Hollywood, FL

June 13-14, 2024

2024 TRANSPORTATION SYMPOSIUM

Design Considerations for Managed Lanes Corridors

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TSM&O Engineer – Freeways, FDOT District Six

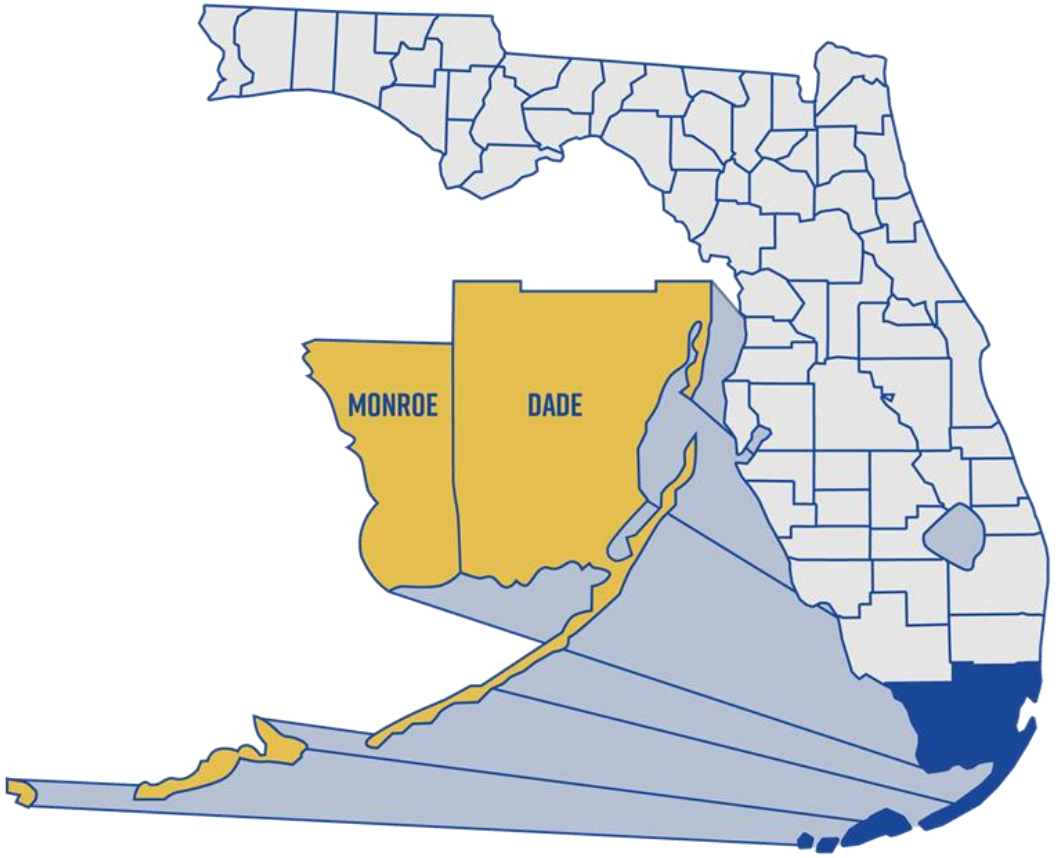
FDOT

Agenda

- Overview of District Six TSM&O Program
- Overview of Managed Lanes
- Considerations from an Operational Perspective
  - Planning & PD&E
  - Design
  - Maintenance
  - Construction & Testing
- Conclusion

District Six TSM&O Program

- Miami-Dade and Monroe Counties
- Population
  - 2.8+ Million Residents
  - 30 Million Visitors
- Coverage
  - 2,835 Lane Miles – 700 Centerline Miles
  - 280 Centerline Miles of ITS Coverage
    - Five Actively Managed Limited Access Facilities
    - Several Key Arterial Roadways
    - Traffic Signal System
  - 34+ Million Vehicle Miles Daily



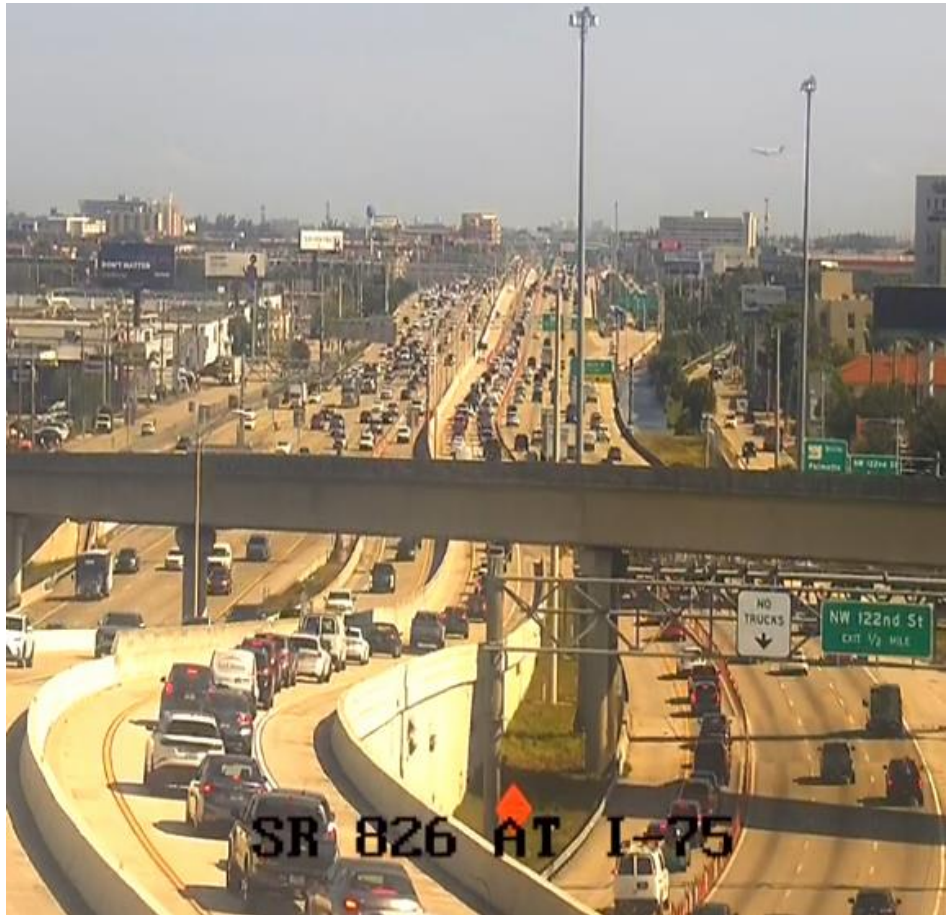
- **Miami is Ranked Top Five Most Congested Cities in the U.S.**

District Six TSM&O Program

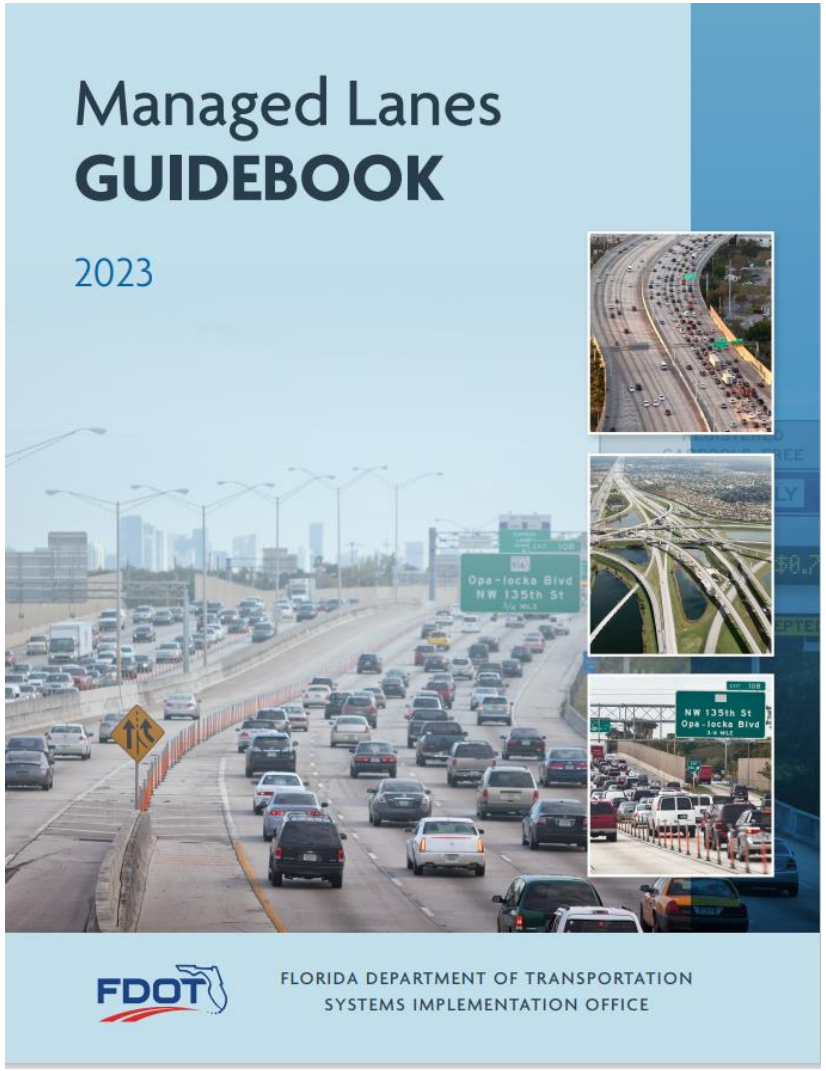
- SunGuide TMC
  - SE Florida's Regional Traffic Command Post
  - 24/7/365 Operations
  - 32,000 Square Foot Facility
  - Four Co-located Agencies
- Infrastructure
  - Closed Circuit TV (CCTV) Cameras – 472
  - Dynamic Message Signs (DMS) – 178
  - Detector Stations – 510
  - Ramp Signals – 41
  - Traffic Signals and other Traffic Control Devices – 79

Managed Lanes

- Affect the regional transportation system.
- One managed lane project can impact other roadway and other managed lane projects.
- Other roadway projects can impact existing managed lanes corridors.

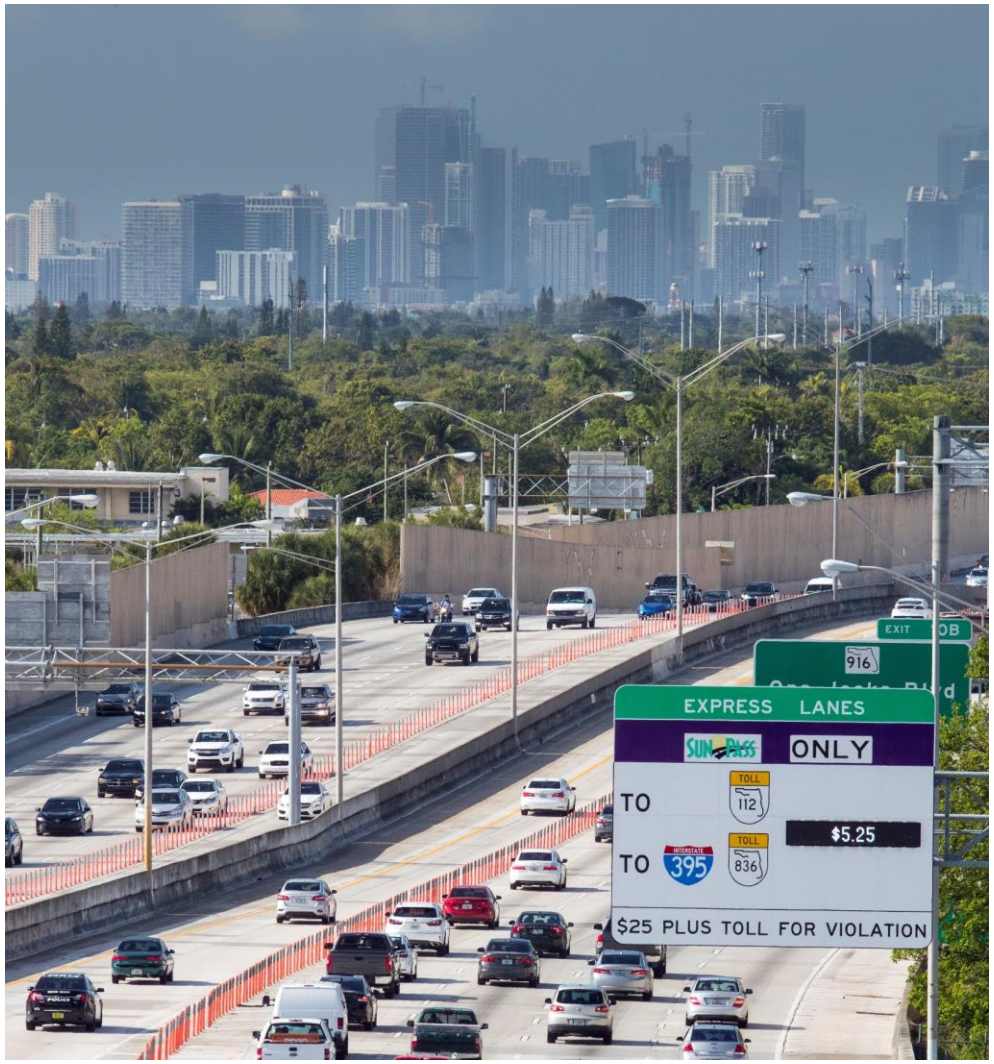


Managed Lanes Program – FDOT ML Guidebook



- Guidance for implementation of the Department's Managed Lanes Policy, Topic No. 000-525-045.
- To be used during the development, implementation, and operations of managed lanes.

Managed Lanes Facility Types



Express Lanes

Congestion is managed with vehicle eligibility, separation, access control, and pricing incentives.

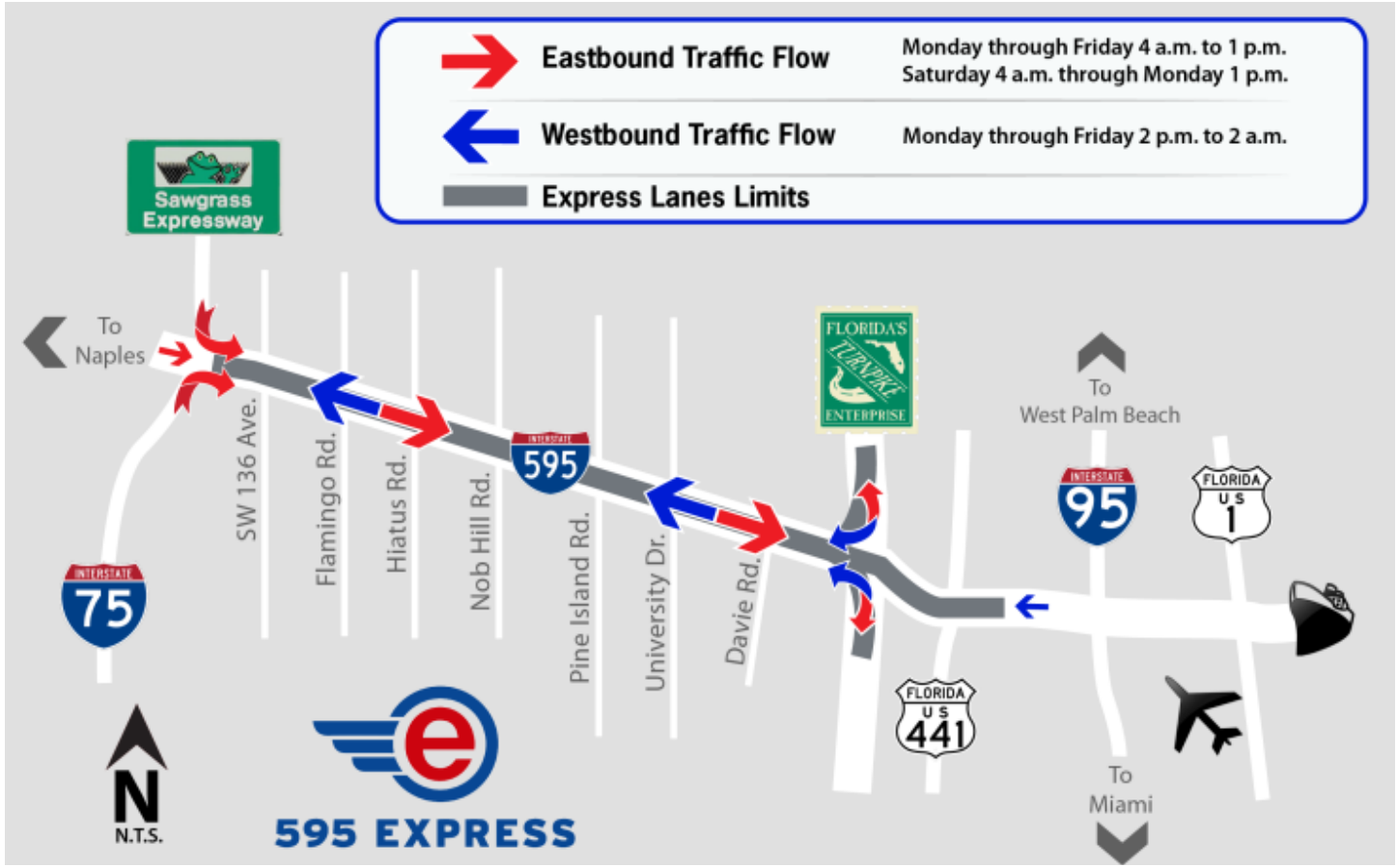
Managed Lanes Facility Types

Thru Lanes

Limited access lanes that serve long distance trips.

TRANSPORTATION SYMPOSIUM

Managed Lanes Facility Types

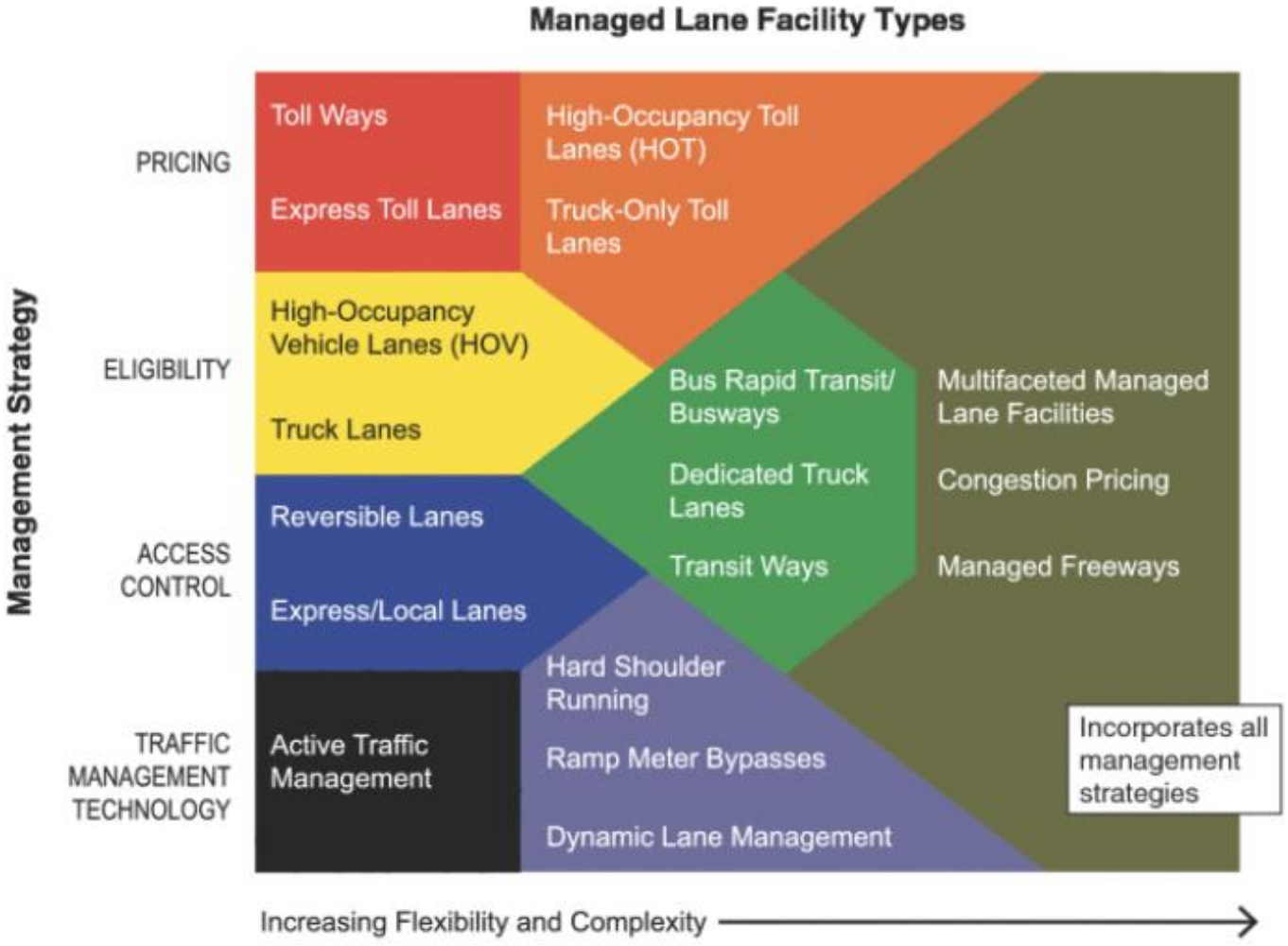


Source: 595express.info

Reversible Lanes

Dedicated lanes that serve directional peak period demands.

Managed Lanes Facility Types



Source: NCHRP Research Report 835 – Guidelines for Implementing Managed Lanes

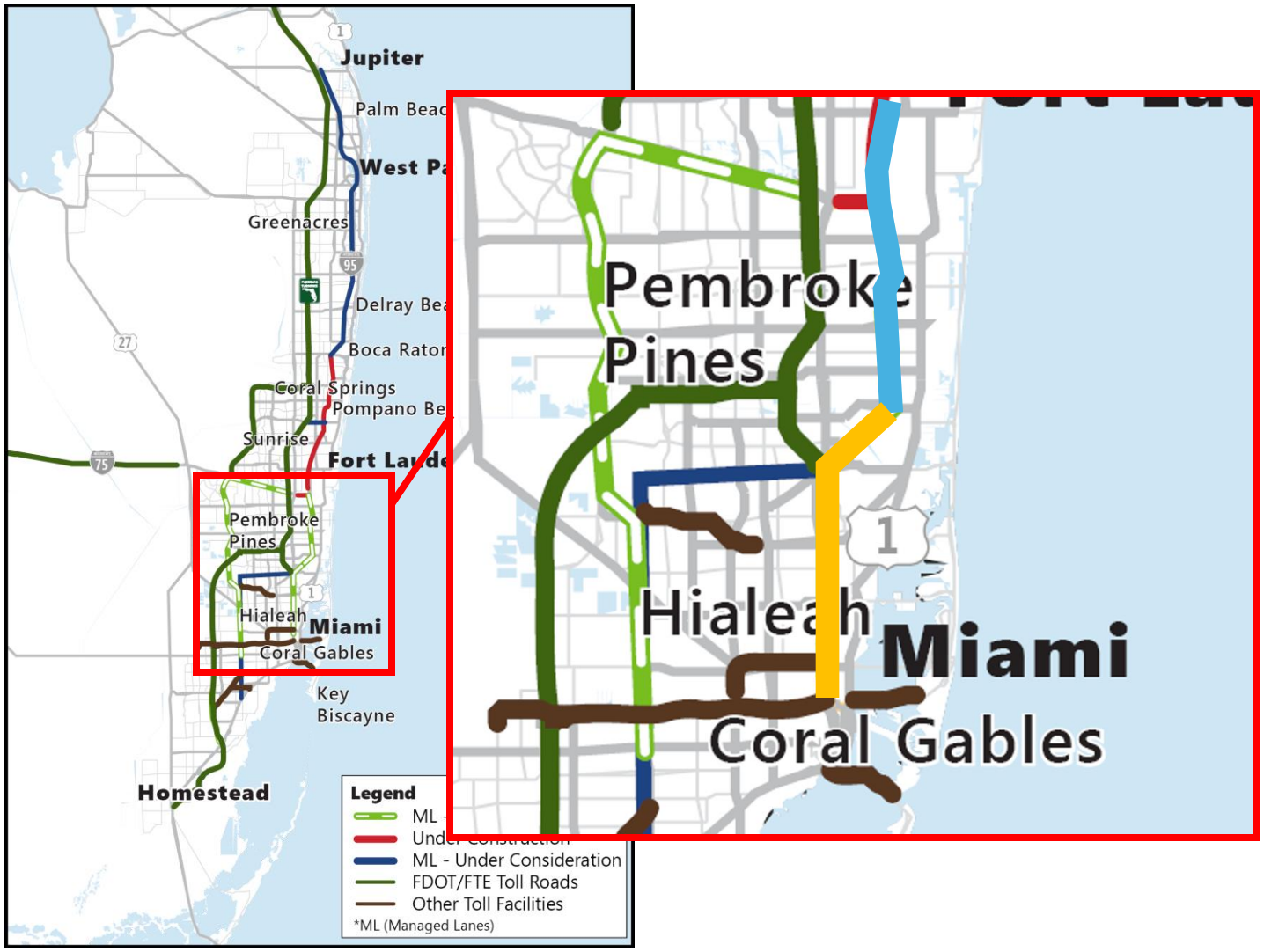
Other Types

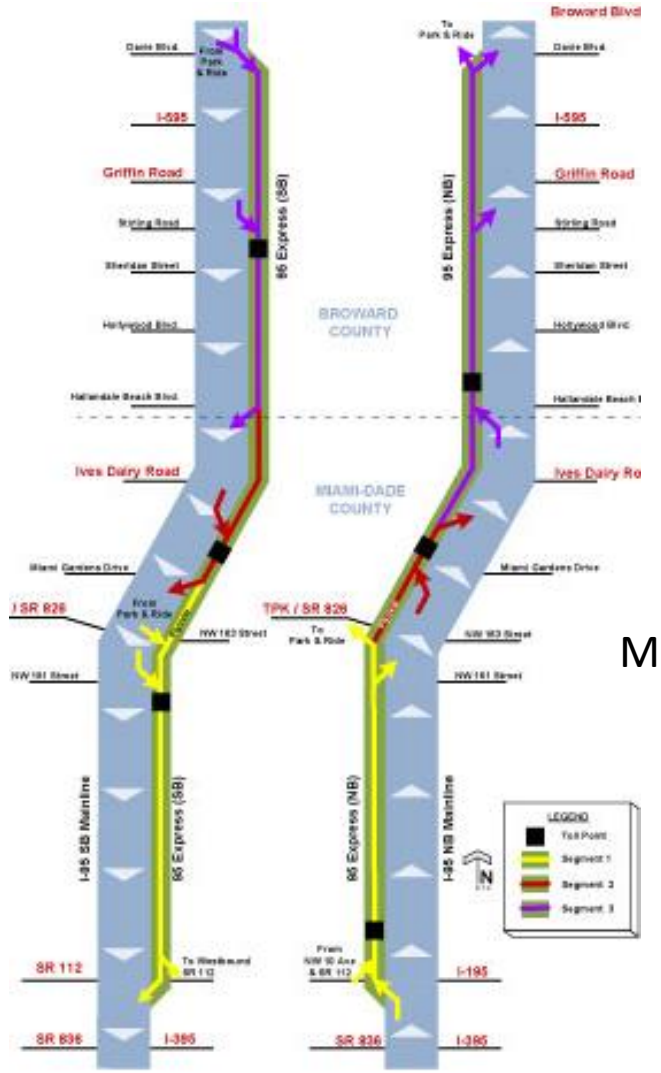
- Carpools
- Truck Only Lanes
- Managed Transit Lanes
- Part Time Shoulder Use
- Connected and Automated Vehicle (CAV) Only Lanes.

Managed Lanes Benefits

Source: *FDOT - Connected Mobility & Technologies Program*

District Six Managed Lanes





95 EXPRESS

Miles Managed = 21

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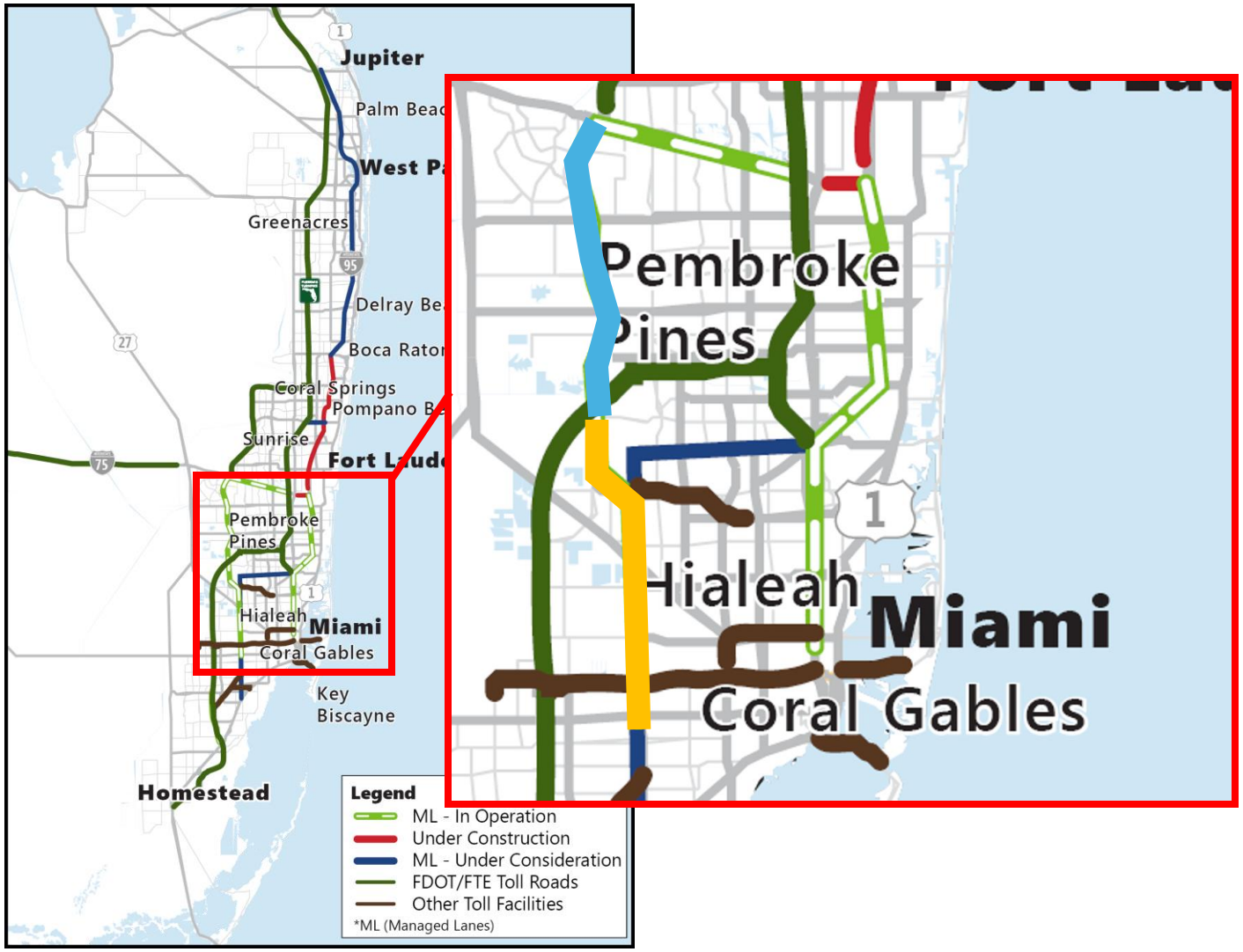
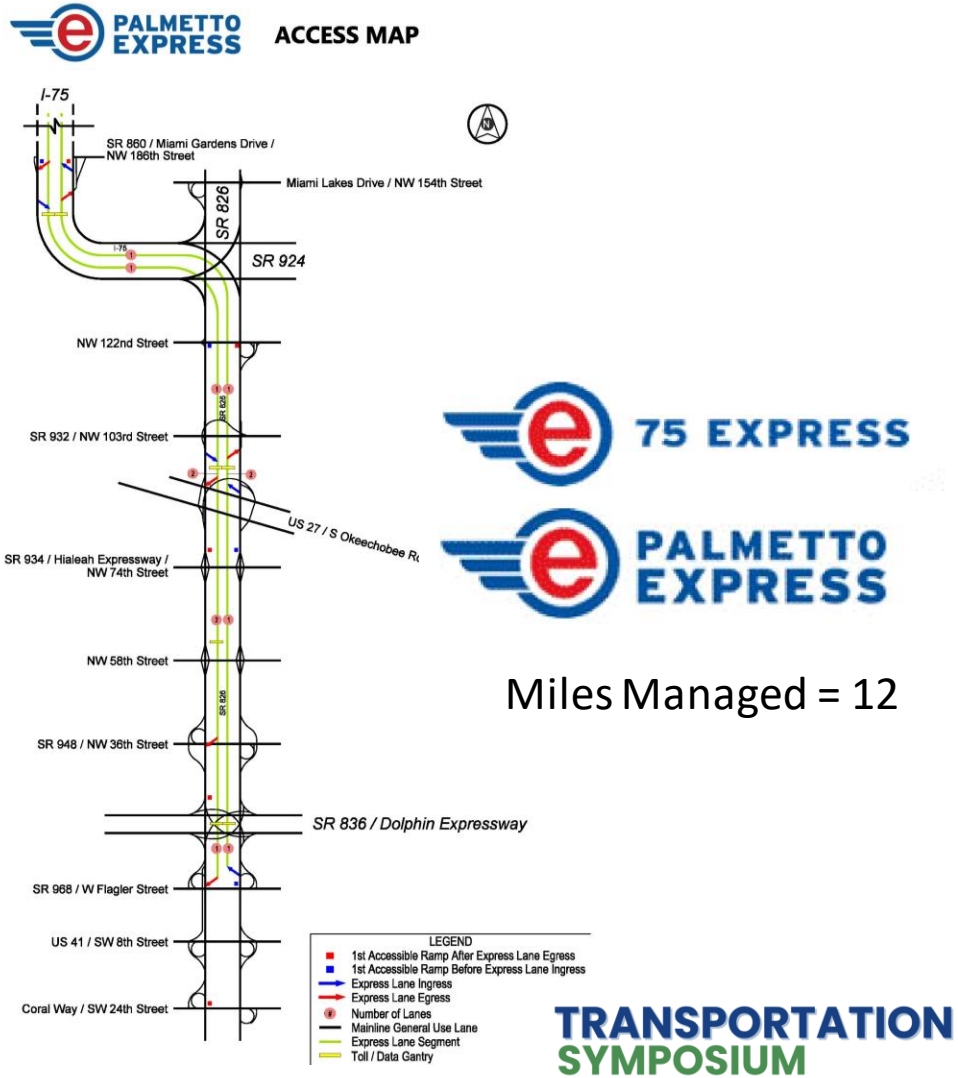
District Six Managed Lanes





75 EXPRESS

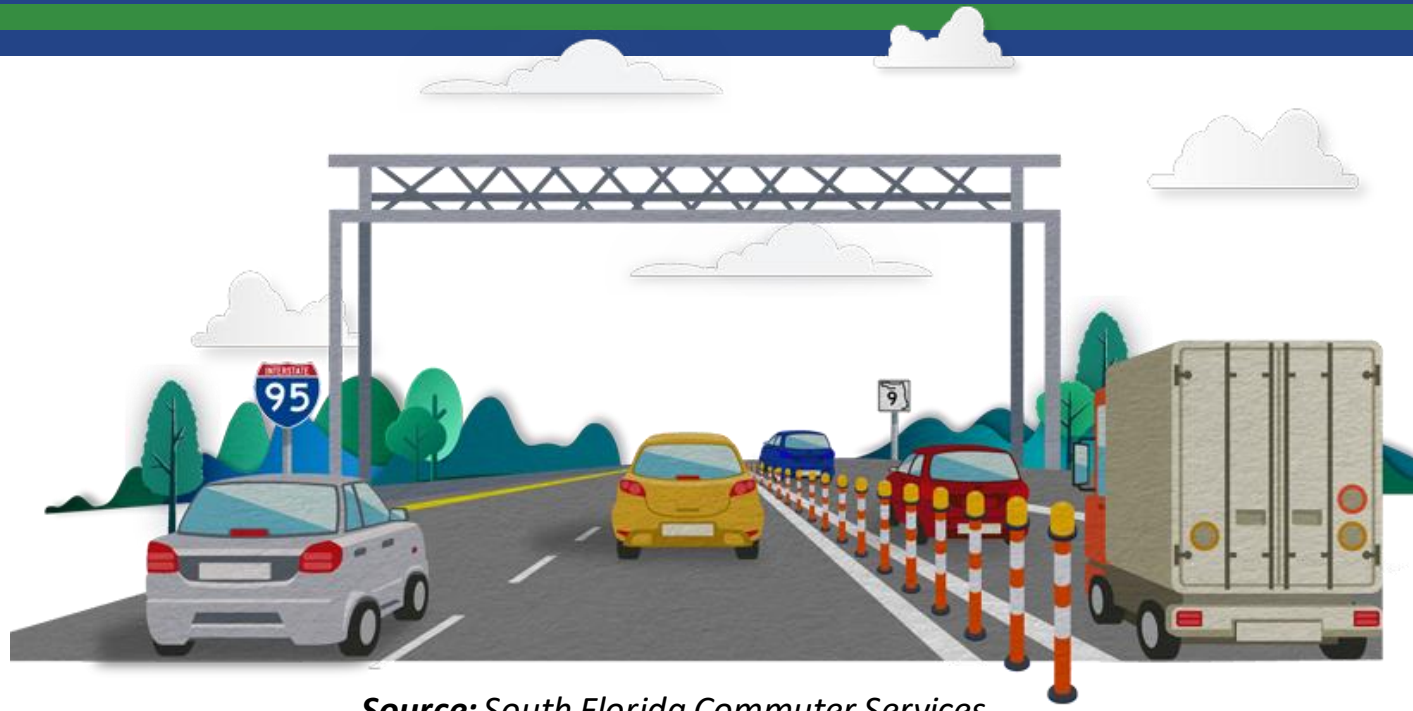
PALMETTO EXPRESS

Miles Managed = 12

TRANSPORTATION SYMPOSIUM

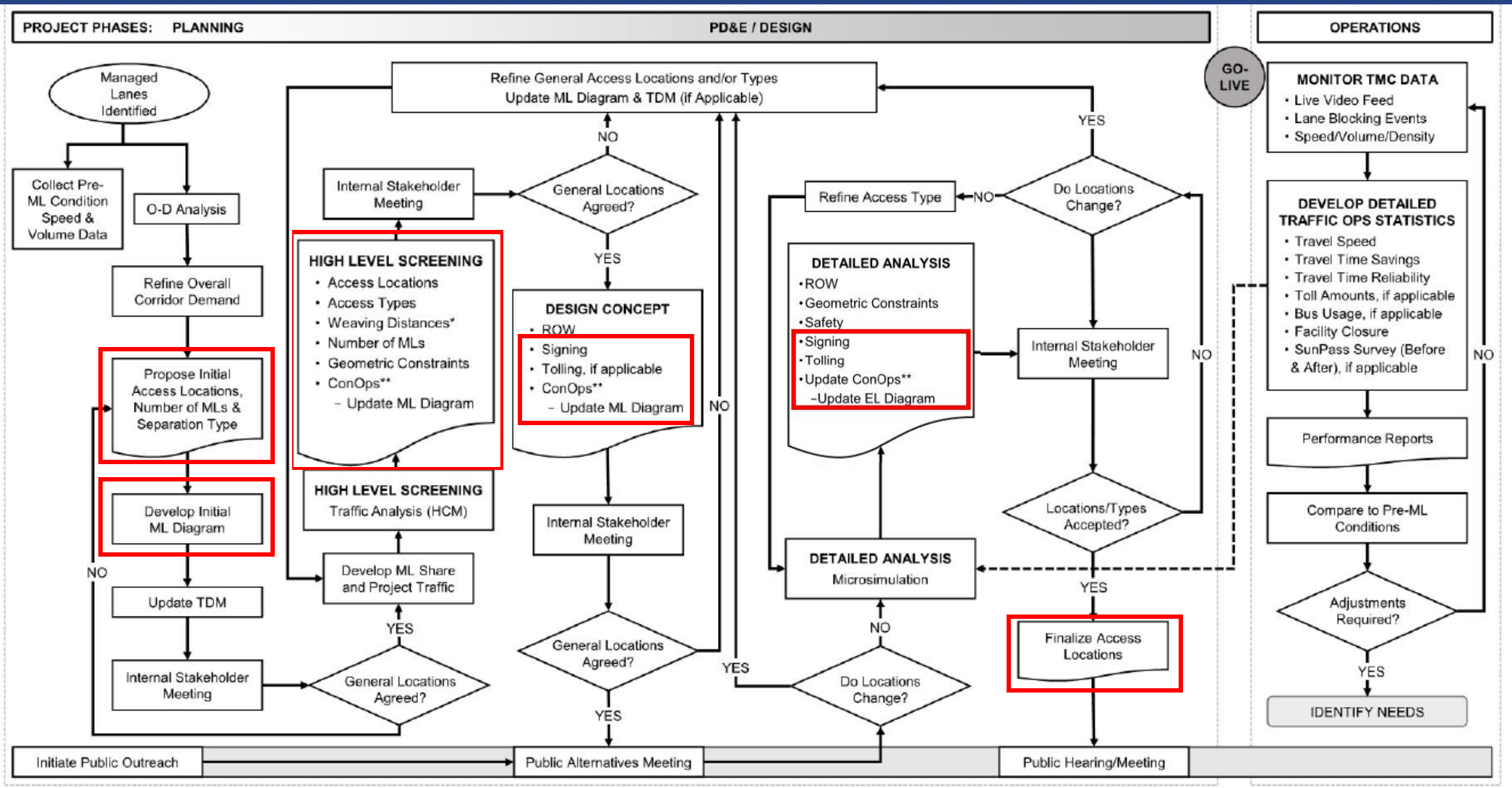
Planning Considerations

- Key Considerations
  - Ingress/Egress locations
  - Toll points
  - Toll amount signs
  - ITS device placement
- Tolling Plan
  - Consistent across all corridor phases
- Lane Separation and Access Control
  - Evaluate proposed types
  - Assess impact on overhead signage



Source: *South Florida Commuter Services.*

Planning Considerations



Source: *FDOT Managed Lanes Guidebook 2023*

Planning Considerations: Ingress/Egress Locations

Ingress/Egress Locations

- Initially Identified through Origin-Destination & Traffic Modeling
- Proposed in Planning and PD&E Phases
- Refined in Design Phase
- Access Considerations
  - Community concerns
  - Support long haul trips

95 Express 1N – Ingress Modification

- 2010 – Original Ingress
  - Near NW 29 ST
  - 1N Distance 7.1 Miles

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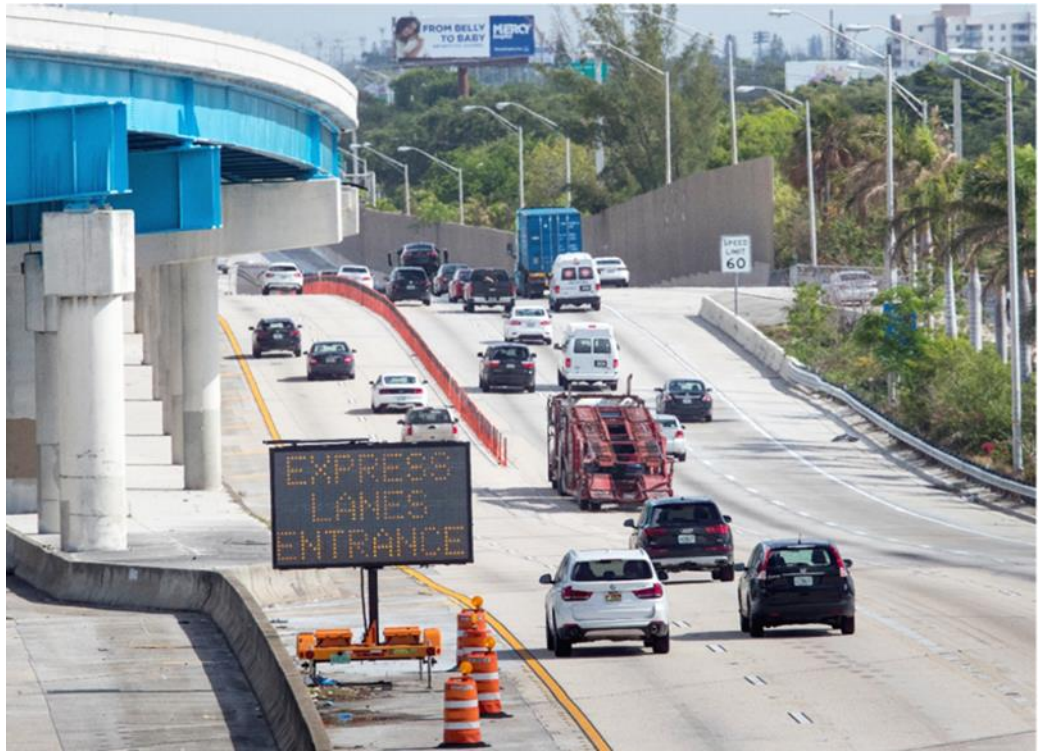
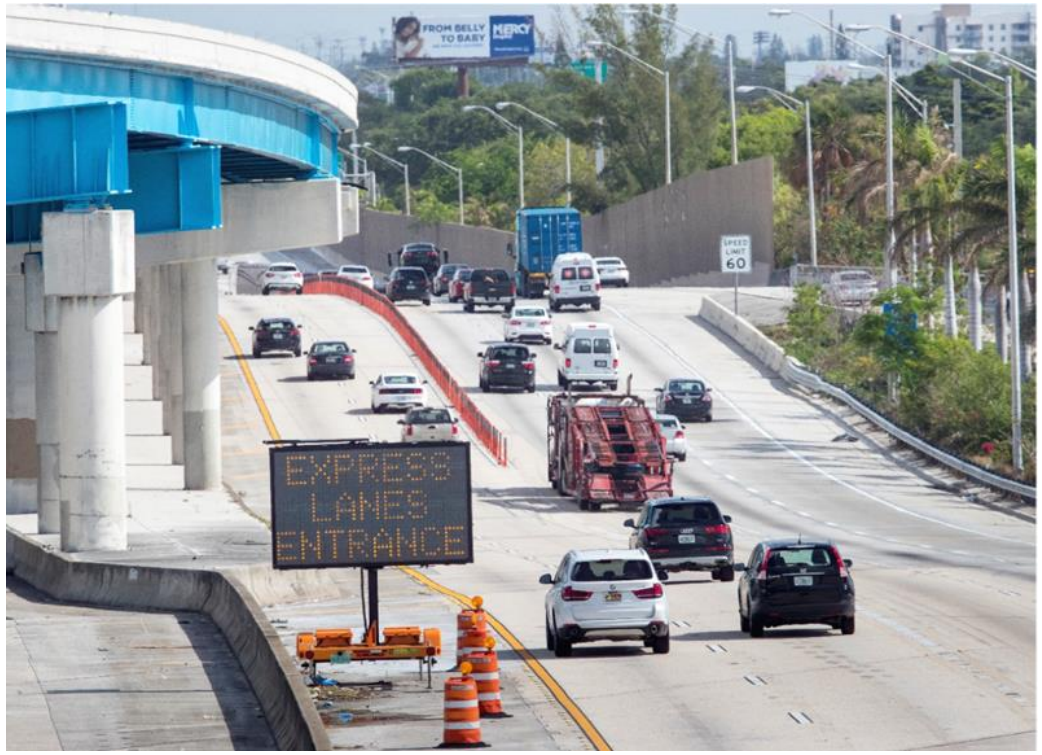
- 2010 – Original Ingress
  - Near NW 29 ST
  - 1N Distance 7.1 Miles
- 2017 – Ingress Relocated
  - Pavement Rehab Projects
  - Pushed Ingress 2/3 Miles North



95 Express 1N – Ingress Modification

- 2017 – Impacts
  - Toll Recalculation
  - Modification to Software Configuration
  - Additional Signage
  - Motorist Expectation
  - Incident Management



95 Express 1N – Ingress Modification

- 2010 – Original Ingress
  - Near NW 29 ST
  - 1N Distance = 7.1 Miles
- 2017 – Ingress Relocated
  - Pavement Rehab Projects
  - Pushed Ingress 2/3 Miles North
  - 1N Distance = 6.67 Miles
- 2023 – Ingress Restored
  - I-395/SR 836/I-95 Project
  - 1N Distance = 7.1 Miles

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95 Express 1N – Ingress Modification

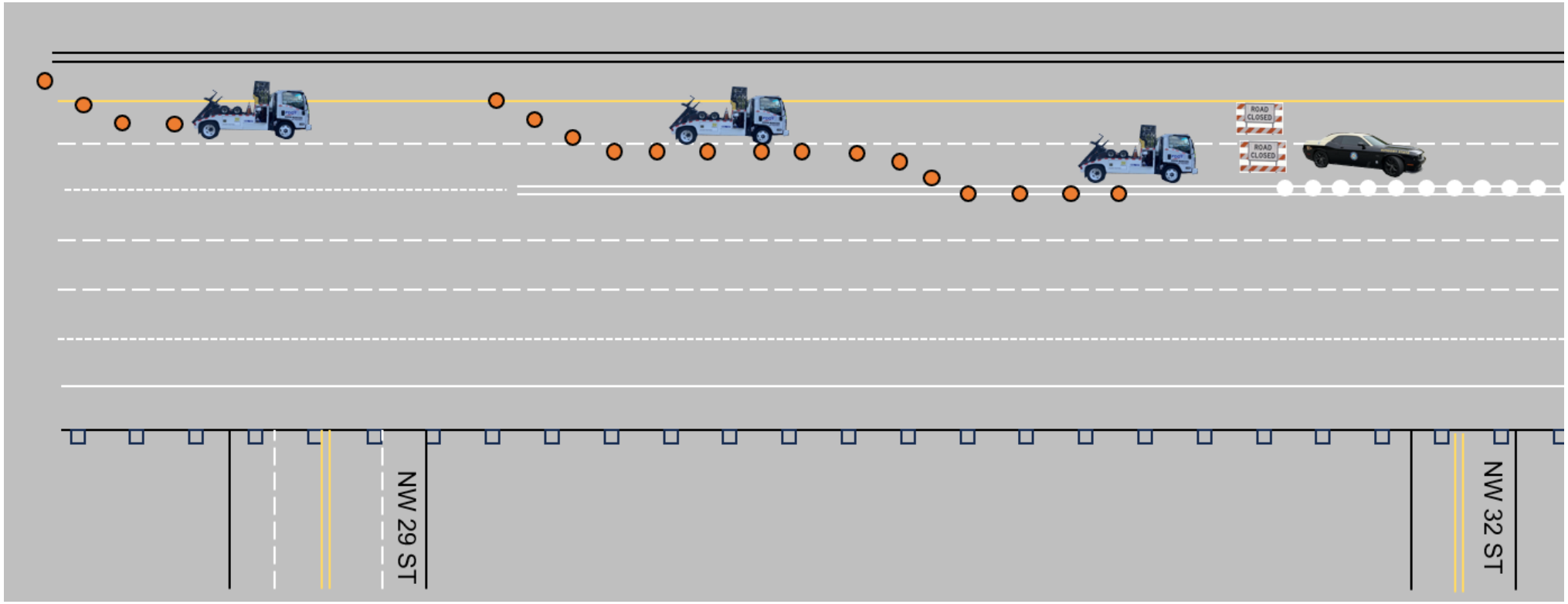
- 2023 – Impacts
  - Original Ingress Was Shortened 500 ft Due to Weaving Requirements
  - Created Ingress in Sag Curve
  - Motorist and Road Ranger Safety

95 Express 1N – Ingress Modification

- Remediation Moved Express Lane Markers North of the Sag Curve
- Gives Motorists More Line of Sight to Ingress

95 Express 1N – Incident Management

- Hard Closure for Incidents in 95 Express
- Road Rangers and FHP Resources for Safety



95 Express 1N Modification – Tolling Impacts

- Relocation of Ingress
  - Impacts of Trip Tolls
  - TADMS Overlays
  - Additional Static Signs

95 Express 1N Modification – Incident Management

- Quick clearance
- Lane diving from Managed Lanes
- Safety concerns for first responders present at a crash downstream of the ingress
- Additional resources needed

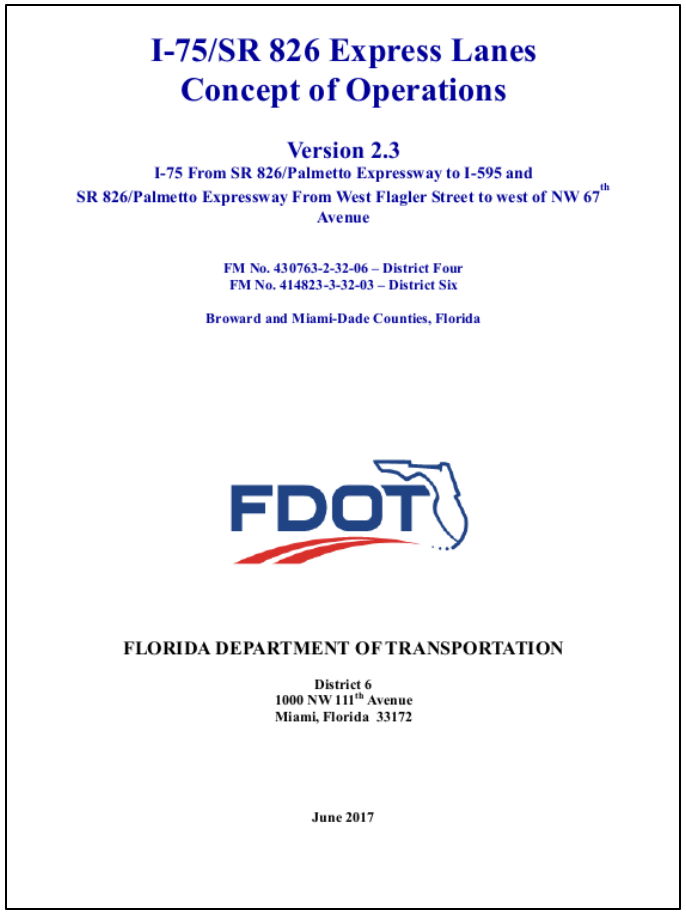
Planning Considerations: Concept of Operations

PROJECT CONOPS

- Project Goals and Objectives
- Refinement of Elements in Regional ConOps
- Managed Lanes Implementation Plan and Project Phasing
- Operational Scenarios
- Toll Project Responsibility Matrix (if applicable)
- Stakeholder Needs
- Roles and Responsibilities
- System Concept
- User Requirements
- Managed Lanes Diagram
- Telecommunications Concept
- ITS Concept
- Risk Analysis

Responsible Party

District in Coordination with Central Office



I-75/SR 826 Express Lanes
Concept of Operations

Version 2.3

I-75 From SR 826/Palmetto Expressway to I-595 and
SR 826/Palmetto Expressway From West Flagler Street to west of NW 67th Avenue

FM No. 430763-2-32-06 – District Four
FM No. 414823-3-32-03 – District Six

Broward and Miami-Dade Counties, Florida

FDOT

FLORIDA DEPARTMENT OF TRANSPORTATION

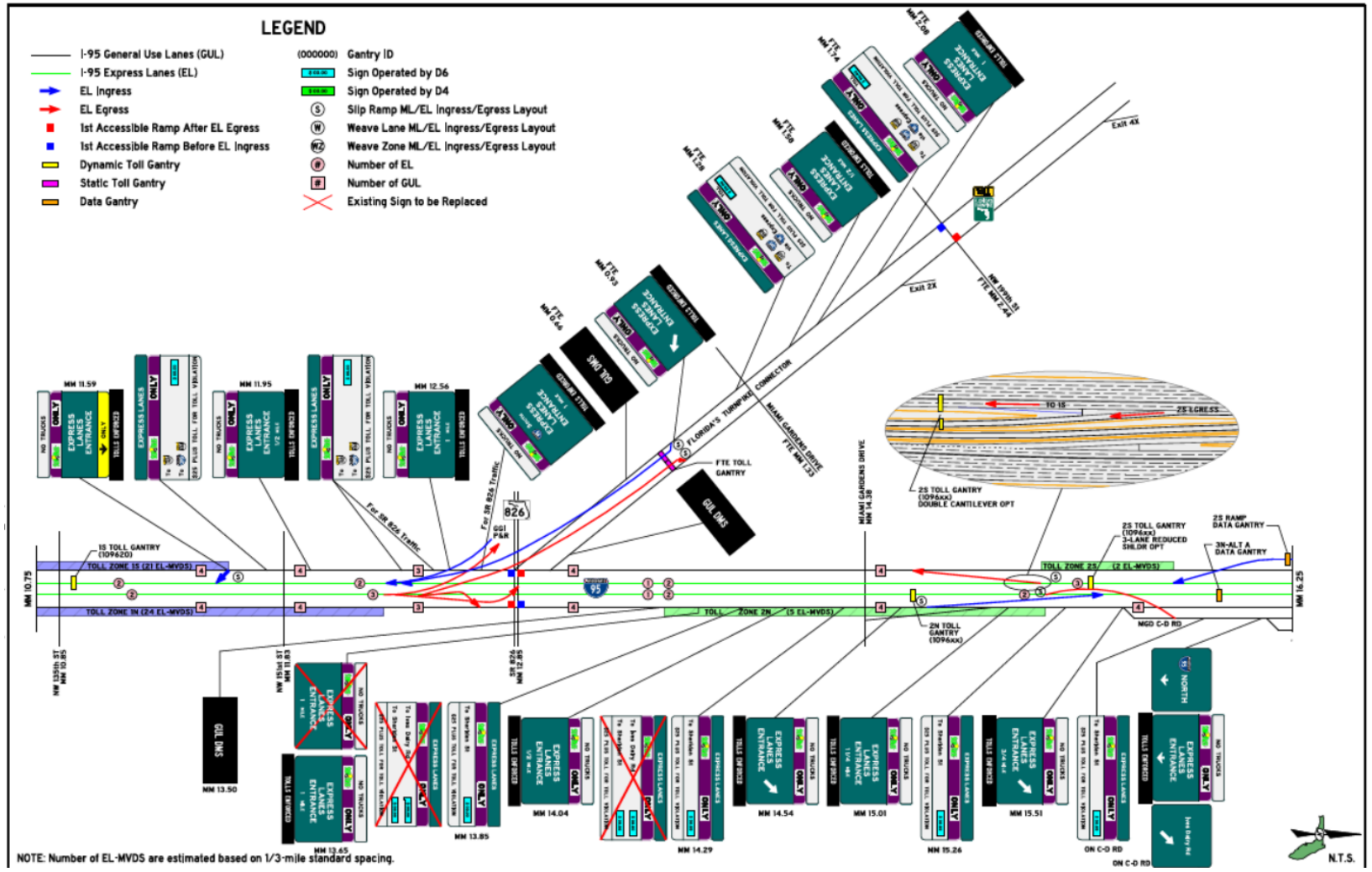
District 6
1000 NW 111th Avenue
Miami, Florida 33172

June 2017

Offers detailed and strategic plans for project implementation.

Source: FDOT Managed Lanes Guidebook 2023.

Planning Considerations: Managed Lanes Diagram



- Regional Impact Overview
- ITS Device Naming
- Maintenance Concerns
- Software Enhancements
- Incident Management Needs

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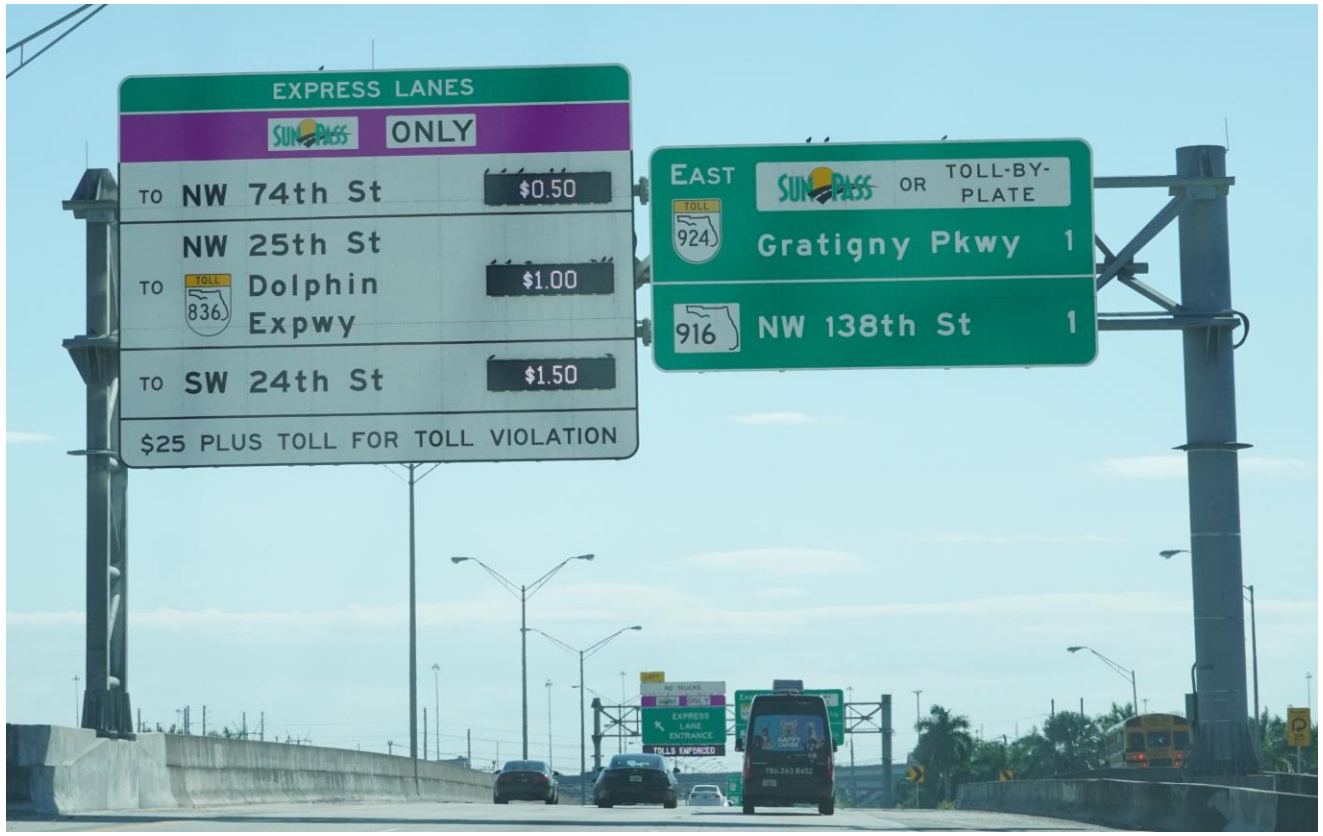
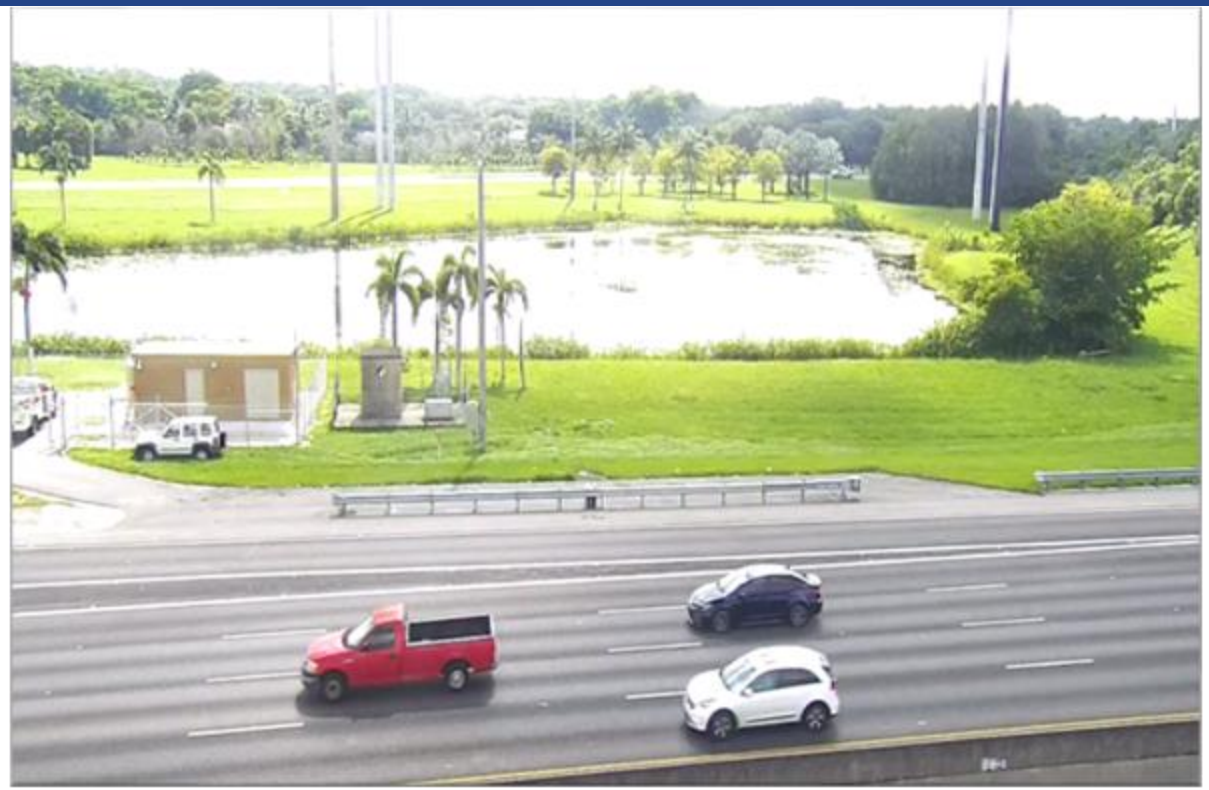
Design Considerations

- Consistent Messaging
  - Critical for safety, operational efficiency, and customer experience
  - Pavement markings
  - Dynamic and static signage
- Managed Lanes functional in interim and ultimate conditions
- Consider future Managed Lanes and General Use Lanes
- Additional requirements for signing, pavement markings, and ITS design



Design Considerations: Enforcement & Response



- Staging areas, Emergency Stopping Site (ESS) and crash investigation areas.
- Staging areas are strategic locations along the corridor that allows incident responders quick and safe access.

Design Considerations: Enforcement & Response

- Ensure wide areas for safety
- Provide space for Road Ranger Service Patrol
- Include spots for law enforcement to monitor traffic

Design Considerations: Enforcement & Response

Staging areas could be near tolling points.

- Barrier walls
- Paved areas
- Safe access to and from managed lanes

Design Considerations: Enforcement & Response

Staging areas could be near tolling points.

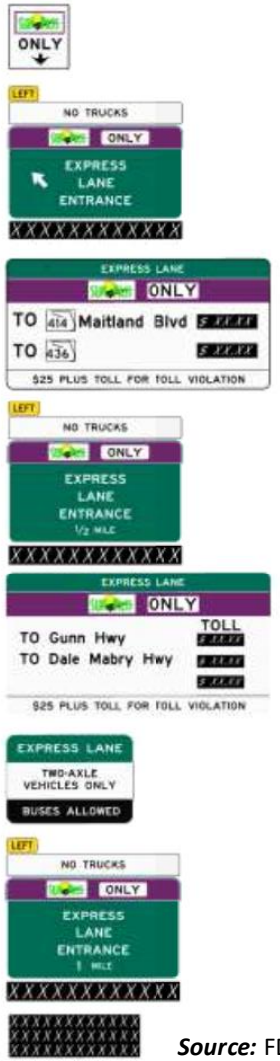
- Barrier walls
- Paved areas
- Safe access to and from managed lanes

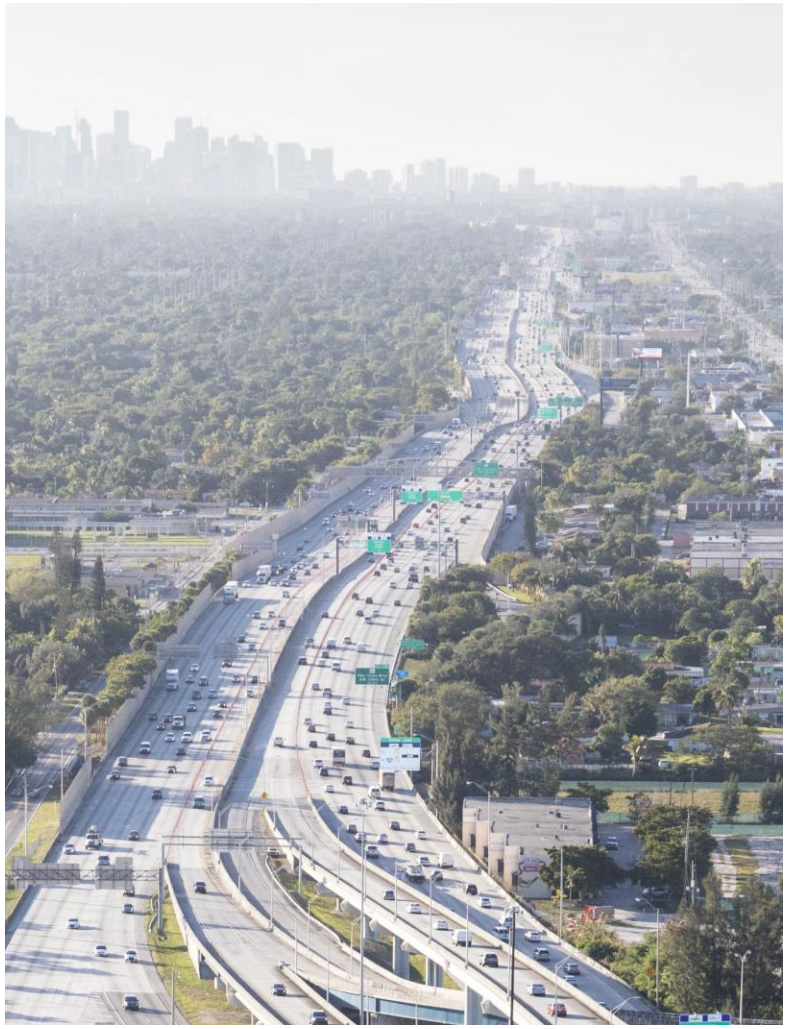
Design Considerations: Enforcement & Response

Warning Gates

- Physically close ingress to Managed Lanes
- Used for crash response and clearance
- Increased safety for first responder and motorists

Design Considerations: Signs





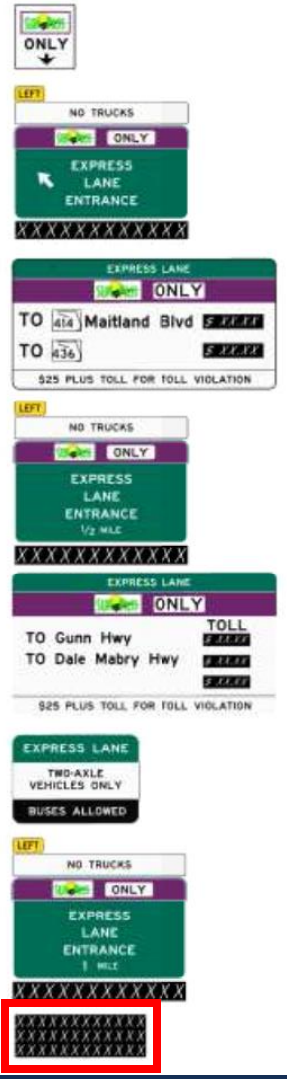
Express Lanes Entrance Signs Sequence

Source: FDOT Traffic Engineering Manual.

Design Considerations: Signs

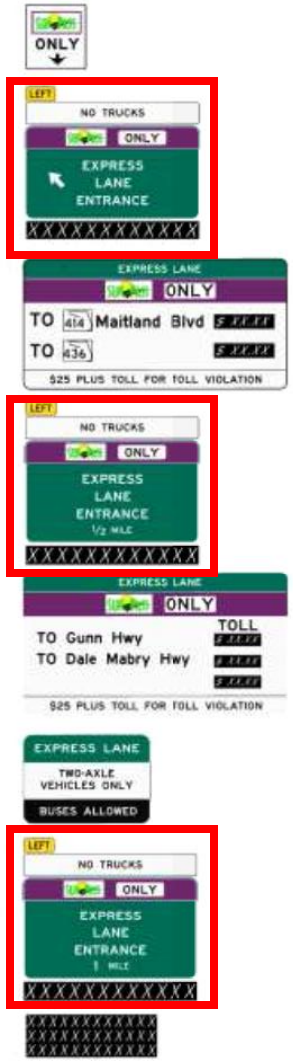
Express Lanes Entrance Signs Sequence

- Dynamic Message Sign



Source: FDOT Traffic Engineering Manual.

Design Considerations: Signs

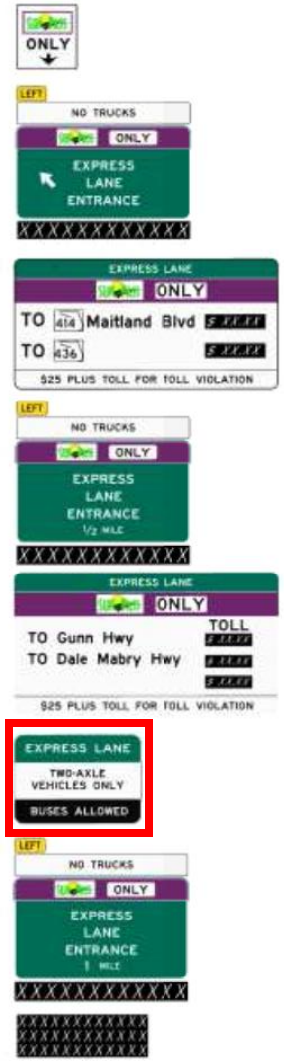


Express Lanes Entrance Signs Sequence

- Dynamic Message Sign
- Point of Entry/Ingress signing

Source: FDOT Traffic Engineering Manual.

Design Considerations: Signs

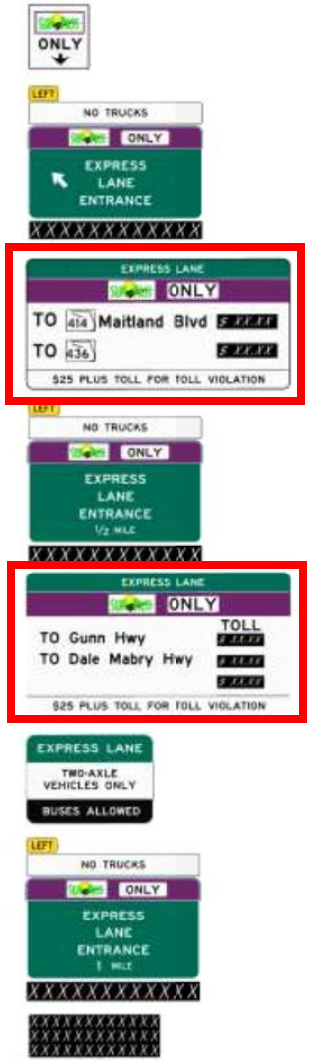


Express Lanes Entrance Signs Sequence

- Dynamic Message Sign
- Point of Entry/Ingress signing
- Vehicle Eligibility Sign

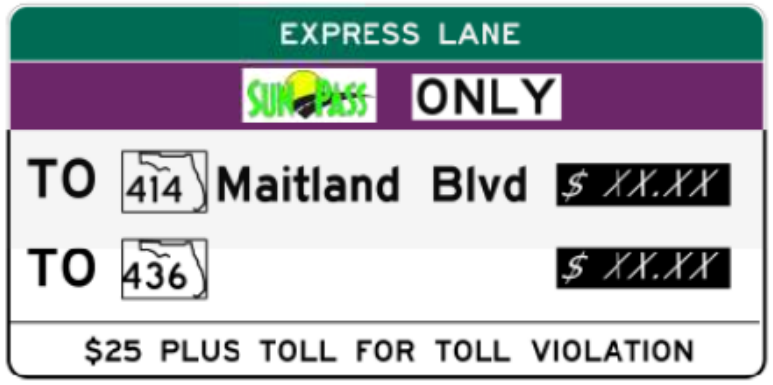
Source: FDOT Traffic Engineering Manual.

Design Considerations: Signs



Express Lanes Entrance Signs Sequence

- Dynamic Message Sign
- Point of Entry/Ingress signing
- Vehicle Eligibility Sign
- Toll Amount Sign

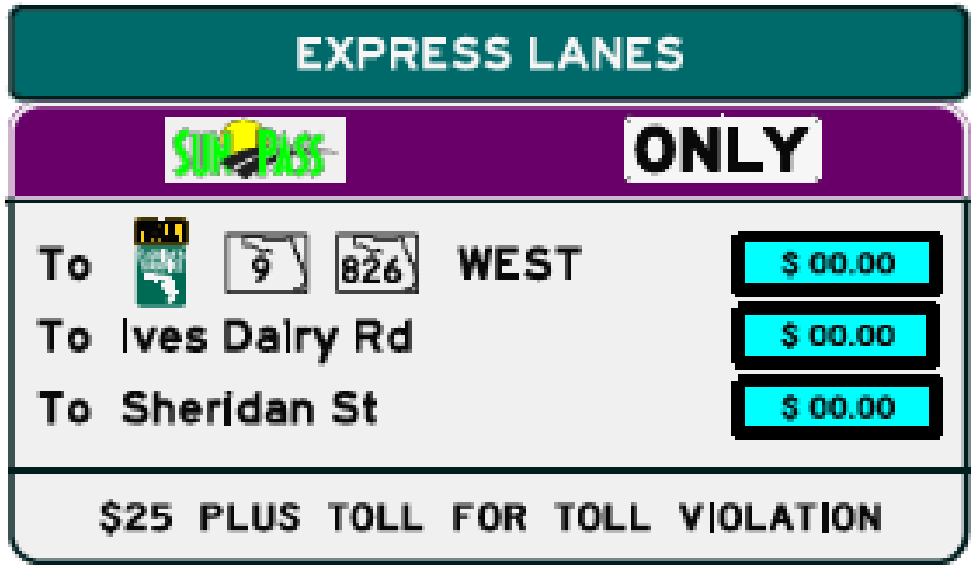


Source: FDOT Traffic Engineering Manual.

Design Considerations: Speed Limit Signs

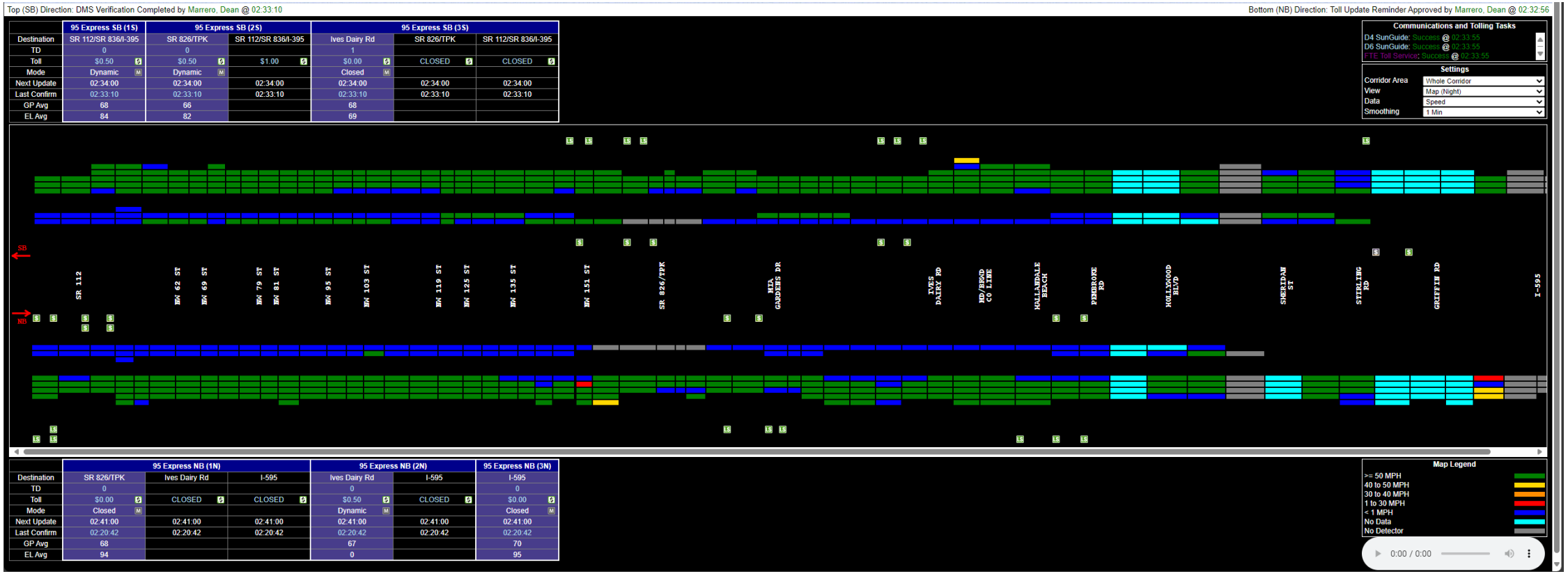
- Managed Lanes and General Use Lane Considered Separate Roadways
- Managed Lanes are Assigned Roadway ID
- Dedicated Speed Limit Signs Required for Enforcement

Design Considerations: Toll Amount Signs



- Display three destinations or less
- Sign all destinations without overlap
- Last destination must have a General Use Lanes exit
- Provide option to continue or exit to General Use Lanes

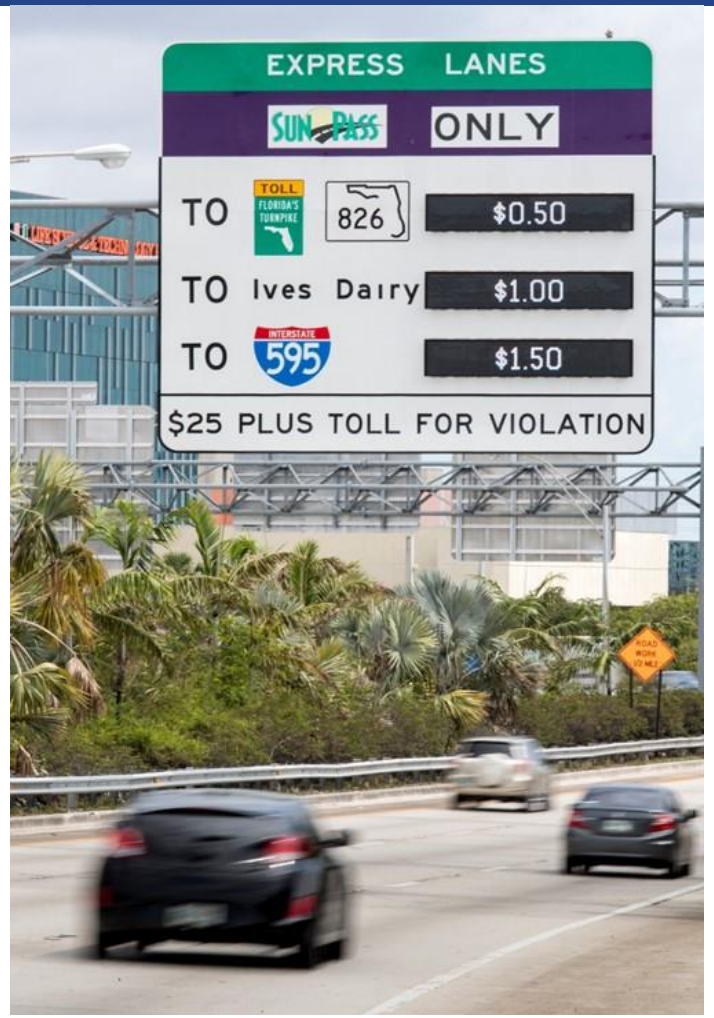
Design Considerations: Toll Segments



- Compatible with the current version of the Statewide Express Lanes Software (SELS).
- Operable across all corridor phases.

Design Considerations

- Include TSM&O Office in reviews
  - ITS
  - Master Signing Plan (MSP)
  - Traffic Control Plan (TCP)
  - Maintenance Of Communications (MOC)
  - Concept of Operations (ConOps)
  - Systems Engineering Management Plan (SEMP)
- Verify Tolling/ITS plans match the approved Toll Diagram & Managed Lanes Diagram
- Early and Timely coordination with STMC for Go-Live



Design Considerations

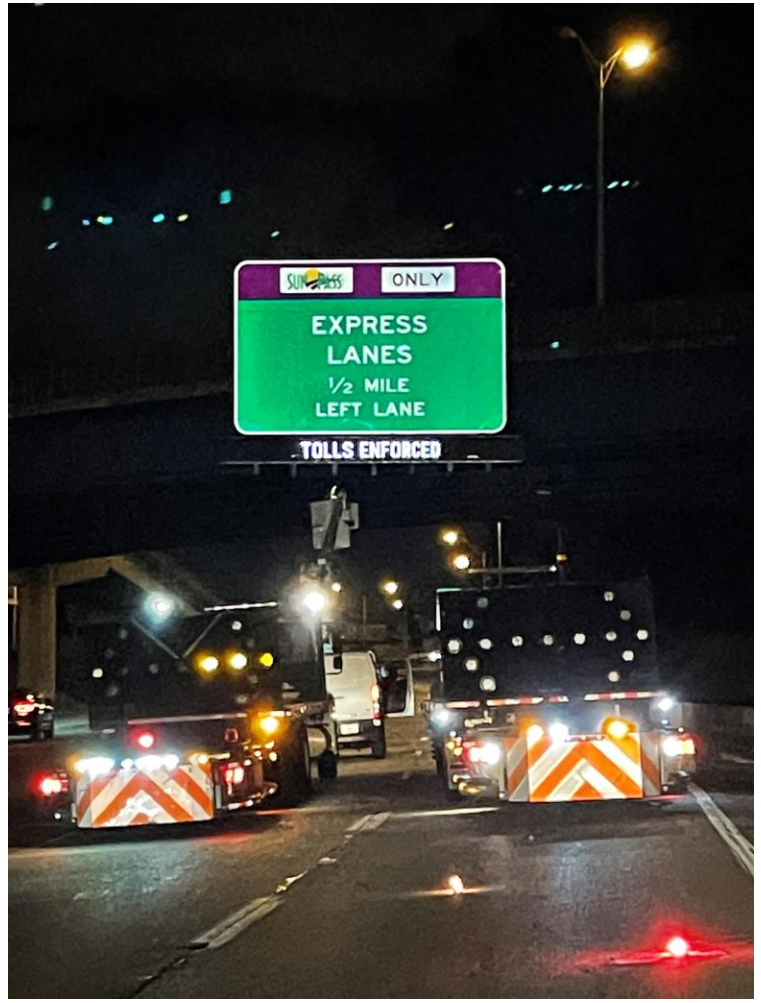
Before Decommissioning Toll Equipment

- Ensure uninterrupted toll collections
- Required ITS installation

Maintenance Considerations

- Safe and Easy Access to ITS Devices
  - Controller cabinets
  - Dynamic messages signs including TADMS and LSDMS
  - Cameras
  - Detectors
- Minimize Maintenance Impact on Traffic
- Lightning Protection and Grounding
- Backup Power Systems
- Equipment Warranties

Maintenance Considerations



Maintenance Considerations

- Bridge Installation
- Requires Long Term Lane Closure

Maintenance Considerations

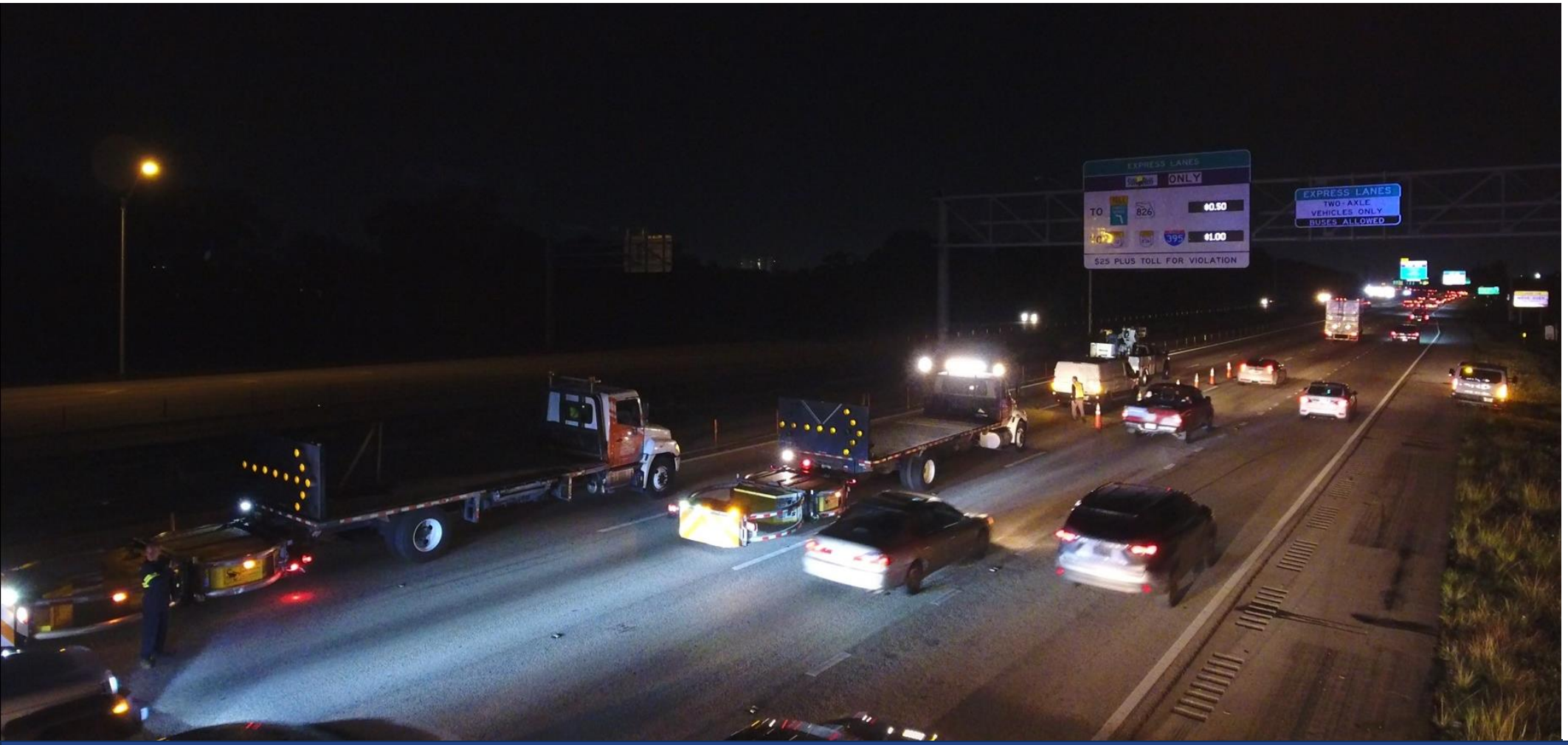
- Bridge Installation
- Full Closure of General Use Lanes

Maintenance Considerations

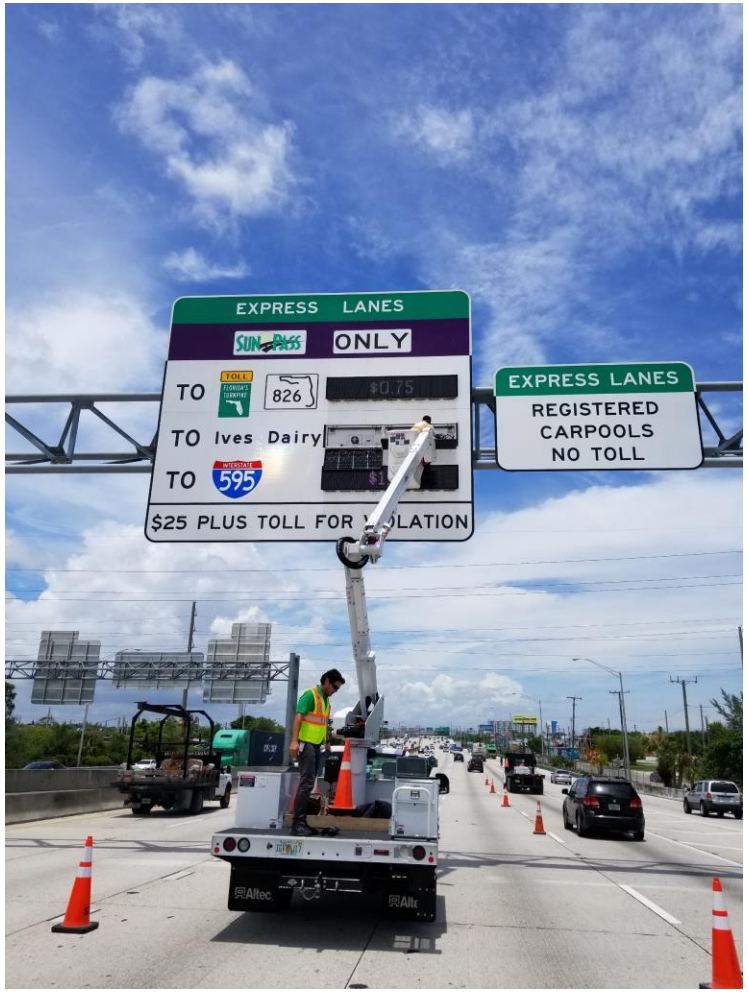
- Full Closure of Express Lanes

Maintenance Considerations

- Rolling Roadblock Operation

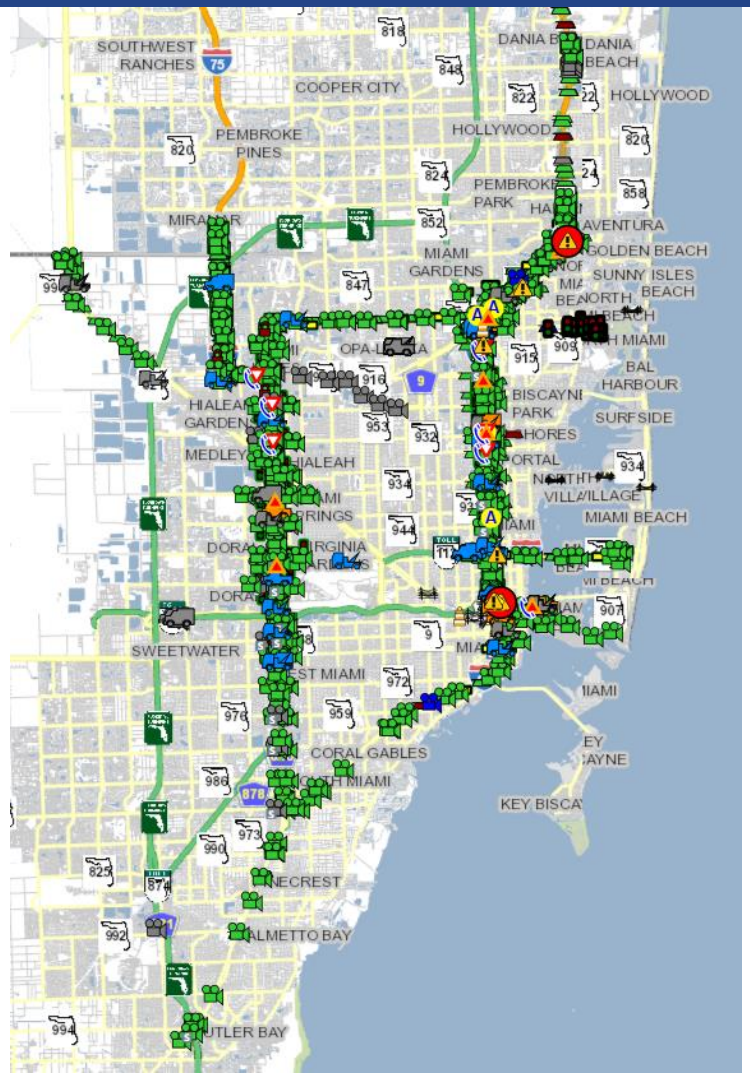


Maintenance Considerations



- Working Adjacent to Live Traffic

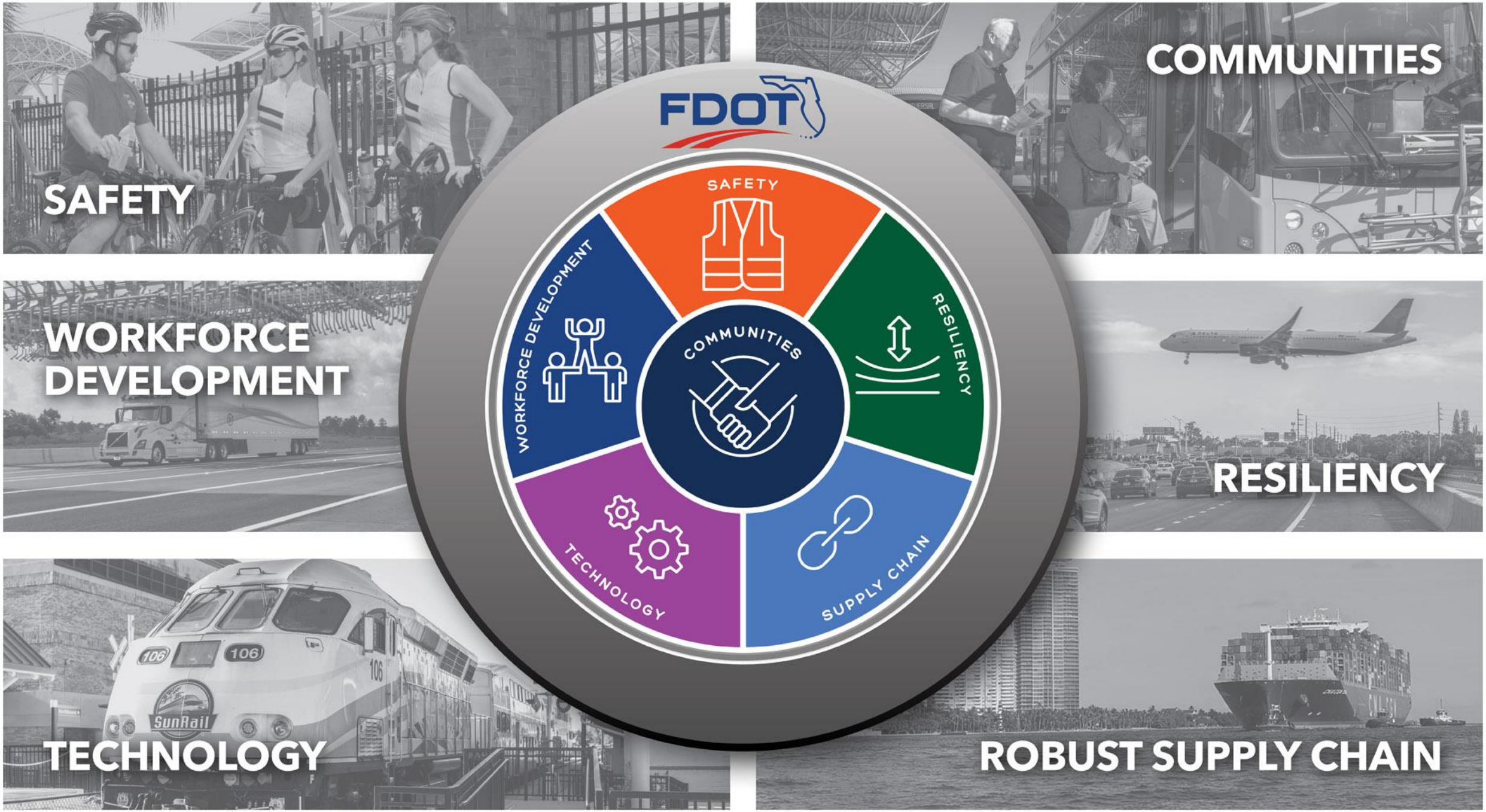
Construction & Testing Considerations



- Submission and approval of standalone, subsystem, and central test plans
- Review list of ITS devices with STMC
- STMC involvement in all communications and ITS device interruptions
- STMC to receive accurate details of ITS device configuration and lane mapping

Conclusion

- Managed Lanes impact regional transportation system
- Early stakeholder coordination
- Early collaboration between agencies
- Managed Lanes require continuous and long-term planning
- Changes need review and revision
- Adherence to guidelines for efficient STMC Operations involvement


FDOT
SAFETY
COMMUNITIES
WORKFORCE DEVELOPMENT
RESILIENCY
TECHNOLOGY
SUPPLY CHAIN
SAFETY
COMMUNITIES
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RESILIENCY
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SUPPLY CHAIN
106
SunRail