade without Median Opening	17%
Ramp	8%
Median Opening Only	7%

Median Width at Wrong-Way Entry Points with Median Openings



Type of Control in Median Opening at Wrong-Way Entry Points



Overview of Methodology

- Focused on high-speed, four lane divided highways with median openings at intersecting roadways (median width ≤ 120 ft)
- Defined response variable as the probability of wrong-way crashes
- Developed 4 logistic regression models to characterize the relationship with potential explanatory variables as changes in odds of a wrong-way crash occurring
  - Rural – all wrong-way crashes
  - Rural – nighttime wrong-way crashes
  - Urban – all wrong-way crashes
  - Urban – nighttime wrong-way crashes

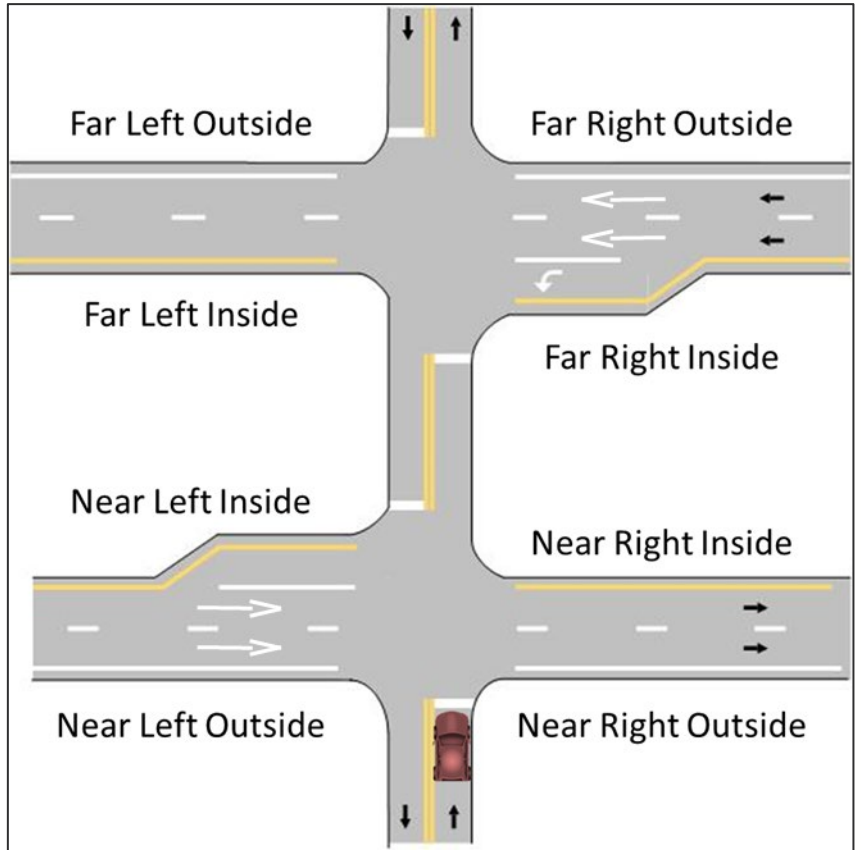
Crash Correlation to Median Width

Dependent upon presence of control in median opening

Control in Median Opening	Change in Wrong-Way Crash Odds Based on Median Width
 or 	None
None	Increased by a multiplicative factor for every additional 10 ft of median width

Traffic Control Devices Found to Reduce Odds of Wrong-Way Crashes

- DO NOT ENTER sign on near left inside and far right inside
- WRONG WAY sign on near left inside and far right inside
- ONE WAY signs on near right outside, near left inside, far right inside, and far left outside
- Wrong-way arrow markings in through lanes
- Centerline in median opening
- Stop or yield line in median opening



Source: TTI

Overview of MUTCD Suggestions

- Median width
  - 30-ft separation criterion appears to be without justification
  - New method for distinguishing between separate and single intersections
- Traffic control devices
  - Revisions to text and figures in several sections in Chapter 2B
  - Add new section for wrong-way traffic control at divided highway intersections

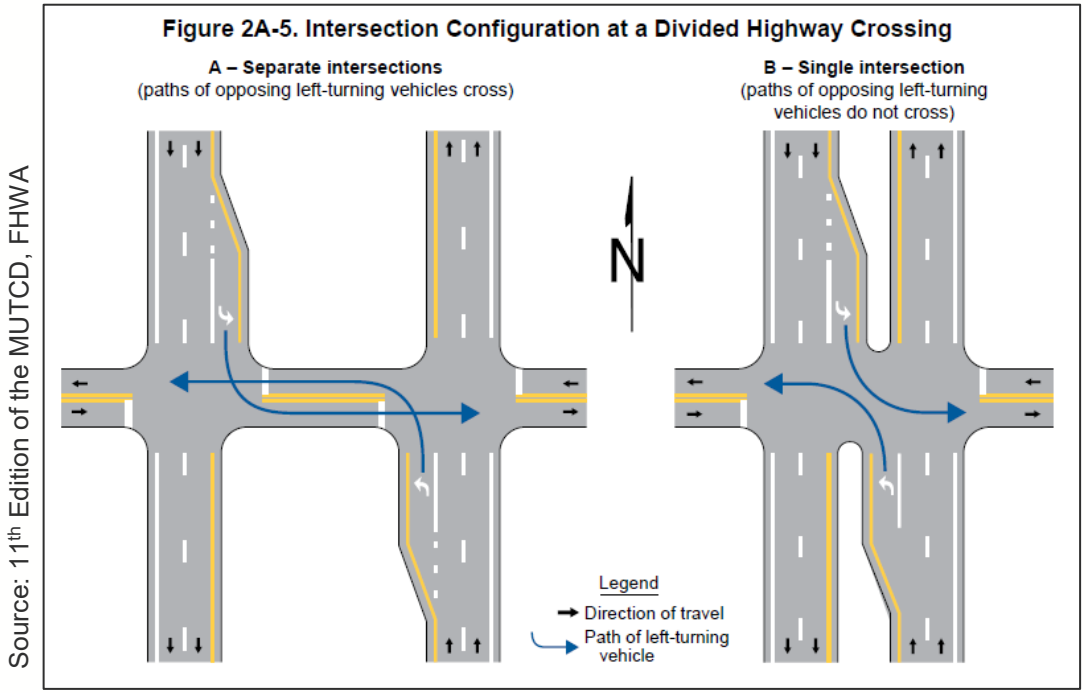
Related Changes in the 11th Edition of the MUTCD (1/5)

- Section 1C.02 Definitions of Words and Phrases Used in this Manual
  - Revised definition of intersection

    113. Intersection–intersection is defined as follows:

    (c) **If a highway includes two roadways separated by a median, then every crossing of each roadway of such divided highway by an intersecting highway shall be a separate intersection if the opposing left-turn paths cross and there is sufficient interior storage for the design vehicle (see Figure 2A-5).**
  - Revised definition of median

    137. Median–**the portion of a highway separating opposing directions of the traveled way** or the area between two roadways of a divided highway measured from edge of the traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges, and at opposite approaches of the same intersection.



Related Changes in the 11th Edition of the MUTCD (2/5)

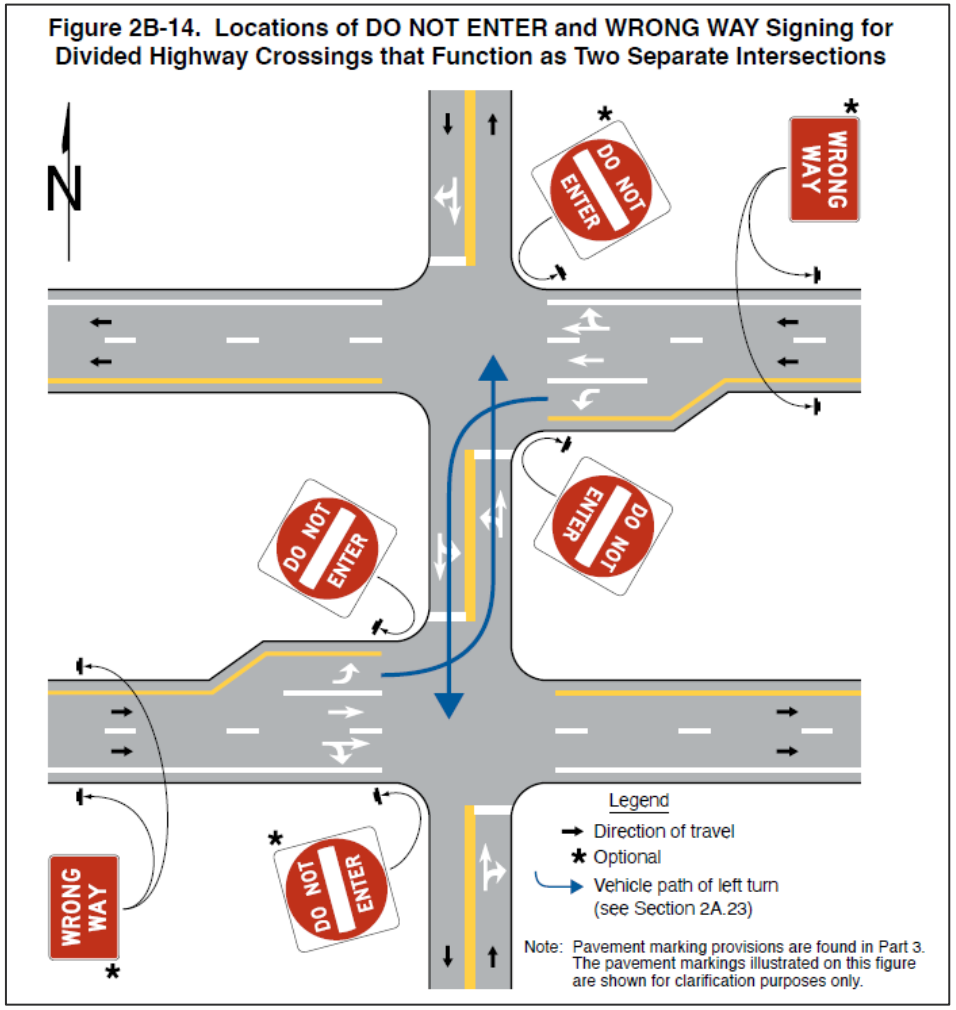
- Section 2A.23 Median Opening Treatments for Divided Highways
  - Removed Guidance that referenced 30 ft criterion
  - Added information about determining if separate intersections or single intersection
- Section 2B.39 Keep Right and Keep Left Signs (R4-7 Series and R4-8 Series)
  - Added Option to install in the median of a divided highway crossing that functions as a single intersection
  - References Figure 2B-20 and Section 2B.49

Related Changes in the 11th Edition of the MUTCD (3/5)

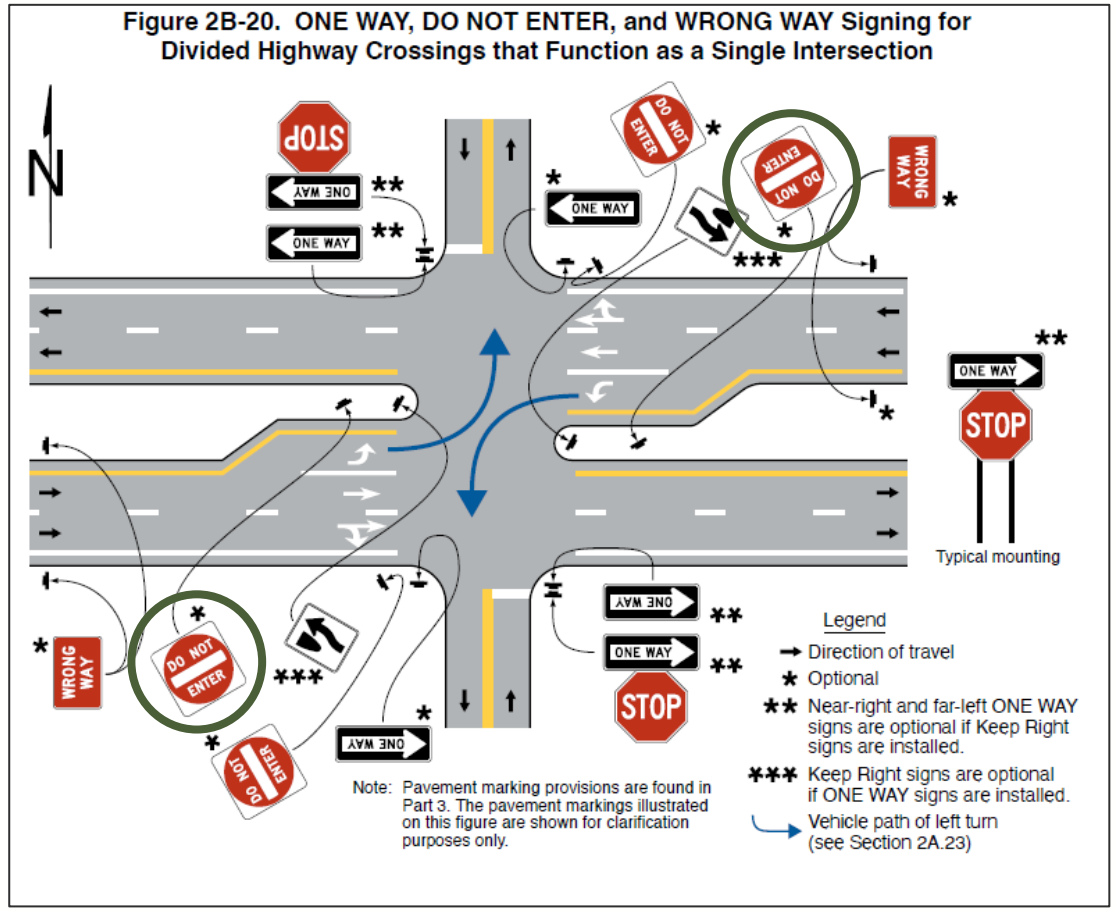
- Section 2B.46 DO NOT ENTER Sign (R5-1)
  - Added Standard for use on divided highways were the crossing functions as two separate intersections
  - Removed references to the right- and left-hand side of the road
  - Added Guidance for use on a divided highway that functions as a single intersection
  - Denoted required and optional signs in figures
- Section 2B.47 WRONG WAY Sign (R5-1a)
  - Added Guidance about placing on the same side of the road as R5-1 sign
  - Denoted optional signs in figures

Related Changes in the 11th Edition of the MUTCD (4/5)

Source: 11th Edition of the MUTCD, FHWA

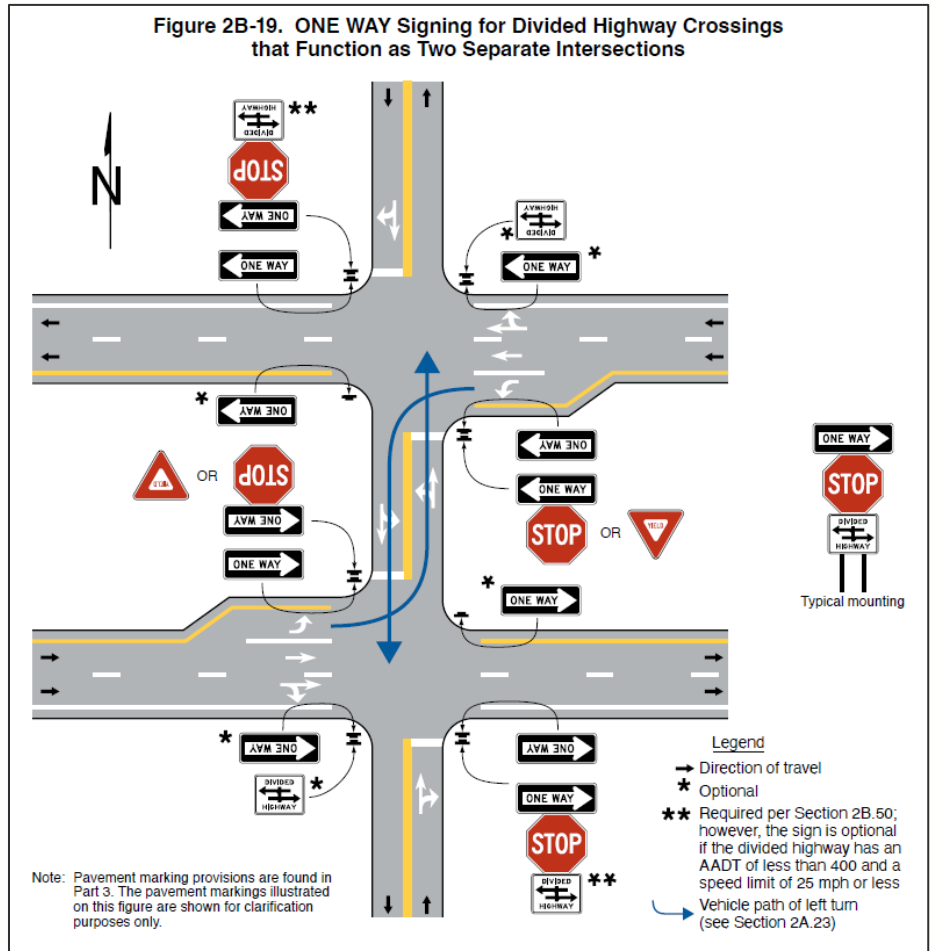


Source: 11th Edition of the MUTCD, FHWA



Related Changes in the 11th Edition of the MUTCD (5/5)

- Section 2B.49 ONE WAY Signs (R6-1 and R6-2)
  - Removed Standard language that referenced 30-ft criterion and replaced with language about separate intersections or single intersection
  - Updated figures to reflect changes



Texas A&M Transportation Institute

Final report available at
http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3856

Transportation Research Record: Journal of the Transportation Research Board Paper available at
https://doi.org/10.1177/0361198119841853

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CENTRAL FLORIDA EXPRESSWAY AUTHORITY

CFX's Wrong Way Driving Program

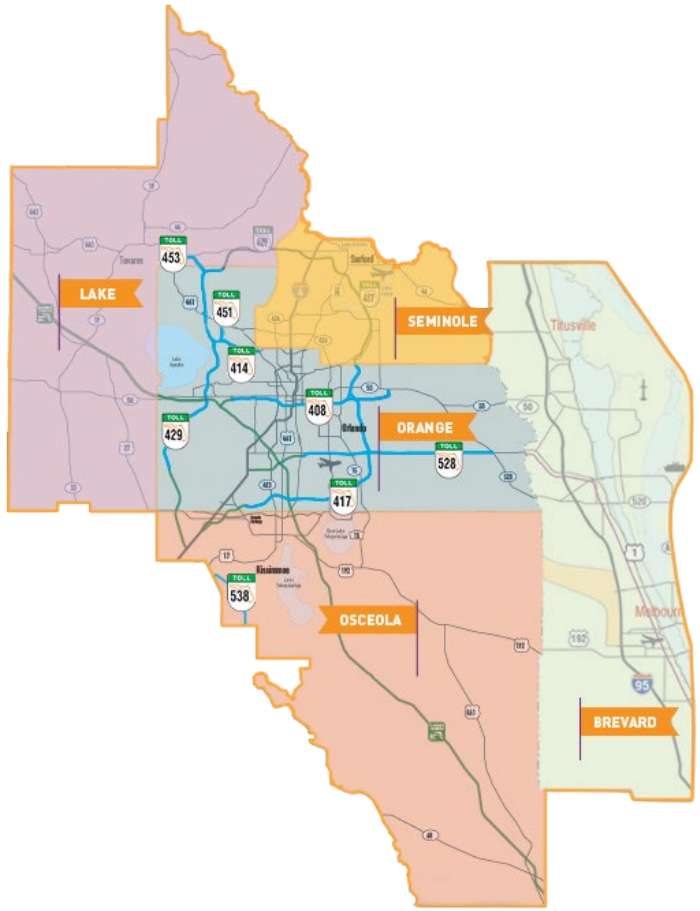
Bryan Homayouni | Director of Intelligent Transportation Systems

— September 17, 2024 —

About CFX

The Central Florida Expressway Authority (CFX) was established in 2014 with an expanded mandate to build and maintain a regional transportation network that connects Brevard, Lake, Orange, Osceola and Seminole counties.

- Over 75 million visitors annually
- Average of 1.5 million toll transactions every day
- 125 centerline miles, 933 lane miles (including ramps), 73 interchanges, 369 bridges, 19 mainline toll facilities



Agency Coordination

UCF

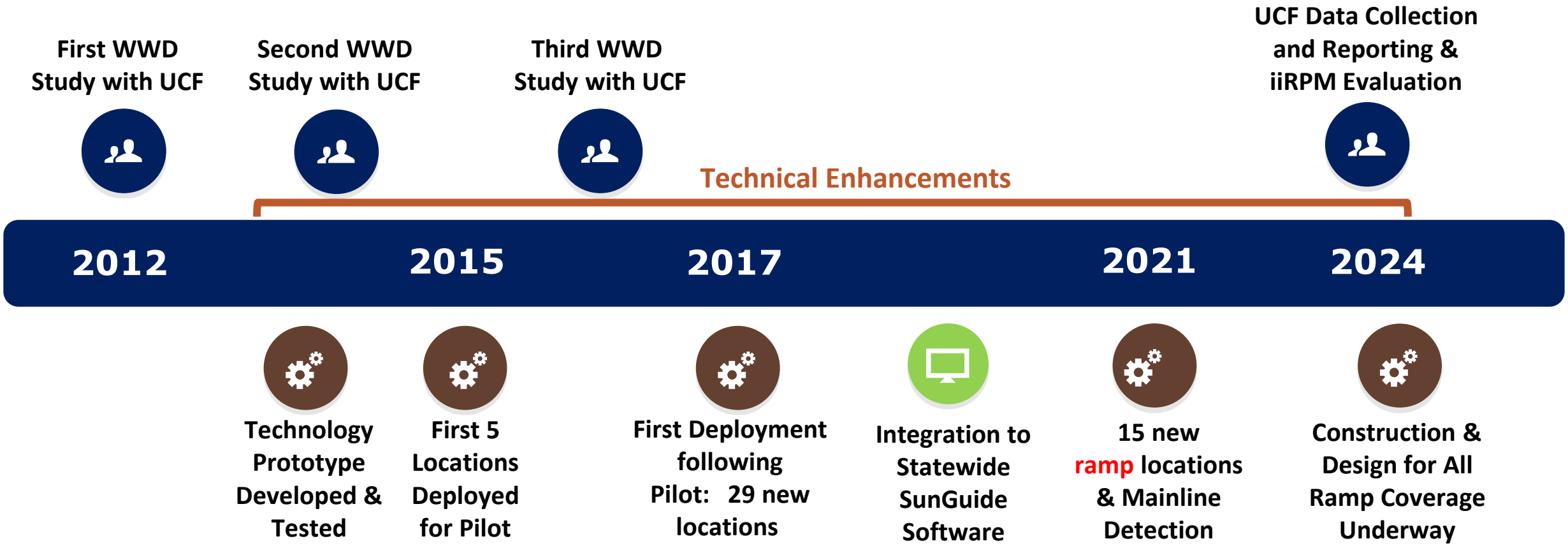
U.S. Department of Transportation
Federal Highway Administration

FDOT

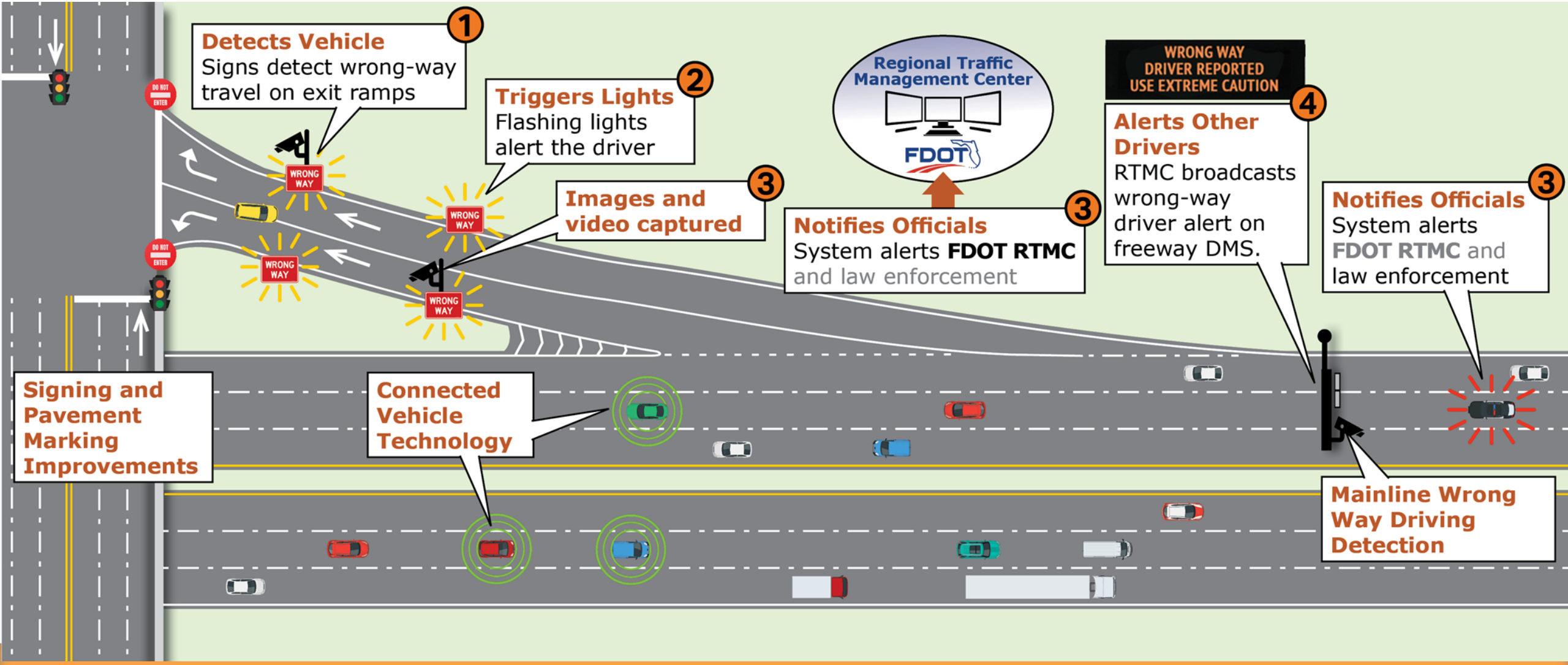
HIGHWAY PATROL
FLORIDA

NCHRP
NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

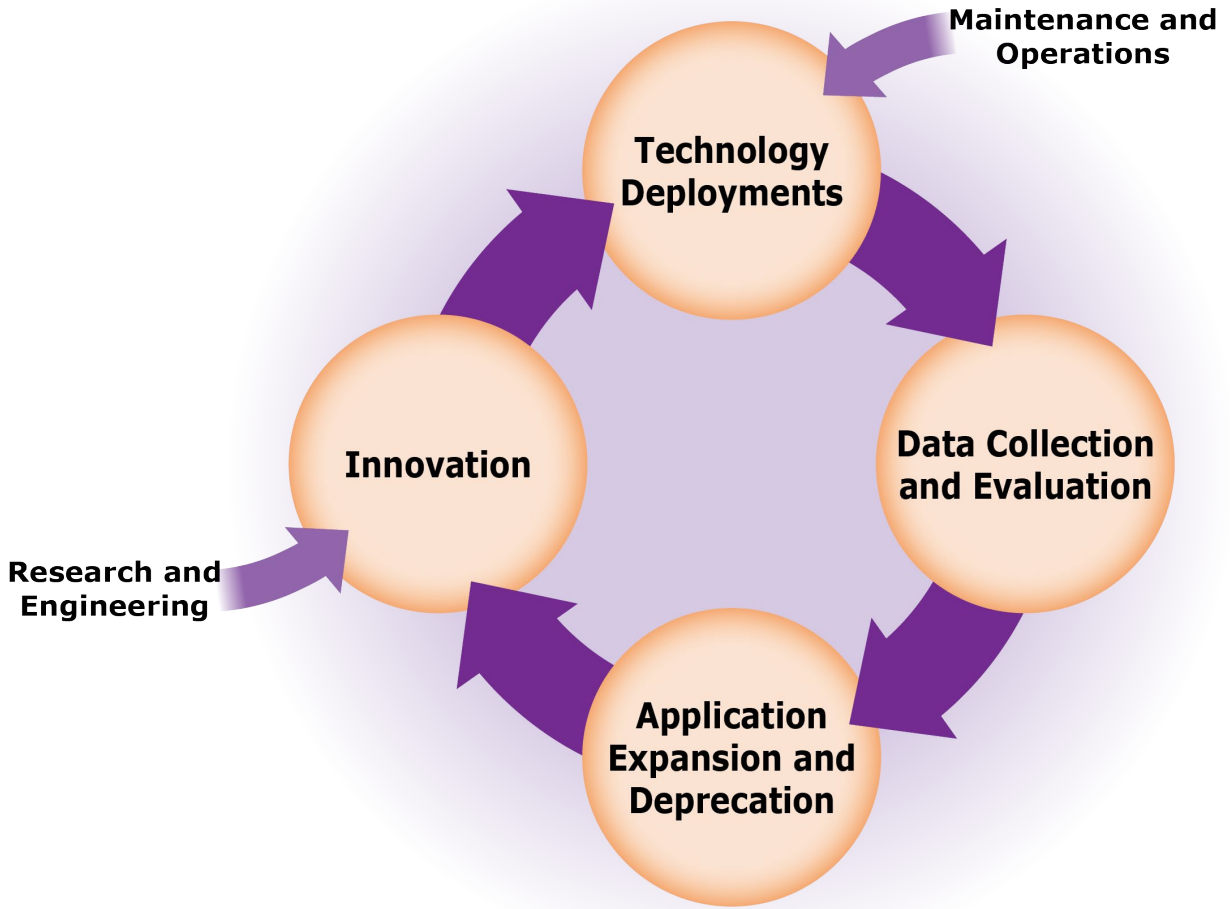
Program Timeline



Wrong-Way Driving System Components



Deployment Lifecycle

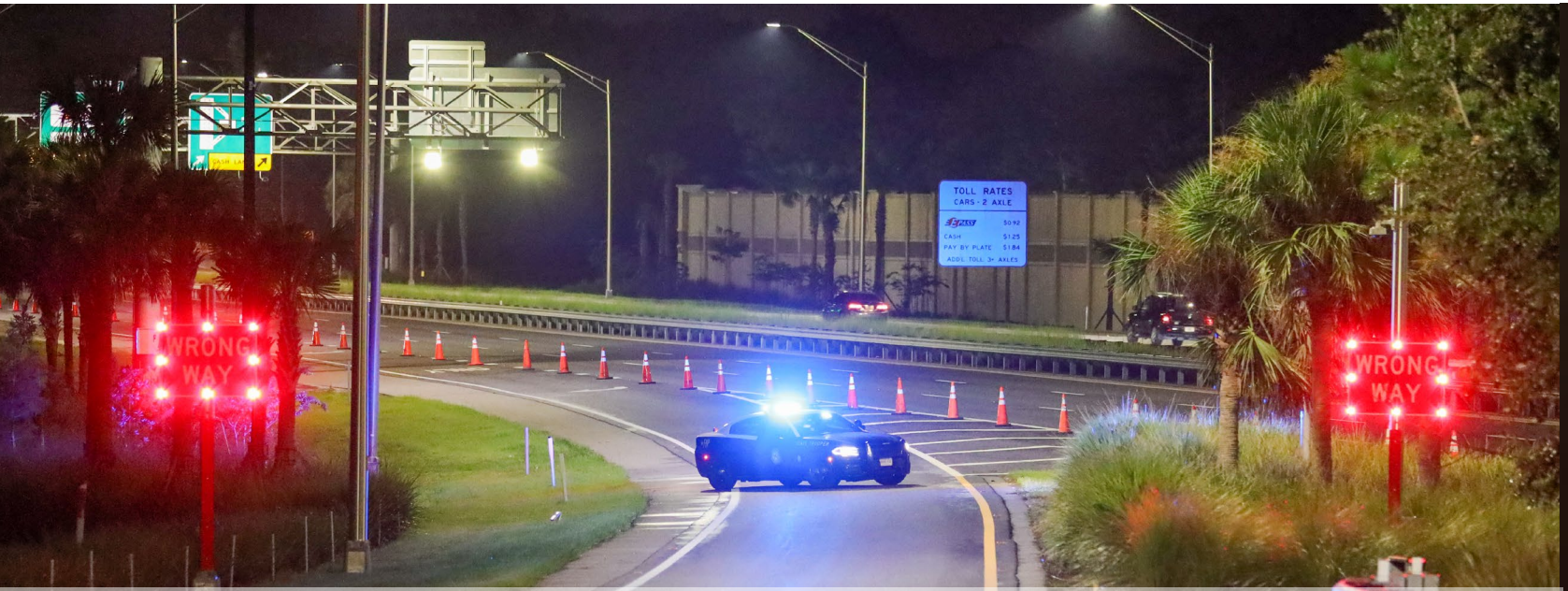


Wrong-Way Reporting

Current Reports show we have an 88.1 % documented turn around rate for WWD system detections using the RFB and LED technologies.

Period Covered	Total WWD Detections	Documented Turn Arounds
June 2024	**39**	**34**
Feb 2015 – June 2024	**2114**	**1863**

CFX Improvements: Red RFB and LED



From Feb 2015 – April 2024

1,813 WWD Detections
(RFB Sites)
1,598 Documented Turnarounds
(RFB Sites)
88 Turnarounds %
(RFB Sites)

232 WWD Detections
(LED Sites)
203 Documented Turnarounds
(LED Sites)
88 Turnarounds %
(LED Sites)

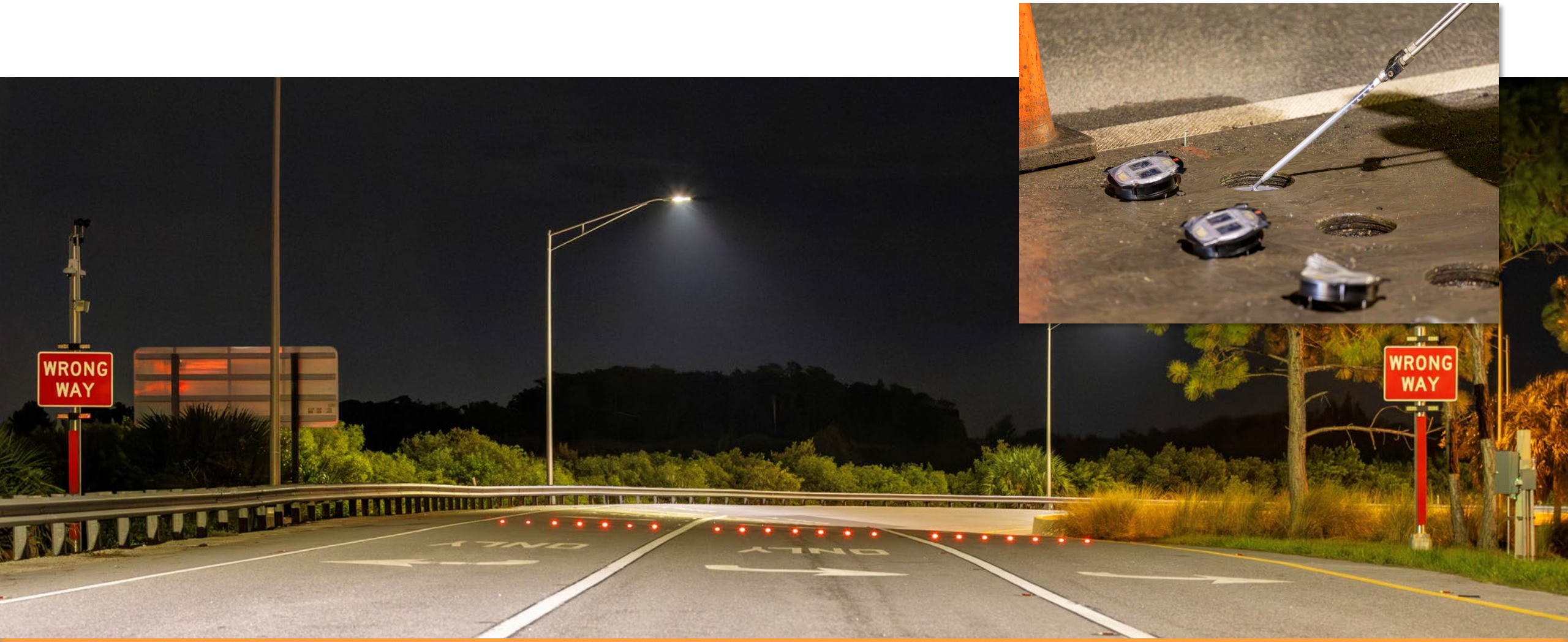
CENTRAL FLORIDA EXPRESSWAY AUTHORITY


WRONG
WAY

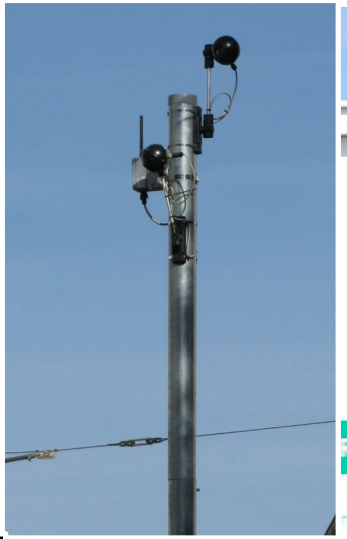

WRONG
WAY


WRONG
WAY
WRONG
WAY

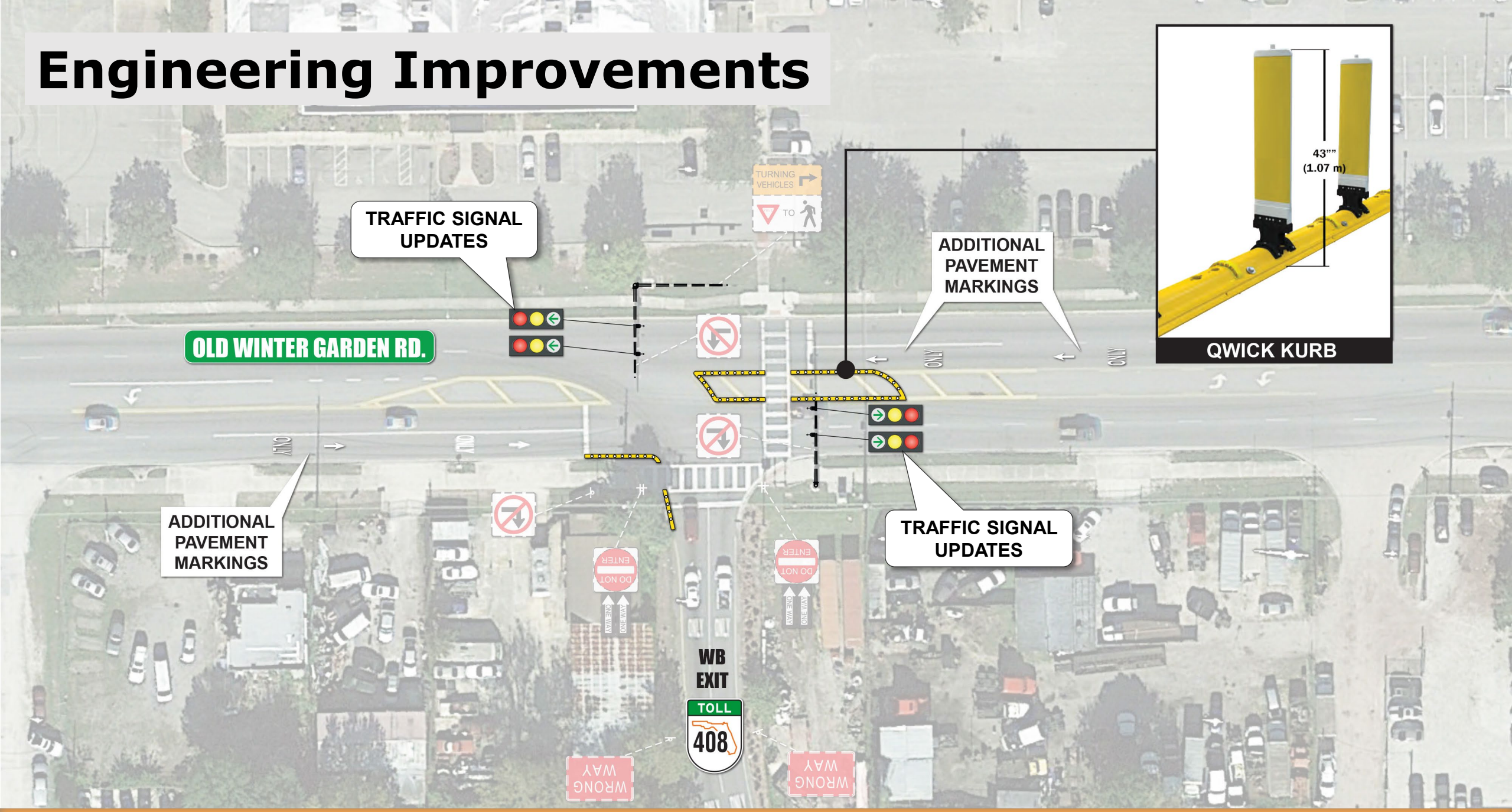
Internally Illuminated Raised Pavement Markers (iiRPM)



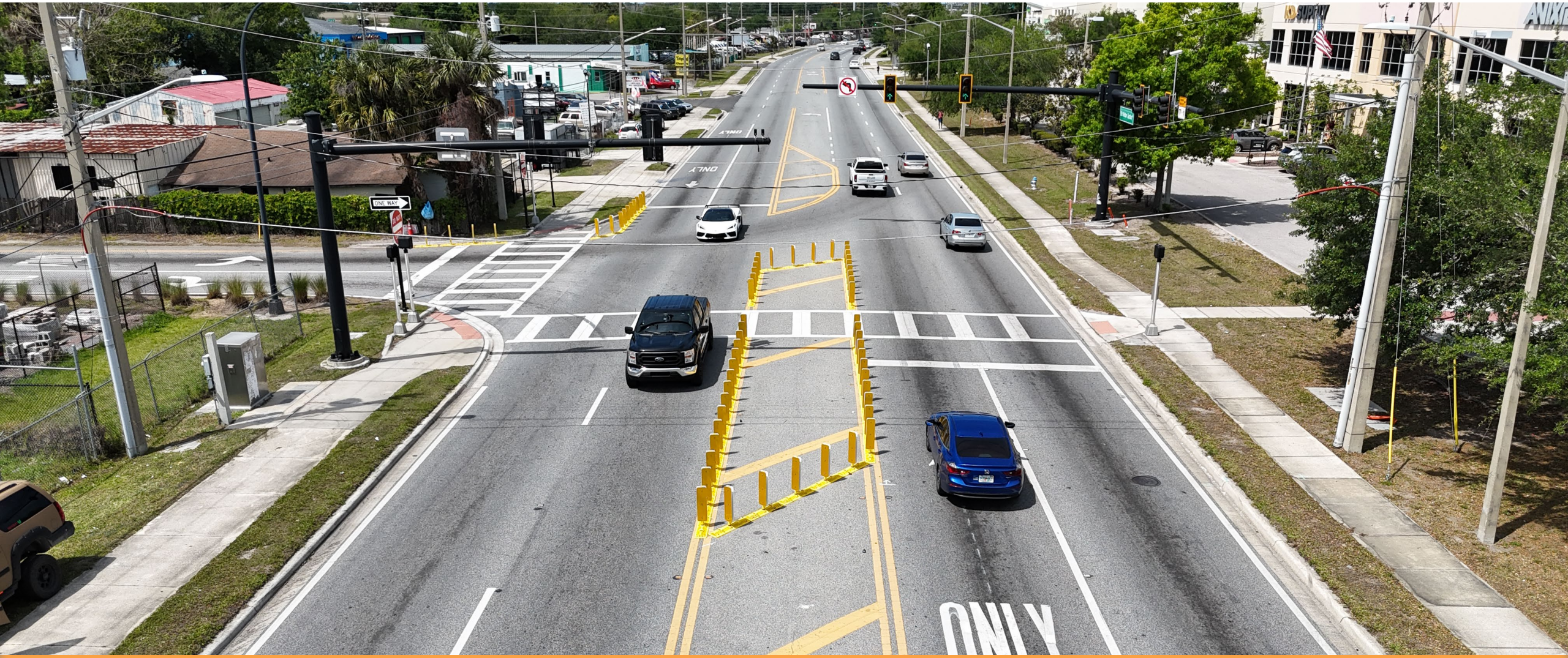
WWD Detection Technologies



Engineering Improvements



Engineering Improvements

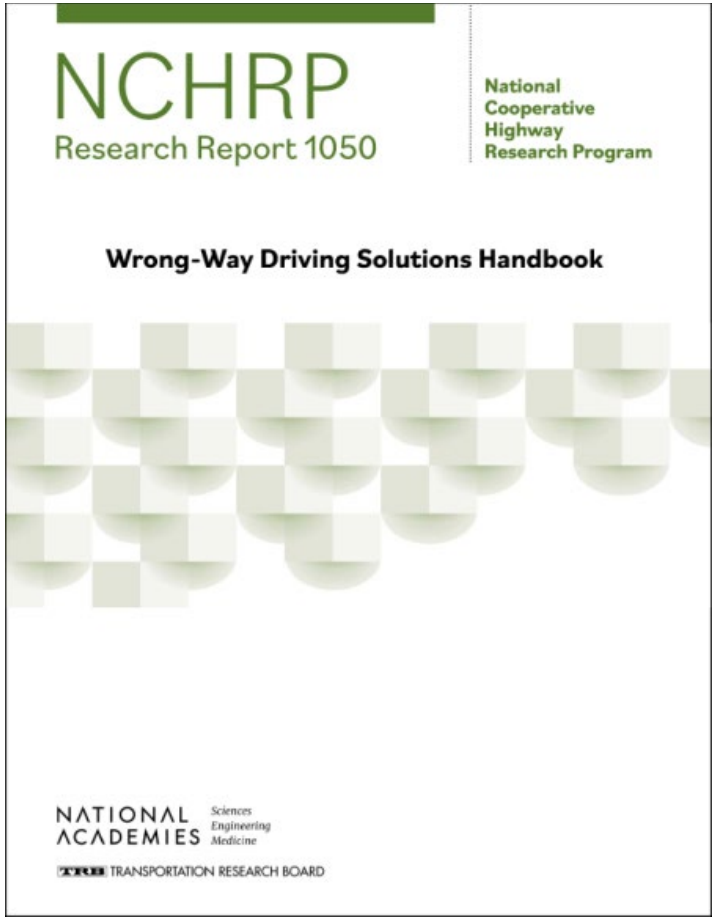


NCHRP Research and Guidance

Published in 2023

Includes:

- Data Analysis and Network Screening Methods
- Signs, Pavement Markings, and Traffic Signals
- Advanced Technologies
- Geometric Design Elements
- Evaluation of Countermeasure Effectiveness
- Enforcement and Education



CENTRAL FLORIDA EXPRESSWAY AUTHORITY

Upcoming events for you

September 23, 2024

TRB Webinar: Progress and Opportunities for In-Vehicle Impairment Detection

October 17, 2024

TRB Webinar: Transformational Technologies and Mobility Inclusion

https://www.nationalacademies.org/trb/events

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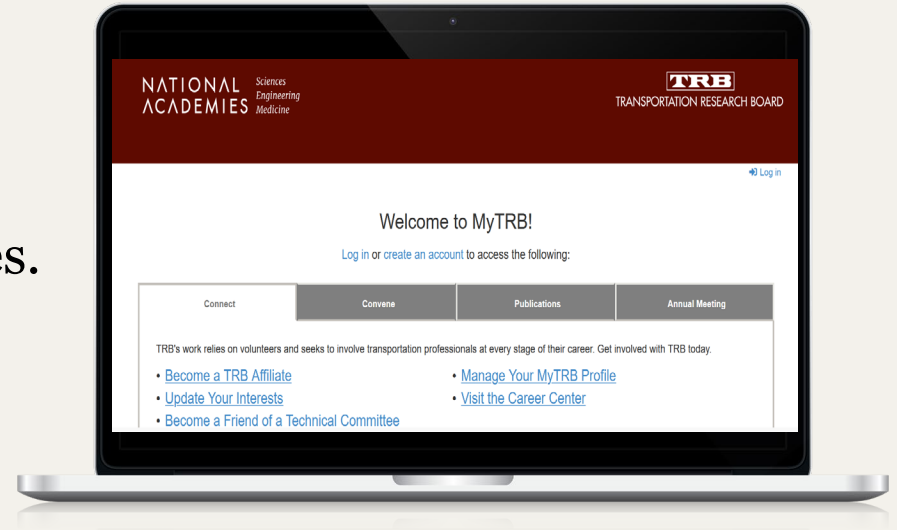

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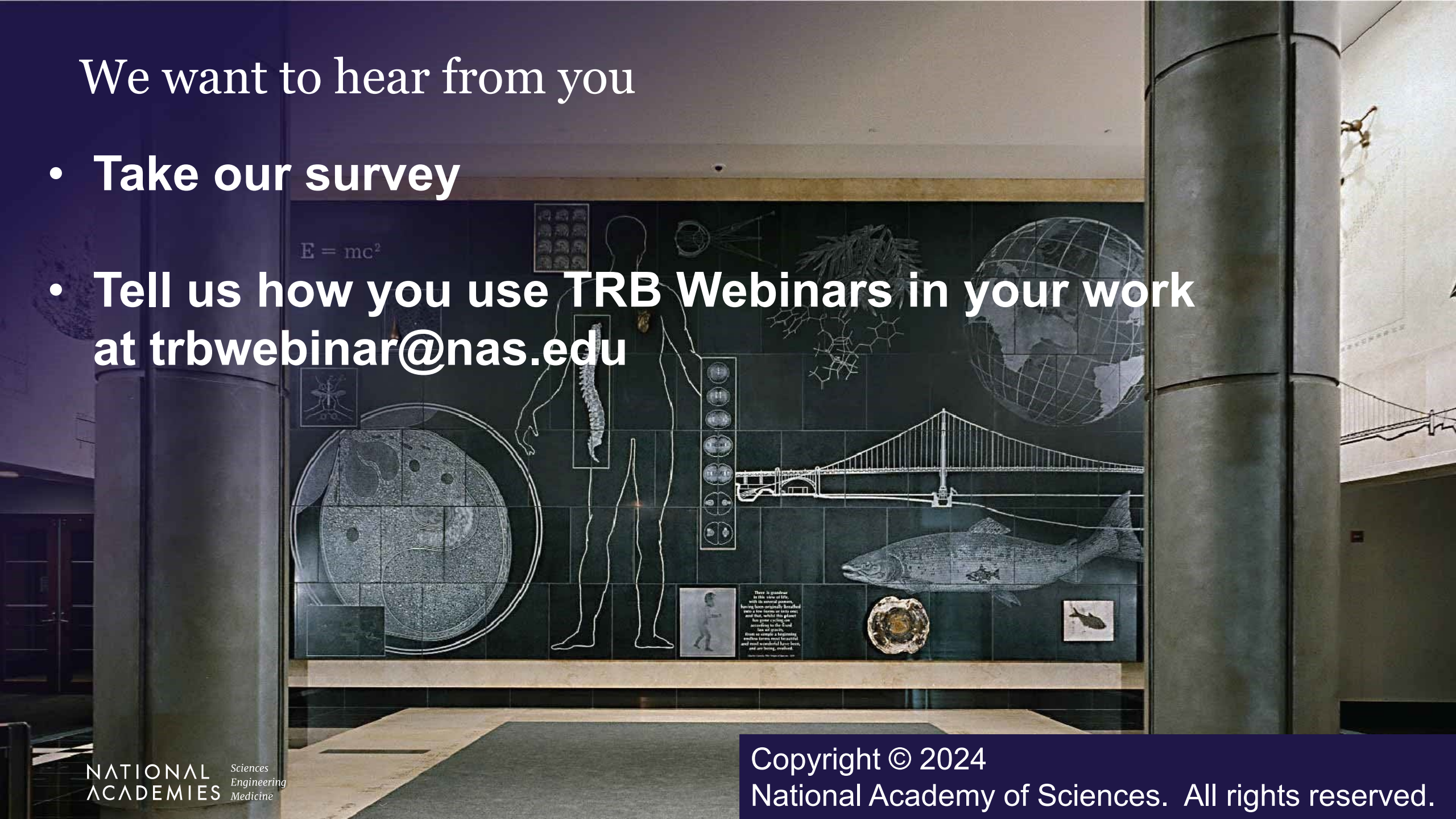

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