Portland Area Mainline Needs Assessment

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Alternative 9b – Implement HOV/HOT Lanes from Exits 44 to 53

HNTB Corporation
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9b.1 Overview

High-occupancy vehicle (HOV) lanes are restricted traffic lanes reserved at peak travel times or longer for the exclusive use of vehicles with a driver and one or more passengers. These often include carpools, vanpools, and transit buses. The normal minimum occupancy level is either two or three occupants. HOV lanes are typically created to increase average vehicle occupancy with the goal of reducing traffic congestion and related air pollution.

High-occupancy toll (HOT) lanes are restricted traffic lanes that are available to HOVs without charge; other vehicles are required to pay a toll that varies according to the time of day or according to real-time traffic conditions. Although numerous HOT lanes are operating in the United States today, none are operating parallel to an existing conventional toll facility. The concept of charging all customers a base toll, while designating an additional lane solely for HOVs and for SOVs willing to pay a higher toll, is untested in this country. This alternative would also create social justice issues with higher tolls being charged for patrons using the dedicated, additional lane.

As noted, no HOT lanes currently exist within conventional toll facilities in the United States. However, many of the components identified above can be observed at various facilities throughout the country. Some comparable facilities are identified below.

The concept of variable tolling is commonly applied at various managed lane facilities. Variable tolling by time of day or in response to real-time traffic conditions approach is employed on managed lanes on State Route 91 in Orange County, I-25 in Denver, the Katy Freeway in Houston, I-66 near Washington, D.C., I-495 on the Capital Beltway, I-95 in Miami, I-15 in Utah, I-15 in San Diego, I-580 in Alameda County, CA, and I-10/I-110 in Los Angeles.

Here, in looking at both HOVs and HOTs, the Study Team assumed that the Maine Turnpike would be widened to three lanes in each direction. Roadway widening alternatives are typically construction-based alternatives that require a fair amount of capital investment, including right-of-way acquisition. They sizably increase the throughput capacity (number of vehicles that can travel) of the roadway.

As part of the Portland Area Mainline (PAM) Needs Assessment, the Study Team assessed the potential results of converting an additional lane in each direction to either HOV or HOT usage from Exit 44 in Scarborough to Exit 53 in West Falmouth. They key components of this alternative would consist of:

- Widening the mainline of the Turnpike for approximately nine miles to provide a three-lane cross section in each direction with similar improvements as identified in Alternative 12 in terms of bridges, toll plazas, and local roadway intersections; and
- No barrier (either physical or painted) separating the HOV/HOT lane, which would allow maximum utilization. This absence is not typical of most HOV/HOT facilities, which usually have a barrier or distance separation.

9b.2 Key Assumptions

The analysis of this alternative is based upon evaluation of other HOV and HOT facilities throughout the United States, combined with an estimation of potential HOV and HOT users from Maine Turnpike Authority (MTA) data. Key assumptions for this analysis are as follows:

- The HOV/HOT lanes would be created by adding a third lane in each direction of travel. The far-left lane in each direction would be designated as either the HOV or HOT lane. Usage of the HOV lanes would be restricted to high-occupancy vehicles, typically defined as either 2+ (e.g. 2 or more people in the vehicle, including the driver) or 3+. Carpools, vanpools, and transit buses comprise much of the HOV lane usage during commuting periods.
- Usage of the HOT lanes would be restricted to two groups of users:
    - *High-occupancy vehicles, or HOVs*. An HOV lane typically requires either 2+ (e.g. 2 or more people in the vehicle, including the driver) or 3+ occupants.
    - *Single-occupancy vehicles (SOVs) that are willing to pay a toll*. The toll would be related to the level of usage of the road—the higher the usage, the greater the toll (in order to manage the demand). This toll would be added to the "base toll" assessed to all users of the Maine Turnpike.
- Access to the HOV/HOT lane would be open. Vehicles would be free to move in and out of HOV/HOT lane at any point. This feature is important because if access to the lane were too restrictive—that is, if the lane were limited to vehicles traveling *through* the region that either met the occupancy criteria or were willing to pay a toll—then the pool of potential users could be extremely small.

9b.3 Capital and Operating Costs

The capital costs to widen the Maine Turnpike one additional lane in each direction for HOV/HOT use between Exits 44 and 53 was estimated to be approximately $145.6 million in 2018 dollars.

The widening of the Maine Turnpike to three lanes in each direction within the Study Area would increase the total number of lane miles to be maintained by approximately 18 miles. With these additional miles, the additional operating and maintenance costs for the widening alternative would be $550,000 per year, based on current Maine Turnpike Authority per mile operation and maintenance costs.

Operation and maintenance costs for the HOV or HOT facility would include additional law enforcement, additional E-ZPass transponder readers and structures, as well as additional MTA back-office costs to maintain. The estimated additional cost to maintain HOV/HOT lanes annually is $180,000 dollars.

9b.4 Findings – HOV Lanes

Using data from the Maine Turnpike Authority Origin and Destination Survey from 2010[1], the following HOV usage was estimated for both 2+ and 3+ occupants. This data is shown in Table 9-1.

Table 9-1: HOV Usage on the Maine Turnpike

HOV Level	Weekday Usage (Mon.-Thurs.)	Friday Usage
2 or more occupants	37.2%	55.8%
3 or more occupants	13.1%	16.7%

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

The potential market for the HOV 2+ lane is greater than or equal to one third of the traffic volume, as demonstrated by Table 9-1. Since the demand for the HOV 2+ lane (one lane of three) is more than one third of the traffic volume, the benefit of an HOV 2+ lane could be diminished.

Conversely, an HOV 3+ lane would be under-utilized for all conditions, which would result in a better opportunity for free-flowing traffic (which is the intent of an HOV lane) but would also result in traffic congestion in the remaining general travel lanes.

9b.5 Findings – HOT Lanes

Implementing an HOT lane on the Maine Turnpike between Exits 44 and 53 would be an immense effort. Although numerous HOT lanes are operating in the United States today, none are operating parallel to an existing conventional toll facility. The concept of charging all customers a base toll, while designating an additional lane solely for HOVs and for SOVs willing to pay a higher toll, is untested in this country. While possible, implementation of HOT lanes is not practical for the following reasons:

- On a per-lane basis, the levels of traffic on the Maine Turnpike in the study area are much lower than the levels observed on existing HOT facilities in the United States. This indicates that the amount of revenue to be generated by this proposed HOT lane would likely be very low. The cost to build and operate such an HOT lane would almost certainly be much greater than the revenue that it would generate.
- Given that an HOT lane would not be self-sustaining, the only way to build and operate the lane would be to finance it with existing toll revenue. The notion of charging SOVs to build a lane that they are not permitted to use (unless they pay a premium) raises equity questions.
- The task of raising revenue and managing traffic is more effectively done by managing tolls on all lanes, rather than focusing solely on a single express lane.

In short, implementing an HOT lane on the Maine Turnpike between Exits 44 and 53 is not practical. It would likely be an expensive venture that would not be the most effective means of providing quality service in an equitable fashion. A separate white paper, titled *The Potential Feasibility of an HOV/HOT lane on the Maine Turnpike*[2], has been prepared to further evaluate this topic in more detail.

9b.6 Summary of Findings

The construction of one third lane per direction to create an HOT/HOV lane on the Turnpike would create additional roadway capacity. Therefore, this alternative does address identified capacity issues on the Maine Turnpike.

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

9b.6.1 Key Benefits

The key benefits of Alternative 9 – HOV/HOT Lanes are the following:

- Anticipated crash rate reduction of 25.9% on the Maine Turnpike;
- An increase in Maine Turnpike roadway capacity;
- A reduction of 13.1 miles of roadway in the region that are near or over capacity;
- 0.3% reduction in regional vehicle hours traveled (VHT);
- This alternative has a viable funding source;
- Has a Benefit/Cost ratio of 3.2; and
- Meets the study purpose.

9b.6.2 Key Impacts

The key impacts and challenges of Alternative 9 – HOV/HOT Lanes are the following:

- 0.2% increase in regional vehicle miles traveled (VMT);
- 17 acre increase of Impervious pavement in Urban Impaired Stream Watersheds;
- Potential wetland Impacts;
- Obstacles to implementation, including Maine State law that prohibits a surcharge on tolls based on time of day; and
- Timeframe to implement is unknown due to the Maine State law.