Low-Cost Improvements to Express-Highway Bottleneck Locations

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Background

• In 2010, FHWA Massachusetts Division recommended that the MPO address bottlenecks in future studies.

• There is a significant opportunity for the application of low-cost solutions to reduce congestion at bottlenecks.

• MPO staff conducted five bottleneck studies and many of the recommendations have been implemented.
Study Achievements

Interstate 95 northbound on-ramp from Interstate 90 in Weston

2011: Acceleration lane

2014: Two-lane on-ramp
Study Achievements

Interstate 95 northbound exit-ramp to Route 3 in Burlington

2011: One-lane exit

2018: Two-lane exit
Study Achievements

Interstate 95 southbound exit ramp to Route 3 in Burlington

2013: One-lane exit-ramp

2018: Two-lane exit-ramp
Study Achievements
Interstate 95 southbound exit ramp to Interstate 90 in Weston

2014: Deceleration lane

2018: Exit-only lane

4 lanes

3 lanes
Study Process

• Inventory of candidate locations
• Screen candidate locations
• Collect data for analysis
• Develop and evaluate low-cost improvements
• Obtain feedback from MassDOT Highway Division
• Produce final report

FHWA = Federal Highway Administration.
Typical Bottleneck Conditions

- High Volume Merge
- Lane Reduction
- Short Weave
Study Locations
Location 1:
Interstate 93 northbound between Exits 40 and 41 in Wilmington
Causes

On-ramp traffic merge
Mainline traffic diverge
Downstream lane-drop (4 => 3) bottleneck

High traffic volume in PM peak period
Crashes (2012–16)

Segment after Exit 41 off-ramp
Segment at diverge area
Segment between merge and diverge areas
Segment before Exit 40 on-ramp

Crash approximate location
A = Crashes in PM peak period (3:00 PM to 7:00 PM)
B = All crashes from 2012–16

- Exit 41: 4
- Exit 40: 5
- Exit 40 merge area: 1
- Segment between merge and diverge areas: 25, 3, 1, 5, 62
- Segment after Exit 41 off-ramp: 4, 7
- Segment at diverge area: 69
- Segment before Exit 40 on-ramp: 125

Crashes (2012–16):
- Total crashes: 69
- Crashes at exit 41: 25
- Crashes at exit 40: 62
- Crashes at exit 40 merge area: 1
- Crashes before exit 40 on-ramp: 125
Lane-drop location
Breakdown lane open
3:00 PM – 7:00 PM

Travel Speeds

LEGEND
Average Travel Speed
(Miles Per Hour)
- 35-44 mph
- 45-49 mph
- 50-54 mph
- 55+ mph

I-93 = Interstate 93.
Improvement: Auxiliary Lane

Use existing paved shoulder to create an auxiliary lane
Next Steps: Further Study of Downstream Bottleneck
Location 2: I-93 Southbound Segment at the End of the HOV Zipper Lane in Quincy and Braintree
Location 2
PM HOV Zipper Lane Exit

HOV = high-occupancy vehicle.
Source: MassDOT.
Causes

- On-ramp traffic merge
- Mainline traffic weaves
- Mainline traffic diverge
- Exit 7
- Exit 8
- HOV traffic merge
- Bottleneck
Travel Speeds

Exit 7
HOV Zipper Lane exit:
Open from 3:00 PM – 7:00 PM

Exit 8

Route 3 split

LEGEND
Average Travel Speed (Miles Per Hour)
- 1–24 mph
- 25–34 mph
- 35–44 mph
- 45–49 mph
- 50–54 mph
- 55+ mph

I-93 Southbound
Crashes (2012–16)

- Segment at Exit 7 split
- Segment leading to Exit 7 diverge
- Segment at Furnace Brook on-ramp

Crash approximate location:
A = Crashes in PM peak period (3:00 PM to 7:00 PM)
B = All crashes from 2012–16
Option 1:
Lengthen HOV Lane Merge Distance
Option 2: Lengthen Acceleration Distance for Furnace Brook Parkway Traffic

Lengthen acceleration distance for the on-ramp or convert it to an auxiliary lane.
Conclusion and Next Steps

• Recommendations align with the MPO goals of improving capacity management and mobility.

• Advance the improvement concepts into projects
Thank you!

Questions, Comments, and Discussion?