



DRAFT

Alternative 12 – Widen Maine Turnpike to three-lanes in each direction from Exits 44 to 53

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12.1 Overview

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 one of twelve alternatives, the Study Team assessed the impacts of widening the Maine Turnpike from two to three general-purpose lanes in each direction from Exit 44 in Scarborough to Exit 53 in West Falmouth. Figure 12-1 shows the project limits. The key components of this alternative would consist of:

- Widening the mainline for approximately nine miles to provide a three-lane cross section in each direction;
- Reconstruction of several bridges including the Stroudwater River, Maine Central Railroad, and Warren Avenue bridges; and
- Reconstruction of any side road underpasses and existing drainage structures not already designed for additional mainline lanes.



Figure 12-1: Turnpike Widening Project Limits

12.2 Key Assumptions

The analysis of this alternative follows a methodology that is based on engineering standards and practices. Factors in the analysis included forecast year, design hours, traffic growth, roadway capacity analysis, travel demand model, and traffic impact analysis.

12.2.1 Traffic Impact Analysis

The Portland Area Comprehensive Transportation System (PACTS) regional travel demand model is an accepted tool that estimates the amount of traffic on the road as well as likely travel routes in the region based on socio-economic factors. The model provides information on travel by vehicles on all the roadways in the study area, providing information on vehicle-miles traveled (VMT) and vehicle-hours traveled (VHT).

The PACTS travel demand model was run with a widened I-95 to determine the traffic impacts on the Portland area roadways for 2040. The traffic impacts identified included changes in traffic volumes on I-95 and key arterials, and changes in vehicle miles travelled (VMT) and vehicle hours travelled (VHT) for the Portland area.

12.2.2 Roadway Capacity Analysis

The capacity (maximum traffic flow) on the mainline sections of the Maine Turnpike was evaluated using the traffic engineering procedures outlined in the Highway Capacity Manual¹, which sets forth nationally and regionally accepted guidelines for the road capacity evaluation of freeways and other roadways.

In accordance with nationally and regionally accepted guidelines, projected design hour traffic volumes for the year 2040 was analyzed using HCS software based on the Highway Capacity Manual², and VISSIM³ software was used to determine roadway, ramp, and intersection levels-of-service.

Design hour traffic volumes for the year 2040 were input into highway capacity software to determine levels-of-service. The traffic volumes, the comparison of the traffic volumes to roadway capacity and the levels-of-service are shown in Table 12-1 and Table 12-2.

¹ Transportation Research Board, *Highway Capacity Manual* (Transportation Research Board, 2010)

² Ibid

³ Microscopic traffic flow simulation software by PTV used to analyze complex roadways and intersections

Table 12-1: NB PM Design Hour Volume, Level of Service, and V/C Ratios

		Northbound PM Design Hour Volume					
		2040 No-Build			2040 Alternative 12		
Location	Capacity	Volume	v/c	LOS	Volume	v/c	LOS
Exits 44 to 45	5400	3434	0.95	E	3434	0.64	C
Exits 45 to 46	5400	3969	1.1	F	3969	0.74	D
Exits 46 to 47	5400	4919	1.37	F	4919	0.91	E
Exits 47 to 48	5400	4588	1.27	F	4588	0.85	D
Exits 48 to 52	5400	4147	1.15	F	4147	0.77	D
Exits 52 to 53	5400	3446	0.96	E	3446	0.64	C

Table 12-2: SB AM Design Hour Volume, Level of Service, and V/C Ratios

		Southbound AM Design Hour Volume					
		2040 No-Build			2040 Alternative 12		
Location	Capacity	Volume ⁴	v/c	LOS	Volume	v/c	LOS
Exits 52 to 53	5400	3482	0.97	E	3482	0.64	C
Exits 48 to 52	5400	3932	1.09	F	3932	0.73	B
Exits 47 to 48	5400	4219	1.17	F	4219	0.78	C
Exits 46 to 47	5400	4566	1.27	F	4566	0.85	D
Exits 45 to 46	5400	3,222	0.9	E	3,222	0.60	D
Exits 44 to 45	5400	2,363	0.66	C	2,363	0.44	C

It should be noted that the traffic levels of service shown in Tables 12-1 and 12-2 reflect the impacts of the traffic demand for that section of roadway only. Traffic congestion can impact downstream roadway segments. For example, in the No-Build Condition, the southbound segment of the Turnpike between Exits 52 and 53 could be an F due to impacts upstream. Likewise, the southbound segment of the Turnpike between Exits 63 and 53 could be an E or F due to impacts from traffic congestion on the segment between Exits 52 and 45.

⁴ Some SB volumes are higher during the PM peak hour, specifically south of Exit 46. However, generally the SB peak volumes occur during the AM peak hour.

12.2.3 Traffic Impact Analysis Findings

Widening I-95 through Greater Portland provided key benefits to safety and mobility on the Maine Turnpike and mostly improved transportation results throughout the region. A summary of key transportation findings includes:

- Improved safety benefits through anticipated reduction in crash rate with three-lane vs. two-lane roadway;
- Improve mobility with improved LOS and V/C ratios on all sections of Maine Turnpike between Exits 44 and 53;
- Reduction in miles of off-Turnpike roadway near or over capacity as traffic shifts to less congested Maine Turnpike; and
- Limited increase in VMT and corresponding reduction VHT as traffic shifts to less congested Maine Turnpike.

12.3 Capital and Operating Costs

The capital costs to widen the Maine Turnpike one additional lane in each direction between Exits 44 and 53 was estimated to be approximately \$142.7 million in 2018 dollars.

This Alternative would also 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 alternative would be \$500,000, based on current Maine Turnpike Authority per mile operation and maintenance costs.

12.4 Findings

Widening of the Maine Turnpike to three general purpose lanes was found to address the capacity constraints of the Maine Turnpike. Under projected volumes from the travel demand model, the Maine Turnpike would be under capacity in 2040 (0.91 or less). 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:

12.4.1 Key Benefits

The key benefits of Alternative 12 – Widening the Turnpike are the following:

- An expected 29.3% reduction in crashes on the Maine Turnpike;
- An increase in Maine Turnpike roadway capacity;
- A reduction of 13.6 miles of roadway in the region that are near or over capacity. This will maintain adequate capacity on interstate system, keeping vehicles on interstate rather than local roads;
- 0.3% reduction in regional vehicle hours traveled (VHT);
- Has a viable funding source;

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- Potential toll revenue increase;
- Can be implemented in a short timeframe;
- Has a Benefit/Cost ratio of 3.9; and
- Does address Portland Area Mainline Needs Assessment Study Purpose.

12.4.2 Key Impacts

The key impacts and challenges of Alternative 12 – Widening the Turnpike are the following:

- 0.2% increase in regional vehicle miles traveled (VMT)17 acre increase of impervious pavement in Urban Impaired Stream Watersheds; and
- Potential wetlands impacts.