



Portland Area Mainline Needs Assessment

DRAFT

Alternative 9c – Reversible Lanes from Exits 44 to 53

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9c.1 Overview

A Reversible Lane is a general use lane, constructed in the median of the freeway. The orientation of the lane can be configured to serve traffic in the peak direction. During periods in which northbound traffic is heaviest, the lane would be oriented in the northbound direction, thus providing an additional general purpose lane for northbound traffic. The same lane then would have its direction reversed relatively quickly (e.g. an hour or less) to serve peak traffic in the southbound direction when southbound traffic is the heaviest. A Reversible Lane is different from a Zipper Lane in that it does not require a moveable barrier machine to create an additional general use lane. Reversible lanes are used where right-of-way is available, whereas a Zipper lane is used on roadways with limited or no additional right-of-way. The Reversible Lane concept assumed as part of this analysis for the Maine Turnpike is similar to the concept employed on Route 3 in Boston and I-30 in Dallas. Other locations where reversible lanes are in use include San Diego-Coronado Bridge, Golden Gate Bridge, Lee Roy Selmon Expressway in Tampa, and I-95 Express Lanes in Northern Virginia.

The general concept of the Reversible Lane is that it provides a barrier-separated additional lane in the peak direction of travel. The number of access points into the Reversible Lane would be limited. Figure 9c-1 provides a schematic overview of the Reversible Lane.

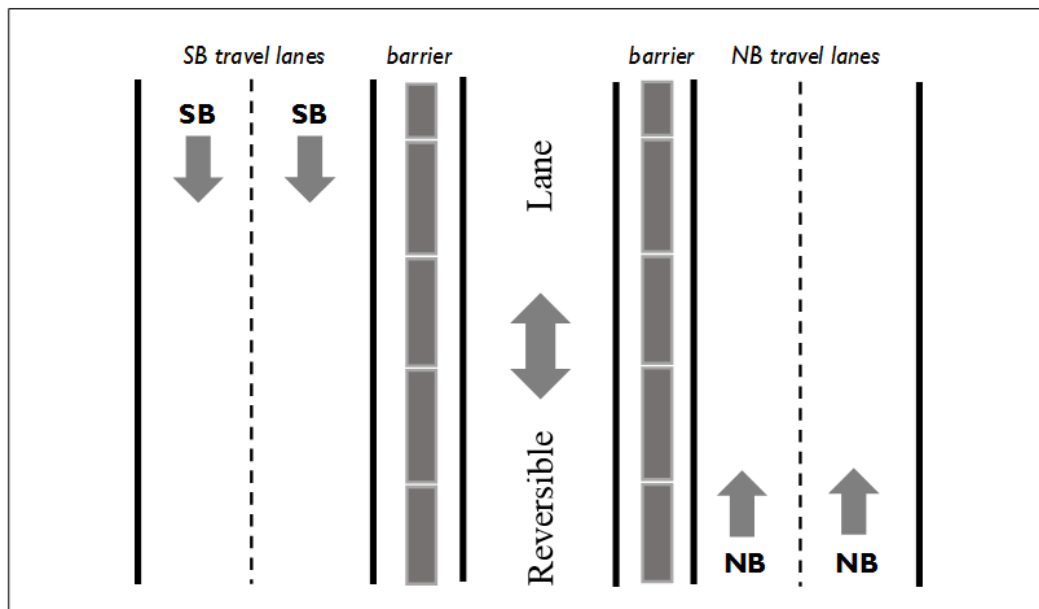


Figure 9c-1: Reversible Lane Schematic

This alternative assumes that the Maine Turnpike would be widened with one additional lane that would serve both directions. Roadway widening alternatives are typically construction-based alternatives that require a fair amount of capital investment. They can sizably increase the throughput capacity (number of vehicles that can travel) of the roadway.

9c.2 Key Assumptions

As part of the Portland Area Mainline (PAM) Needs Assessment, the Study Team assessed the potential utilization of constructing and operating a Reversible Lane that would be constructed between the

northbound and southbound lanes for use in each direction from Exit 44 in Scarborough to Exit 53 in West Falmouth. The key components of this alternative would consist of:

- Widening the mainline of the Turnpike for approximately nine miles in one direction to provide a three-lane cross section in the median of the Maine Turnpike, with similar improvements as identified in Alternative 12 in terms of bridges, toll plazas, and local roadway intersections;
- Access to the Reversible Lane for northbound vehicles would be at some point south of Exit 44;
- Access to the Reversible Lane for southbound vehicles would be at some point north of Exit 53; and
- One additional access point was assumed between Exits 48 and 52 based on the available distance and no interchange access within this section of Maine Turnpike.

The analysis of this alternative was based upon evaluation of other Reversible Lane facilities throughout the United States, combined with an estimation of potential Reversible Lane utilization based on Maine Turnpike interchange to interchange traffic data. Key assumptions for this analysis were as follows:

- The full length of the Reversible Lane would operate in the same direction, either northbound or southbound. The Reversible Lane would not have the capability of serving northbound traffic for one portion of the corridor and southbound traffic for a separate portion of the corridor; and
- For safety purposes, the Reversible Lane is barrier separated with limited access and egress points as noted previously. Consequently, it is intended to serve vehicles that are making longer-distance trips through the corridor, rather than serving shorter distance trips within the corridor.

The Reversible Lane concept assumed as part of this analysis is similar to the concept employed on Route 3 in Boston and I-30 in Dallas. Due to the limited access, some groups of users would be unable to use the Reversible Lane. For example:

- Any northbound driver wishing to exit the Maine Turnpike between Exits 45 and 48 would not be able to use the lane, since the first egress point is north of Exit 48;
- Any southbound driver entering at Exit 52 would be unable to use the Reversible Lane unless the destination was Exit 42 or south; and
- All drivers whose origin and destination is between Exits 45 and 53 would be unable to use the lane.

Traffic volumes in the peak hours were reviewed to estimate the extent to which the Reversible Lane would impact traffic flows. Figure 9c-2 summarizes the projected NB peak-hour traffic flows through the corridor in the year 2040.

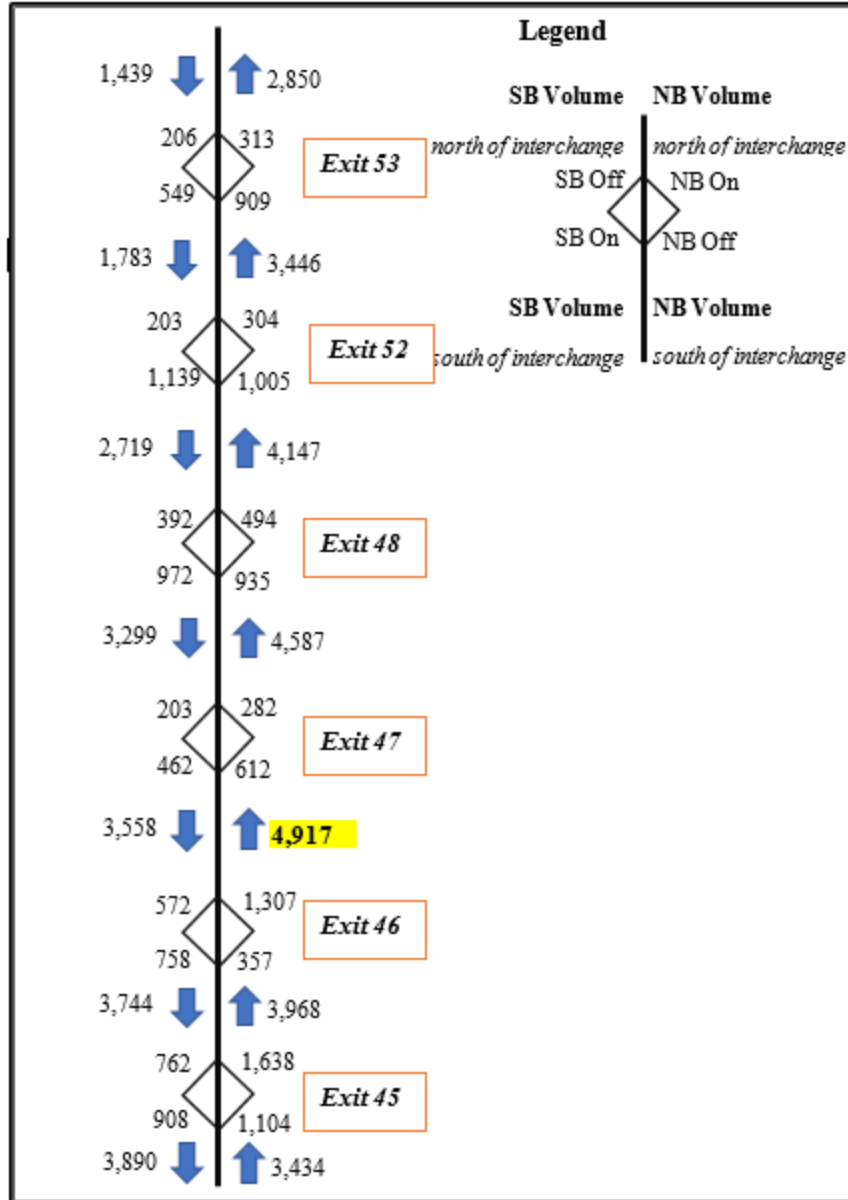


Figure 9c-2: Projected 2040 NB Peak-Hour Traffic (Summer PM)

As Figure 9c-2 illustrates, the peak NB volume is 4,917 vehicles per hour between Exits 46 and 47 (highlighted in yellow). It is important to note that in this peak hour the Reversible Lane would be used for the northbound direction, but the southbound direction south of Exit 46 is over capacity. This figure demonstrates the unique traffic characteristics of the Maine Turnpike. The Maine Turnpike has high commuter traffic heading to points south of Portland, and high tourist traffic northbound on Friday afternoons.

Figure 9c-3 summarizes the projected SB peak-hour traffic flows through the corridor in the year 2040.

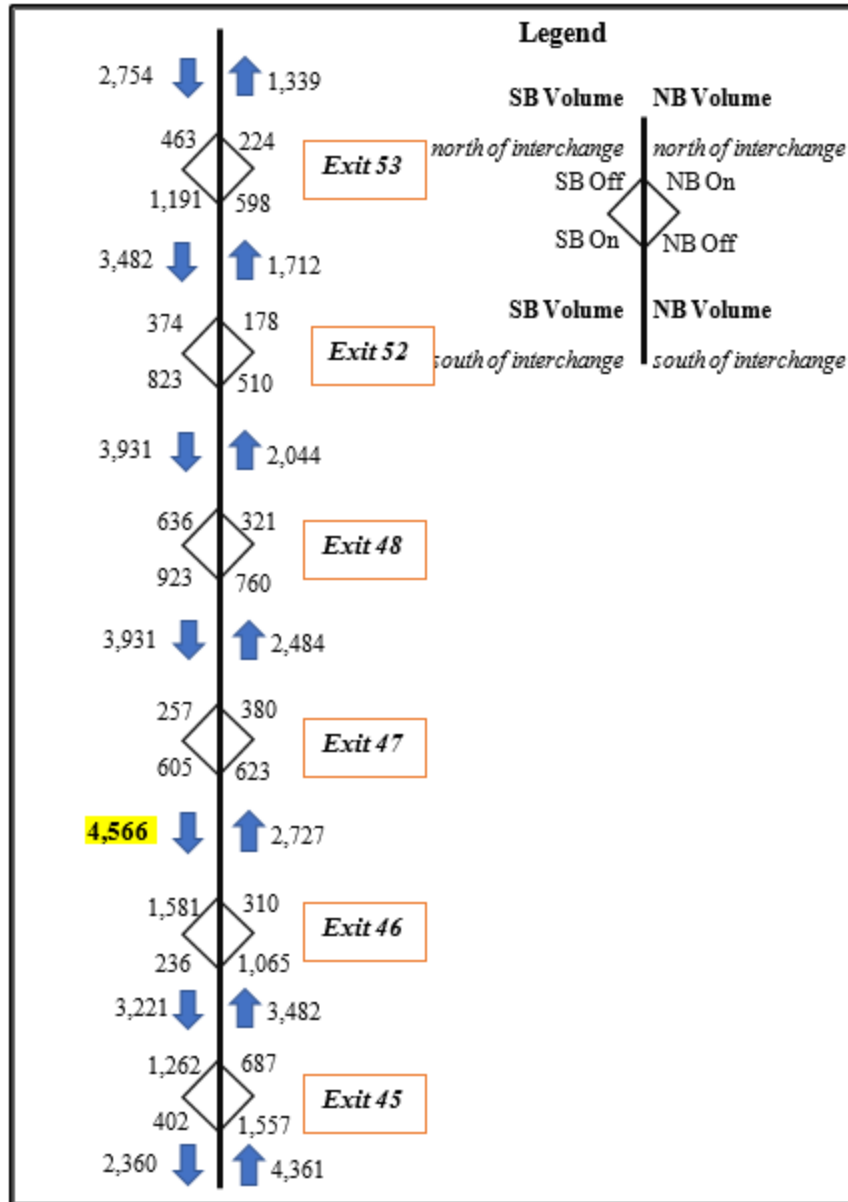


Figure 9c-3: Projected 2040 SB Peak-Hour Traffic (Fall AM)

As Figure 9c-3 illustrates, the peak SB volume is 4,566 vehicles per hour between Exits 46 and 47 (highlighted in yellow). It is important to note that in this peak hour the Reversible Lane would be used for the southbound direction, but the northbound direction south of Exit 45 is substantially over capacity.

However, using information from the 2010 Origin and Destination Study¹, it is estimated that 300 to 500 of these vehicles are destined to connect to I-295 in South Portland. These vehicles are simply using the NB off-ramp Exit 45 to bypass the exit toll at Exit 44. If these vehicles were to shift from the Exit 45 NB-off ramp to the Exit 44 NB-off ramp, the NB volume between Exits 44 and 45 would be more manageable.

¹ Maine Turnpike Authority, 2010 Origin - Destination Survey Summary Report (HNTB Corp., June 2011)

9c.3 Capital and Operating Costs

The capital costs to widen the Maine Turnpike one additional lane for a Reversible Lane between Exits 44 and 53 was estimated to be approximately \$123.5 million in 2018 dollars.

The widening of the Maine Turnpike for an additional lane within the Study Area would increase the total number of lane miles to be maintained by approximately nine miles. With these additional miles, the additional operating and maintenance costs for this alternative would be \$470,000 per year, based on current Maine Turnpike per mile operation and maintenance costs.

Operation and maintenance costs for the Reversible Lane facility would include additional law enforcement, moveable gates and signals at either end of the Reversible Lane to safely control traffic entering in the peak direction and prohibit traffic in the alternate direction. The estimated additional cost to maintain the Reversible Lane annually is \$130,000 dollars.

9c.4 Findings

Using data from current Maine Turnpike Authority interchange to interchange traffic data, the Reversible Lane usage was estimated. The analysis suggests that a Reversible Lane could provide significant congestion relief during peak periods in the near term until 2035. However, traffic volumes will be near capacity from 2024 through 2035 resulting in undesirable levels of service (LOS E/F). After Year 2035, an additional general purpose lane would need to be added to accommodate traffic safely and at an appropriate level of service as demand will exceed capacity.

More information regarding Reversible Lanes is included in a separate white paper entitled *The Reversible Lane: The congestion-reduction potential of a single reversible lane*².

The construction of a Reversible Lane on the Turnpike will create additional roadway capacity. However, the extra lane can only be used by the peak direction of traffic and by 2035 it will not be able to accommodate the expected peak hour traffic. This alternative is considered to be a short-term fix and would require the addition of a third lane in the non-peak direction by 2035. Additionally, there would be higher throw-away cost due to the amount of pavement required for the Reversible Lane.

Two challenges of this alternative are snow storage and incident management. Currently, the Maine Turnpike Authority uses the medians for snow storage. Therefore, the design and implementation of this alternative would need to accommodate snow storage for all lanes of traffic. Incident management will also be an issue as access to the reversible lane will be limited, which adds difficulty and time for clearing incidents.

This alternative was evaluated against several Measures of Effectiveness (MOEs) which are summarized in the Alternatives Evaluation Matrix, dated April 12, 2018. The key findings from that matrix for this alternative are as follows:

² March 2018, HNTB

9c.4.1 Key Benefits

The key benefits of Alternative 9c – Reversible Lanes are the following:

- Anticipated crash rate reduction of 25.3% on the Maine Turnpike in the peak direction;
- An increase in Maine Turnpike roadway capacity in the peak direction;
- A reduction of 7miles of roadway in the region that are near or over capacity;
- 0.3% reduction in regional vehicle hours traveled (VHT);
- Has a viable funding source; and
- Can be implemented in a short timeframe; and
- Has a Benefit/Cost ratio of 3.0.

9c.4.2 Key Impacts

The key impacts and challenges of Alternative 9c – Reversible Lanes are the following:

- No capacity increase to the off-peak travel direction;
- Segments still near or exceeding capacity on off-peak;
- 0.2% increase in regional vehicle miles traveled (VMT); and
- Potential wetland impacts.