CENTRAL FLORIDA TSM&O CONSORTIUM MEETING SUMMARY

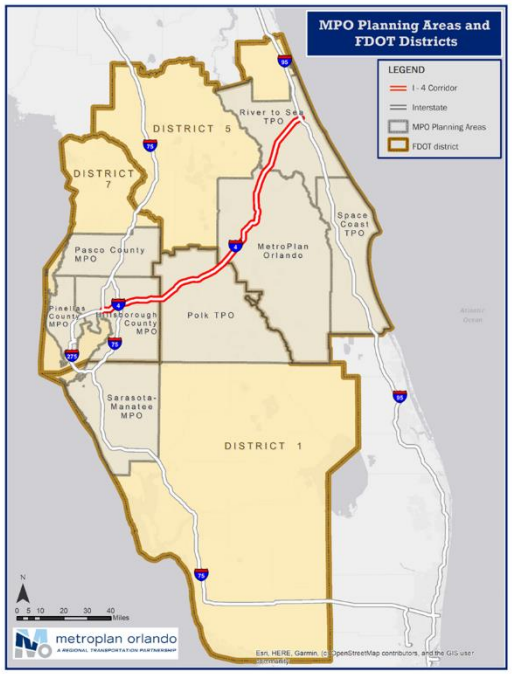
Meeting Date:	October 20, 2022 (Thursday)	**Time**: 10:00 AM – 12:00 PM
Subject:	TSM&O Consortium Meeting	
Meeting Location:	Teleconference	

I. OVERVIEW

The purpose of this recurring meeting is to provide an opportunity for District Five FDOT staff and local/regional agency partners to collaborate on the state of the TSM&O Program and ongoing efforts in Central Florida. Jeremy Dilmore gave a short introduction and outlined the meeting agenda.

II. REGIONAL TSM&O PROGRAM

Eric Hill gave a brief update on the Regional TSM&O Program (RTSMOP).



- Comprised of 8 MPOs & TPOs within Districts 1, 5, and 7
- Accomplishments so far:
  - MOU
  - Working Group
  - State Transportation Innovation Council (STIC) Award
  - National Institute on Congestion Reduction (NICR) Grant
  - Peer Exchange
- Most of the M/TPOs have approved execution of the final MOU
- Goals & Objectives of the RTSMOP
  - Coordination between staff
  - Mainstream TSMO
  - Develop culture/champion
  - Showcase TSMO projects
- Under the NICR Grant, a literature review was completed and a *Framework for a Regional TSMO Program and Equity Consideration* was developed
- The Framework identified the need for a Strategic Plan
- The peer program was comprised of MPOs and coalitions from across the funded by the NICR Grant
  - Eastern Transportation Coalition (TETC)

  - I-10 Coalition
  - Niagara International Transportation Technology Coalition (NITTEC)
  - Atlanta Regional Commission (ARC)
  - North Central Texas Council of Governments (NCTCOG)
  - Denver Regional Council of Governments (DRCOG)
  - Oregon Metro
  - Smart North Florida
- Consensus from the MPO directors was achieved on developing the Strategic Plan

- Discussion:
  - Mike Woods – it is on the Lake-Sumter MPO agenda for approval to join the Regional TSMO Program
  - Rob Balmes – will bring this to the Ocala/Marion TPO Board for approval in November

III. CFMPOA PRIORITY LIST

Eric Hill gave a brief update on the Central Florida MPO Alliance (CFMPOA) Priority List.

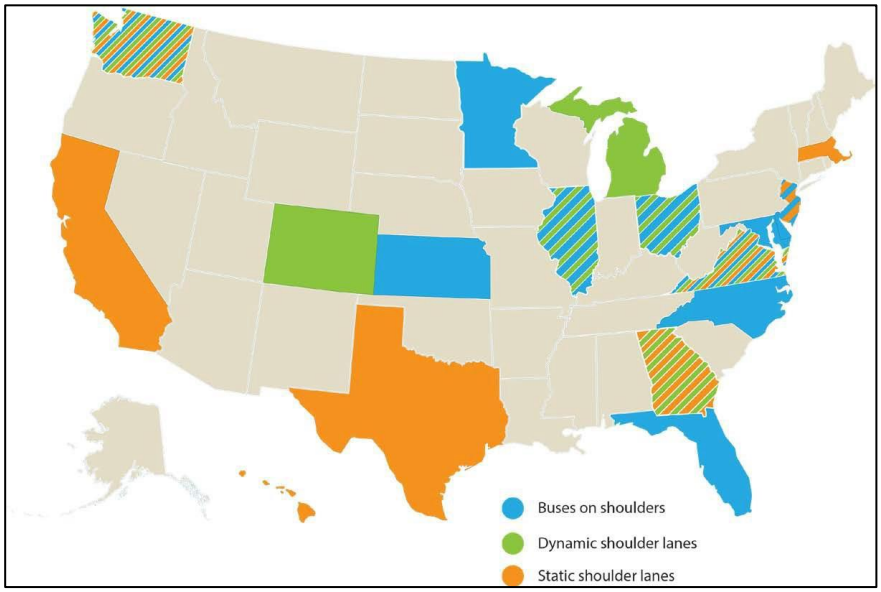
- Previously gained acceptance from CFMPOA on definition of a regional TSMO project; also developed process for identifying regional TSMO project
  - will present the process for identifying regional TSMO projects to the CFMPOA in early 2023 for approval

IV. PART-TIME SHOULDER USE PROJECTS

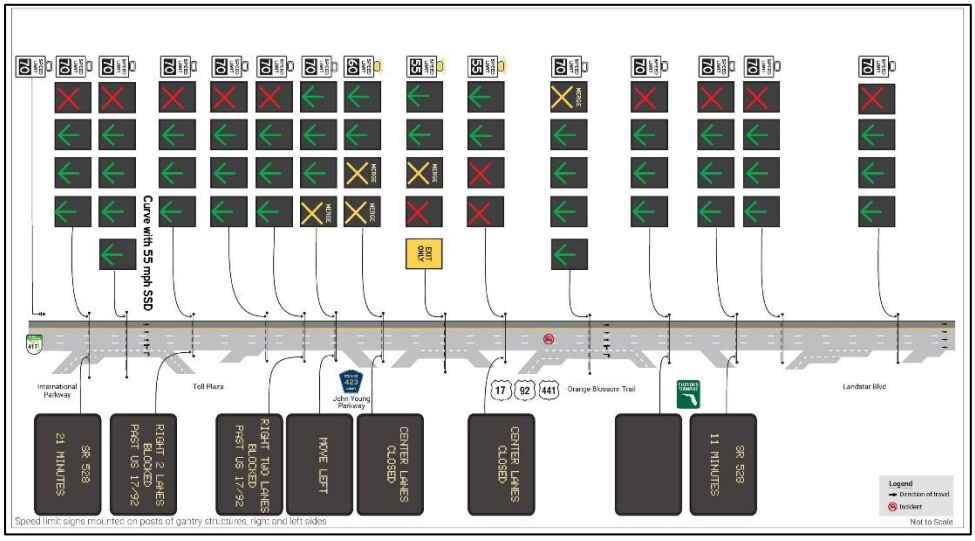
Bryan Homayouni presented on recent Central Florida Expressway Authority (CFX) Part-Time Shoulder Use (PTSU) projects.

- SR 417/SR 429 widening
  - 5 projects on SR 417
  - 3 projects on SR 429
  - both facilities being widened to include
    - 3rd full-time/regular lane
    - 19' Left Shoulder (12' for PTSU, 7' for full-time shoulder)
    - concrete median barrier
    - right shoulder stays the same
- PTSU
  - use of the left or right shoulders of an existing roadway for travel during certain hours of the day
  - first deployed in the United States in 1970
  - also called "Hard Shoulder Running"
  - Branded names like *Flex Lane*, *Smart Lane*, *Smart Road*, etc.
  - types of PTSU include:
  - bus-on-shoulder (BOS)
  - static PTSU – open to users during predetermined hours of operations

- dynamic PTSU – open to users based on need and real-time conditions
- 18 states of at least one form of PTSU
    - in Florida, Miami-Dade Transit has operated BOS on SR 874 and SR 878
        - Pinellas Suncoast Transit Authority has operated BOS on I-275 since 2021



- SR 417 and SR 429 PTSU will have dynamic signs over all lanes and left shoulder; signs approximately half-mile apart, controlled from FDOT District 5 RTMC
- 19' shoulder will be wider than any current PTSU facility



- The PTSU will place vehicles closer to median barrier, so speeds will be reduced slightly
- The PTSU will provide benefits to Fire/EMS response
    - very wide left shoulders
    - reinforcement of lane closures through red X's
    - additional flexibility to manage traffic during incidents
    - display of symbol or message to support "move over" law

        - used hundreds of times per year on similar facility on Illinois Tollway
    - Next Steps
        - continue coordination with law enforcement
        - identify EMS contact list
        - begin developing SOP for RTMC
        - public information campaign

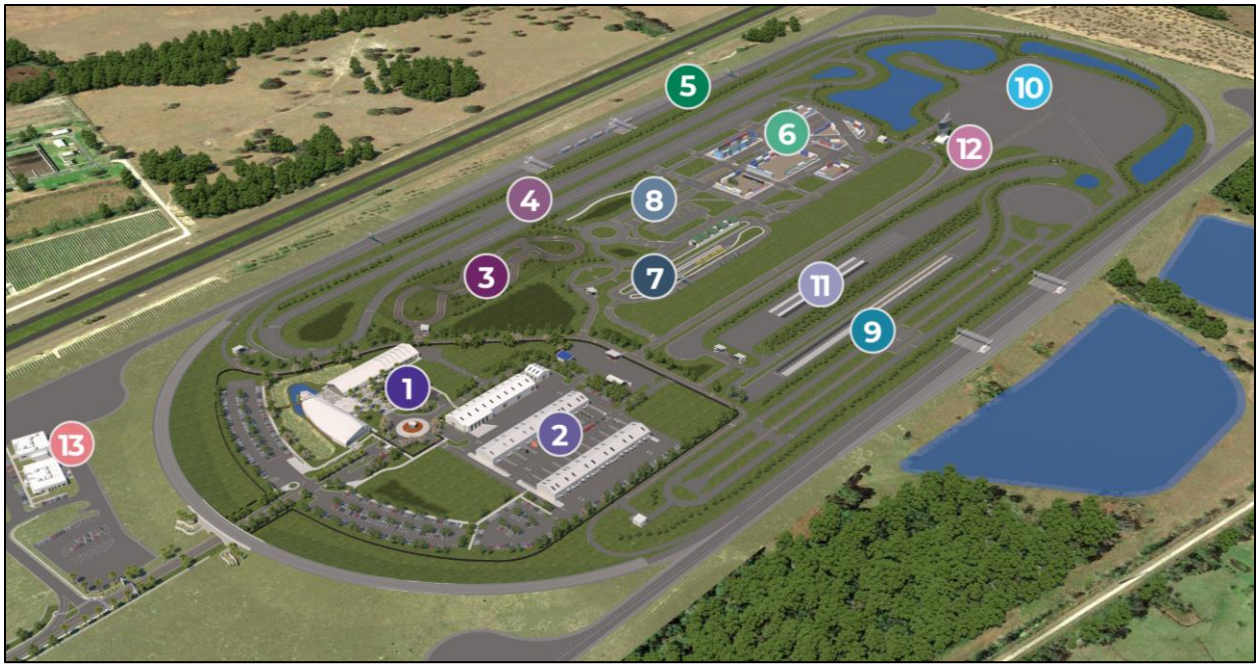
Discussion:

- Q: timeline on projects?
    - A: SR 417 – ready sometime mid-2023 for projects
        - PTSU will start after that (most likely late 2023)
- Q: Any studies on PTSU?
    - A: FHWA published a guidance document
        - CFX also coordinated with 5-6 agencies across the country; everyone indicated it has been effective and well-received by the public
- Q: Heavy emphasis will be on informing and directing the traveling public
    - A: Agreed. CFX will deploy outreach materials ~6 months before rollout
- Q: Any coordination with Waze?
    - A: Currently, there's no way to do this, but Waze/Google are interested in beta testing it with CFX
        - Don't incident events through WZDx get rolled up to Waze?
            - There is some nuance; don't want to show lane closures when it's just PTSU
- Q: Any plans to inventory other areas of the state for future PTSU implementation?
    - A: Jeremy – appreciate CFX taking the lead on deploying PTSU
        - this has been a longstanding (10+ years) discussion across the state
        - PTSU has one of the highest Benefit-Cost Ratios in the TSMO playbook
    - FTE has also looked at PTSU for sections of the Turnpike; PTSU is now a potential strategy considered in PD&E studies

V. FLORIDA'S TURNPIKE ENTERPRISE PROJECT UPDATES

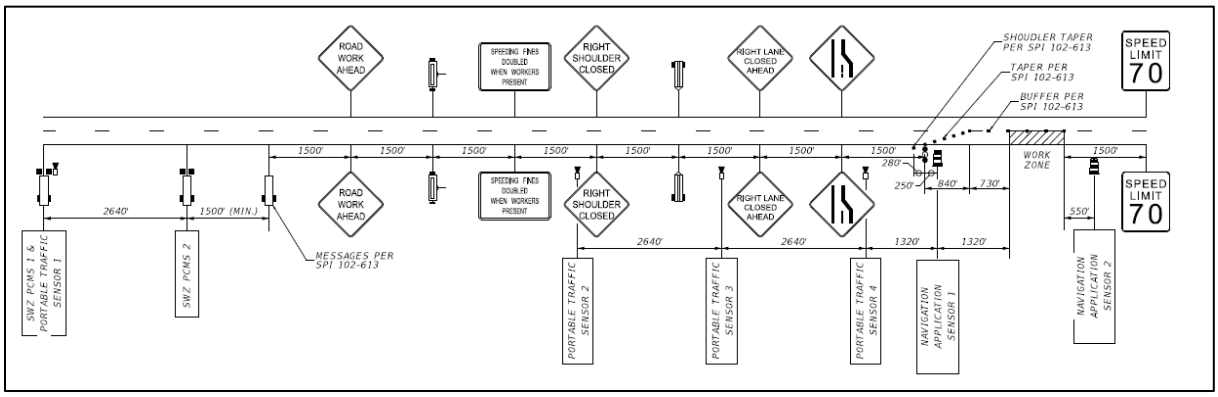
Ryan Brown discussed current projects and initiatives in development by Florida's Turnpike Enterprise (FTE).

- SunTrax Updates
    - 2.25mi oval track, 200-acre infield
    - 10 testing centers
    - next step is contracting an operator (under contract by early 2023)
        - will have an industry forum at FAV Summit
    - OBU and other CV efforts will be tested on SunTrax
    - Queue warning system kicked off today; expect completion in 2023



- CV Initiatives
  - Central Florida CV Deployment (expected to cost $3.7M)
    - anticipated completion – March 2023
    - Turnpike Mainline (SR 91) – MP 255-267
    - SR 528 – MP 0-8
    - applications include WWD, Curve Speed Warning, Queue Warning
  - Smartphone as a Sensor
    - cellular delivery model
    - surrogate for OBU data
      - speed detection
      - disabled vehicle detection
      - WWD
      - queue and curve warning
      - loss of control detection
      - lane departure detection
- Smart Work Zones
  - Lane closure notification system
  - multiple SWZ projects

        - included as a package in most FTE projects with lane impacts during construction
    - Motorist Advisory System Enhancement



- Queue Warning Projects
    - 2 phased projects; 12 locations
    - estimated queue lengths
    - SunGuide software enhancement
    - Message Concept
        - SLOW TRAFFIC – 2 miles ahead
        - STOPPED TRAFFIC – 3 miles ahead
- Freight Safety Technology
    - 6 month pilot
    - reduce commercial crashes
    - connected freight data
    - merge with existing sources
    - develop new strategies

Discussion:

- Q: How are you using LiDAR?
    - A: designed to integrate field sensors and LiDAR for DMS
        - Have you deployed the MH Corbin units yet; the LiDAR seems to be very accurate
            - Still in testing phase; will report findings to Consortium group
- Q: What kind of penetration are you seeing for OBUs?
    - A: not yet implemented; expect to identify this number soon
    - DSRC has 1-2% penetration
- Q: Will Queue Warning roll up to SunGuide?
    - A: built as a separate subsystem to SunGuide

VI. IMPROVING SAFETY FOR PEDESTRIANS AND BICYCLISTS ACCESSING TRANSIT

David Williams gave a brief summary of the FHWA guidance document, *Improving Safety for Pedestrians and Bicyclists Accessing Transit*.

- Published by FHWA in September 2022

- Purpose – provide agencies with a thorough review of bike/ped safety considerations in accessing transit
- Core Principles
    - physical safety of transit passengers is crucial to a successful transit system
    - transit stops are bike/ped generators
    - bike/ped routes to transit should reflect connected network of roadway, sidewalk, and bicyclist facilities
        - directness, continuity, connectivity, and comfort
    - in a typical day, 17% of Americans reported taking a walk or bicycling
    - Largest proportion of nonmotorized travel is among 40- to 64-year olds
- Traveling Characteristics
    - 65 and older were more likely to use transit; 20 and younger were less likely
    - Walkshed for pedestrians traveling to transit stop → 0.5 miles
    - Bikeshed for bicyclists traveling to transit stop → 3 miles
- Crash Statistics
    - in 2019, pedestrian crashes accounted for 17% of all fatalities, but only 3% of injuries
    - 82% of pedestrian and 78% of bicyclist fatalities occur in urban settings
    - pedestrian crossings near transit stops have a higher crash risk
- Tools for Identifying Bike/Ped safety issues
    - Estimating first-mile/last-mile access
    - Observing bike/ped behaviors
    - Safety data analysis
        - Bike/Ped crash data, health outcome data, emerging data sources
- Approaches to enhancing safety
    - Internal transit agency actions such as operator training programs, vehicle safety features, and agency documentation and policies
    - developing partnerships with other agencies and third parties
- Design and Operational Measures
    - transit access – designing bike/ped routes to transit facilities
    - active and passive rail treatments
- Overcoming barriers to safe and accessible transit
    - changing driver behavior near transit stops
    - co-locating mobility options
    - technological solutions to route solutions
    - addressing sidewalk maintenance
    - resilience planning for emergency response

Bikeway Type	Design User	Potential Conflicts with Transit (Location and Behavior)	Reduce Transit Conflicts
Shared Lane	• Highly confident users	• Entire segment/travel lane • Transit stop areas • "Leapfrog" passing • Limited visibility	• Improve signage • Reduce road speeds • Evaluate potential for dedicated bicyclist facilities • Evaluate parallel routes for transit or bicyclists
Traditional Bicycle lane	• Highly confident users • Somewhat confident users	• Potential encroachment into bicycle lane • Entering and exiting bicycle lane at transit stop locations • "Leapfrog" passing	• Modify pavement markings to indicate mixing zone • Evaluate potential for buffered or separated bicyclist facilities • Evaluate parallel routes for transit or bicyclists
Buffered Bicycle lane	• Highly confident users • Somewhat confident users	• Entering and exiting bicycle lane at transit stop locations • "Leapfrog" passing	• Evaluate the need for a floating transit stop versus mixing zone • Evaluate potential for vertical separation of bicyclist facility
Separated Bicycle lane and Two-way Separated Bicycle Lanes	• Highly confident users • Somewhat confident users • Interested but concerned users	• Bicyclist conflicts with boarding and alighting transit users	• Implement floating transit stop • Route bikeway behind transit stop • Implement shared transit bicycle lane stop

VII. TAKING TIME TO FLEX

David Williams briefly discussed the TSMO eLearning platform FLEX.

- What's new?
  - New courses available
    - Computer Security Awareness
    - I-4 Express Gate
    - Drones and Traffic Management (workshop)
  - Active Users – 408
  - Courses completed – 325
  - Most popular course – Traffic Signal Training (A)
- Upcoming courses

  - SunGuide 101
  - Active Alert
- If you have a training from a vendor upcoming, and are okay with it, we'd like to record it and post it on the FLEX Portal

VIII. CURRENT INITIATIVES

Jeremy Dilmore briefly provided an update on the current work efforts throughout District Five.

- Jim Wood was the interim DTOE; this is now permanent
- Smart Signal – internal design staff had questions so TSMO group is developing more robust materials
- CFLSmartRoads –
  - working on new org chart
  - New RWIS platform – helped determine when a bridge needed to be closed due to high winds; under ICM Stat
- Letters of Support – signal technician need is growing; need help showing the need for training additional signal technicians
- Workforce Development Training
  - courses are available for signal technician training

Course Topic	Duration	Venue	Intended Audience	Class Date	Class Recording Available?
Basic Traffic Signal Cabinet and Field Equipment Orientation	1 day	Lab	Signal Technicians	10/17/2022	PPT & Recording
Traffic Signal Timing Basics	1 day	Classroom	Signal Technicians	10/24/2022	PPT & Recording
Traffic Signal Controller Programming	1 day	Lab	Signal Technicians	10/31/2022	PPT & Recording
CMS and TSP Orientation	1 day	Classroom	Signal Technicians	11/7/2022	PPT & Recording
SIIA and NOEMI Orientation	1 day	Classroom	Signal Technicians	11/14/2022	PPT & Recording
ATMS Monitoring and Programing	1 day	Lab	Signal Technicians	11/21/2022	NA
Video Detection Setup - Iteris	1 day	Lab or Classroom	Signal Technicians	Vendor Presented - TBD	NA
Video Detection Setup - Gridsmart	1 day	Lab or Classroom	Signal Technicians	Vendor Presented - TBD	NA
Video Detection Setup - Econolite	1 day	Lab or Classroom	Signal Technicians	Vendor Presented - TBD	NA
Travel Time System Platforms	1 day	Classroom	Engineers & Signal Technicians	Previously recorded	PPT & Recording

- Network support staff (Aurelio) now available
- TAPs-LA funding – next cycle is coming up
- Pushbutton – next round of needs is Lake County
- RICMS – software is stood up but data from I-4 is still poor; looking to improve resiliency (via digital twin)
- Bluetoad – Bluetooth + CV2X
  - navigated a lot of firmware issues; currently deploying them roadside
    - currently 250 RSUs deployed in the region; the Bluetoad will bump that to ~425
    - will support signal request message (SRM)
- Freight Signal Priority pilot is in progress
- Wekiva Pkwy – WB I-4 to Wekiva is opening 10/21
- I4U – moving toward dynamic pricing; expecting early to mid-2023 for fully dynamic pricing
- Smart Work Zone – working with CO on integrating with one.network
- Arterial RR – started in Orange County; found its necessary to having roving patrols instead of stationed patrols

  - incorporating near-miss, predictive crash systems to guide RR on where to go
- Ramp Metering
  - CO will be visiting to discuss D5's process for integrating into Ramp Metering
- Looking to add step between 60% and 90% plans, for discussions relating to:
  - "what products are you using?"
  - "did you talk with local agencies about this?"
  - "did you review SOPs?"
  - We want to hear if locals are seeing any issues that we can bring to discussions

IX. NEXT MEETING

- December 8, 2022

X. ATTACHMENTS

- A – Presentation Slides
- B – Meeting agenda

END OF SUMMARY

This summary was prepared by David Williams and is provided as a summary (not verbatim) for use by the Consortium Members. The comments do not reflect FDOT's concurrence. Please review and send comments via e-mail to dwilliams@vhb.com *so the meeting summary can be finalized.*

Welcome to the TSM&O Consortium Meeting

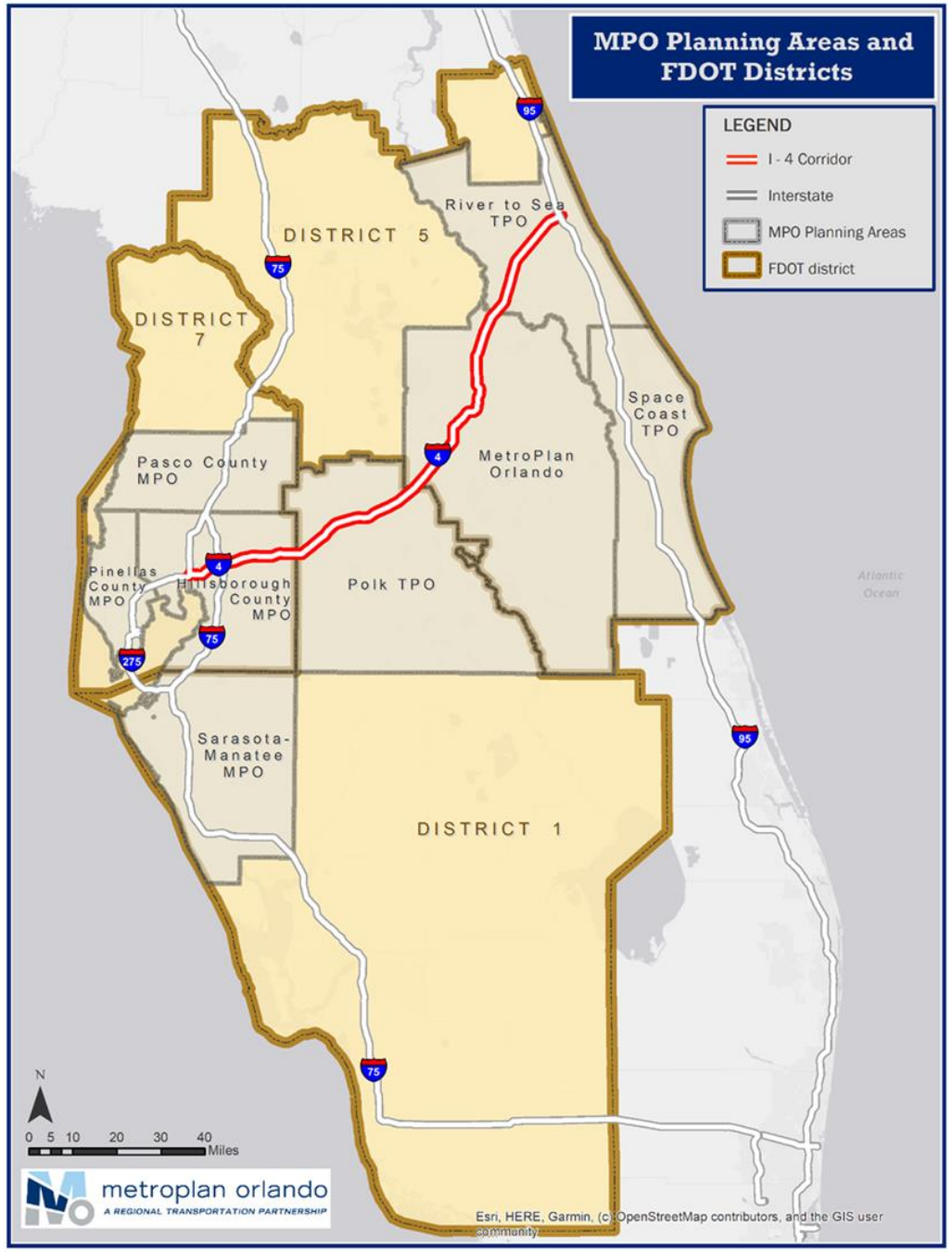
October 20, 2022

Transportation Systems Management & Operations

Meeting Agenda

1. Welcome
2. Regional TSM&O Program (RTSMOP) – Update
3. Part-Time Shoulder Use (CFX)
4. Florida's Turnpike Enterprise – Project Updates
5. Improving Safety for Pedestrians and Bicyclists Accessing Transit
6. Current Initiatives

Regional Transportation Systems Management and Operations Program (RTSMOP)



Participating M/TPOs

Accomplishments

- Memorandum of Understanding
  - ➢ Working Group
- State Transportation Innovation Council (STIC) Award
  - ➢ National Institute on Congestion Reduction (NICR) Grant
- Department of Energy (DOE)
  - ➢ Peer Exchange

Working Group

- Goals and objectives
- Regular meetings
- Survey
    - Knowledge transfer
    - Funding
    - Advancing and prioritizing TSMO

NICR Grant

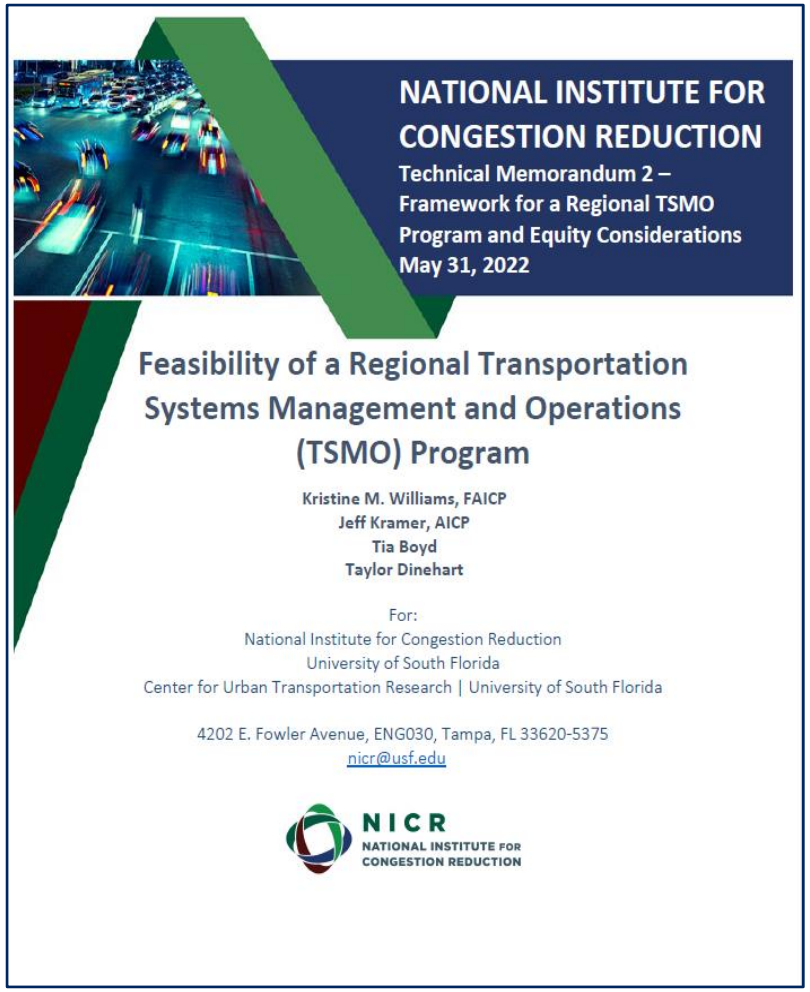
- Literature Review

- Framework

Peer Programs

- **The Eastern Transportation Coalition (TETC)**
- **I-10 Coalition**
- **Niagara International Transportation Technology Coalition (NITTEC)**
- **Atlanta Regional Commission (ARC)**
- North Central Texas Council of Governments (NCTCOG)
- Denver Regional Council of Governments (DRCOG)
- **Oregon Metro**
- Smart North Florida (SNF)

Framework for a Regional TSMO Program and Equity Considerations



- TSMO strategic plan
- Work plan
- Annual review
- Funding
- Staff
- Governance structure
- Education & Communication
- Equity

Peer Exchange

- September 13, 2022, 1:30pm – 4:00pm (virtual)
- Feasibility Study (NICR)
  - Peer Programs
  - Potential Framework
  - ➢ **Guidance: Consensus on Strategic Plan**

Thank You

MetroPlanOrlando.com | 407-481-5672
250 South Orange Ave., Suite 200, Orlando, FL 32801

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

SR 417 and SR 429
Part-Time Shoulder Use (PTSU)

Bryan Homayouni, Director of Intelligent Transportation Systems

- October 20, 2022 -

Agenda

1. SR 417 and SR 429 Widening
2. What is Part-Time Shoulder Use (PTSU)?
3. PTSU on SR 417 and SR 429
4. Discussion

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

SR 417 and SR 429 Widening

SR 417

- International Drive to SR 528

SR 429

- Stoneybrook Parkway West to SR 414

Both facilities being widened to inside:

- 3rd Full-time/Regular Lane
- 19’ Left Shoulder (12’ envisioned for PTSU, 7’ for full-time shoulder)
- Concrete Median Barrier

Right shoulder remains the same (~10’)

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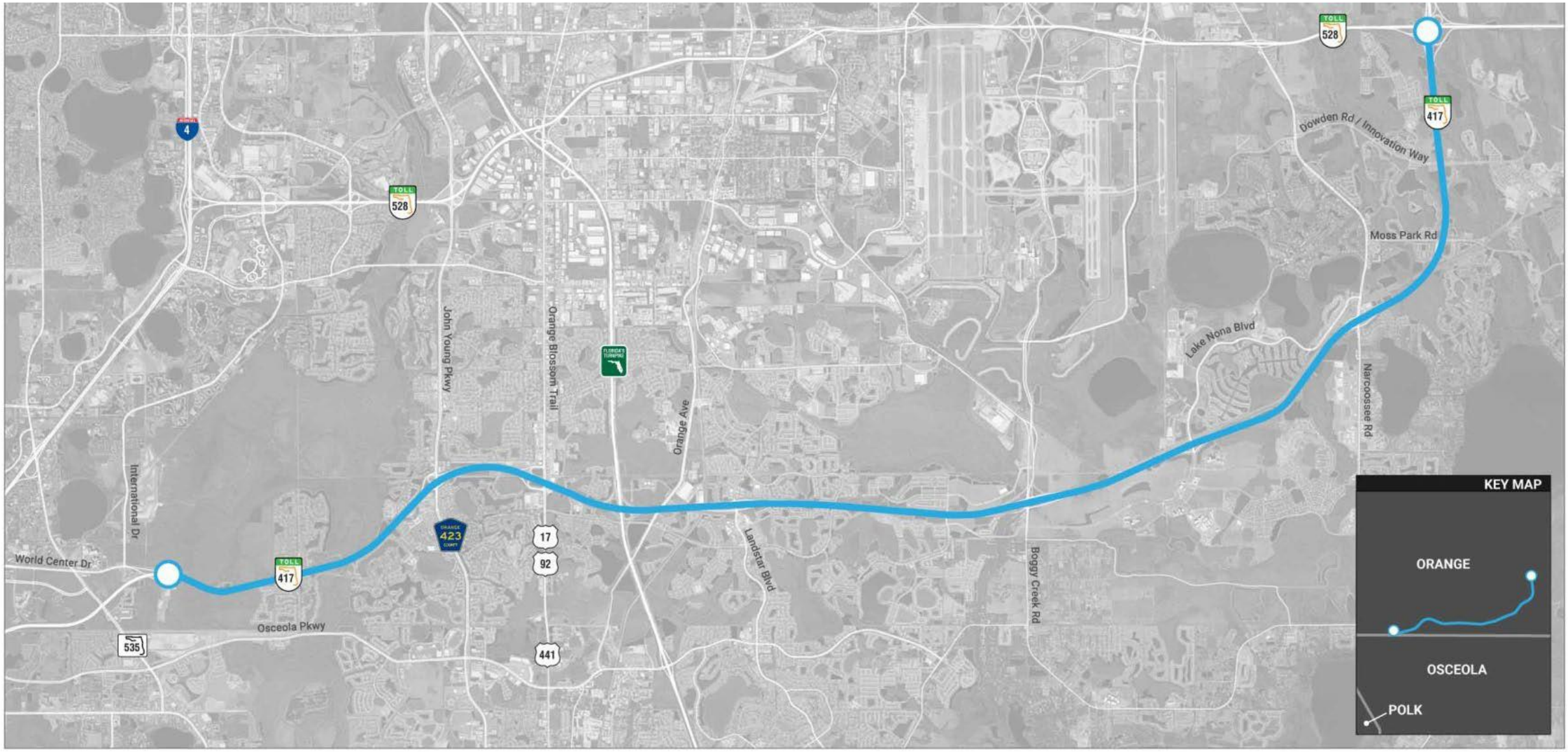

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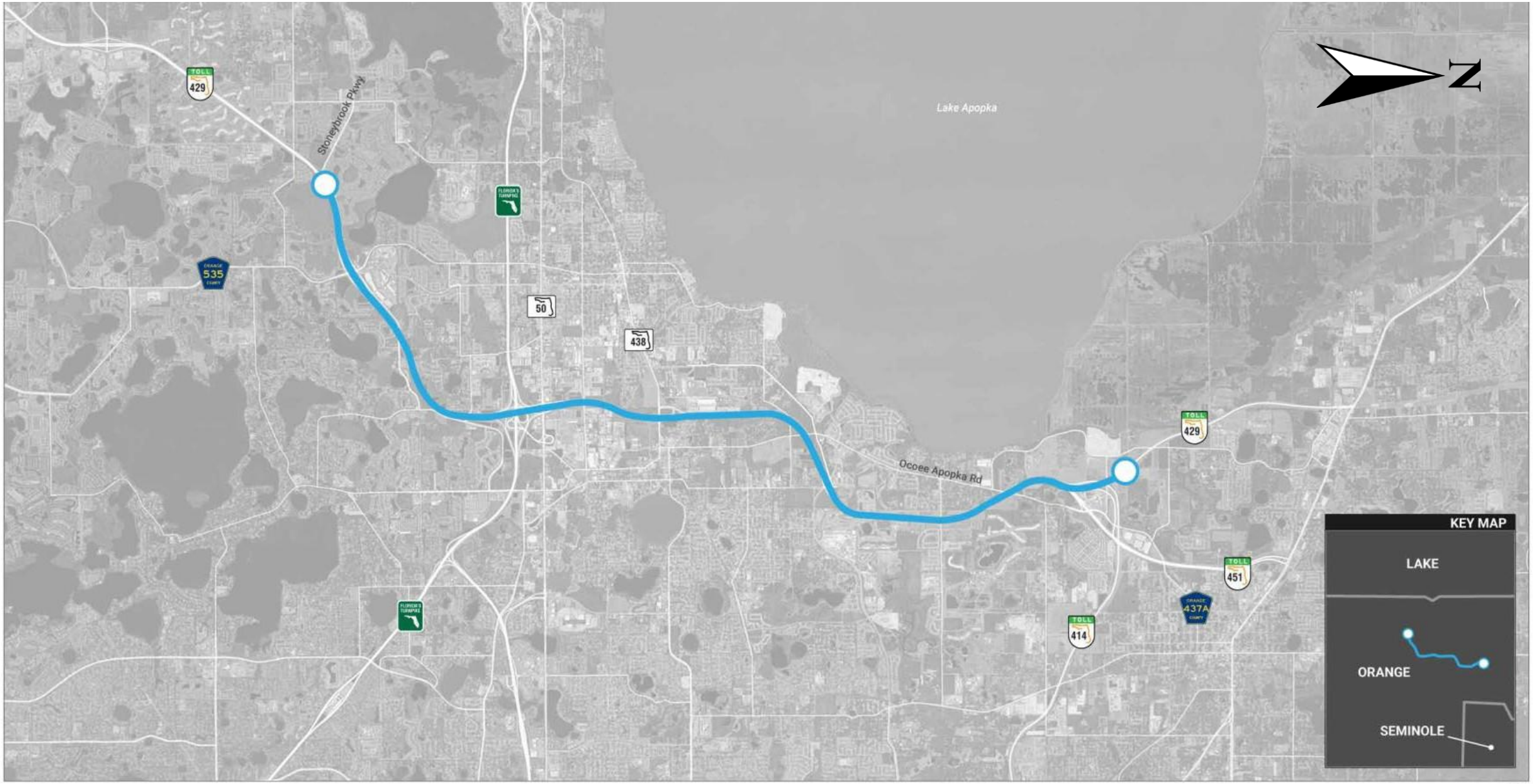
SR 417 Part-Time Shoulder Use

International Drive to SR 528

Project Location

Figure 1



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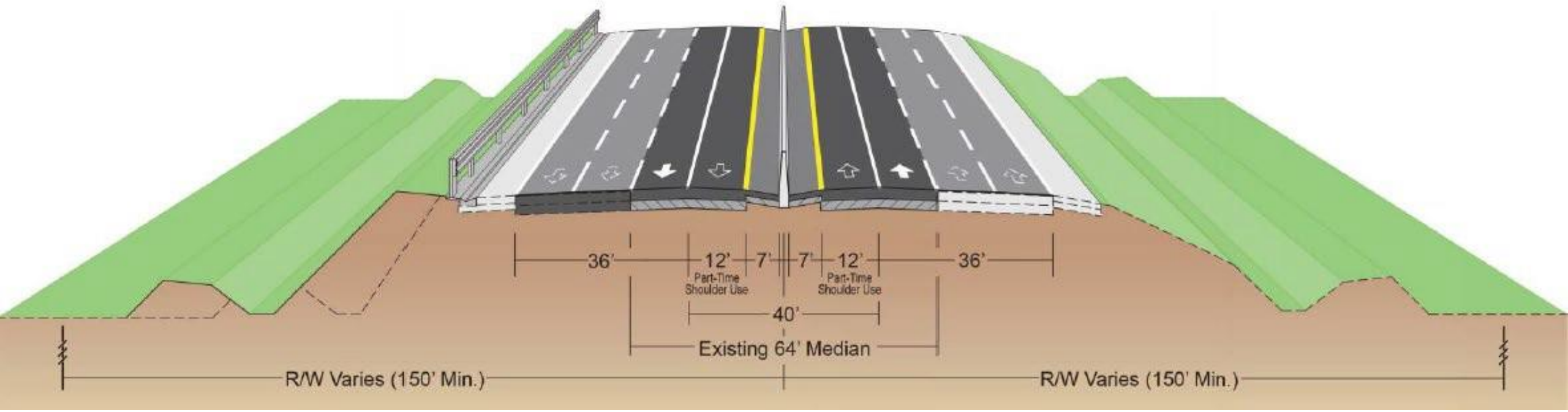
SR 429 Part-Time Shoulder Use

Stoneybrook West Parkway (South) to SR 414

Project Location

Figure 1

SR 417 and SR 429 Widening



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What is Part-Time Shoulder Use?

- Various names
  - Hard shoulder running
  - “Branded” names like Flex Lane, Smart Lane, Smart Road, etc.
- Same meaning: use of the left or right shoulders of an existing roadway for travel during certain hours of the day

Types of Part-Time Shoulder Use

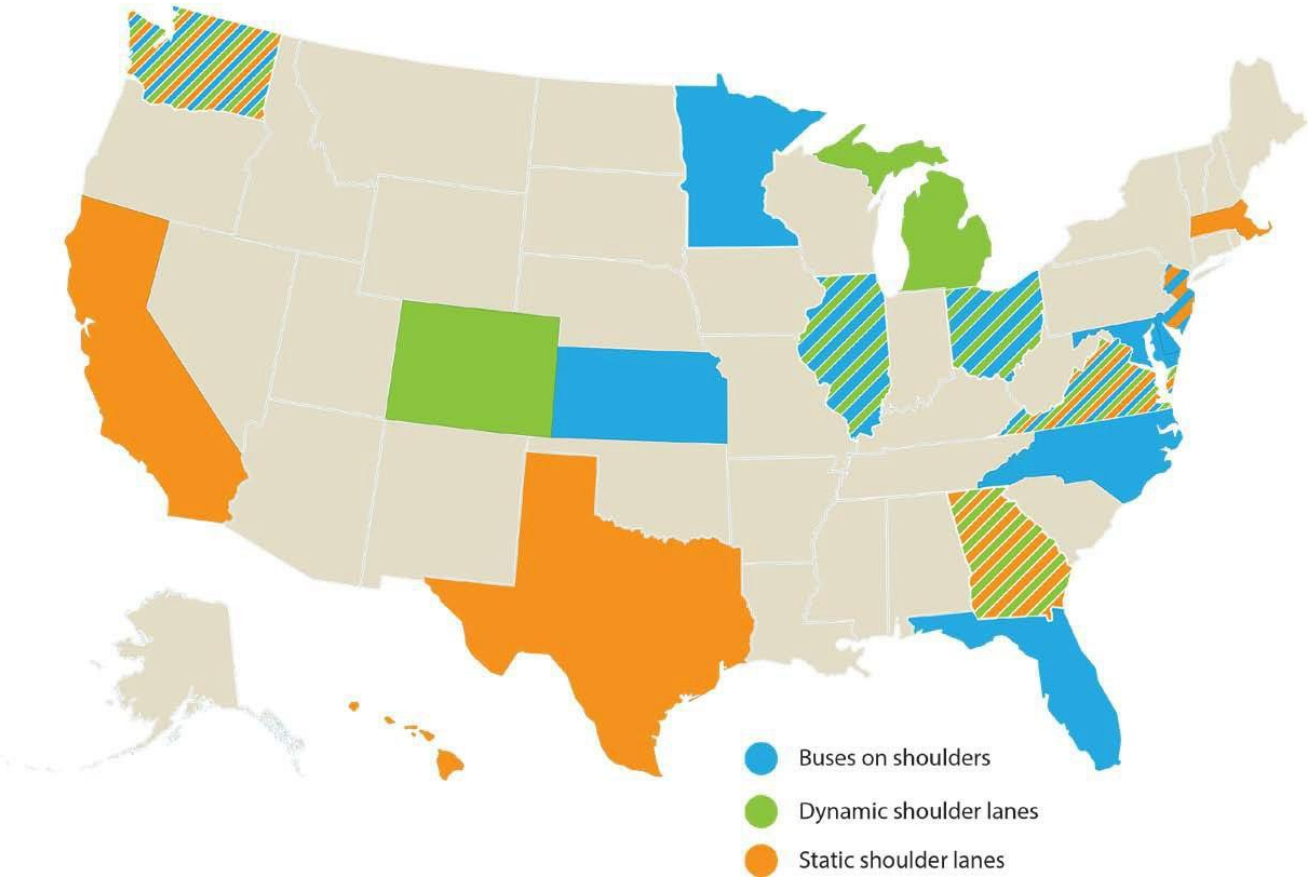
Bus-on-Shoulder (BOS) - open only to buses, used at driver's discretion under low-speed conditions

Static PTSU – open to passenger vehicles during predetermined hours of operation

Dynamic PTSU – open to passenger vehicles based on need and real-time conditions

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

Where is Part-Time Shoulder Use?



- 18 states have at least one form of PTSU
- In Florida:
  - Miami-Dade Transit has operated BOS on portions of SR 874 (Don Shula Expressway) and SR 878 (Snapper Creek Expressway) since 2006
  - Pinellas Suncoast Transit Authority has operated BOS on five miles of I-275 since 2021

State-of-the-Art PTSU

Recent PTSU projects have:

- Been dynamic (have the capability to open the shoulder at any time of day)
- Lane control signals over all lanes
- Incorporated other active traffic management (ATM) strategies like queue warnings or variable speed limits

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SR 417 and SR 429

Widening project adding through lane in each direction

- No need to open shoulder for additional roadway capacity in opening year
- May be used to relieve congestion ~2025 and beyond

System can be used for incident management in opening year

- Open left shoulder to traffic if right side of roadway is blocked
- Close full-time lanes (display red X) if they are blocked
- Display other warnings to drivers, such as stopped traffic ahead

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

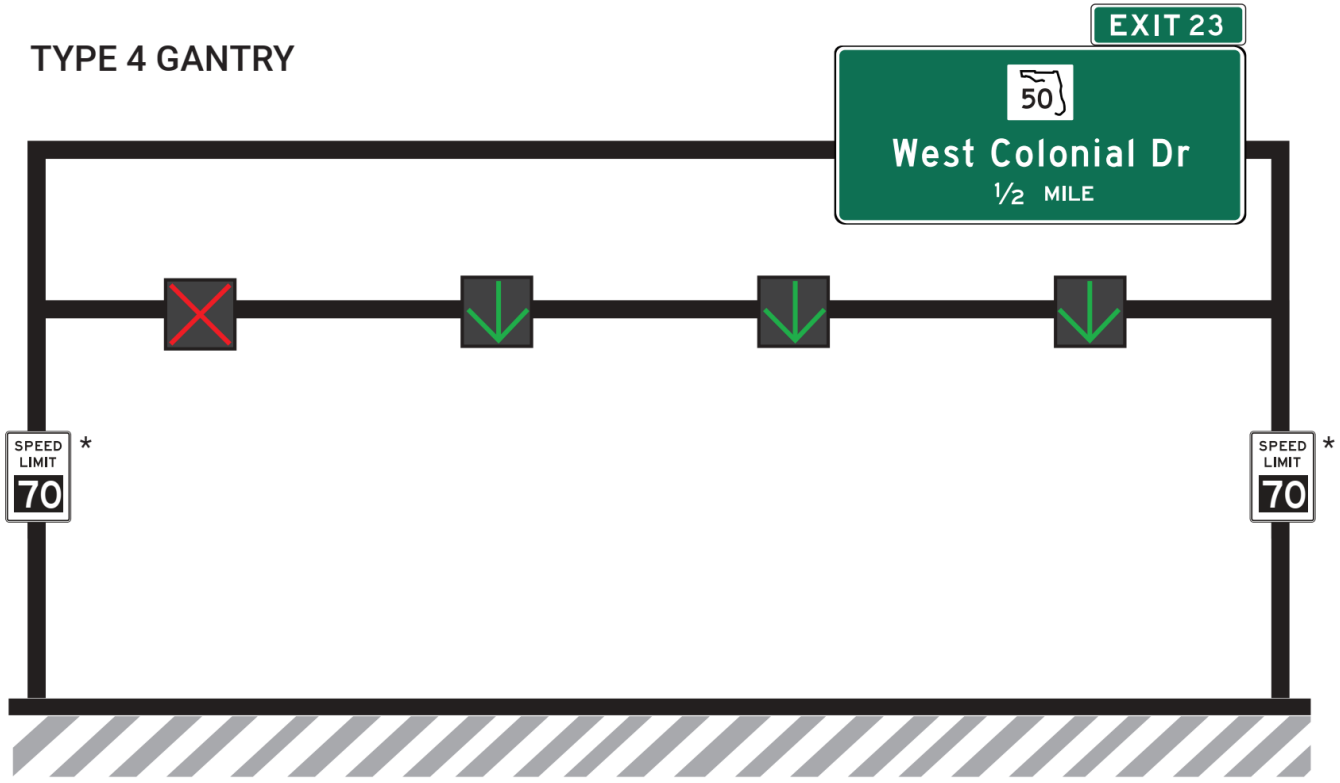
SR 417 and SR 429

System will have dynamic signs over all lanes and left shoulder

- Signs ~1/2 mile apart
- Controlled from FDOT District 5 RTMC

19’ shoulder will be wider than any current PTSU facility

- 7’ of permanent shoulder beyond the 12’ shoulder lane



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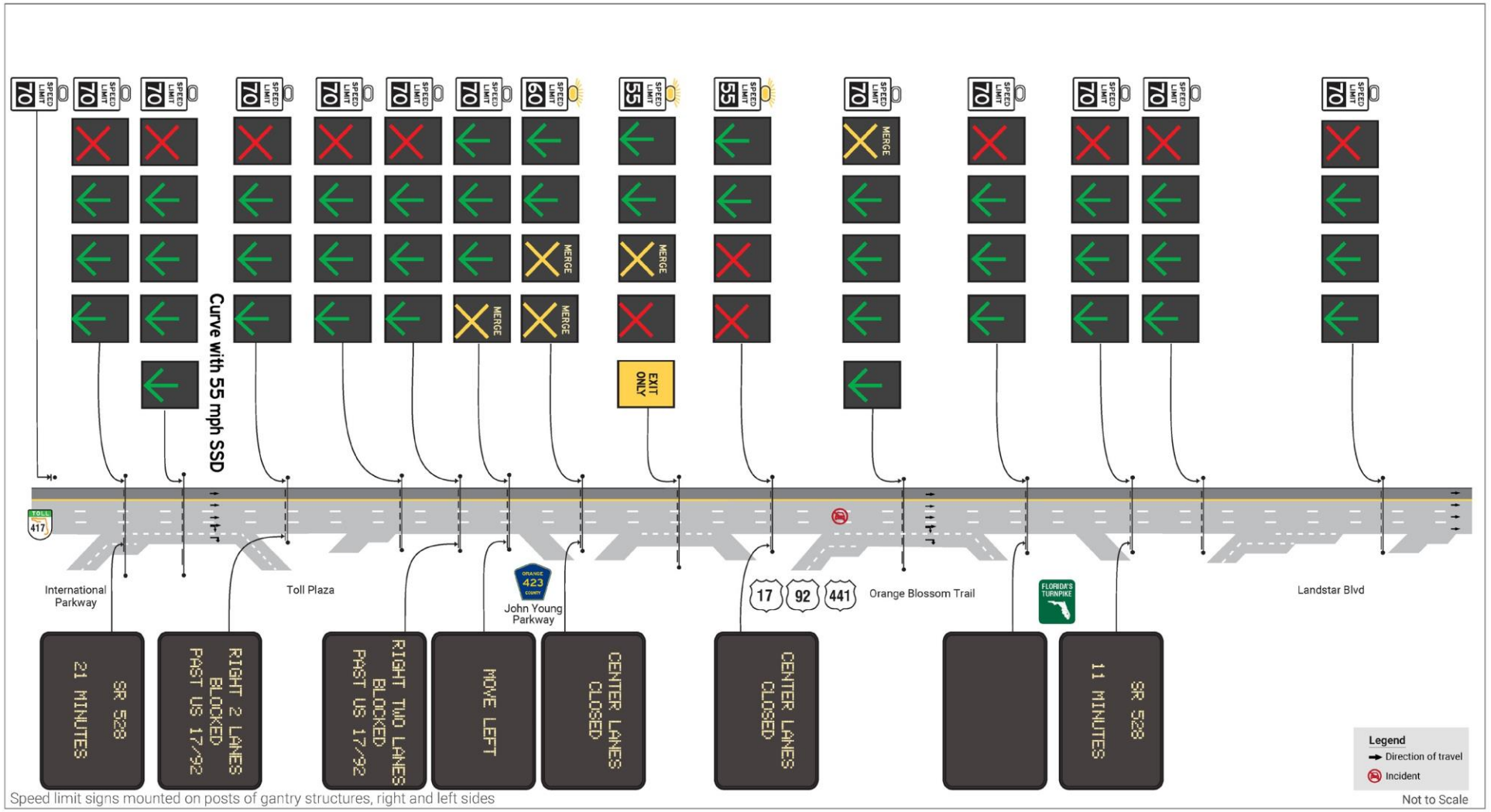
Example: Incident in Center Lane



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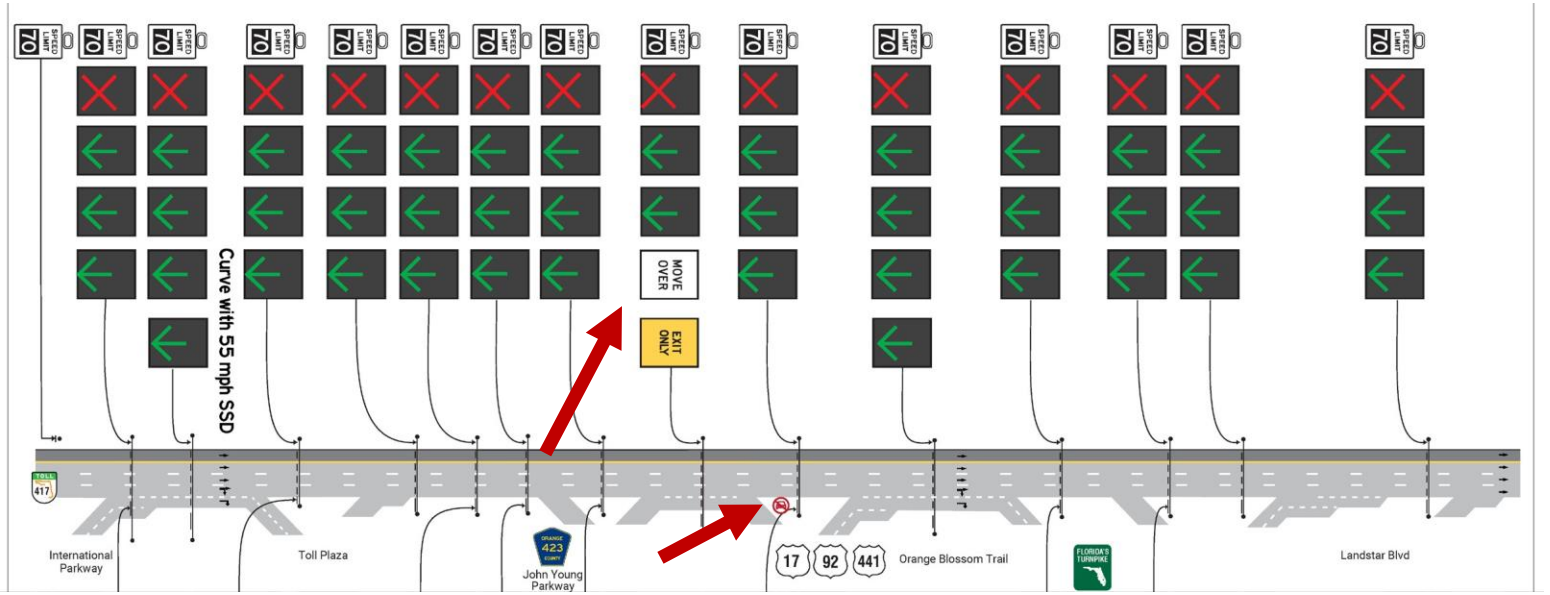
Variable Speed Limits

PTSU will place traffic closer to concrete median barrier, limiting how far around curves a driver can see

- Based on national design criteria, 14+ curves on SR 417 and SR 429 do not meet criteria for 70 mph speed limit
- Speed will be reduced to 55 MPH on all of SR 429 project area when shoulder open
- Speed will be reduced to 55, 60, or 65 MPH on 5 short portions of five SR 417 (2 NB, 3 SB) at curves
- Speed will be reduced to 55 MPH in vicinity of incidents

Potential Benefits for Fire/EMS

- Very wide left shoulder
- Reinforcement of lane closures through red Xs
- Additional flexibility to manage traffic during incidents
- Display of symbol or message to support “move over” law
- Used hundreds of times per year on similar facility on Illinois Tollway



CENTRAL FLORIDA EXPRESSWAY AUTHORITY

Next Steps

- Continue coordination with law enforcement
- Identify EMS contact list
- Begin developing Standard Operating Procedures for RTMC
- Public information campaign

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

Questions / Discussion

Florida’s Turnpike Current Events

FTE Traffic Operations

Agenda Example

- SunTrax Updates
- CV Initiatives
- Smart Work Zones
- Queue Warning Projects
- Freight Safety Technology

FLORIDA'S TURNPIKE

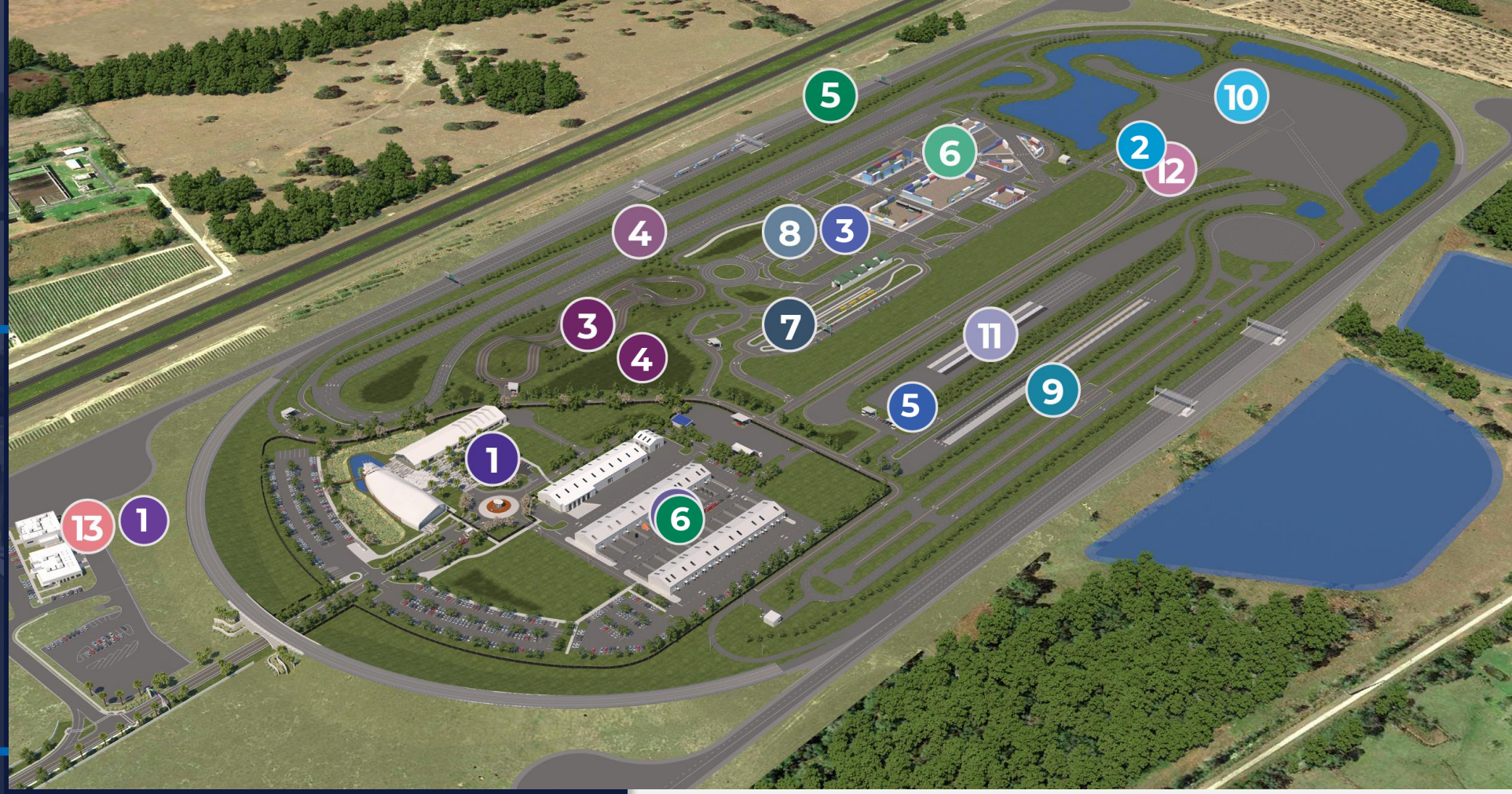
SUNTRAX®

- 2 ¼ Mile Oval Track
- 4 Specialized Toll Gantries
- 200-Acre Infield
- Precision Driving Surfaces
- 10 Testing Centers
- Advanced Observation Deck
- Secured Warehousing and Staging Sectors
- 20,000 Sq. Ft Welcome Center with Offices and Classrooms

CONSTRUCTION BEGAN
November 2017

COMPLETED CONSTRUCTION
Today

Explore SUNTRAX®



1 Main Entry Campus

2 Maintenance and Workshops

3 Geometry Track

4 Loop Track

5 High-Speed Oval

6 Urban

7 Pick-Up / Drop-Off

8 Suburban

9 Noise, Vibration and Harshness

10 Technology Pad

11 Wet Test Tracks

12 Observation Tower

13 Operations Building

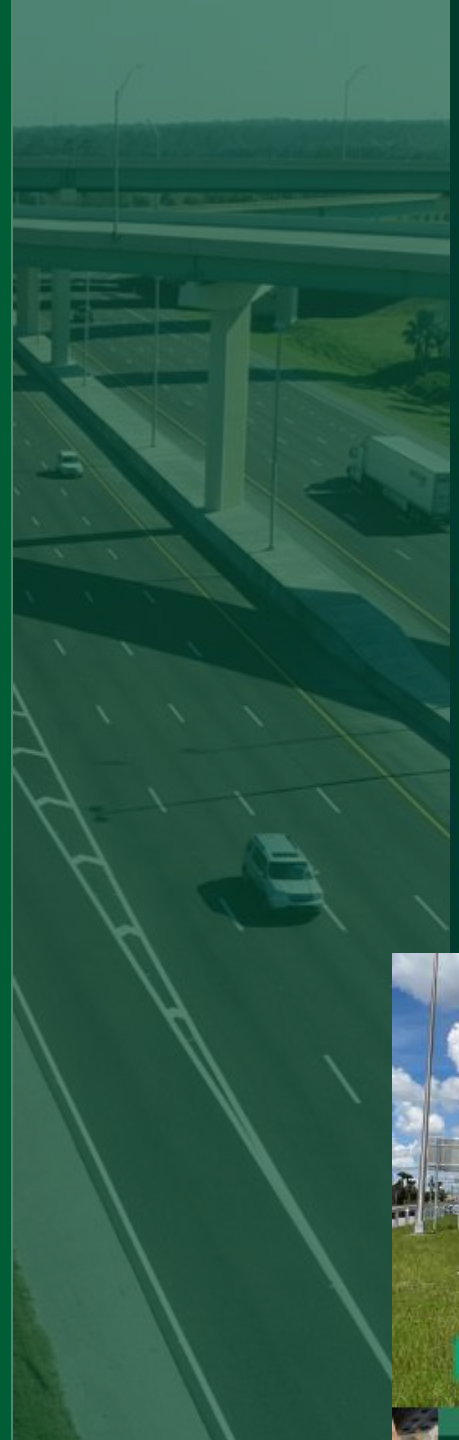
FLORIDA'S TURNPIKE

FDOT

FLORIDA'S TURNPIKE

Connected Vehicle Initiatives

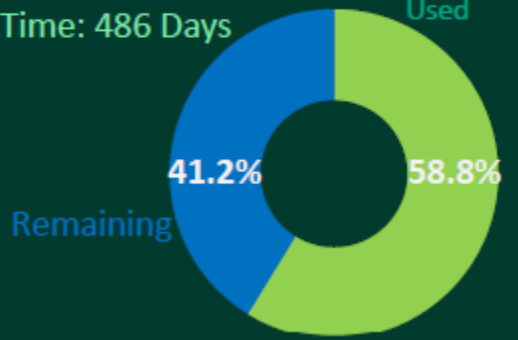
- Central Florida CV Deployment
- Expected to cost $3.7 million
- Anticipated completion date: March 2023
- SR 91 – MP 255-267
- SR 528 - MP 0-8
- Applications Include:
  - Wrong Way Detection
  - Curve Speed Warning
  - Queue Warning



All 23 ITS cabinets were procured in August
(long lead item)

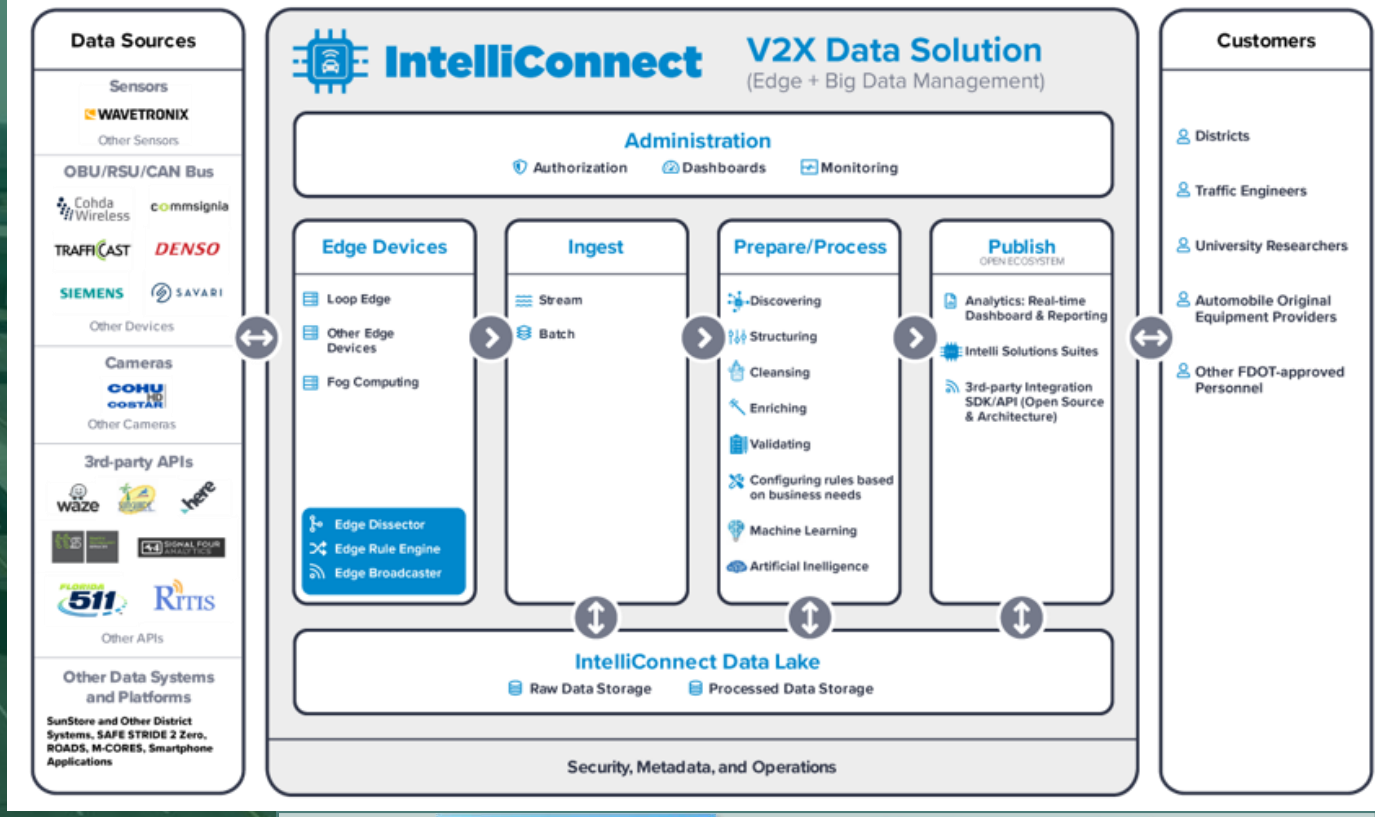
Time

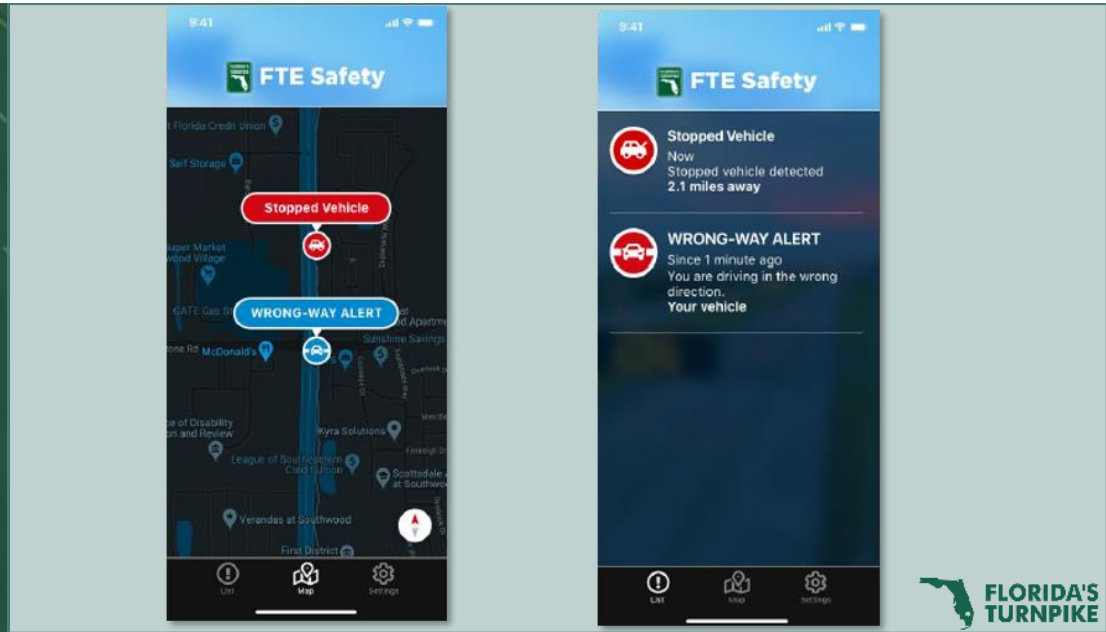
284 days, as of August estimate
Allowable Time: 486 Days



Connected Vehicle Initiatives

- Smartphone as a Sensor
  - Cellular Delivery Model
- Surrogate for OBU Data
  - Speed Detection
  - Disabled Vehicle Detection
  - Wrong Way Detection
  - Queue and Curve Warnings
  - Loss of Control Detection
  - Lane Departure Detection



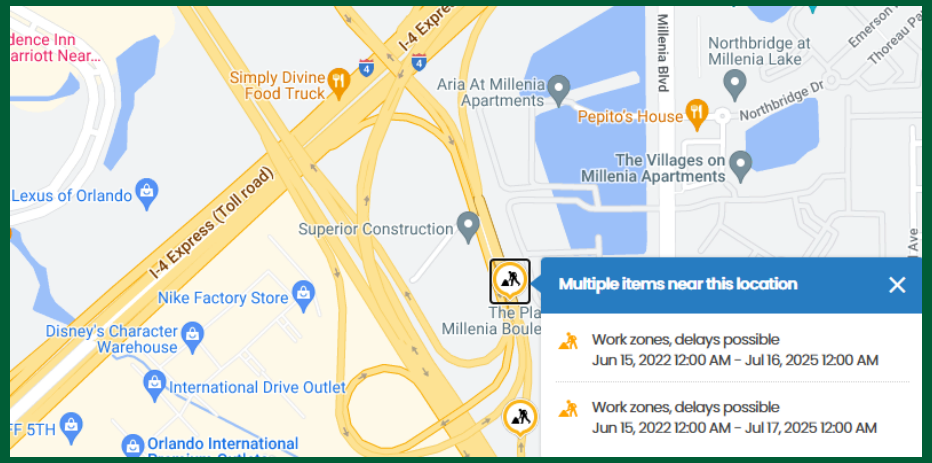


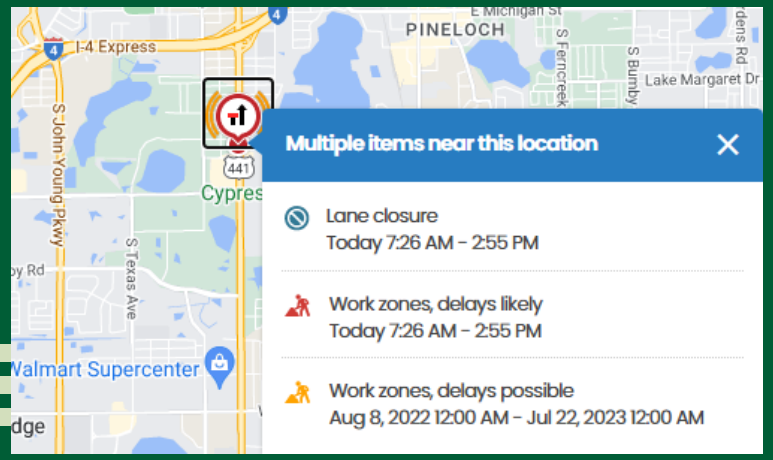
FLORIDA'S TURNPIKE

Lane Management & Smart Work Zones

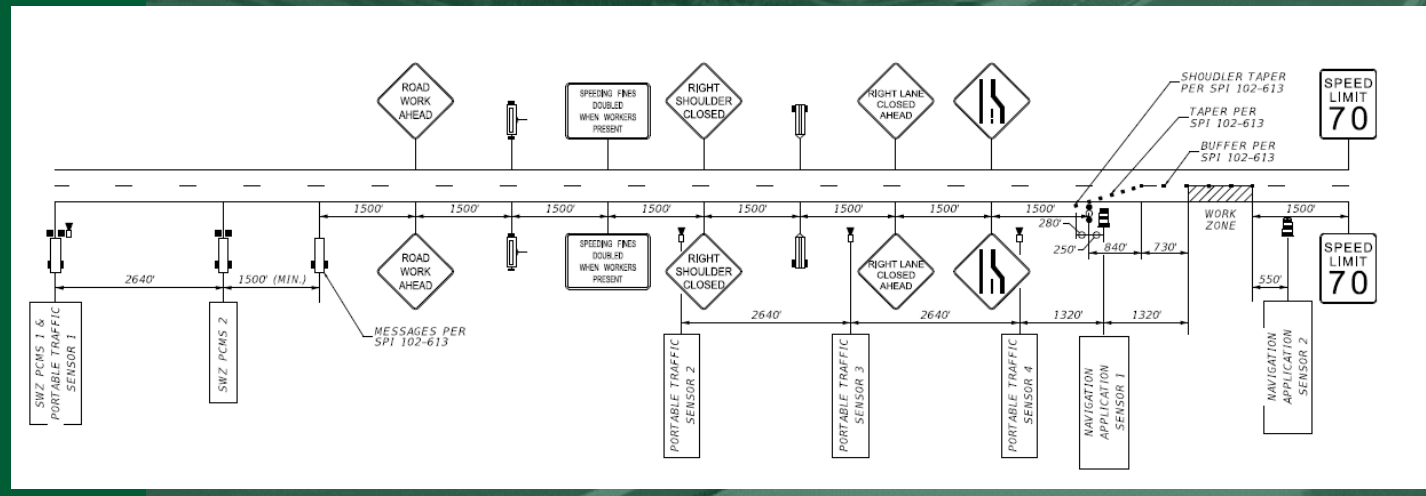
- Lane Closure Notification System
- Construction Projects

one.network





- Multiple SWZ Projects
- Included as a package in most FTE Projects with lane impacts during construction
- Motorist Advisory System Enhancement



FLORIDA'S TURNPIKE

Queue Warning Projects

- Two Phased Projects
- 12 Locations
- Estimated Queue Lengths
- SunGuide Software Enhancement
- Message Concept:
  - SLOW TRAFFIC – 2 Miles Ahead
  - STOPPED TRAFFIC – 3 Miles Ahead

FLORIDA'S TURNPIKE

Freight Safety Technology

- 6 Month Pilot
- Reduce Commercial Crashes
- “Connected” Freight Data
- Merge with existing sources
- Develop new strategies
- Enhance 4E’s

FLORIDA'S TURNPIKE

Questions?

Contact:
Ryan Brown, P.E.
ryan.brown@dot.state.fl.us

Improving Safety for Pedestrians and Bicyclists Accessing Transit

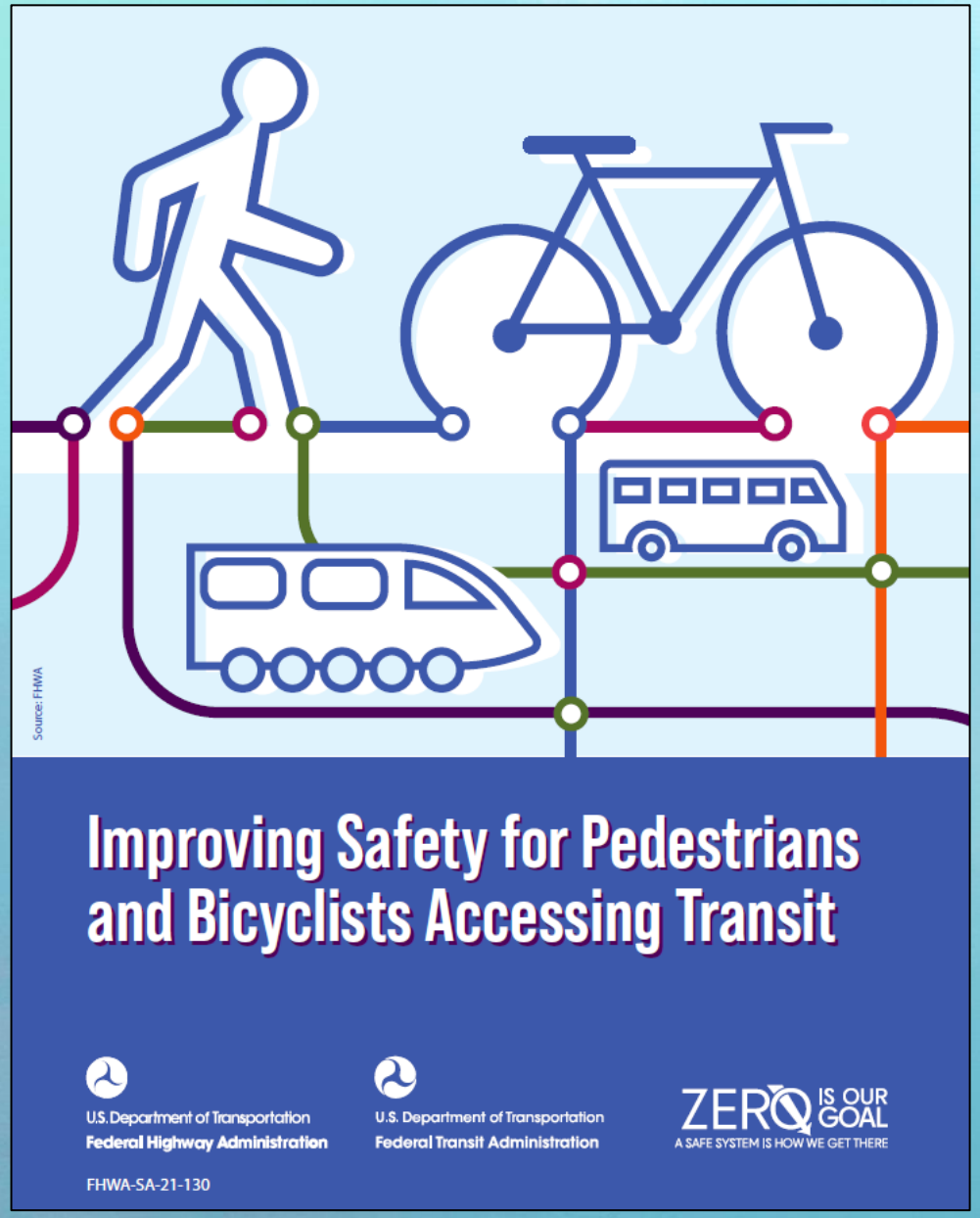
David Williams, VHB

FDOT TSM&O
Transportation Systems Management & Operations

Transportation Systems Management & Operations

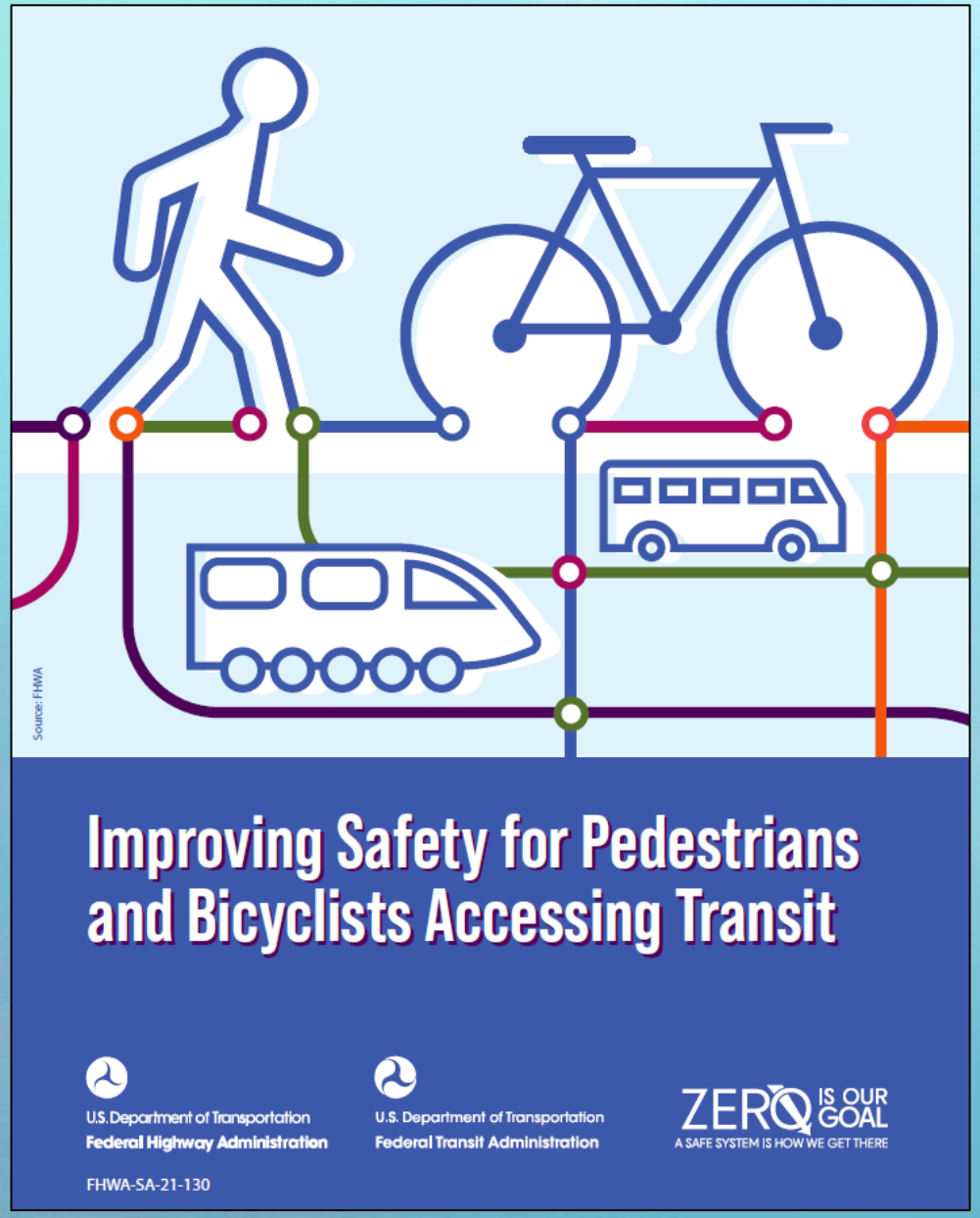
CENTRAL FLORIDA TSM&O CONSORTIUM

Improving Safety for Pedestrians and Bicyclists Accessing Transit



- Published by FHWA September 2022
- Purpose:
  - Every transit user travels some distance by foot or mobility device to the transit stop
  - This provides agencies with a thorough review of bike/ped safety considerations in accessing transit
- Audience:
  - Transit Agencies, Roadway Owners, MPOs and TPOs

Improving Safety for Pedestrians and Bicyclists Accessing Transit



- Chapter 1 – Introduction
- Chapter 2 – Fundamentals of Bike/Ped Safety & Transit
- Chapter 3 – Tools for Identifying Safety Issues
- **Chapter 4 – Organizational strategies to Improve Safety**
- **Chapter 5 – Design & Operational Measures to improve safety**
- Chapter 6 – Overcoming barriers to accessibility

Core Principles – Safe Access to Transit for Bicyclists & Pedestrians

- Physical safety of transit passengers is crucial to a successful transit system
- Transit stops are bike/ped generators
- Bike/Ped routes to transit should reflect connected network of roadway, sidewalk, and bicyclist facilities
  - **Directness** – bike/ped network should be direct; should support "desire lines"
  - **Continuity & Connectivity** – minimize gaps
  - **Comfort** – where possible, provide increased separation from motor vehicles
- Transit stops can enhance safety but should be usable and welcoming to all

Fundamentals – Who Uses Transit (NHTS* 2020 Survey)

- In a typical day, 17% of Americans reported taking a walk or bikeriding
- Largest proportion of nonmotorized travel – 40 to 64 year olds
  - Smallest proportion – 16 to 24 year olds
- 65 and older were more likely to use transit; 20 and younger less likely

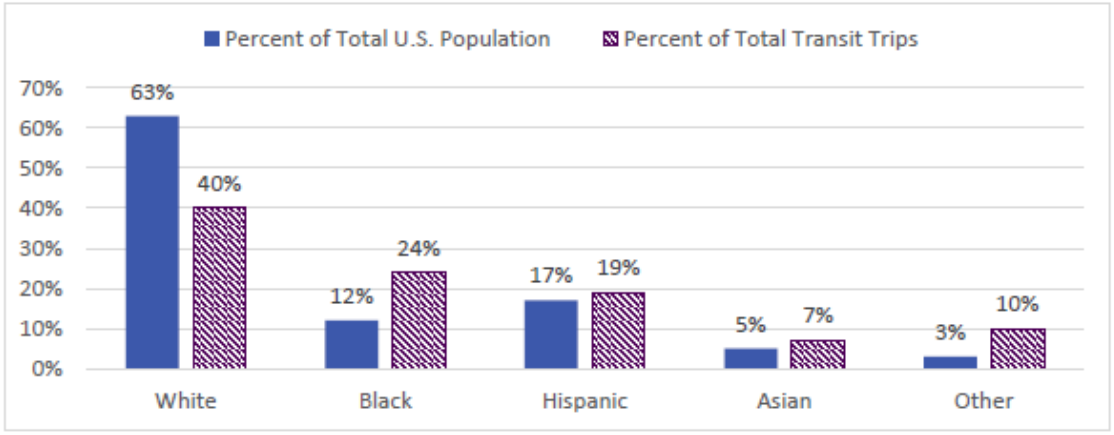


Figure 2. Graphic. Ethnic composition of riders and of the population in the United States in 2017 (adapted from APTA, 2017).

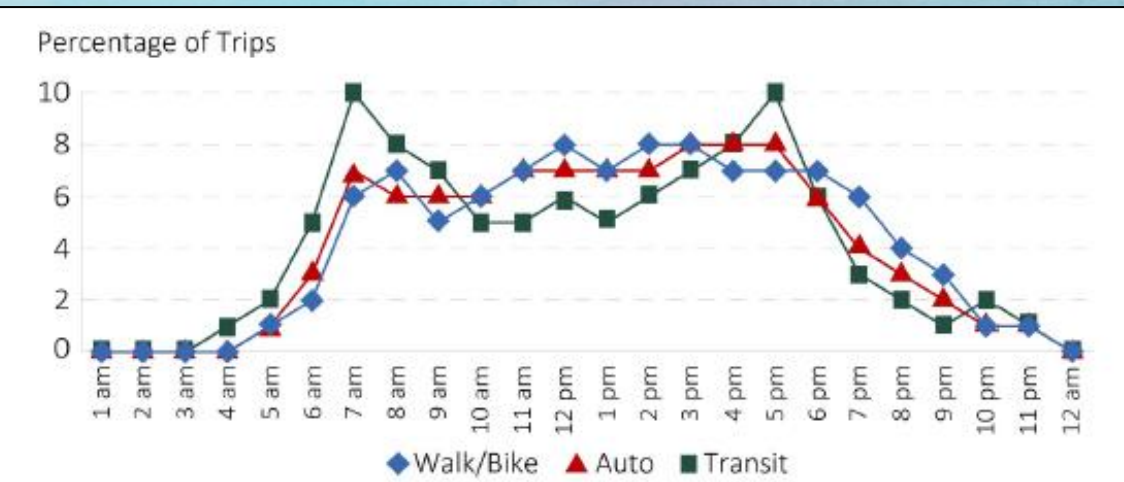


Figure 3. Graphic. Comparison of travel mode by time of day (NHTS, 2020).

*NHTS – National Household Travel Survey

Fundamentals

- The FTA considers the walkshed for pedestrians to be ½-mile
  - Bikeshed → 3 miles

Figure 4. Graphic. Examples of ½-mile walksheds for two Dallas area rapid transit rail stations (FTA, 2017).

Fundamentals – Bike/Ped Considerations

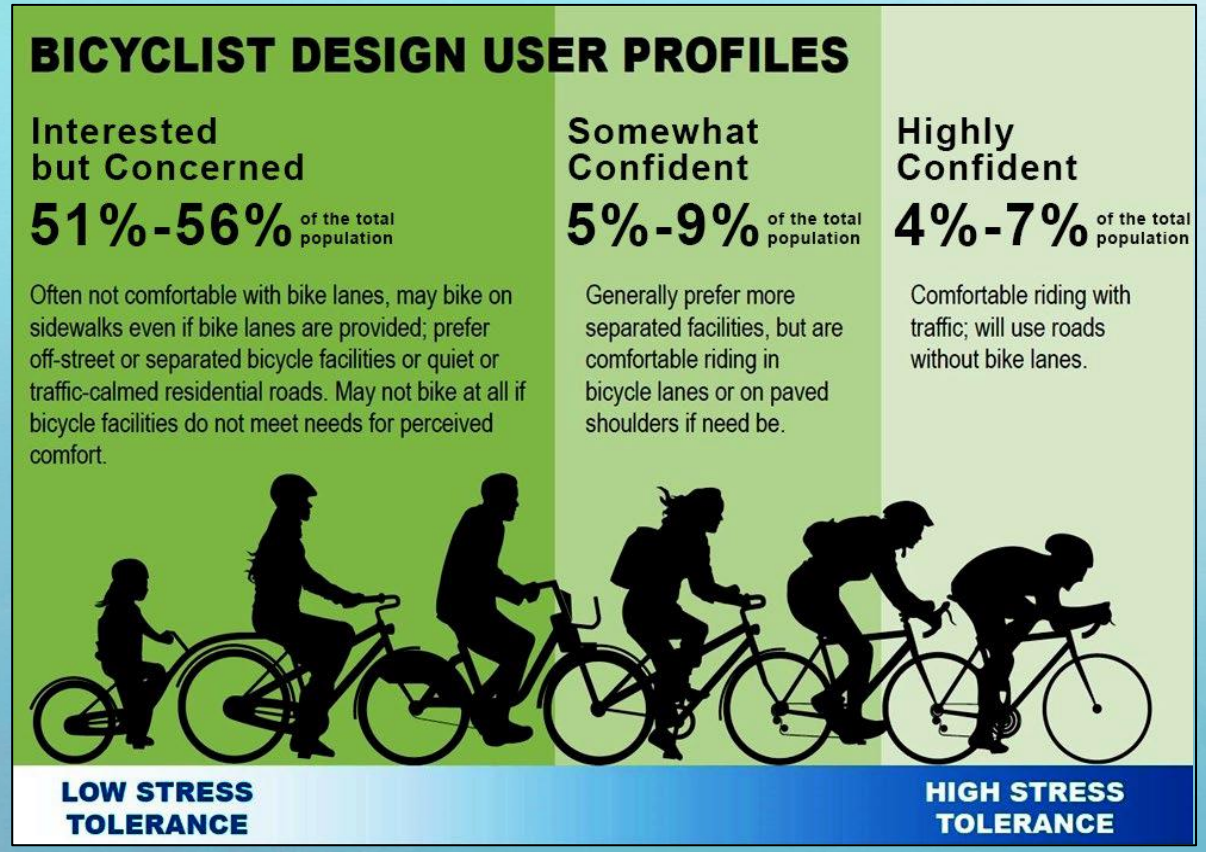


Table 1. Considerations for pedestrians and bicyclists accessing transit.

Transit User Group	Considerations
General	• Need safe, accessible, and connected pedestrian and bicyclist facilities that are connected to the transit facility. • Generally prefer to use the most direct route to and from the transit facility. • May feel unsafe travelling to/from, or waiting at, transit stops (especially at night or in isolated locations)(Whitfield et al., 2018; Lubitow et al., 2019). • May not understand traffic flow or travel patterns. • May have difficulty with orientation and understanding traffic signs. • May have difficulty judging speed of approaching vehicles. • May be more affected by surface irregularities in the pavement and changes in slope or grade. • Children may have difficulty seeing (and being seen by) drivers of all types of vehicles, including buses because of decreased detection of threats within their peripheral vision (David et al., 1986) and shorter stature than adults.
Bicyclists	• Need safe and connected bicyclist facilities within the bikeshed leading to the transit facility. • May have a child or additional luggage on the bicycle, which can make the bicycle heavier and more cumbersome to handle. This can impact the ability to stop quickly, make sharp turns, or load into bicycle parking or a transit vehicle. • May need more space or time when boarding transit to load their bicycle on the transit vehicle (such as loading onto a train or securing it to the front of the bus). • Certain styles and types of bicycles—such as electric bicycles or cargo bicycles—may not fit onto transit vehicles or could be difficult to load due to the weight of the bicycle. • Some riders may not be physically capable of lifting the bicycle onto transit vehicle racks. • Adequate and secure storage areas for bicycles are needed at the transit facility if the traveler is not continuing by bicycle for the remainder of their trip, if the transit vehicle does not have space for their bicycle, or if the transit agency has policies against bringing the bicycle onto transit.
Pedestrians	• Need accessible and connected pedestrian facilities within the walkshed leading to the transit facility. • May have a child (possibly with a stroller) or luggage (such as a suitcase or grocery cart) and need more space to maneuver and store/secure items. • May have difficulty deciding where and when it is safe to cross the street. • May need more time to cross a street due to walking speed. • May have reduced vision and hearing acuity that affect their awareness of oncoming traffic or transit. • May need pedestrian signal information provided in multiple formats (audible, tactile, and visual). • May need accommodations at transit stops, such as additional seating or lean bars.

Fundamentals – Crash Risk

- In 2019, pedestrian crashes account for 17% of all fatalities, but only 3% of all injuries
- 82% of pedestrian and 78% of bicyclist fatalities occur in urban settings
- Pedestrian crossings near transit stops have a higher crash risk*

Table 2. Summary of identified potential roadway and traffic risk factors for pedestrian and bicyclist crashes (adapted from Monsere et al., 2017).

Risk Factors	Bicyclist	Pedestrian	Both
Horizontal curves	x	x	x
Presence of bus stops	x	x	x
Number of driveways	x	x	x
Presence of median	x	x	x
Traffic volume	x	x	x
Number of lanes	x	x	x
Posted/vehicle speed	x	x	x
Percent heavy vehicles	x	x	x
Lighting	x	x	x
Lane width	x	x	x
Presence of bicycle lanes	x	-	-
Presence of bicycle paths	x	-	-
Presence of parking	x	-	-
Vertical grade (slope)	x	-	-
Width of bicycle lanes	x	-	-
Average sidewalk width	-	x	-
Distance to the closest marked crosswalk or intersections	-	x	-
Maximum number of crossing stages	-	x	-
Number of traffic directions	-	x	-
Paved shoulder	-	x	-
Presence of marked crosswalk	-	x	-
Presence of paved sidewalk	-	x	-
Total road width	-	x	-
Pedestrian delay	-	x	-

Note: dashed line indicates the item is not applicable to the category.

Developed by Oregon DOT via research, modeling, and other analyses

*based on analyses of pedestrian crashes in Seattle, Los Angeles, Toronto, and Charlotte

Tools for Identifying Bike/Ped Safety Issues

- Direct feedback from users/stakeholders
- Transit Stop Assessment Tools
  - Transit Stop checklists, Road Safety Audits, Facility Inventories, Transit Stop Balancing
- Pedestrian and Bicycle Crash Analysis Tool (PBCAT)

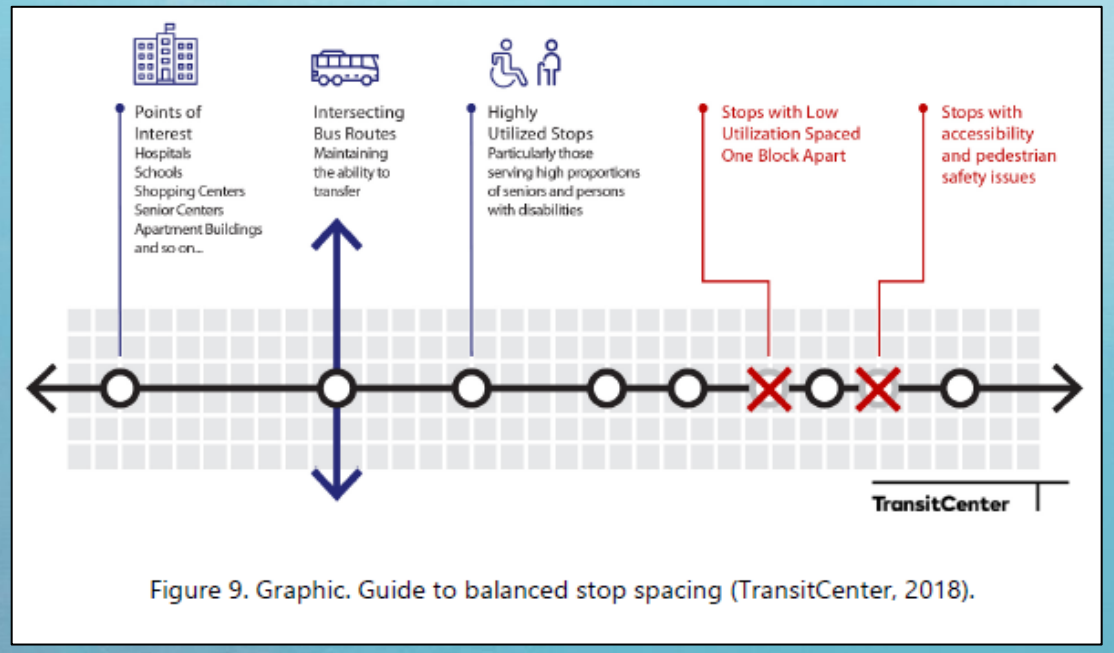
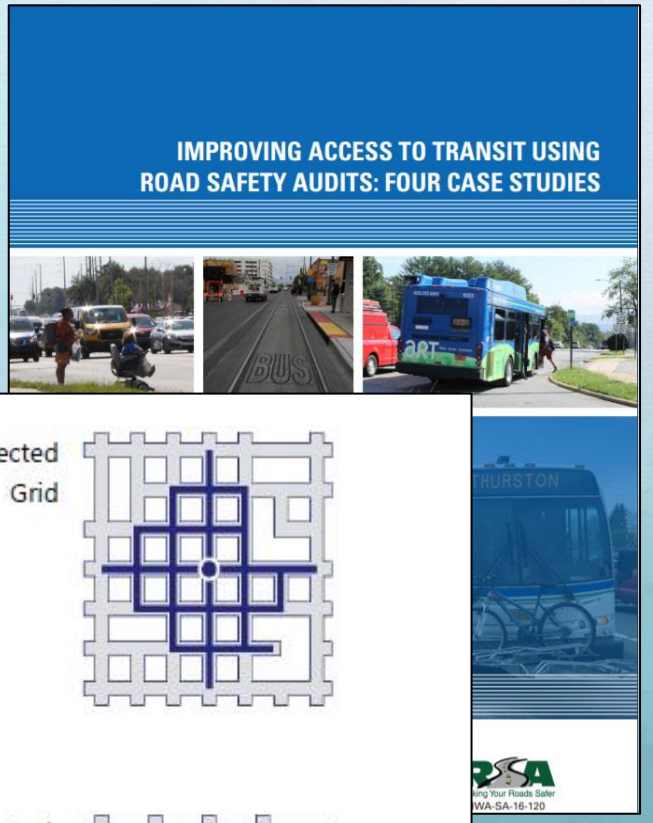


Figure 9. Graphic. Guide to balanced stop spacing (TransitCenter, 2018).



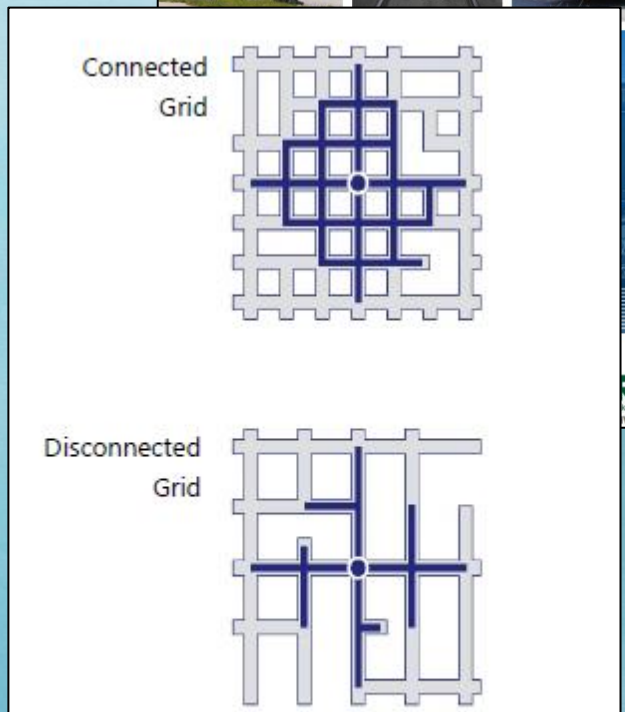
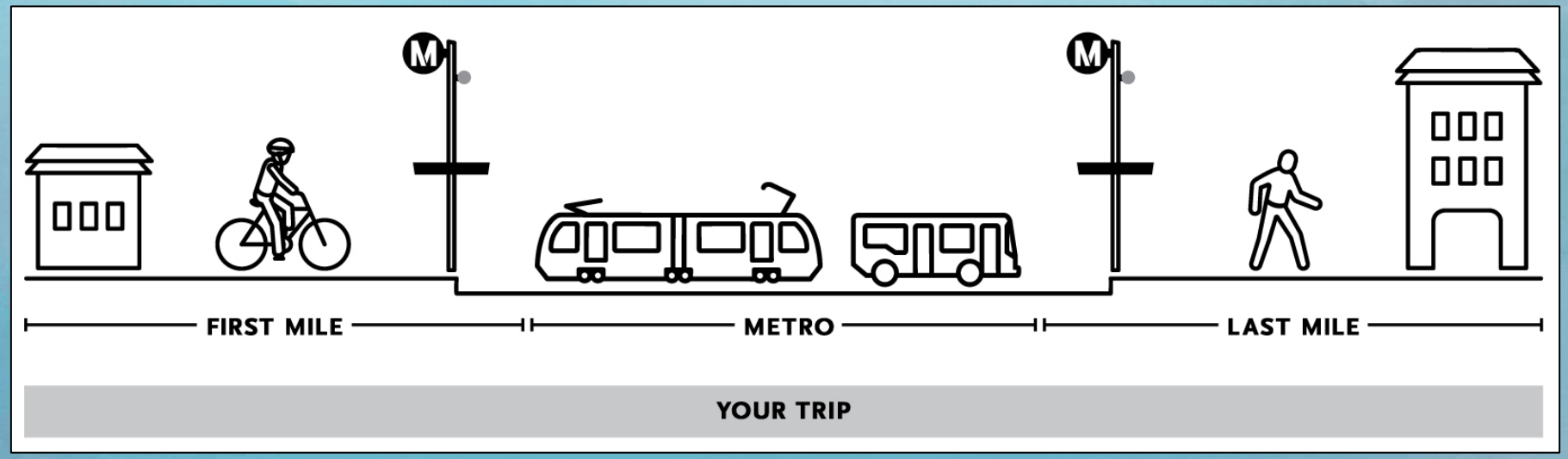


Figure 8. Graphic. TriMet pedestrian plan walkshed analysis (TriMet, 2020).

Tools for Identifying Bike/Ped Safety Issues

- Estimating First-Mile/Last-Mile Access
- Observing Pedestrian and Bicyclist Behavior
- Safety Data Analysis
  - Pedestrian and Bicyclist Crash Data Analysis, Health Outcome Data, Emerging Data Sources



Approaches to Enhancing Pedestrian and Bicyclist Safety

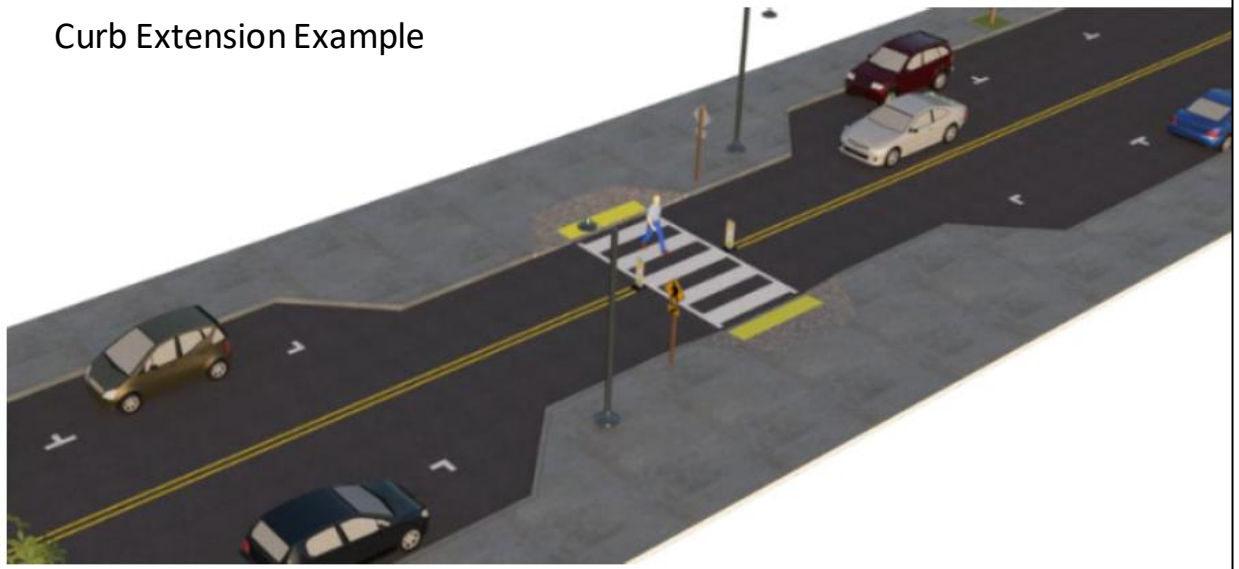
- Internal Actions
  - Transit Agency Organizational Improvements
  - Transit Operator Training Programs
  - Internal Agency Documentation and Policies
  - Transit Services and Facilities
  - Transit Vehicle Safety Features
- Partnerships
  - Public Agency Partnerships
  - Public Private Partnerships

Figure 19. Photograph. Two examples of MaineDOT pedestrian safety posters on transit vehicles (VHB, 2019).*

Design and Operational Measures

- Transit Access – designing bike/ped routes to transit facilities
  - Pedestrian Facility Design
  - Bicyclist Facility Design
  - Roadway Crossings
  - Rail, Light Rail, and Streetcar Crossings

Curb Extension Example



Bikeway Type	Design User	Potential Conflicts with Transit (Location and Behavior)	Reduce Transit Conflicts
Shared Lane	• Highly confident users	• Entire segment/travel lane • Transit stop areas • "Leapfrog" passing • Limited visibility	• Improve signage • Reduce road speeds • Evaluate potential for dedicated bicyclist facilities • Evaluate parallel routes for transit or bicyclists
Traditional Bicycle lane	• Highly confident users • Somewhat confident users	• Potential encroachment into bicycle lane • Entering and exiting bicycle lane at transit stop locations • "Leapfrog" passing	• Modify pavement markings to indicate mixing zone • Evaluate potential for buffered or separated bicyclist facilities • Evaluate parallel routes for transit or bicyclists
Buffered Bicycle lane	• Highly confident users • Somewhat confident users	• Entering and exiting bicycle lane at transit stop locations • "Leapfrog" passing	• Evaluate the need for a floating transit stop versus mixing zone • Evaluate potential for vertical separation of bicyclist facility
Separated Bicycle lane and Two-way Separated Bicycle Lanes	• Highly confident users • Somewhat confident users • Interested but concerned users	• Bicyclist conflicts with boarding and alighting transit users	• Implement floating transit stop • Route bikeway behind transit stop • Implement shared transit bicycle lane stop

Active Rail Crossing Treatment

Table 4. Overview of active rail crossing treatments (adapted from Goodchild et al., 2017).

Treatments	Cost	Maintenance	Weather	Quiet Zone	Light Emission	Duration	Compliance	Behavior
Flashing Light Signals	$$	$$	M	--	L	L	L	H
Bells	$	$	--	--	--	L	L	H
Vehicle Automatic Gates	$$	$	--	--	--	H	--	M
Wayside Horn System	$$	$	M	L	--	L	--	M
In-Pavement Marker System	$$-$$$	$$	M	--	M	L	--	M
Pre-Signal/Traffic Lights	$$$	$$	M	--	H	--	--	L
Variable Message Sign/Blank-Out Signs	$$	$	H	--	--	--	--	M
Dynamic Speed Monitoring Display (DSMD)	$	$	H	--	--	--	H	H
Pedestrian Automatic Gates	$$	$$	L	--	--	--	--	M
Pedestrian Hybrid Beacon	$$	$	M	--	--	M	M	H
Active and Automatic Rectangular Rapid Flash Beacon (RRFB)	$	$$	L	--	M	H	H	L

Legend for Active Treatments

Low	Medium	High
L	M	H
$	$$	$$$

Developed by Oregon DOT via research, modeling, and other analyses

Passive Rail Crossing Treatment

Table 5. Overview of passive rail crossing treatments (adapted from Goodchild et al., 2017

Treatment	Cost	Maintenance	Day Visibility/Audibility	Night Visibility/Audibility	Sight Distance	Weather	ADA	Duration	Compliance	Behavior
Crossbucks	$	$	M	L	M	H	--	L	L	M
Railroad Crossing Advance Sign	$	$	M	L	M	H	--	--	--	M
Look Both Ways	$	$	M	L	M	H	--	L	--	M
Pavement Marking	$	$$	M	L	M	H	H	L	--	H
Tactile Warning	$	$$	H	L	M	M	M	L	--	H
Dynamic Envelope	$$	$$	H	M	M	M	H	L	M	M
Conflict Paint	$	$	H	M	H	M	--	L	H	L
Glow in Dark Paint	-	-	H	H	H	M	--	L	H	L
Rumble Strips	$	$	M	L	L	L	L	M		M
Speed Bumps	$	$	H	M	M	M	L	L	H	M
Speed Humps	$	$	H	L	H	L	L	L	--	L
Speed Kidney	$	$	H	M	M	M	L	L	H	M
Speed Cushion	$	$	H	M	M	M	L	L	M	M
Speed Table	$	$	H	M	M	M	L	L	H	L
Grade/Hill	$$	$	H	L	L	L	L	M	--	M
Curves	$$	$	H	L	H	L	H	M	--	L
Raised Crosswalk	$	$	H	L	M	H	H	L	M	L
Bollards	$	$	H	M	H	M	--	M	H	M
Bicycle Rail or Lean Rail	$	$	H	L	M	L	--	--	H	L
Lighting	$	$	--	H	H	M	--	--	H	M
Mirrors	$	$	H	L	M	H	--	L	--	M
Pedestrian Refuge	$$	$	H	M	M	L	M	L	--	M
Channelization (Paving/Delineation)	$$$	$$	H	M	H	L	--	M	--	L
Channelization (Z-Crossing)	$$$	$	H	M	H	L	H	L	--	M
Manual Gates	$	$	H	M	H	L	H	L	--	M
Pedestrian overcrossing, undercrossing	$$$	$	H	M	M	L	M	M	H	L
Quick/Temporary Curb	$	$	H	M	H	M	H	M	--	M
Pedestrian Crossing Flags	$	$	M	L	M	H	H	L	L	H

Legend for Passive Treatments

Low	Medium	High
L	M	H
$	$$	$$$

Developed by Oregon DOT via research, modeling, and other analyses

Design and Operational Measures

- Transit Stop / Station – locating and designing transit stops for safety and accessibility
  - Transit Stop Placement
  - Transit Stop Design

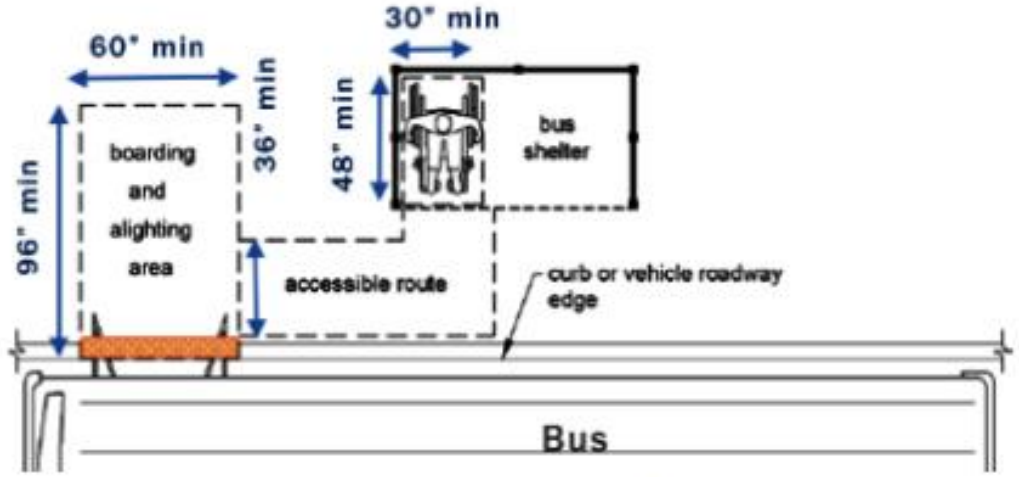
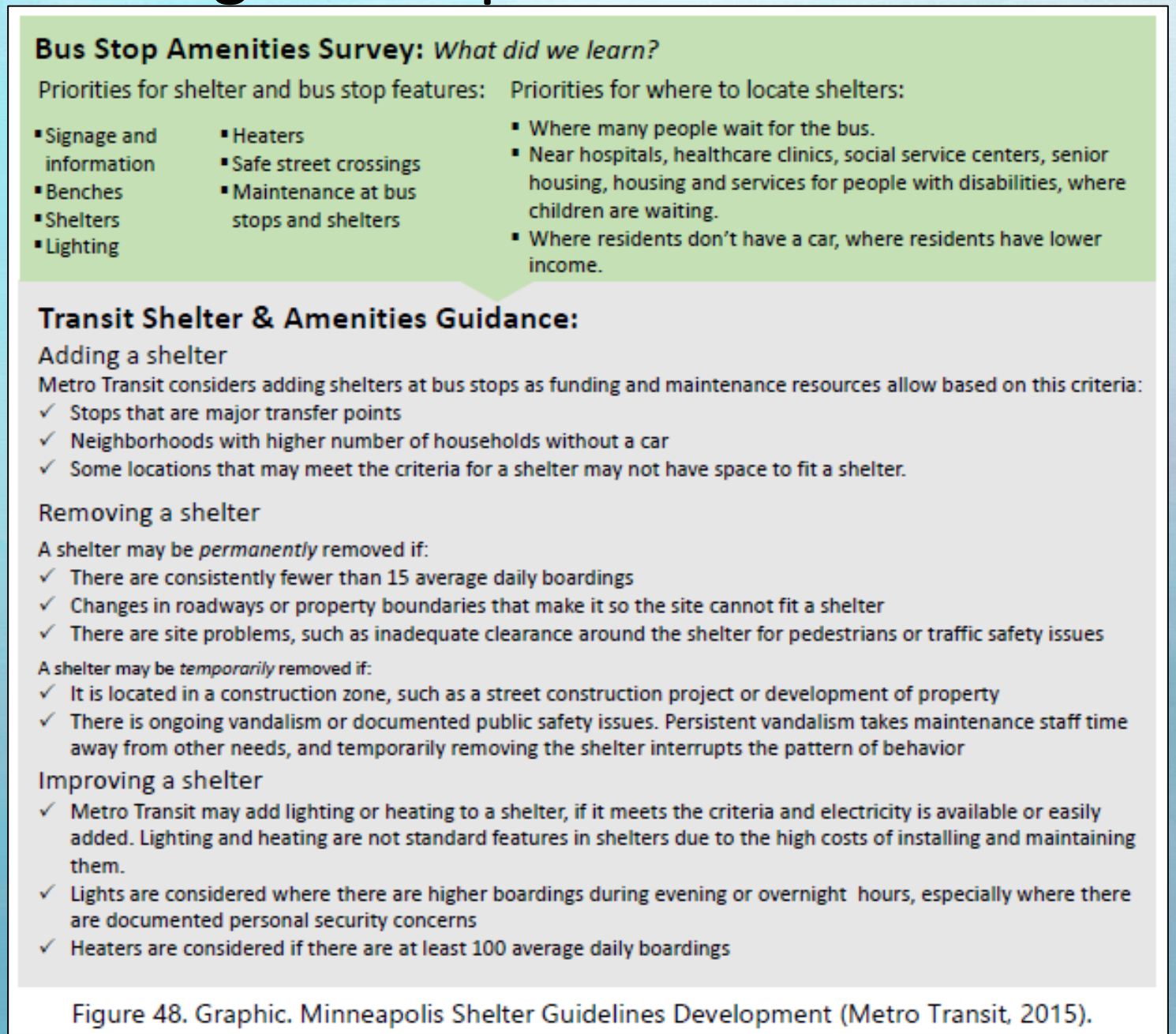


Figure 41. Graphic. Accessible bus stop boarding and alighting area, and shelters

Table 6. Comparative analysis of bus stop locations (adapted from FTA 2015).

Stop Type	Advantages	Disadvantages
Near Side	• Minimizes interference when traffic is heavy on far side of intersection • Allows passengers access to buses closest to the crosswalk • Intersection available to assist in pulling away from curb • Prevents double stopping • Allows buses to service passengers while stopped at red light • Provides driver with opportunity to look for oncoming traffic including other buses with potential passengers	• Conflicts with right-turning vehicles are increased • Potentially obscures curbside traffic control devices and crossing pedestrians • Potentially obscures sight distance for crossing vehicles stopped to the right of the bus • Potentially blocks the through lane during peak periods by queuing buses • Increases sight distance problems for crossing pedestrians
Far Side	• Minimizes conflicts between right-turning vehicles and buses • Provides additional right turn capacity by making curb lane available for traffic • Minimizes sight distance problems on approaches to intersection • Encourages pedestrians to cross behind the bus • Accommodates shorter deceleration distances for buses • Creates gaps in traffic flow for buses reentering the flow of traffic at signalized intersections	• Potentially blocks intersections during peak periods by queuing buses • Potentially obscures sight distance for crossing vehicles • Increases sight distance problems for crossing pedestrians • Interferes with bus operations and all traffic in general when stopping after a red light • Potentially increases number of rear end crashes since drivers do not expect buses to stop again after stopping at a red light
Midblock	• Minimizes sight distance problems for vehicles and pedestrians • Minimizes pedestrian congestion in passenger waiting areas • Reduces conflicts with different movements of vehicles (vehicles turning right and left) and can eliminate turning lanes	• Necessitates additional distance for no parking restrictions • Encourages patrons to cross street at midblock (jaywalking) • Increases walking distance for patrons crossing at intersections

Design and Operational Measures



Bus Stop Amenities Survey: *What did we learn?*

Priorities for shelter and bus stop features:

- Signage and information
- Benches
- Shelters
- Lighting
- Heaters
- Safe street crossings
- Maintenance at bus stops and shelters

Priorities for where to locate shelters:

- Where many people wait for the bus.
- Near hospitals, healthcare clinics, social service centers, senior housing, housing and services for people with disabilities, where children are waiting.
- Where residents don't have a car, where residents have lower income.

Transit Shelter & Amenities Guidance:

Adding a shelter

Metro Transit considers adding shelters at bus stops as funding and maintenance resources allow based on this criteria:

- ✓ Stops that are major transfer points
- ✓ Neighborhoods with higher number of households without a car
- ✓ Some locations that may meet the criteria for a shelter may not have space to fit a shelter.

Removing a shelter

A shelter may be *permanently* removed if:

- ✓ There are consistently fewer than 15 average daily boardings
- ✓ Changes in roadways or property boundaries that make it so the site cannot fit a shelter
- ✓ There are site problems, such as inadequate clearance around the shelter for pedestrians or traffic safety issues

A shelter may be *temporarily* removed if:

- ✓ It is located in a construction zone, such as a street construction project or development of property
- ✓ There is ongoing vandalism or documented public safety issues. Persistent vandalism takes maintenance staff time away from other needs, and temporarily removing the shelter interrupts the pattern of behavior

Improving a shelter

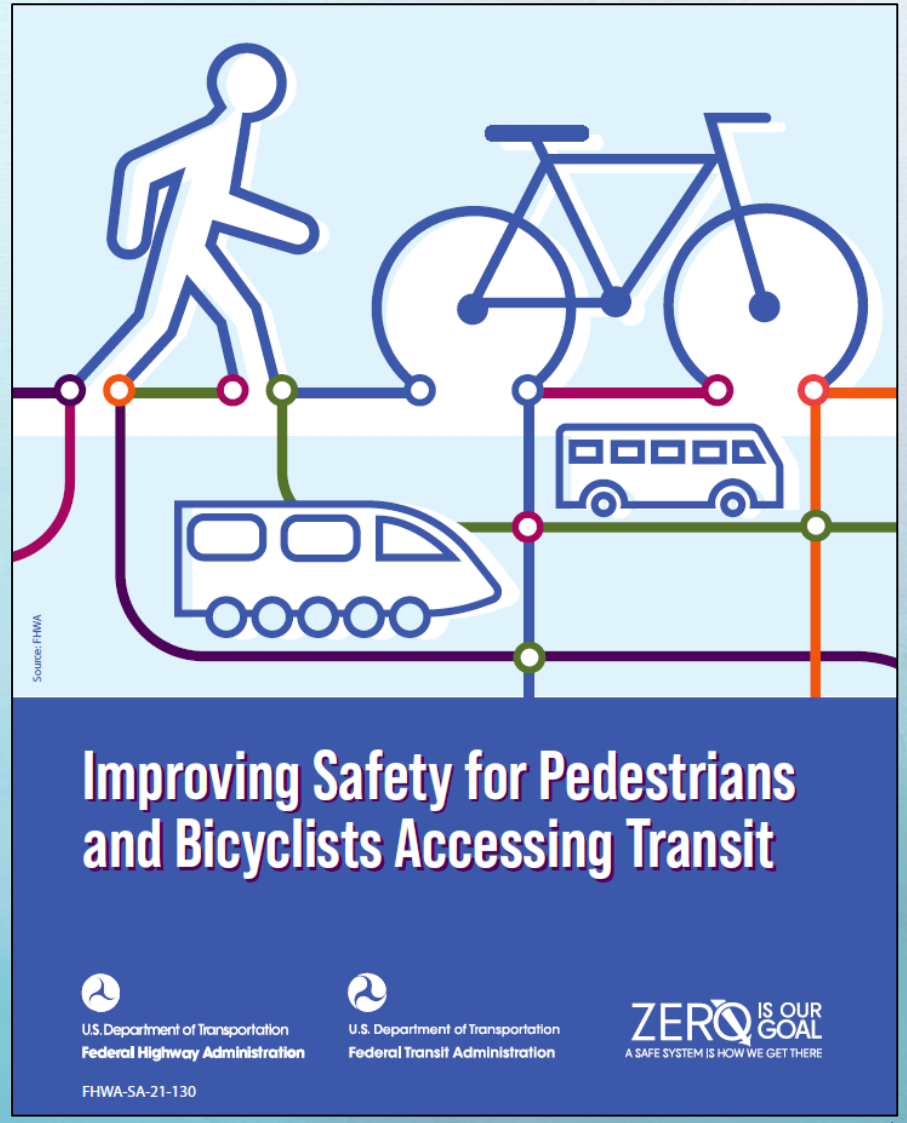
- ✓ Metro Transit may add lighting or heating to a shelter, if it meets the criteria and electricity is available or easily added. Lighting and heating are not standard features in shelters due to the high costs of installing and maintaining them.
- ✓ Lights are considered where there are higher boardings during evening or overnight hours, especially where there are documented personal security concerns
- ✓ Heaters are considered if there are at least 100 average daily boardings

Figure 48. Graphic. Minneapolis Shelter Guidelines Development (Metro Transit, 2015).

Overcoming Barriers to Safe and Accessible Transit

- Changing Driver Behavior Near Transit Stops
- Co-locating Mobility Options
- Technological Solutions to Route Solutions
- Addressing Sidewalk Maintenance
- Resilience Planning for Emergency Response

Questions?


Source: FHWA
Improving Safety for Pedestrians and Bicyclists Accessing Transit
U.S. Department of Transportation
Federal Highway Administration
U.S. Department of Transportation
Federal Transit Administration
ZERO IS OUR GOAL
A SAFE SYSTEM IS HOW WE GET THERE
FHWA-SA-21-130

Taking Time to FLEX – What's new in Training

David Williams, VHB

Transportation Systems Management & Operations

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- Types of training in FLEX Portal
  - TSM&O concepts
  - TSM&O applications
  - Field equipment
  - How-to training videos
- FLEX Portal is available with a **free** account

TSM&O Focused Learning Education and Experiences (FLEX)

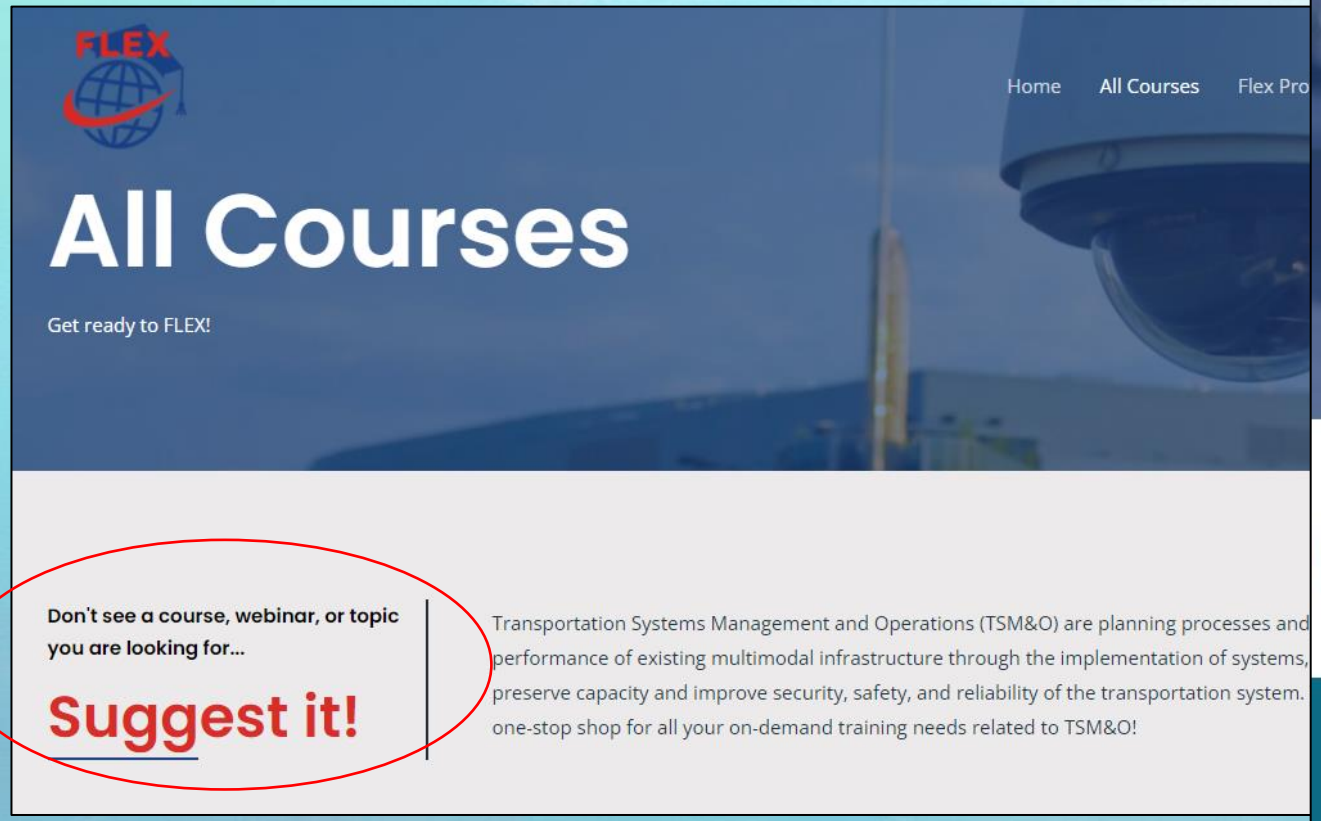
- Active Users – 408
- Courses Completed – 325
- Most Popular Course – *Traffic Signal Training (A)*

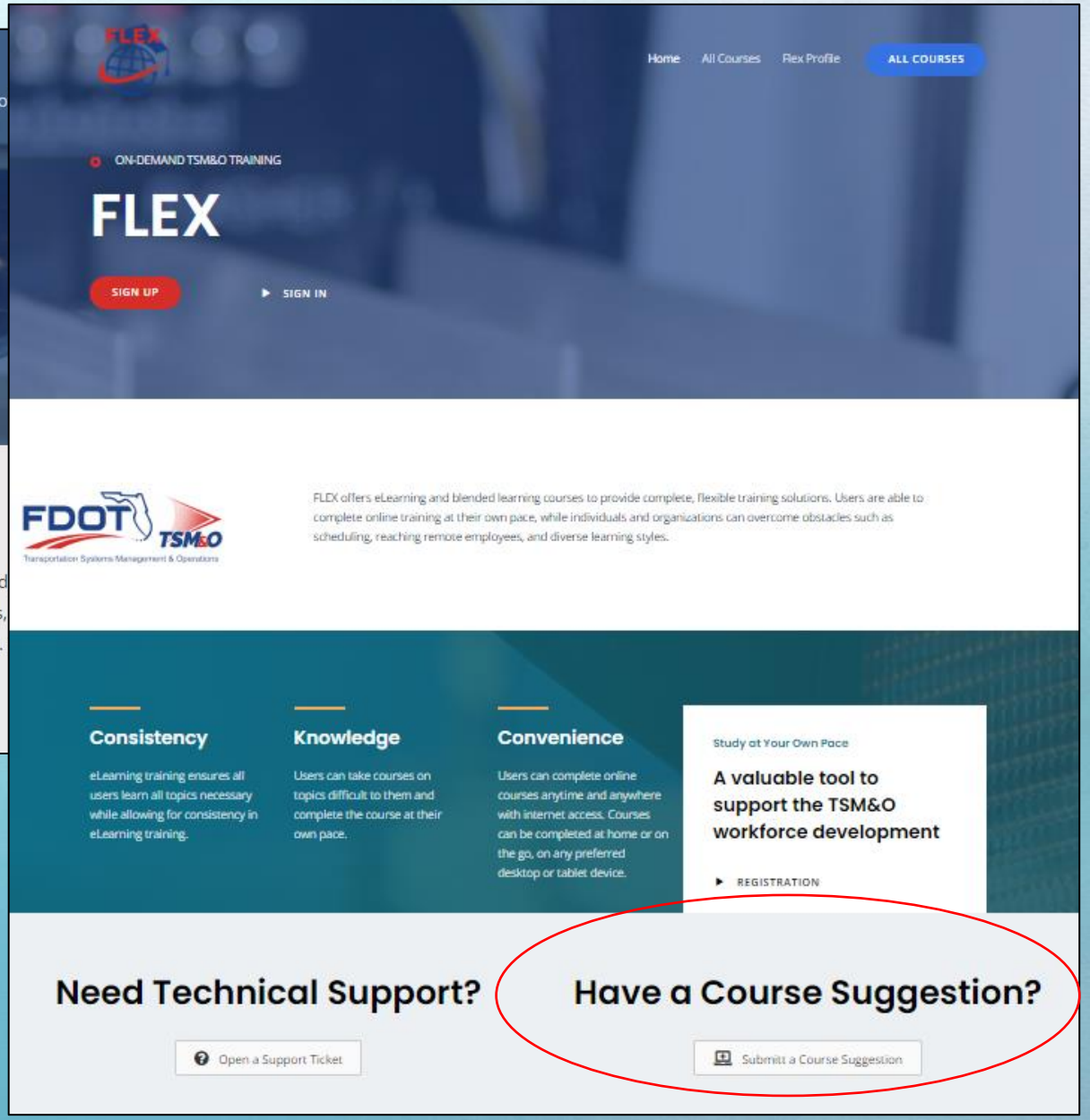
- Troubleshooting – *Request Support* button
- For more information, visit: https://elearning.cflsmartroads.com/
  - Google: “FDOT FLEX Portal”

Courses Coming Soon to FLEX Portal

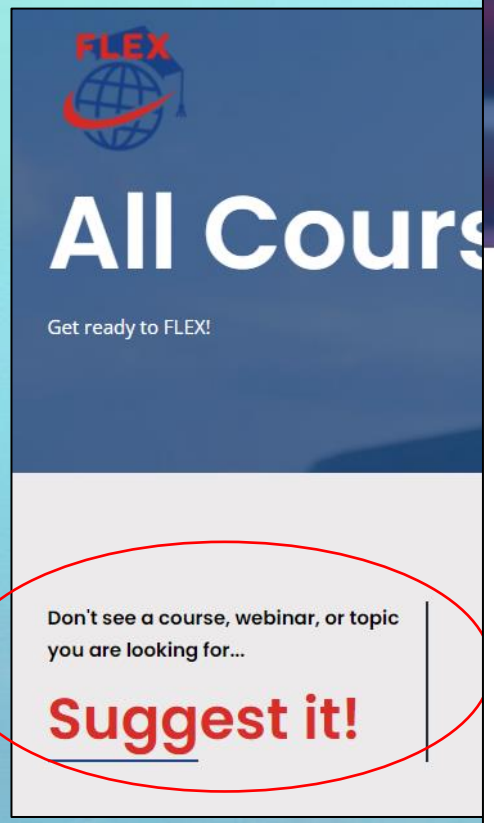
- SunGuide 101
- Active Alert

Have a Suggested Training?

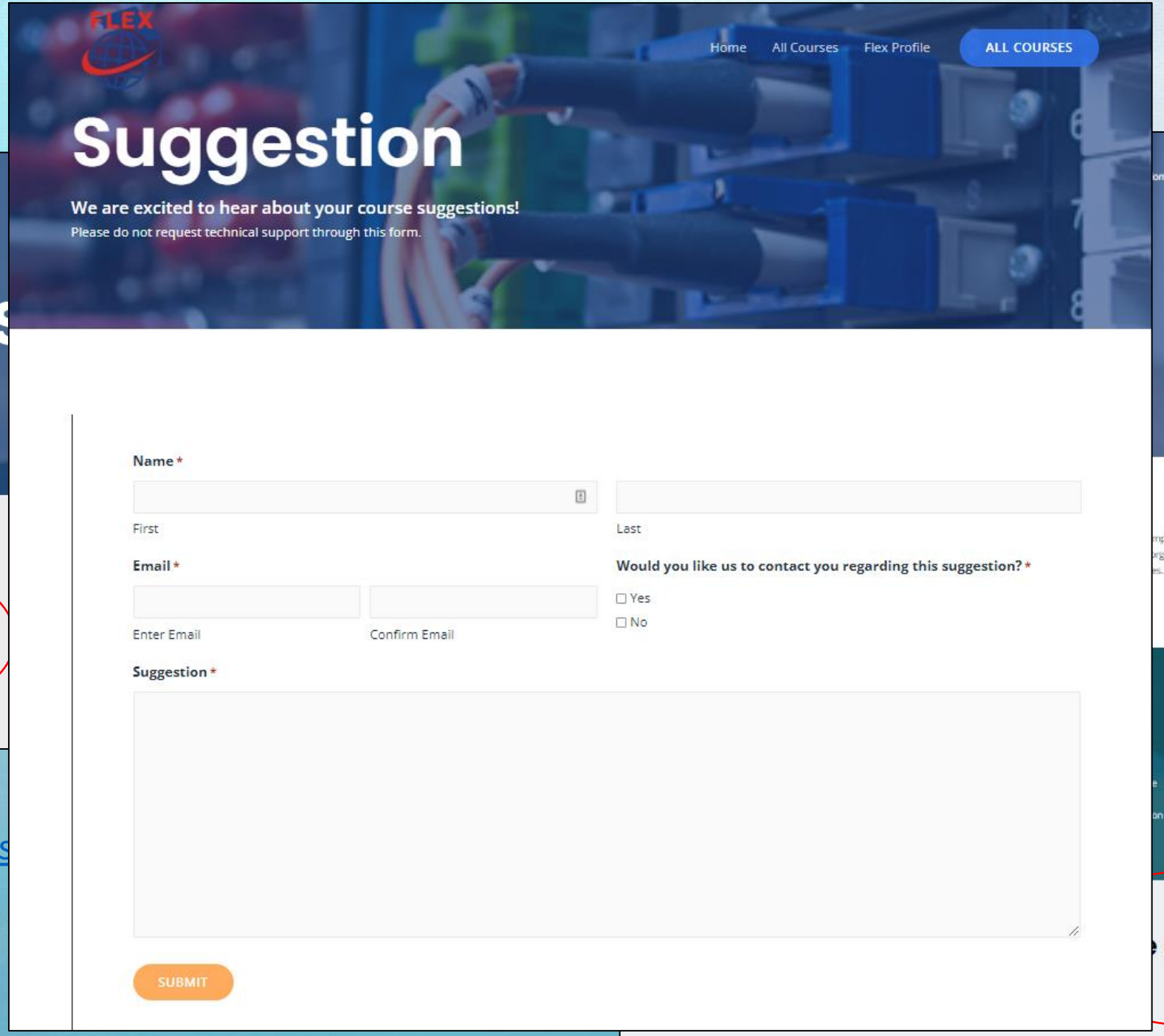


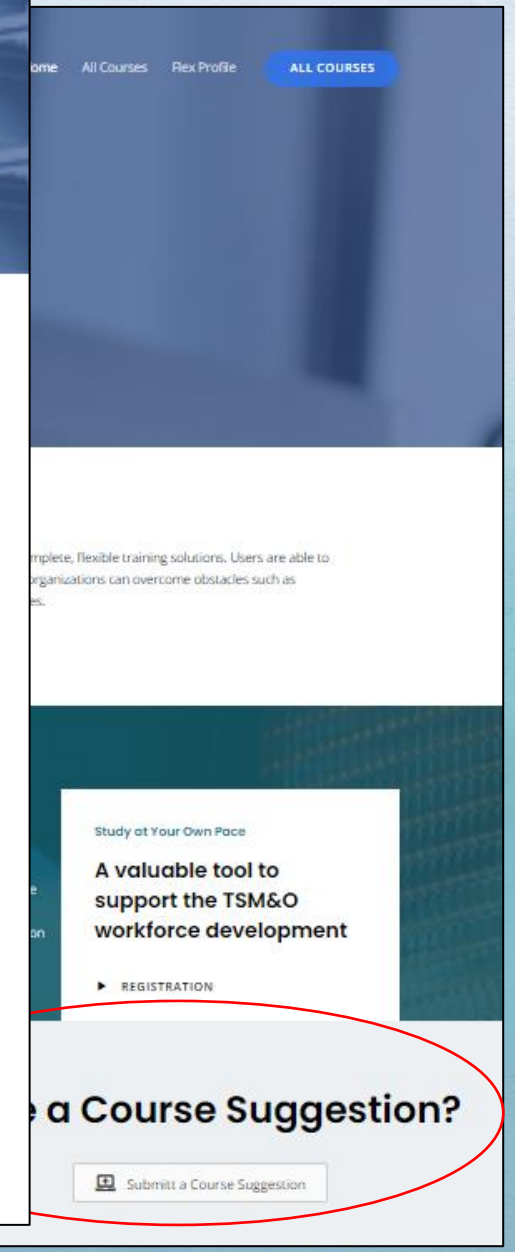


https://elearning.cflsmartroads.com/flex-suggestions/



https://elearning.cfls





Urban SDK | District 5

Performance reporting harmony

Safety

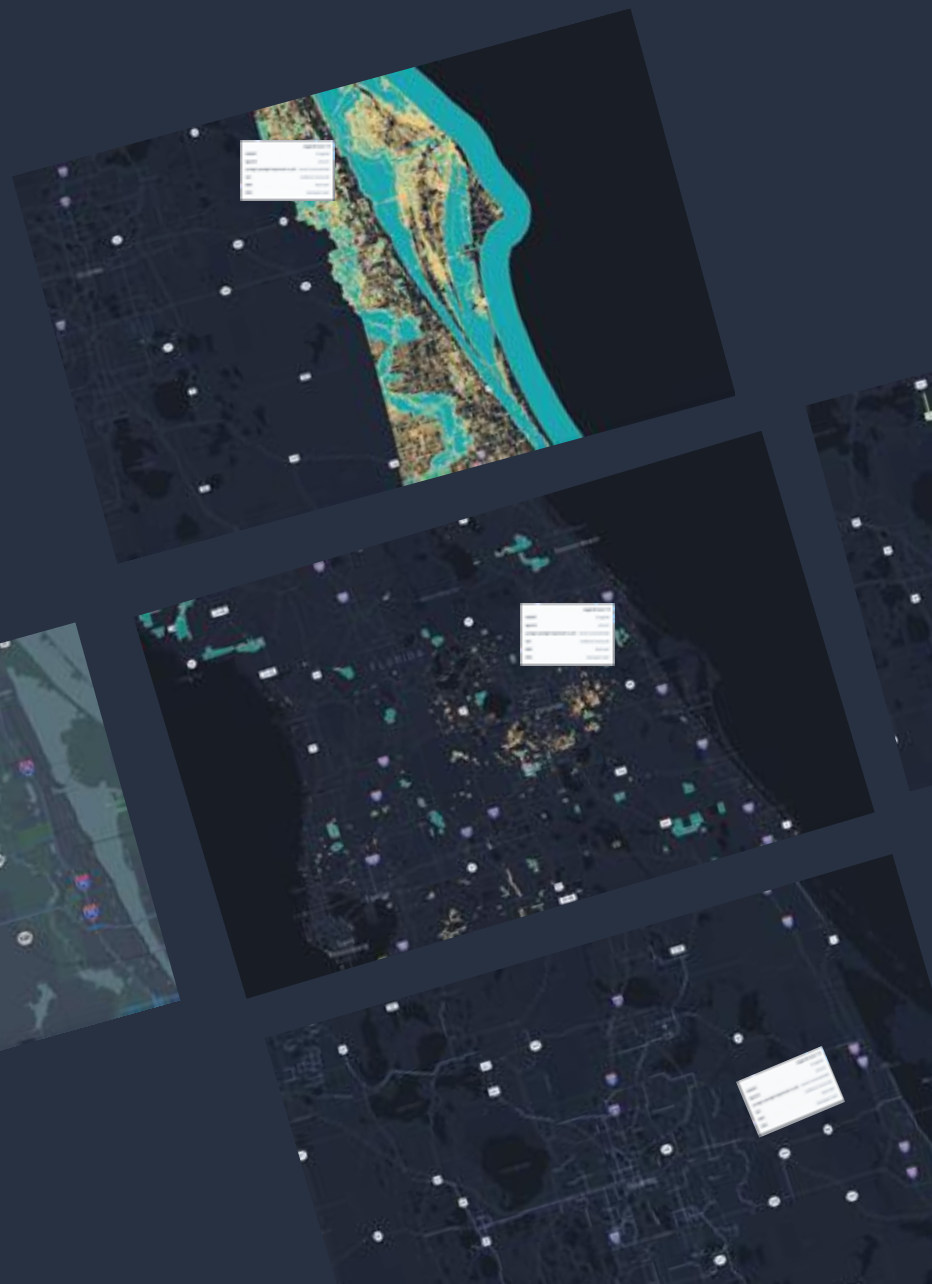
Technology/ Autonomy

Infrastructure

Economy/ Tourism

Mobility
Reliability

Equity/ Livability



Current Initiatives

Workforce Development Training

- Courses available for **Signal Technician Training**
  - Contact Tricia Ballard (tricia.ballard@dot.state.fl.us) or Manny Rodriguez (manny.rodriguez@dot.state.fl.us)

Course Topic	Duration	Venue	Intended Audience	Class Date	Class Recording Available?
Basic Traffic Signal Cabinet and Field Equipment Orientation	1 day	Lab	Signal Technicians	10/17/2022	PPT & Recording
Traffic Signal Timing Basics	1 day	Classroom	Signal Technicians	10/24/2022	PPT & Recording
Traffic Signal Controller Programming	1 day	Lab	Signal Technicians	10/31/2022	PPT & Recording
CMS and TSP Orientation	1 day	Classroom	Signal Technicians	11/7/2022	PPT & Recording
SIIA and NOEMI Orientation	1 day	Classroom	Signal Technicians	11/14/2022	PPT & Recording
ATMS Monitoring and Programing	1 day	Lab	Signal Technicians	11/21/2022	NA
Video Detection Setup - Iteris	1 day	Lab or Classroom	Signal Technicians	Vendor Presented - TBD	NA
Video Detection Setup - Gridsmart	1 day	Lab or Classroom	Signal Technicians	Vendor Presented - TBD	NA
Video Detection Setup - Econolite	1 day	Lab or Classroom	Signal Technicians	Vendor Presented - TBD	NA
Travel Time System Platforms	1 day	Classroom	Engineers & Signal Technicians	Previously recorded	PPT & Recording

Each class will be limited to 10 participants

Current Initiatives

- I-4 Ultimate – Express Lanes
- Wekiva Pkwy

Current Initiatives

- Smart Work Zone Trailer
- TSMCA Update
  - Draft *Exhibit E Amendment* developed by FDOT Legal
  - Coordinating revisions/signatures with Maintaining Agencies
- Event Management II
- SunStore

Current Initiatives

- PedSafe
- PedSafe II
- AV Shuttle – received FHWA approval to deploy electrical upgrades
  - May look to expand service area once the shuttle service is restored
    - Office of Exceptional Learning has reached out
- Kiosks at UCF – software running in O&M
  - Exploring mounting modification options
- I-4 FRAME (led by District 7)

THANK YOU!

Next Consortium – December 8, 2022