Portland Area Mainline Needs Assessment

DRAFT

Alternative 1 – Future No Build 2040

HNTB Corporation
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1.1 Overview

The Future No Build Alternative provides the baseline to which all other alternatives will be compared. Using the status quo as a baseline allows the Study Team to determine how the other proposed alternatives would affect mobility in the study area and particularly on the Maine Turnpike between Exits 44 and 53. In the Future No Build Alternative, as the name implies, no capacity improvements would be made, and no travel demand or transportation system strategies would be implemented, with all existing conditions remaining in their current state.

The factors analyzed in this alternative include:

- The forecast year that Mainline Turnpike sections would be projected to fail (defined as level-of-service E/F);
- The amount that estimated traffic volumes would exceed road capacity in the forecast year; and
- Impacts to other Greater Portland roadways in the forecast year.

1.2 Key Assumptions

The analysis of this alternative follows a methodology that is based on engineering standards and practices. Descriptions of the assumptions and methods follow.

1.2.1 Forecast Year

Every study assigns a year in the future as the target to plan for, called a forecast year. For roadway design projects in Maine, the typical forecast year is 20 years[1] in the future. The basis of analysis for this study was the most recent travel demand model developed by the Portland Area Comprehensive Transportation System (PACTS), for which the forecast year is 2040. Therefore, 2040 is the forecast year used for this study.

1.2.2 Design Hours

Traffic studies assign one or more design hours during the day for which traffic volumes will be analyzed. For this study, two design hours were chosen – one summer weekday afternoon and one fall weekday morning. These hourly traffic volumes represent the 30th highest hourly traffic volume for the year – one for the northbound direction of the Turnpike, and one for the southbound direction. Using the 30th highest hour as the basis for design and analysis is an engineering design standard[2] because it allows for a functional, free-flowing road without overbuilding for peak traffic.

1.2.3 Traffic Growth

Forecast year (2040) traffic estimates were developed using a growth rate of 1.5% growth per year from 2016 to 2040. This growth rate was developed as part of the Maine Turnpike Authority (MTA) Safety and Capacity Study[3]. The 1.5% growth rate was considered conservative, as it is lower than the daily traffic growth rate on the Maine Turnpike in Portland from 1996 to 2016, which averaged 2.3% per year.

[1] MaineDOT, *Highway Design Guide* (MaineDOT, February 2015)
[2] AASHTO, *A Policy on Geometric Design of Highways and Streets, 6th Edition,* (2011)
[3] Maine Turnpike Authority, *Maine Turnpike Needs Assessment, Safety and Capacity Study* (HNTB Corp., May 2016)

1.2.4 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 Manual[4], which sets forth nationally and regionally accepted guidelines for the road capacity evaluation of freeways and other roadways.

1.2.5 Travel Demand Model

The 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 PACTS travel demand model estimates future vehicular and person travel throughout the PACTS region. The model reflects the geographic distribution and densities of residential, commercial, government, and recreational development as forecast by Greater Portland Council of Governments (GPCOG) staff. The model accounts for the factors that affect a person's choice of travel mode (either private vehicle, transit, or walk) and selection of a travel path (to avoid traffic congestion delays). 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).

1.2.6 Traffic Impact Analysis

In accordance with nationally and regionally accepted guidelines, projected design hour traffic volumes for the years 2016, 2025, and 2040 were analyzed using HCS software based on the Highway Capacity Manual[5], and VISSIM[6] software was used to determine roadway, ramp, and intersection levels-of-service. The design hour traffic volumes, a comparison of the traffic volumes to existing roadway capacity, and the resulting levels-of-service for northbound and southbound Maine Turnpike are shown in Table 1-1 and Table 1-2.

[4] Transportation Research Board, *Highway Capacity Manual* (Transportation Research Board, 2010)
[5] Ibid
[6] Microscopic traffic flow simulation software by PTV used to analyze complex roadways and intersections

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

		Northbound PM Design Hour Volume								
		2016			2025			2040		
Location	Capacity	Volume	v/c	LOS	Volume	v/c	LOS	Volume	v/c	LOS
Exit 44 to 45	3600	2402	0.67	C	2746	0.76	D	3434	0.95	E
Exit 45 to 46	3600	2776	0.77	D	3174	0.88	E	3969	1.1	F
Exit 46 to 47	3600	3440	0.96	E	3934	1.09	F	4919	1.37	F
Exit 47 to 48	3600	3209	0.89	E	3670	1.02	F	4588	1.27	F
Exit 48 to 52	3600	2901	0.81	D	3317	0.92	E	4147	1.15	F
Exit 52 to 53	3600	2411	0.67	C	2756	0.77	D	3446	0.96	E

Table 1-2: SB AM Design Hour Volume, Level of Service, and V/C Ratios

		Southbound AM Design Hour Volume								
		2016			2025			2040		
Location	Capacity	Volume[7]	v/c	LOS	Volume	v/c	LOS	Volume	v/c	LOS
Exit 52 to 53	3600	2436	0.68	C	2785	0.77	D	3482	0.97	E
Exit 48 to 52	3600	2751	0.76	D	3145	0.87	E	3932	1.09	F
Exit 47 to 48	3600	2951	0.82	D	3375	0.94	E	4219	1.17	F
Exit 46 to 47	3600	3194	0.89	E	3653	1.01	F	4566	1.27	F
Exit 45 to 46	3600	2,253	0.63	C	2,577	0.72	D	3,222	0.9	E
Exit 44 to 45	3600	1,651	0.46	B	1,889	0.52	C	2,363	0.66	C

It should be noted that the traffic levels of service shown in Tables 1-1 and 1-2 reflect the impacts of the traffic demand for that section of roadway only. Traffic congestion can impact downstream roadway segments. For example, 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.

[7] 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.

1.3 Capital and Operating Costs

There are no assumed additional capital or operating costs for the Future No Build Alternative.

1.4 Findings

All the mainline segments of the Maine Turnpike between Exits 44 and 53 under future No Build conditions can be expected to be significantly at or over capacity by Year 2040. By 2025, traffic demands for the majority of the study area corridor would exceed roadway capacity.

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:

1.4.1 Key Benefits

The key benefits of Alternative 1 – Future No Build are the following:

- No new potential wetland impacts; and
- No new impacts to Urban Impaired Streams.

1.4.2 Key Impacts

The key impacts and challenges of Alternative 1 – Future No Build are the following:

- No relief to Maine Turnpike capacity constraint (Year 2040 v/c = 1.37);
- No relief to regional off-turnpike miles near or over capacity (460 miles). As the traffic demand for the Turnpike cannot be accommodated, more traffic is using local roads;
- Potential for lost revenue on Maine Turnpike; and
- Does not address Portland Area Mainline Needs Assessment Study Purpose.