

TRANSPORTATION SYMPOSIUM

2019

Bus on Shoulder Project on I-275

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AGENDA

- Introduction
 - Project Overview Video
 - What is Bus on Shoulder?
 - Existing Systems
- Statewide Guidance
 - Planning Guidelines
 - Design Guidelines
 - Operating Guidelines
 - Project Development
- I-275 Pilot Project
- Q&A





Introduction



I-275 Bus on Shoulder Pilot Project



Why Bus On Shoulder?

- Bus on Shoulder allows authorized buses to merge onto the shoulder, bypassing congestion, when certain conditions are met along the corridor.

Reduce
Congestion

Improve Travel
Time / Speeds

Interim
Measure

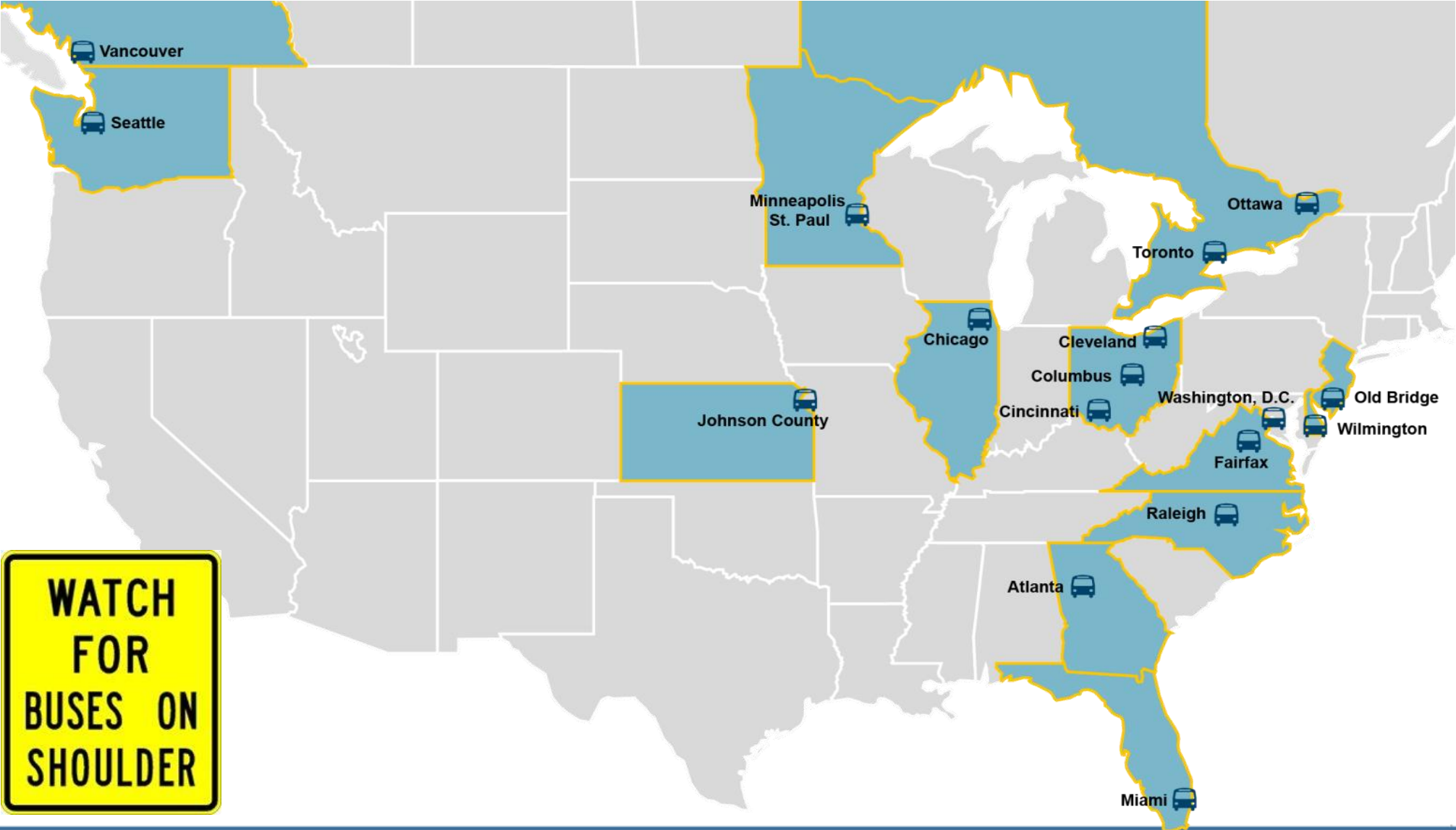
Possible Reasons for Implementation

Increase Transit
Acceptance and
Reliability

Budget
Constraints

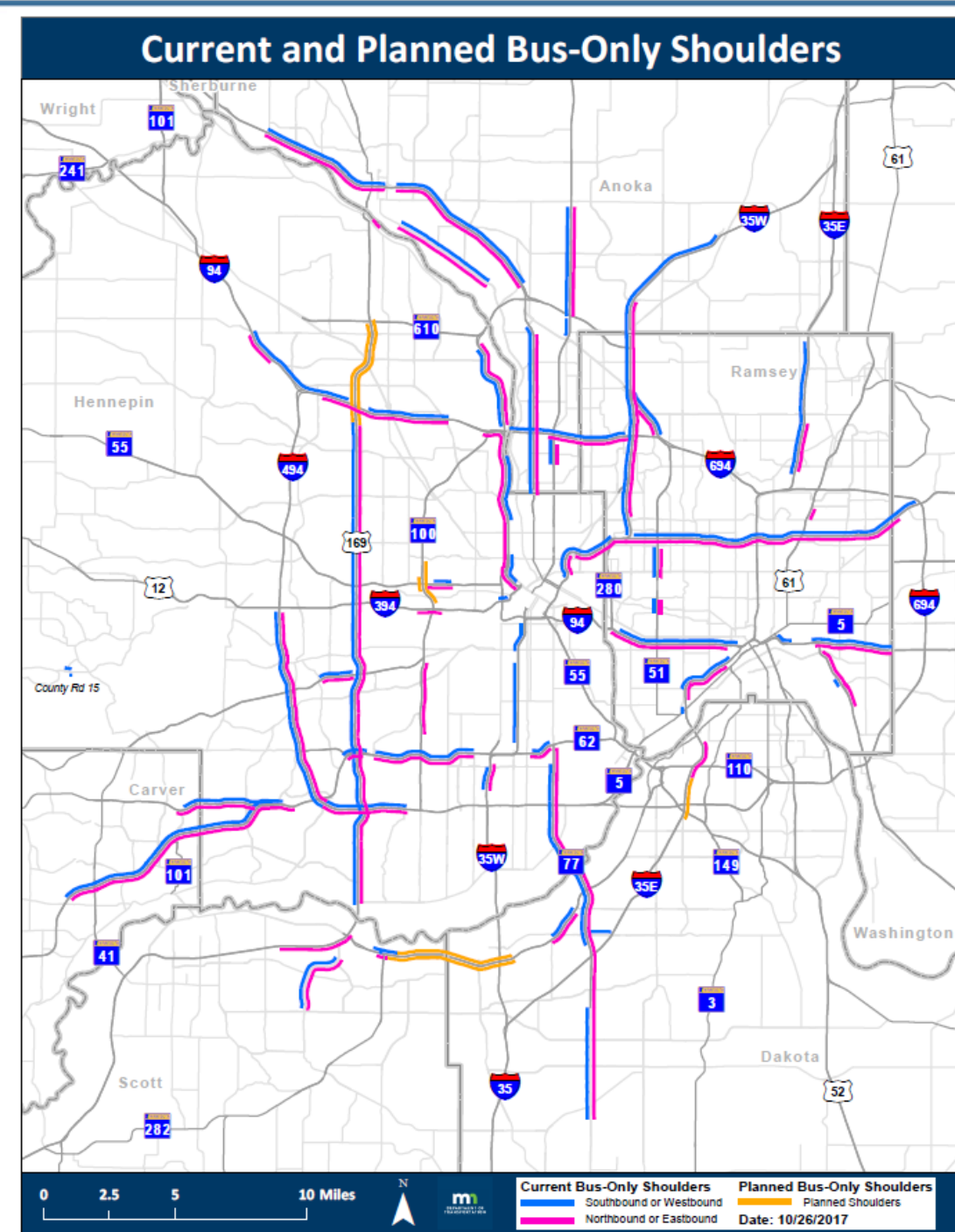


Existing Operational BOS Systems



Case Study Factoid: Minneapolis

- Began in 1992
- Prototype System
- 300 miles BOS/ 400 Buses
- Only 1 injury accident in the first 15 years operation



Case Study Factoid: Chicago

- Bus on time performance improved from 65% to 95% immediately after implementation of BOS
- Effective use of bus wraps

The Traffic-Free Lane Is Faster.

Pace Edens (I-94) Bus-on-Shoulder

PaceBus.com

**There's a new "express way"
on the Edens Expressway:
Pace Edens Bus-on-Shoulder**



Case Study Factoid: Ottawa

- Buses are permitted to operate at maximum speed of 62 mph!



Case Study Factoid: Miami

- Jealous motorist issue: 44% transit drivers were blocked by cars on a daily basis





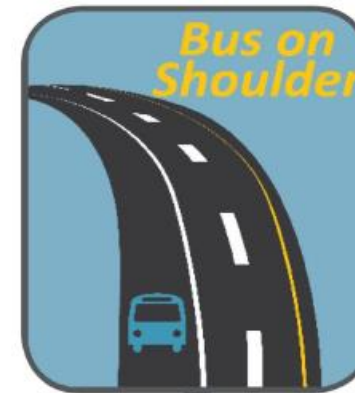
Bus On Shoulder Statewide Guidance

Bus on Shoulder Statewide Guidance

- Planning Guidelines
- Design Guidelines
- Operating Guidelines
- Project Development & Concept of Operations



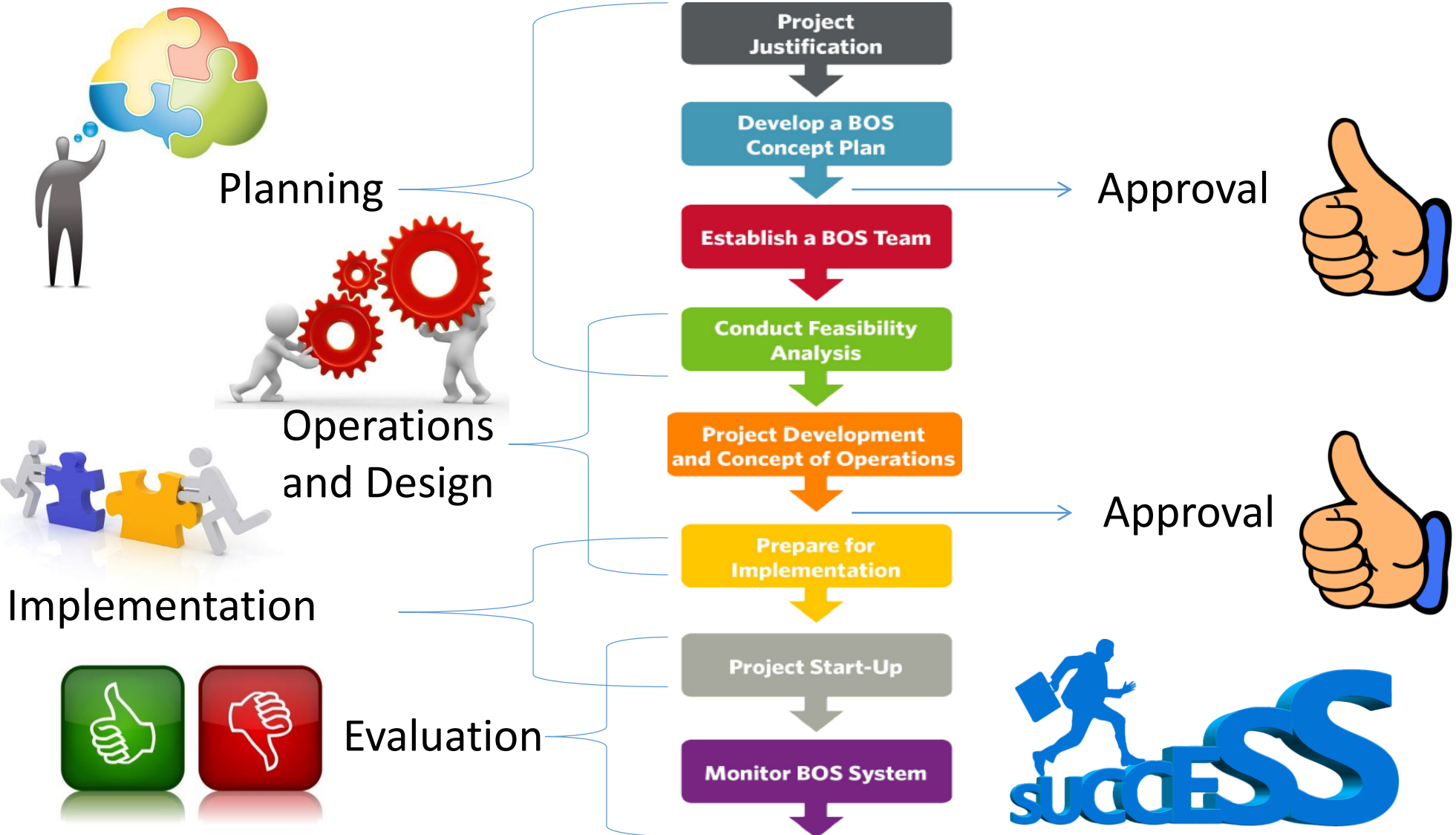
January 2017



*Implementing Bus on
Shoulder in Florida*

Statewide Guidance

Planning for Bus on Shoulder



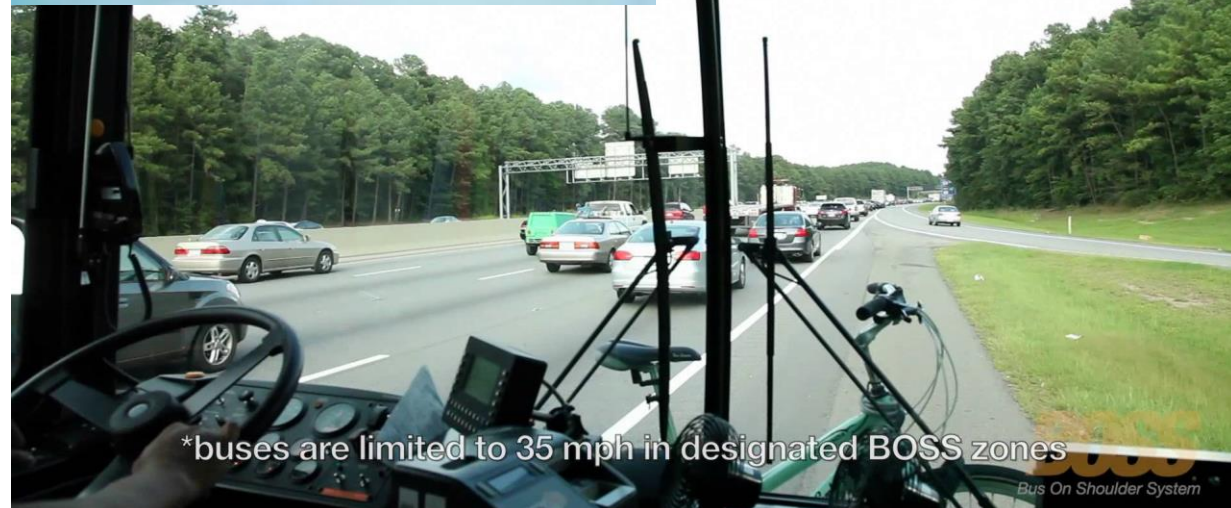
Design Guidelines

- Design Speed
- Lane and Shoulder Width
- Alignment and Cross Slope
- Vertical and Horizontal Clearance
- Inside Vs. Outside Shoulder
- On-Ramps and Off Ramp Locations
- Vertical Obstructions
- Drainage and Utilities
- Rumble Striping
- Signage and Pavement Markings
- Auxiliary and Managed Lanes (Existing and Future)
- Refuge Areas
- Emergency Evacuation



Operating Guidelines

- Speed Protocols
- Operating Hours
- Driver Training
- Authorized Users
- Safety
- Arterial Operations
- Incident Management
- Maintenance
- Start-up Measures



*buses are limited to 35 mph in designated BOSS zones

Design and Operating Criteria Checklist

Design Features	Yes/ No/N/A	Comments
Is the shoulder along the corridor at least 10 feet in width where there is no barrier?		
Is the shoulder along the corridor at least 11.5 feet in width in segments with a barrier?		
Can shoulder pavement conditions withstand BOS operations? (7 inch pavement depth is ideal)		
Is the shoulder pavement slope less than or equal to 6 percent? (Assess rutting, edge wear, and skid resistance)		
Are there rumble strips along the shoulder?		
Are there drainage structures and/or utilities obstructing BOS operations?		
Will the outside shoulder or inside shoulder be used? (Consider shoulder width, location of entry and exit ramps, segment length, and operating conditions to make this determination)		
Can buses travel at least two miles on the shoulder without encountering a conflict such as an on-ramp or off-ramp?		
Are there significant traffic weave issues along the corridor?		
Do on-ramps have less than 1000 vph merging onto the corridor? (More than 1000 vph may result in challenging merging and weaving)		
Are there traffic sight distance issues along the corridor?		
Is it safe to operate BOS in this corridor? (Evaluate crash rates and types to understand if BOS may impact the safety conditions)		
What signs and pavement markings will be used and where along the corridor? ("Bus Only" signs every quarter to half mile along the segment, watch for BOS, pinch point signs, etc.)		

Operating features:	Comments
When should BOS be allowed? (Typically allowed when general purpose lanes slow to 35 mph)	
What is the maximum speed limit on shoulder? (35 mph or below)	
What is the allowable speed differential between the shoulder and general purpose lanes? (15 mph or below)	
What are the operating hours? (any time the general purpose lanes slow to 35 mph or below)	
Who are the authorized users? (List all transit agencies/bus operators - fixed route, paratransit, charter, school buses, etc.)	
What types of buses will be utilizing the shoulder? (Standard 40' bus/ paratransit vehicles/ etc.)	
How will the operators be trained? (classroom, simulator, on-the-road)	
How long will the training take to complete?	
Will trained bus operators be required to use the shoulder under ideal conditions or is shoulder use optional? (Optional)	
Will operators be required to use their four-way flashers at all times when operating on the shoulder? (Yes)	
Are bus operators required to merge into the general purpose lanes when approaching an on-ramp? (Yes)	
Which public agencies will be involved in enforcement? (FHP, local police, Traffic Incident Management)	
Who will be responsible for maintenance of the shoulder and how often will they be cleared of debris? (Contracted out, Road Rangers, etc.)	

Project Development and Concept of Operations (Con-Ops)

- Project Area
- Traffic Characteristics and Existing Operations
- Stakeholder Roles and Responsibilities
- Operational Assessment
- Incident Management
- Project Constraints and Assumptions
- System Overview
- Traffic Operations
- Traffic Control
- System Management
- System Maintenance
- Bus Driver Training (Transit Agency)
- Public Outreach (Transit Agency)



Implementation & Monitoring Checklist

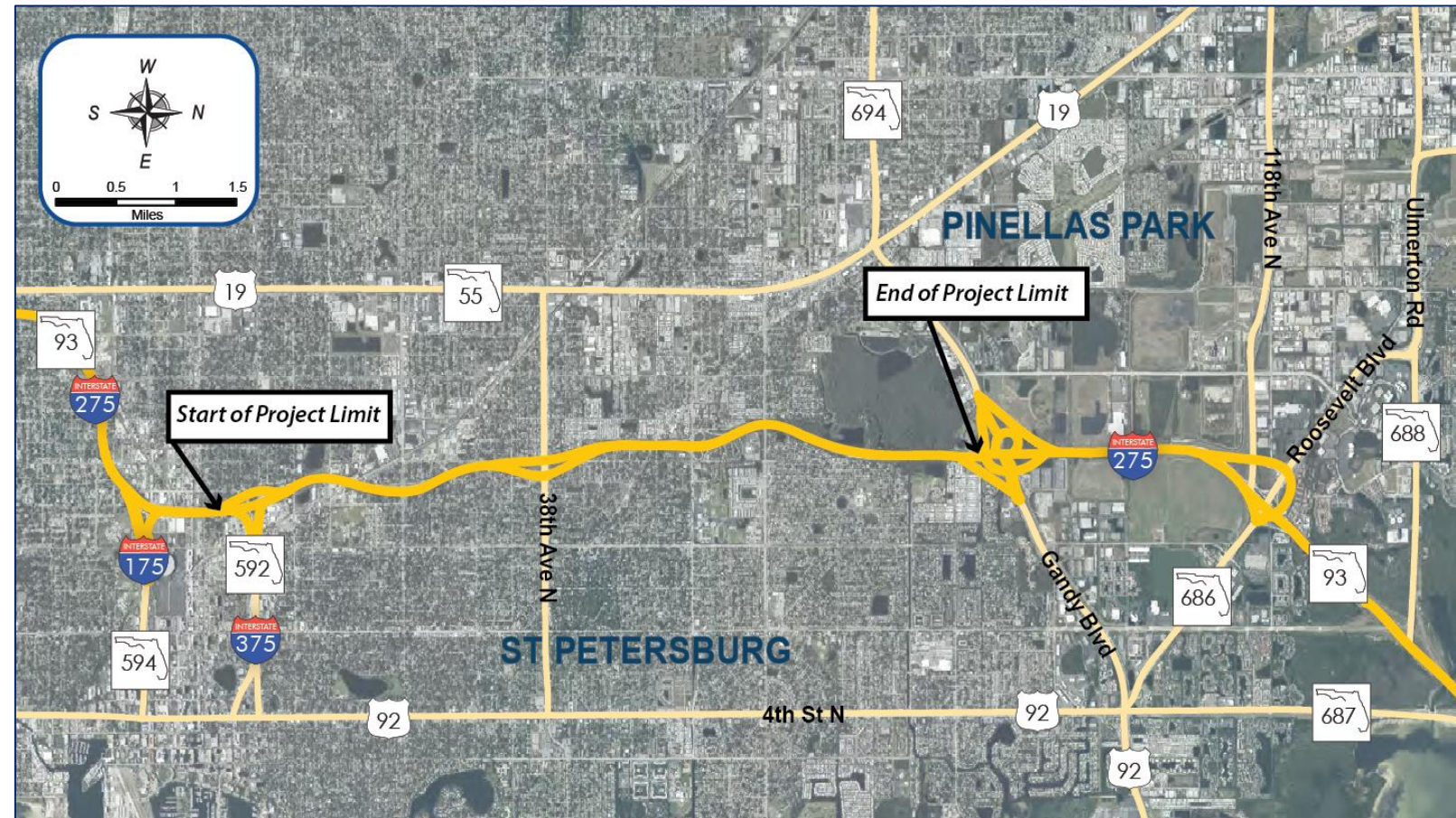
Implementation	Comments	Post-Implementation	Yes/No/N/A	Comments
What is the cost and funding source for implementation?		Conduct a before and after study.		
Has legal authority been established?		What is the cost of on-going operation/maintenance?		
Are operating protocols in place?		What is the funding source?		
Is the necessary infrastructure in place?		Has transit ridership increased as a result of the BOS operation?		
Are the bus drivers trained?		(Ridership numbers may need to be evaluated over two years to determine changes)		
Have all approvals to begin BOS service been received?		Has the BOS operation resulted in travel time savings?		
How will facilitation of agency coordination occur? Which public agencies need to be involved? Have the roles of each agency been defined?		Has the BOS operation improved travel time reliability?		
Has BOS been coordinated with Florida Highway Patrol (FHP)? Did they conduct ride along?		Has the BOS operation caused safety issues? Were there any crashes resulting from buses traveling on shoulder? If so, specify the type and severity of crash.		
How will the public be informed of BOS implementation? How long prior to implementation will public information/awareness campaign begin?		Has there been confusion or conflict amongst traffic in the general purpose lanes resulting from the BOS operation?		
		Conduct a survey of bus operators, bus passengers, and auto drivers in general purpose lanes. Are their perceptions positive? What potential improvements were identified?		



I-275 BOS Pilot Project

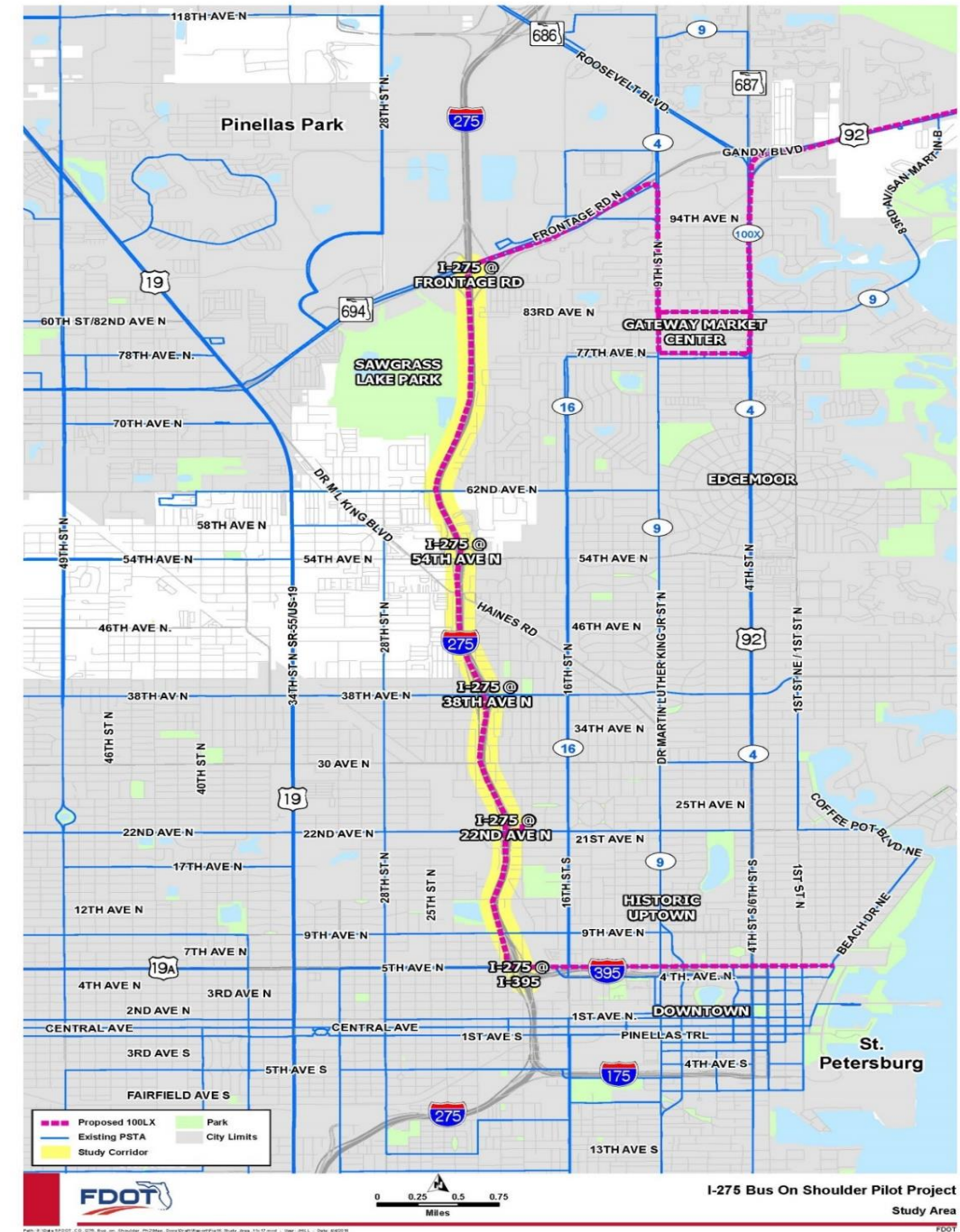
I-275 BOS Pilot Project

- 5 mile segment of I-275 from St. Petersburg to Tampa
- Goals and Objectives
 - Extend PSTA express bus route 100X south of Gandy Blvd. to Downtown St. Petersburg
 - Increase the average transit speed
 - Support regional connectivity from St. Petersburg to Tampa
 - Improve operational efficiency



Purpose and Need

- Expand connectivity and increase transit ridership between St. Petersburg and Tampa
- Provide greater transit access to residential and employment areas adjacent to the Marion Transit Center (Tampa) and Downtown St. Petersburg
- Reduce transit travel time and improve route performance



I-275 Pilot Project Stakeholders and Roles

FDOT District 7

- Operating & Maintaining I-275 corridor
- Oversees Road Rangers

PSTA

- Public transit provider in Pinellas County
- Operate the bus system along the corridor
- Organize and complete training program for BOS drivers
- Create and execute public outreach plan

FHWA

- Provides oversight of projects that impact I-275

ForwardPinellas

- MPO for the County
- Promotes Regional Coordination

Law Enforcement

- FHP and PSCO
- Enforcing Laws and responding to accidents/incidents along corridor

Emergency Responders

- Use the corridor to respond to emergencies along the corridor and across the county



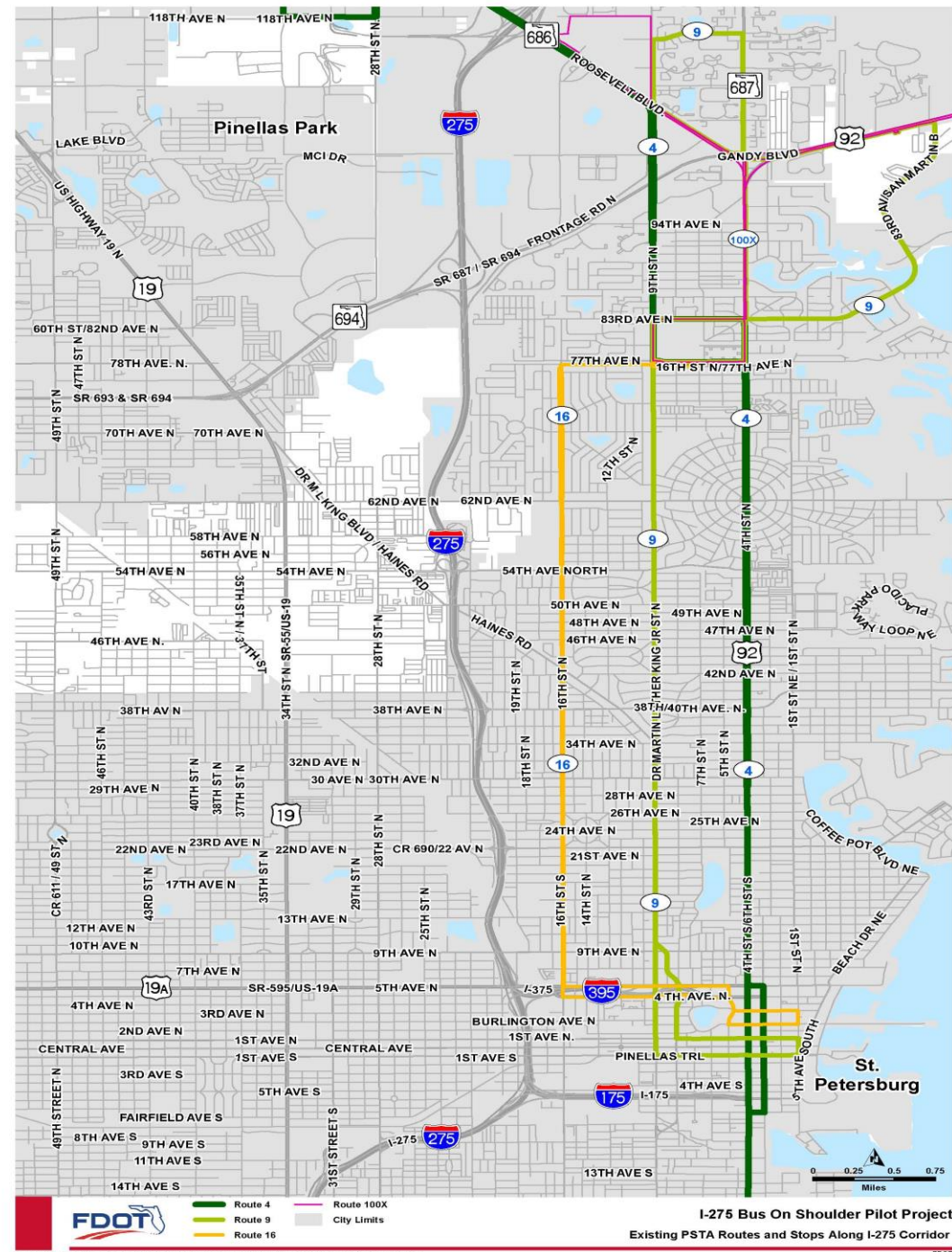
Corridor Assessment

- Evaluate Current Conditions
 - Level of Service
 - Travel Time
 - Nearby Transit Service
- Identify Other Projects in the Region
 - Managed Lanes
 - Lane Continuity Study
 - Regional Transit Feasibility Plan
- Project Future Conditions
 - Level of Service
 - Travel Time
 - Transit Ridership



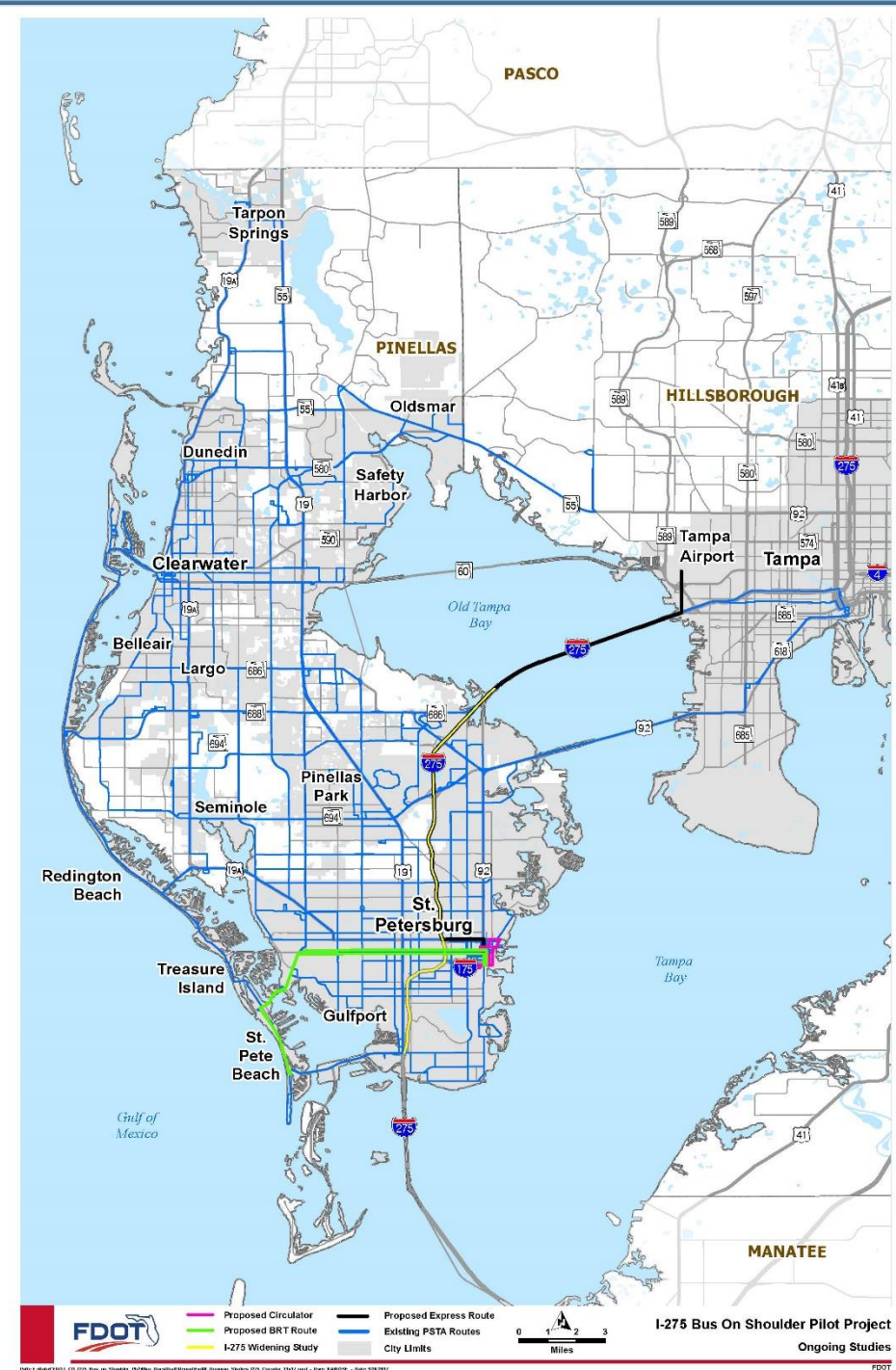
Existing Operational Conditions

- Level of Service F
- 3 Existing Transit Routes- 4, 9, & 16 connect to current 100X
- Travel Time:
 - Approximately 90 minutes via bus, double the time of a personal automobile
 - Expected to increase over the next 10-20 years
- Non-recurring congestion during peak periods



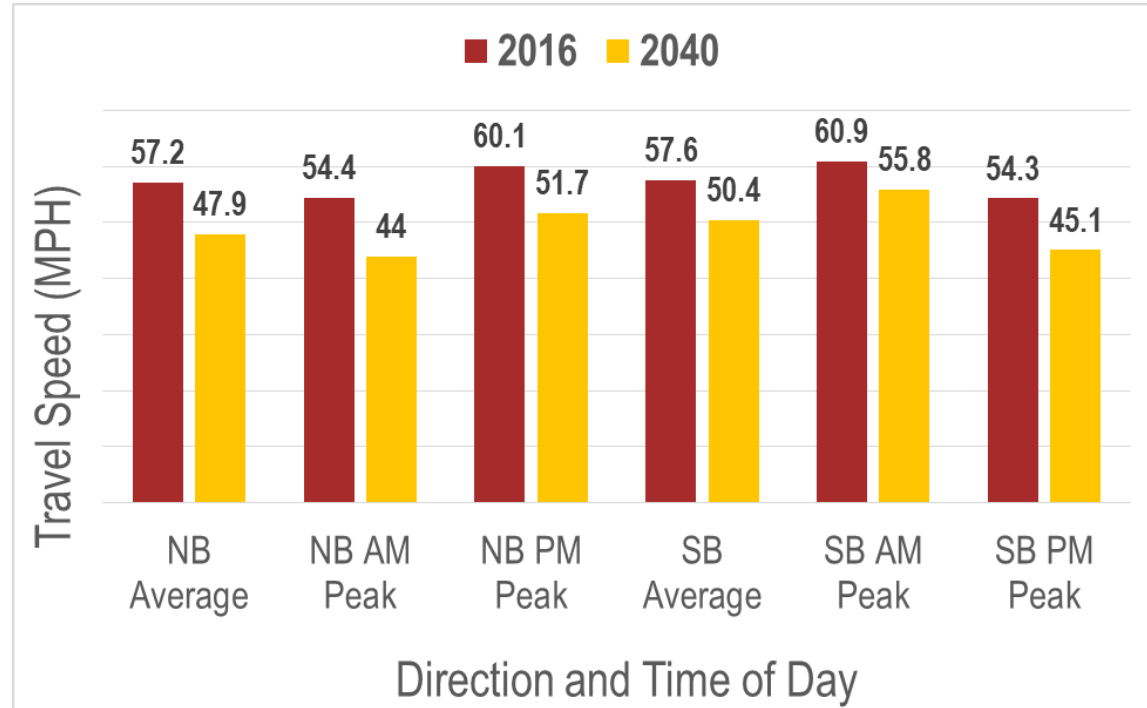
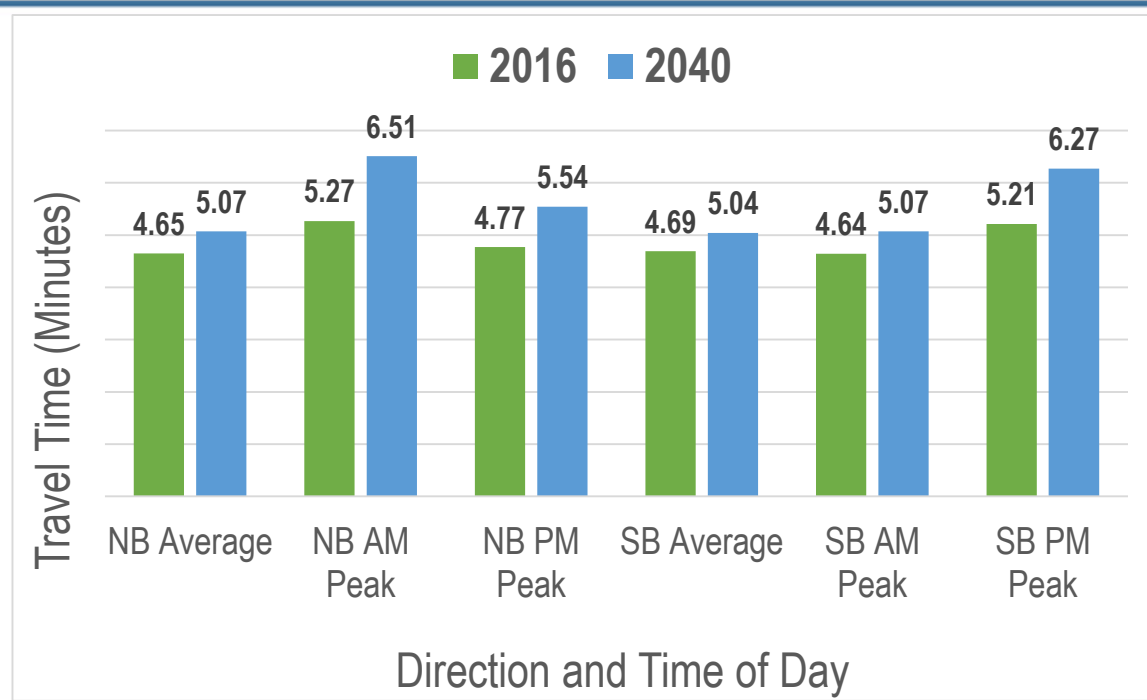
Regional Projects

- I-275 Managed Lanes & Lane Continuity Study
 - Connect I-275 within Pinellas County to the future network of express lanes planned for the Tampa Bay Region
- Regional Transit Feasibility Plan
 - PSTA, FDOT, HART, PCPT- identify regional transit projects with public support that can be funded and implemented



Future I-275 Operational Conditions

- Level of service will remain at F
- AM/PM peak period travel time increases by 1+ minutes
- AM/PM peak period travel speed decreases by ~10 MPH



Existing Physical Conditions

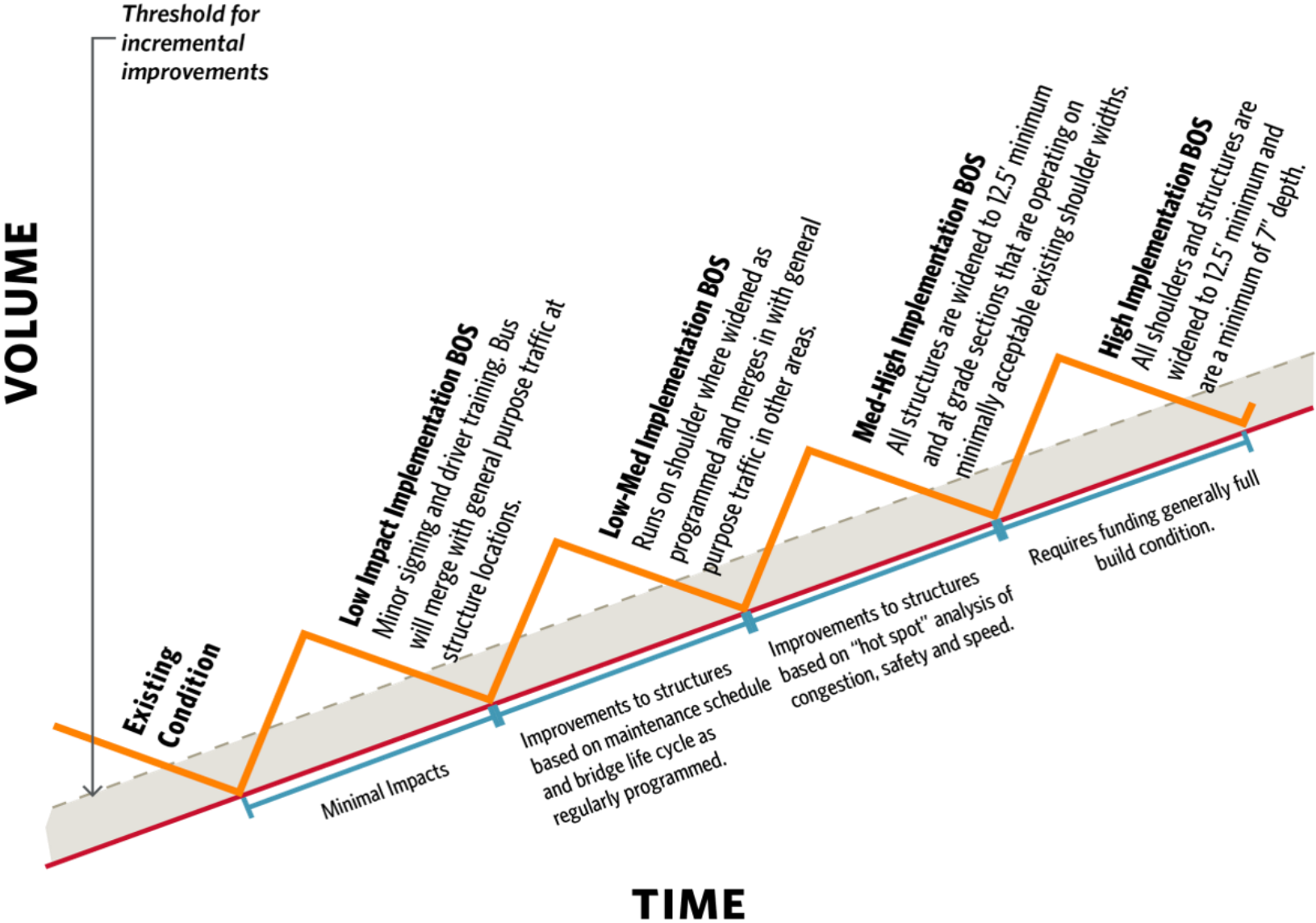
- 4.78 mile segment
- Typical Section- varies between 6 and 8 lane divided section
- Lane Width- 12 ft.
- Median Width- 65 ft.
- Inside/Outside Shoulder Width-
 - 12 ft. w/ 10 ft. paved
 - 8 ft. paved at sections with shoulder gutter with drainage inlets and guardrail on the outside
- 8 bridges over roadway and 1 bridge over a railroad



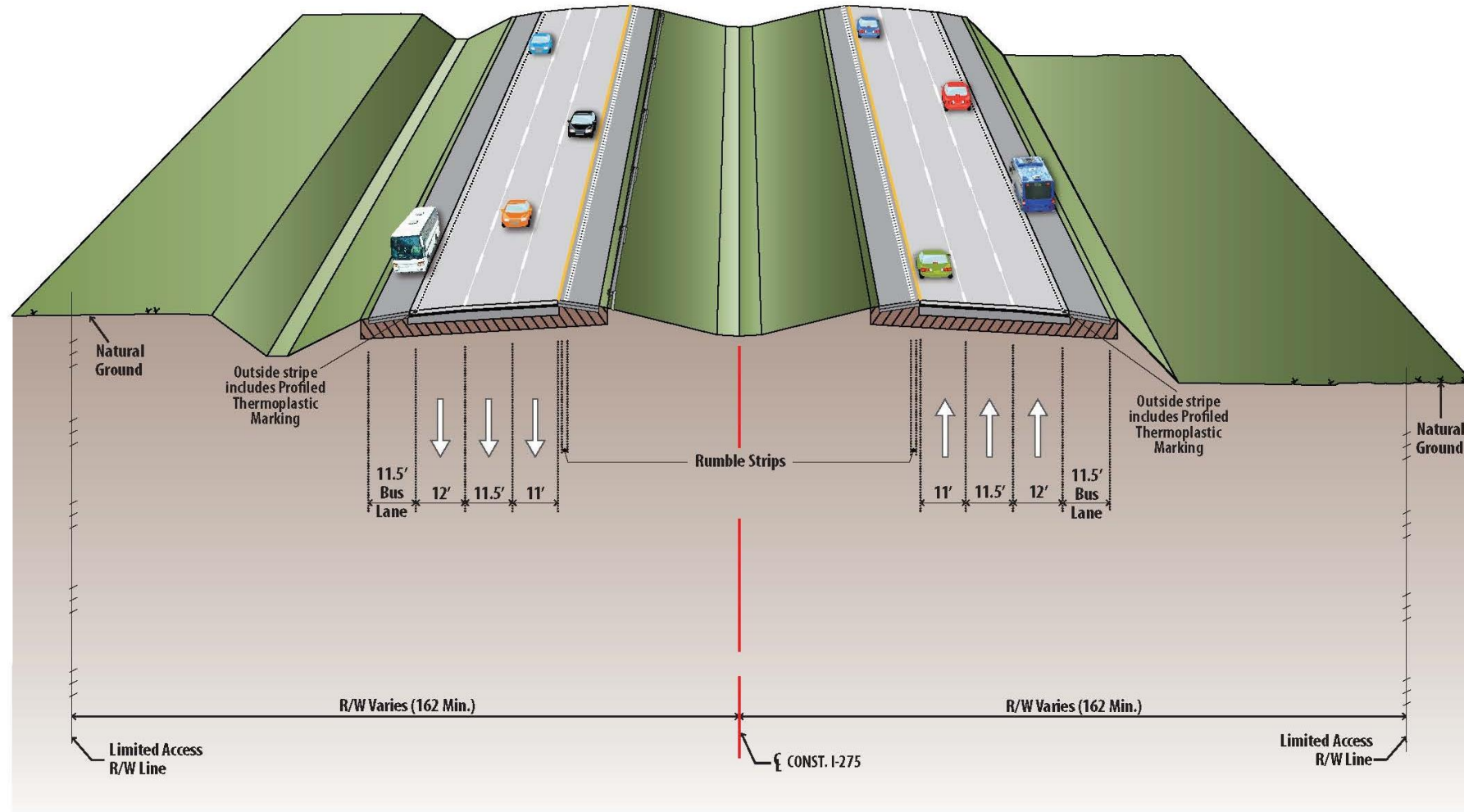
1-275 Shoulder Widths



Development of Alternatives



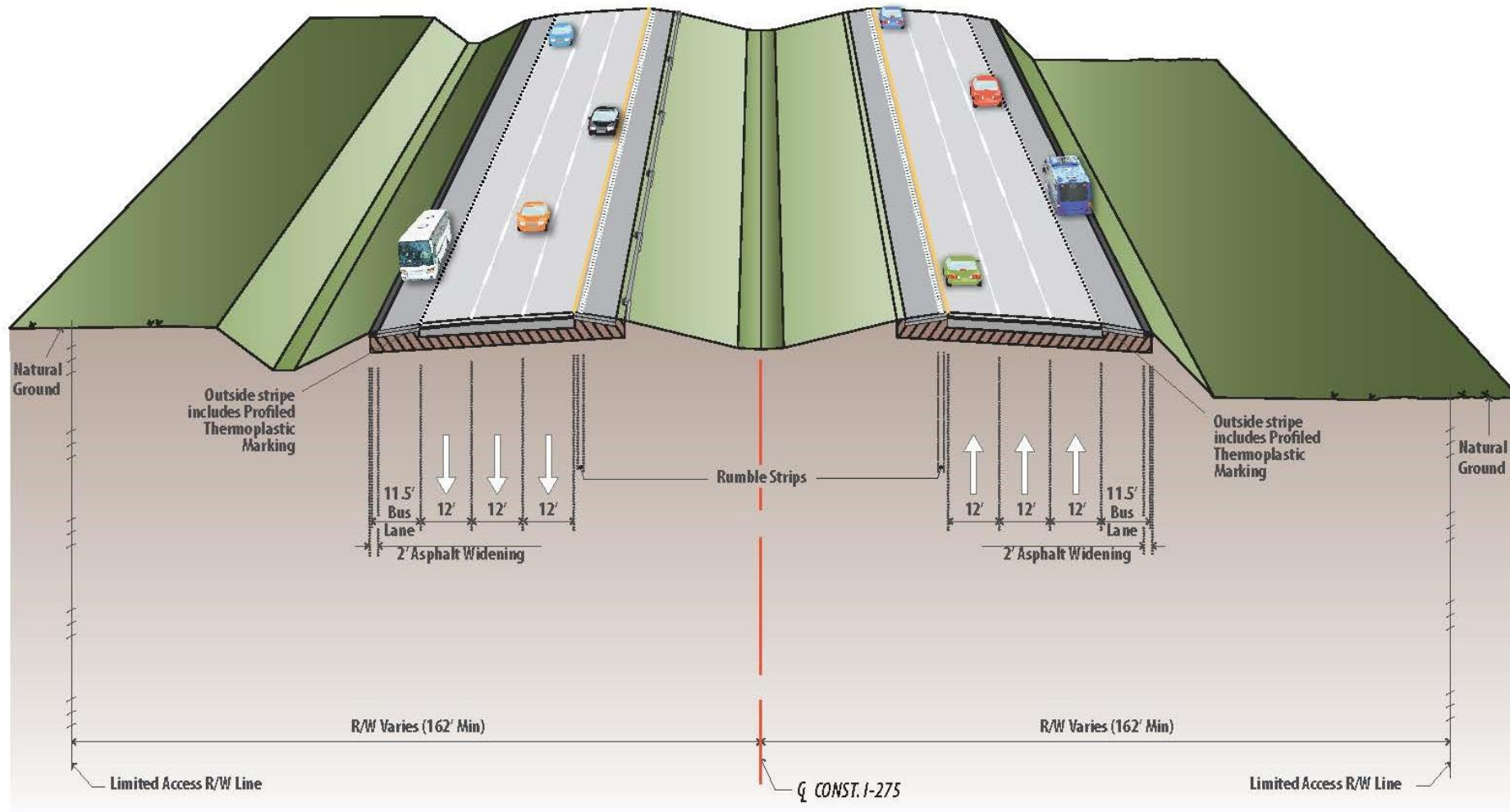
Alternative 1: Hold Outside Edge of Pavement



Alternative 1 Typical Section

LEGEND Existing Concrete Pavement New Concrete Pavement Existing Asphalt Pavement New Asphalt Pavement

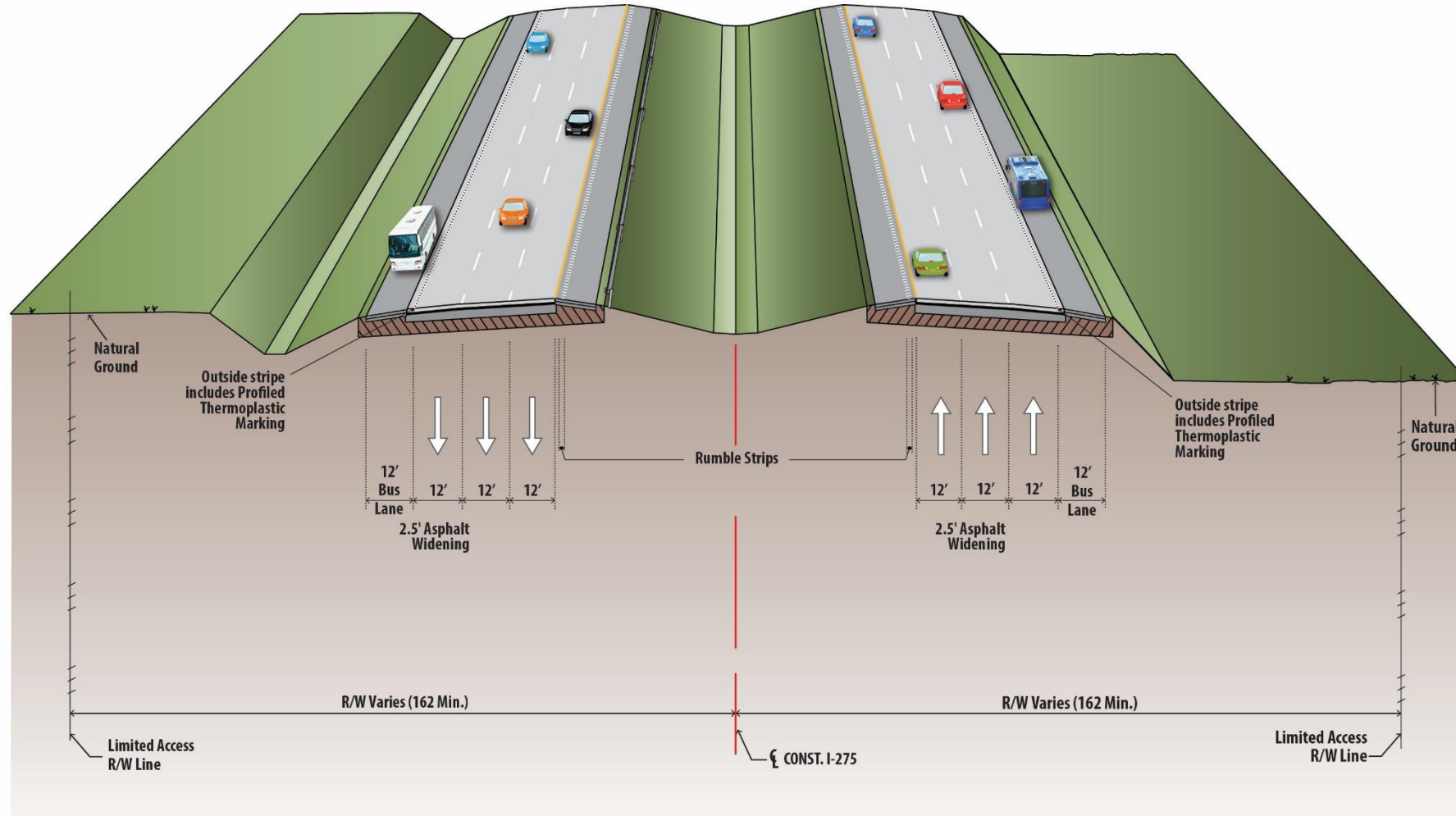
Alternative 2: Hold Outside Edge of Travel



Alternative 2 Typical Section

LEGEND Existing Concrete Pavement New Concrete Pavement Existing Asphalt Pavement New Asphalt Pavement

Alternative 2B: Preferred Alternative

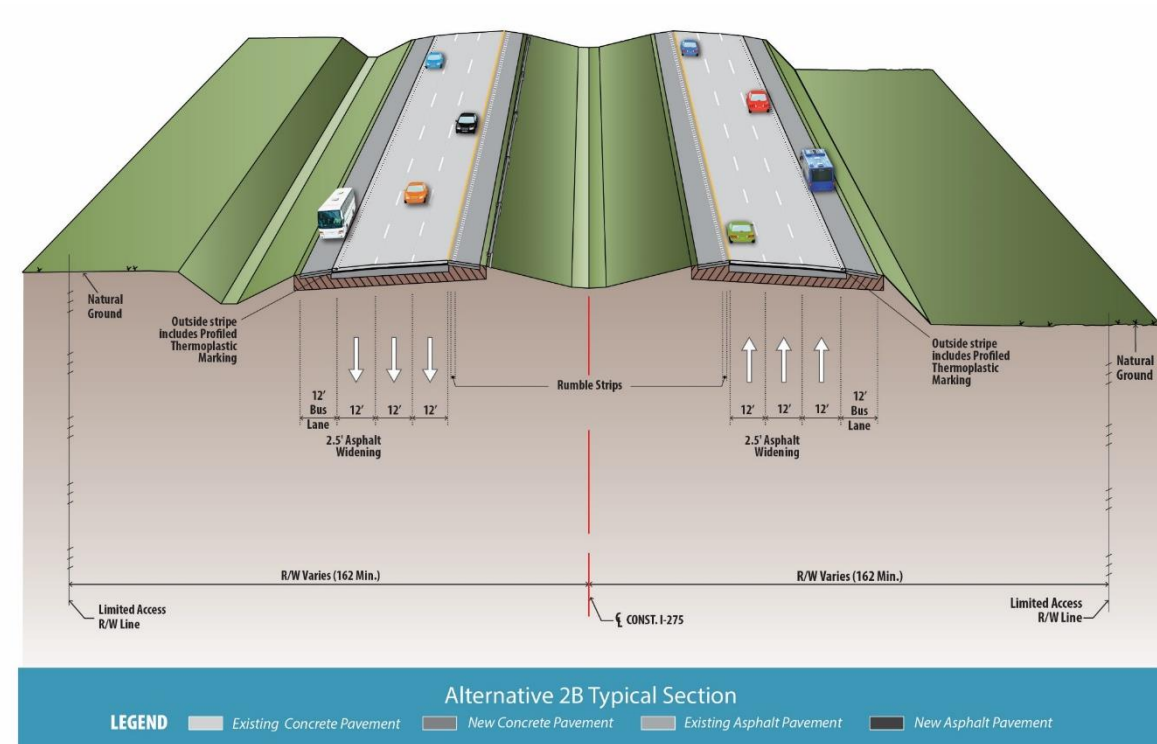


Alternative 2B Typical Section

LEGEND Existing Concrete Pavement New Concrete Pavement Existing Asphalt Pavement New Asphalt Pavement

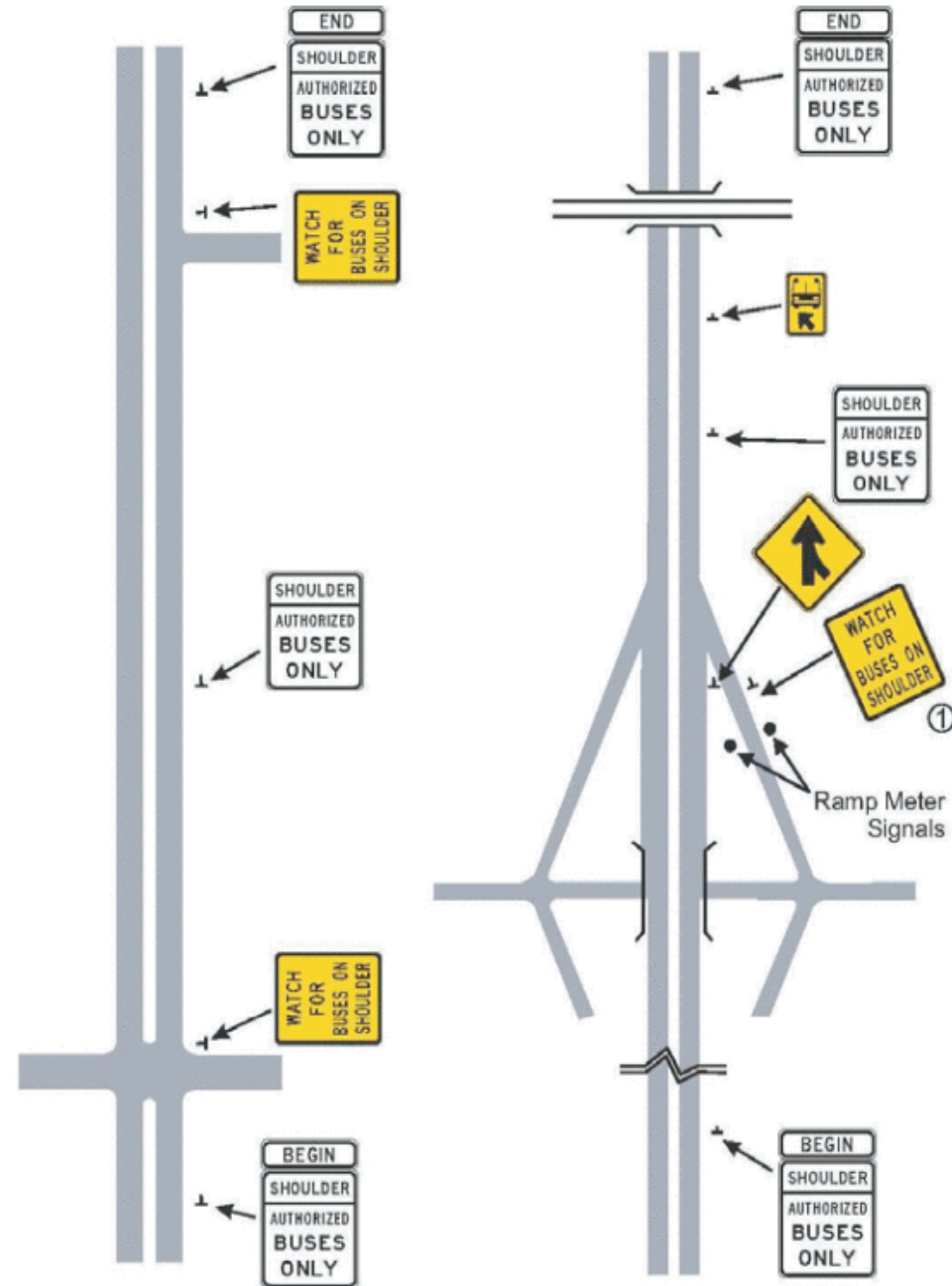
Preferred Alternative: Alternative 2B

- Add shoulder pavement to outside shoulder for a 12' shoulder throughout the corridor
- Requires:
 - Relocate guardrails where needed
 - Relocate rumble striping
 - Movement of drainage inlets
 - Lane shifts at Bridges
 - Restripe bridge structures
 - Reduced Lane Widths



Signage & Striping

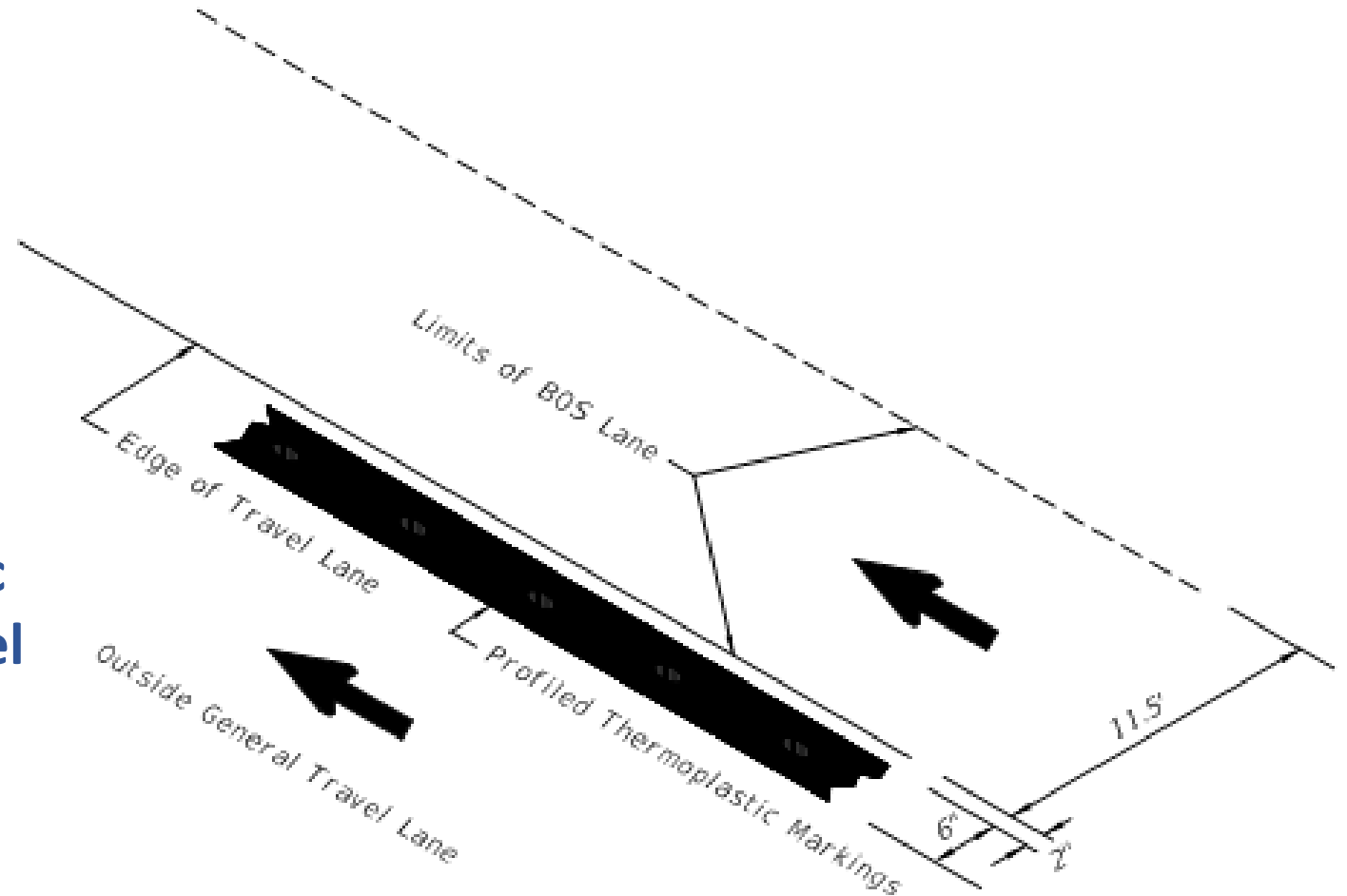
- Signage options:
 - **Static Signage (preferred)**
 - Advance Guide Signs - distance/open/closed
 - Variable Message Signs (VMS)
 - Lane Use Signs (LUS)
- Striping options:
 - **Solid white line with “BUS ONLY” marking (preferred)**
 - Fully colored shoulder to denote a bus lane



Rumble Strips

Options Considered:

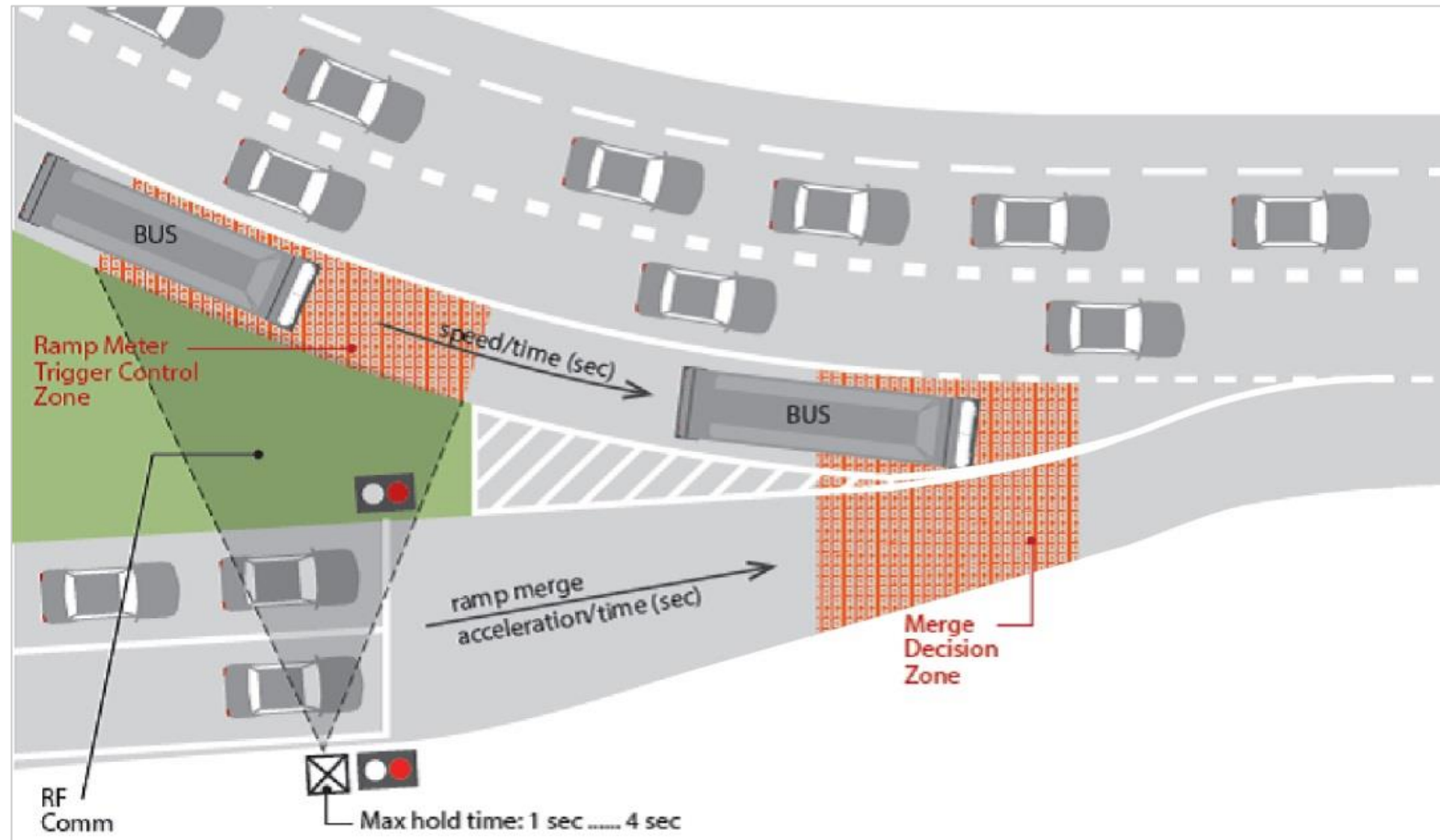
- Leave as is
- Shift rumble strip to center of shoulder lane
- **Install Profiled Thermoplastic Markings at the edge of travel lane (preferred)**



ISOMETRIC - LONGITUDINAL CUT (RIGID PAVEMENT)

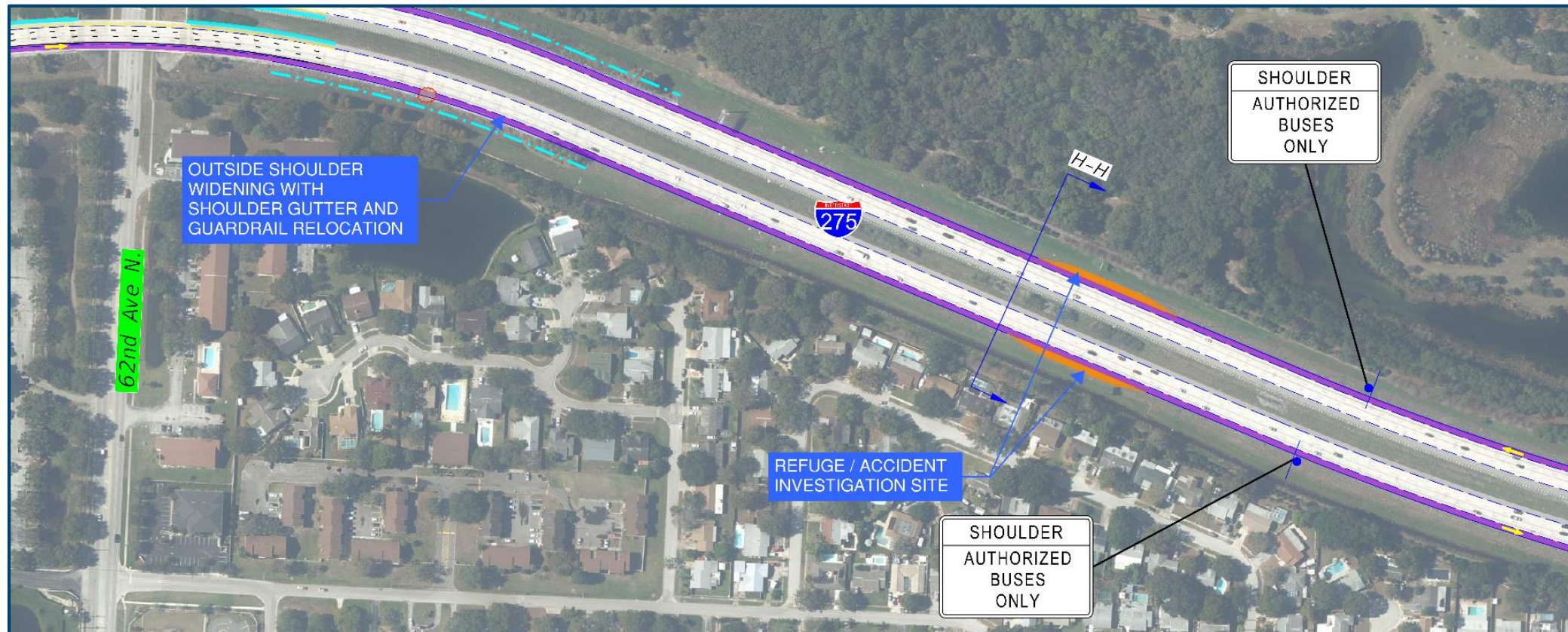
Ramp Metering

- Ramp metering creates a gap for the bus to traverse the interchange
- Ramp meters will be installed in both the northbound and southbound directions at 38th Avenue N and 54th Avenue N



Refuge Areas

- Refuge areas provide incident management/enforcement opportunities
- Move accidents from GP lanes to refuge area rather than shoulder lane to maintain BOS operations
- Decision to not include refuge areas for secondary accidents and interchange spacings



I-275 Concept of Operations

- **Speed Protocols:**

- >35 MPH in GP lanes (recommended)
- Buses travel no more than 35 MPH
- Buses travel no faster than 15 MPH than the adjacent traffic lane

- **Operating Hours:**

- Anytime the GP lanes slow to the designated speed for shoulder use which includes incidental congestion

- **Authorized Users:**

- Only trained (classroom & on-the-road) PSTA drivers
- Should utilize shoulder when permitted

- **Incident Management:**

- Buses will remerge into traffic if an accident/breakdown is blocking the shoulder
- Law enforcement will move accidents to the refuge areas

- **Maintenance:**

- Pavement, signing and striping maintained by FDOT at current frequency
- Increased sweeping of shoulder from once a month to once a week
- Shoulder debris monitoring and clearing will be the responsibility of Road Rangers and PSTA drivers will be trained to report shoulder blockages



RFP DEVELOPMENT

PRE-RFP DEVELOPMENT MEETING

- *CO Approves Design Build Project Delivery*
- *Develop Procurement Schedule*
- *Schedule RFP Development Meeting*
- *Pre-scoping questions and current RFP template*
- *Establish TRC and prepare advertisement*

POST RFP DEVELOPMENT MEETING

- *Incorporate Stage I comments in RFP*
- *Send out Draft Stage II RFP for comments and reminder for pre-scoping question responses*
- *Schedule a Page Turn Meeting for the RFP Development Team*
- *Verification and Approval of all reference docs and attachments*
- *Submit Draft RFP to Central Office for approval for advertisement (include pre-scoping Q&A)*

FINAL RFP AND BID

- *Approval of RFP package by CO*
- *RFP goes to advertisement*
- *RFP package is sent to FTP site*
- *Bid questions and answers*
- *Price proposals and selection*

Lessons Learned

- Close coordination with all stakeholders
- Impact of changes and the importance of decisiveness
- Technological limitations of the local transit agency
- Early identification of limitations on O&M activities
- Early identification of the need for various approvals from other agencies





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- Santanu Roy, PTP; Vice President; HDR; 407-222-9971; Santanu.Roy@hdrinc.com