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.

Possible Reasons for Implementation

- Reduce Congestion
- Improve Travel Time / Speeds
- Interim Measure
- Increase Transit Acceptance and Reliability
- Budget Constraints
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
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
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
## Design and Operating Criteria Checklist

### Design Features

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

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

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

<table>
<thead>
<tr>
<th>Direction and Time of Day</th>
<th>Travel Time (Minutes)</th>
<th>Travel Speed (MPH)</th>
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<tbody>
<tr>
<td></td>
<td>2016</td>
<td>2040</td>
</tr>
<tr>
<td></td>
<td>NB Average</td>
<td>NB AM Peak</td>
</tr>
<tr>
<td></td>
<td>4.65</td>
<td>5.07</td>
</tr>
<tr>
<td></td>
<td>SB Average</td>
<td>SB AM Peak</td>
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<tr>
<td></td>
<td>5.27</td>
<td>5.54</td>
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<tr>
<td></td>
<td></td>
<td>4.69</td>
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<td>4.64</td>
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<td>5.21</td>
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<td></td>
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<td>6.27</td>
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</tbody>
</table>

Direction and Time of Day: NB (Northbound), SB (Southbound)

Travel Time (Minutes)
- NB Average: 4.65, NB AM Peak: 5.07, NB PM Peak: 6.51
- SB Average: 5.27, SB AM Peak: 5.54, SB PM Peak: 4.77

Travel Speed (MPH)
- NB Average: 57.2, NB AM Peak: 47.9, NB PM Peak: 44
- SB Average: 60.1, SB AM Peak: 51.7, SB PM Peak: 57.6

Direction and Time of Day: 2016 (red), 2040 (blue)
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
Alternative 1: Hold Outside Edge of Pavement
Alternative 2: Hold Outside Edge of Travel
Alternative 2B: Preferred Alternative
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)
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
• Ming Gao, P.E.; Modal Development Manager; FDOT District 7; (813) 455-1136; Ming.Gao@dot.state.fl.us
• Craig Fox, P.E.; Design Project Manager; FDOT District 7; 813.975.6082; Craig.Fox@dot.state.fl.us
• Santanu Roy, PTP; Vice President; HDR; 407-222-9971; Santanu.Roy@hdrinc.com