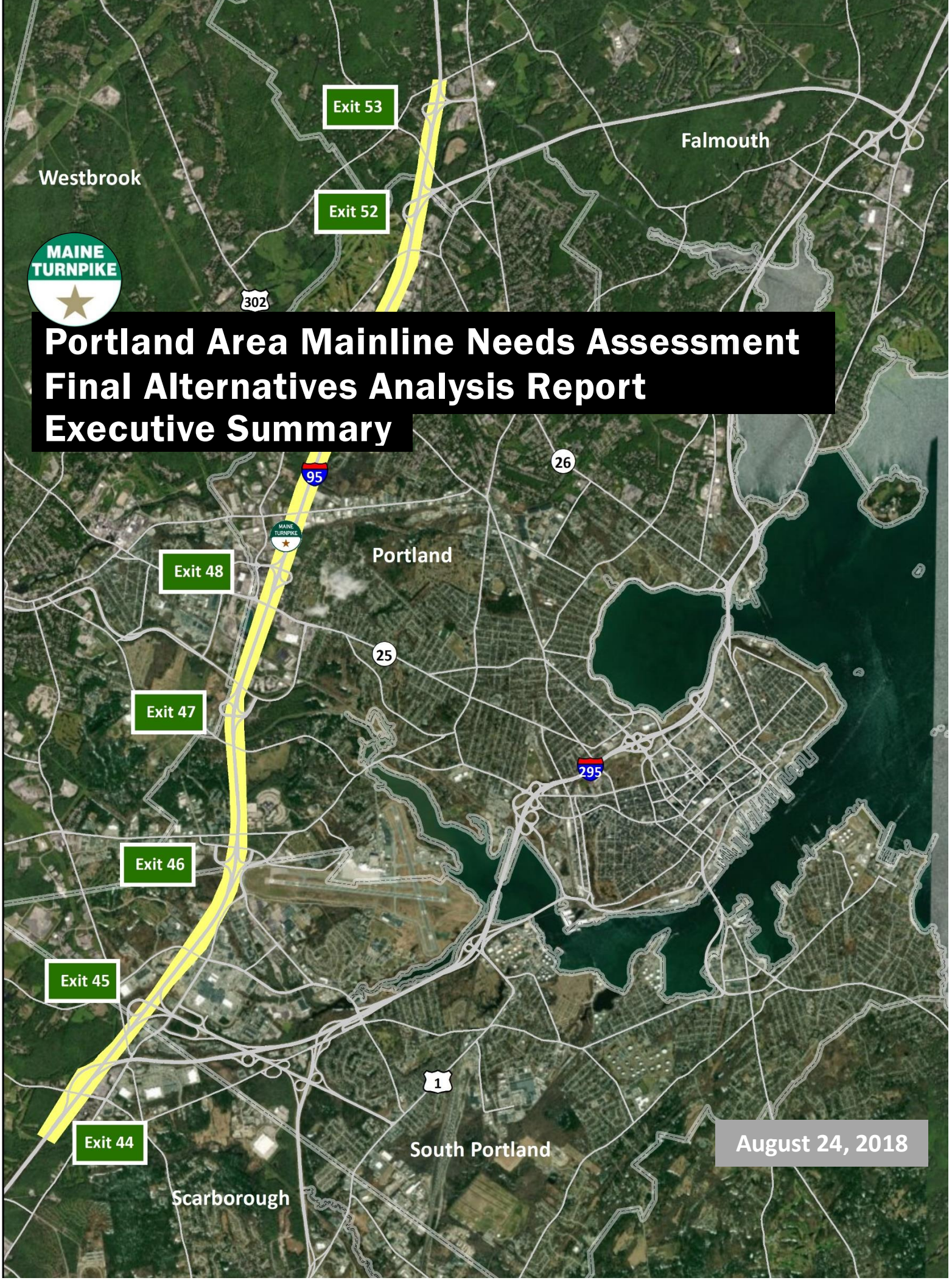

Portland Area Mainline Needs Assessment
Final Alternatives Analysis Report
Executive Summary

August 24, 2018

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EXECUTIVE SUMMARY

1.1 Introduction

The Maine Turnpike mainline through the Greater Portland area is an essential component of the regional and state-wide transportation system. It provides safe and efficient mobility for regional through-traffic, as well as quick and convenient cross-town access to local businesses, municipalities, and other transportation modes.

The primary purpose of the Portland Area Mainline Needs Assessment Study (PAM Study) is to assess safety and mobility deficiencies on the Maine Turnpike between Scarborough and Falmouth, Maine and, as needed, recommend practicable solutions that preserve and improve long-term highway mobility for the region in a manner that is consistent with the Sensible Transportation Policy Act (STPA), enhances the regional transportation system, meets Maine Turnpike Authority (MTA) responsibilities, and reasonable customer expectations. MTA responsibilities include those defined by law and contract, such as the obligation to maintain and improve the Maine Turnpike to meet revenue projections pledged to MTA investors. Maine Turnpike customers reasonably expect that the tolls they pay will be used to provide a safe and reliable travel experience. Chronic congestion is not consistent with these responsibilities and expectations, and the MTA has an obligation to anticipate such conditions and attempt to avoid them with practicable solutions before they occur.

Figure ES-1: PAM Study Area

The Study Area includes the Maine Turnpike corridor from Exit 44 in Scarborough to Exit 53 in West Falmouth. The Maine Turnpike passes through five communities in this corridor – Scarborough, South Portland, Portland, Westbrook, and Falmouth. The Study Area is shown in Figure ES-1: PAM Study Area.

This PAM Study is the mechanism to meet MTA obligations for this section of the Turnpike. The Turnpike is part of a larger system and context, and the future of transportation in this region will be determined by a myriad of factors and efforts including population and economic growth, the price of land, highway capacity decisions, efforts to reduce traffic demand and provide reasonable transportation choices, land use decisions, and efforts to maintain quality of life and the livability of communities. Participants in these

broader efforts necessarily include the public, businesses, transportation and planning agencies, and government officials. Consistent with MTA responsibilities, this PAM Study fits well into this larger context, and focuses on the identified safety and mobility deficiencies, a full range of reasonable alternatives, and the potential for each alternative or combination of selected alternatives to cost-effectively address the study purpose.

The PAM Study follows the direction and requirements identified by STPA and the MTA Enabling Act (see 23 M.R.S.A. §73 and §1965-B). These laws require that the MTA evaluate a full range of reasonable transportation strategies to address the transportation need before adding transportation capacity. To be considered reasonable, strategies need to address the study purpose, be cost effective, and be capable of being implemented within a reasonable time-period. The PAM Study was also designed to be consistent with alternatives analyses required by the Army Corps of Engineers (ACOE) and by the Maine Department of Environmental Protection (MaineDEP).

1.2 Public Outreach Process

Although consideration of the needs of this section of the Maine Turnpike has been occurring for over a decade, the PAM Study began in the spring of 2017. The Study Team aided the MTA in developing an active public outreach process that was an integral part of the assessment. Because the development and analysis of alternatives would include much technical information, the MTA decided to center the public outreach process on a broad-based Public Advisory Committee (PAC). The PAC would guide the range of alternatives to be evaluated and help assess final recommendations. A broader public outreach effort was launched towards the end of the evaluation process to provide the public with a clear set of tools and choices for commentary.

During the course of the PAM Study, five PAC meetings were held. Dates and topics are noted below.

- Meeting #1: June 28, 2017 – Existing conditions, regional transportation and economic systems;
- Meeting #2: October 5, 2017 – Future transportation infrastructure, when it is appropriate to address highway safety and capacity issues, and what an STPA study looks like;
- Meeting #3: January 24, 2018 – Future No Action conditions, Alternatives Pros/Cons;
- Meeting #4: April 25, 2018 – Alternatives Evaluation and Measures of Effectiveness (MOE's); and
- Meeting #5: June 19, 2018 – Induced Demand, Additional Alternatives Evaluated, and PAC Recommendations

PAC meetings were open to the public and time was allotted at each meeting for public comment. The PAC meetings were publicized throughout the study process via traditional media, social media and the MTA website. Press releases were sent to more than 40 regional media outlets two weeks prior to each PAC meeting, and the meeting date was prominently featured on the MTA website.

Additionally, a Public Open House was held on June 7, 2018 at the Maine Mall. This event provided detailed study information and the opportunity to comment.

Also, five municipal select board/city council meetings took place in May and June 2018 for communities in the study area: Portland, South Portland, Westbrook, Scarborough and Falmouth. All were televised via local cable channels. Most were informational only and therefore did not include commentary; those

that did ranged from questions about how this study would affect a potential Gorham spur to concerns about potentials for additional traffic, air pollution, and induced demand.

Finally, the PAM Study is being considered by the Portland Area Comprehensive Transportation System (PACTS), the federally designated Metropolitan Planning Organization (MPO). Public comment is also invited at each monthly meeting of the Maine Turnpike Board of Directors.

1.3 The Challenge: Existing and Future Conditions

Existing Conditions

Understanding the relationship between supply and demand is a fundamental consideration in evaluating how well a transportation facility fulfills its objective to serve the traveling public. For a highway facility, this is accomplished by conducting a level-of-service (LOS) analysis using the traffic engineering procedures outlined in the Highway Capacity Manual[1], which sets forth nationally and regionally accepted guidelines for the evaluation of freeways and other roadways.

Level-of-service describes the operating conditions of the highway using a scale of A-F, with LOS A being a free-flow open condition and LOS F being a heavily congested condition with frequent slowing or stops, representing where vehicular demand exceeds available capacity. The LOS analysis compares "peak" traffic demands with the available highway capacity. AASHTO and MaineDOT roadway guidelines suggest that roadways should be designed to operate at an LOS C or better. In accordance with common engineering practice, the peak demand utilized for this analysis is based on design hour volumes, or typically the 30th highest hour vehicular volumes. When practicable, it is the general policy of the MTA to begin developing solutions before existing conditions reach LOS E to account for the development process and to avoid unacceptable impacts on customers.

The LOS analysis of existing (2016) AM and PM peak hour traffic volumes on the mainline sections of the Maine Turnpike between Exits 44 and 53 are shown in Table ES-1: 2016 AM and PM Existing Traffic Analysis Results.

Table ES-1: 2016 AM and PM Existing Traffic Analysis Results

Location	Northbound PM Design Hour Volume		Southbound AM Design Hour Volume	
	Volume	LOS	Volume	LOS
44 to 45	2402	C	1,651	B
45 to 46	2776	D	2,253	C
46 to 47	3440	E	3194	E
47 to 48	3209	E	2951	D
48 to 52	2901	D	2751	D
52 to 53	2411	C	2436	C

From this analysis using 2016 data, the Study Team found that several sections of the Maine Turnpike already meet or exceed roadway capacity, LOS (D or worse). These sections include the Northbound PM Peak from Exit 45 to 52 and the Southbound AM Peak from Exit 52 to 46.

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

Due to relatively high traffic volumes on the section of the Maine Turnpike between Exits 44 and 53, the annual number of crashes is significant. The annual crash total for this section has been increasing steadily since 2012. From 2012 to 2016, the annual number of crashes increased from a 10-year low of 67 crashes to 84 crashes – a 25% increase in four years. However, according to MaineDOT standards, no locations on the Maine Turnpike mainline in the study area are classified as a High Crash Location (HCL), although there are several HCLs immediately adjacent to the Maine Turnpike in the PAM study area.

Future Conditions

Projecting traffic conditions to a future year is a standard engineering practice to prevent the transportation facility from operating at or over capacity shortly after construction is completed. For roadway design projects in Maine, the typical forecast year is 20 years[2]. In this case, the forecast year of 2040 was selected to be consistent with the regional traffic model used by this study and by PACTS.

The next step to determine future traffic conditions is to establish an expected annual growth rate. Traffic growth on this section of the Maine Turnpike has been among the highest on the entire Turnpike in recent years (2014-2016) – ranging from 4.3 % to 6.2%. However, establishing a growth rate for a long-term forecast such as this requires a broader consideration of several sources of historic data and forecasts. The Study Team considered the following:

- Historic daily traffic growth on the Maine Turnpike between Exits 44-53
- Maine Turnpike Authority (MTA) Safety and Capacity Study[3]
- 2017 Toll Revenue Study[4]
- Dr. Charles Colgan Maine Turnpike Transaction Forecast[5]
- Total Gross Domestic Product for Maine[6]

From these sources, a range of long-term annual growth rates from 1.4% to 2.3% per year were identified. Following review of these sources with the MTA and the PAC, the Study Team found that although higher rates are possible, a growth rate of 1.5% per year was clearly supportable and conservative. This growth rate is consistent with the MTA's Safety and Capacity Study, another long-range transportation planning study, and exceeds the 0% - 0.9% growth rates used by MaineDOT in its analysis of I-295 entitled "I-295 Corridor Update Scarborough to Brunswick" dated June 2018.

Using the 2040 forecast year and the 1.5% annual growth rate, the design hour traffic volumes and the resulting levels-of-service for the northbound and southbound directions of the Maine Turnpike were grown to the levels shown in Table ES-2: 2040 AM and PM Future Traffic Analysis Results.

[2] MaineDOT, *Highway Design Guide* (MaineDOT, February 2015)
[3] Maine Turnpike Authority, *Maine Turnpike Needs Assessment, Safety and Capacity Study* (HNTB Corp., May 2016)
[4] Maine Turnpike Authority, *Maine Turnpike 2017 Toll Revenue Study* (CDM Smith, December 2014)
[5] Charles S. Colgan PhD., 16 February 2015, memorandum, *Turnpike Transaction Forecast*
[6] https://fred.stlouisfed.org/series/MENGSP

Table ES-2: 2040 AM and PM Future Traffic Analysis Results

Location	Northbound PM Design Hour Volume		Southbound AM Design Hour Volume	
	Volume	LOS	Volume	LOS
44 to 45	3,434	E	3,482	E
45 to 46	3,969	F	3,932	F
46 to 47	4,919	F	4,219	F
47 to 48	4,588	F	4,566	F
48 to 52	4,147	F	3,222	E
52 to 53	3,446	E	2,363	C

From this analysis of future conditions, the Study Team finds that virtually all of the Maine Turnpike in the Study Area will be at an unacceptable LOS by 2040. Forecasted volumes are anticipated to be approximately 400 to 1,300 vehicles per hour over capacity. These are not far off, distant concerns. Traffic conditions were also forecasted for 2025, and substantial portions of the Maine Turnpike in the Study Area will be at undesirable and unacceptable LOS, especially in the area of Exits 46 to 48. To the Maine Turnpike traveler, this future will reveal itself in the form of more crashes, chronic congestion, stop and go traffic, queues at ramps, and unreliable travel, which will lead to a desire to look for alternative routes. In summary, this analysis confirms that action is required to keep the Maine Turnpike operating safety and reliably in accordance with MTA responsibilities and reasonable customer expectations.

1.4 Solutions: The Alternatives Evaluation

The Alternatives Evaluation was conducted for the MTA to help identify possible solutions to address the safety and mobility deficiencies previously identified. This evaluation fully complies with Maine's STPA and Maine's Enabling Act by considering a full range of reasonable transportation strategies to address the transportation need before adding transportation capacity. This evaluation was also designed to be consistent with alternative analysis required by the ACOE and by the MaineDEP.

Alternatives analyzed fall into the following categories:

- No Action
- Travel Demand Management (TDM) Alternatives
- Transportation System Management (TSM) Alternatives
- Capacity Alternatives
- Combination Alternatives

The original scope of the PAM Study identified 10 alternatives for evaluation. Through the PAC and public outreach process, an additional nine alternatives were added, for a total of 19 alternatives. The alternatives evaluated are summarized in Table ES-3: Alternatives Evaluated, following.

Table ES-3: Alternatives Evaluated

Alternative Category	Alternative Number	Alternative Name	Alternative Source (Study Scope, PAC, Public)
No Action			
	Alternative 1	No Action	Study Scope
Travel Demand Management (TDM)			
	Alternative 2	Travel Demand Management (TDM)	Study Scope
	Alternative 3	Congestion Pricing	Study Scope
	Alternative 4	Intercity Bus	PAC
	Alternative 5a	Regional Bus	Study Scope
	Alternative 5b	Local Bus	Study Scope
	Alternative 5c	I-95 Corridor Regional Bus	PAC
	Alternative 6a	Commuter Rail	PAC, Public
	Alternative 6b	Local Commuter Rail	PAC
	Alternative 7	Freight Rail	PAC, Public
	Alternative 8	Land Use	Study Scope
Transportation System Management			
	Alternative 9a	Ramp Metering	PAC
	Alternative 9b	HOV/HOT Lanes	PAC
	Alternative 9c	Reversible Lanes	PAC
Capacity			
	Alternative 10	I-295 Widening	Study Scope
	Alternative 11	I-295 Widening with Tolls	Study Scope
	Alternative 12	I-95 Widening	Study Scope
Combined			
	Alternative 13	Alternatives 2, 4, 5a, 5b, and 8	PAC
	Alternative 14	Alternatives 2, 4, 5a, 5b, 8, and 12	PAC

The Study Team also produced working papers analyzing several other topics raised during the Study process including autonomous vehicles, congestion pricing, HOV/HOT lanes, ITS, part-time shoulder use, and induced demand.

Each alternative shown in Table ES-3 above was analyzed for the Year 2040, the future analysis year determined for the PAM Study and compared against the future No Action Alternative.

Alternatives were evaluated using evaluation criteria known as Measures of Effectiveness (MOE's). MOE's are used to compare the performance of the alternatives based on the issues, opportunities, and goals identified in the Study Purpose statement.

Twenty-two MOE's were developed and divided into five groups:

- Transportation Measures
- Environmental Measures
- Cost/Funding Measures
- Implementation Measures

- Summary Measures

Results of the alternatives evaluation are shown in the Evaluation Summary Matrix included as Table 6-13 in this report. The Evaluation Summary Matrix identifies each of the 19 alternatives and provides information under each of the 22 MOE's.

1.5 Study Team Findings

In accordance with the STPA and environmental and planning laws and guidance, the Study Team determined that an alternative was "reasonable" if it meets the study purpose (see second paragraph on page ES-1 above), is cost effective, and is capable of being implemented within a reasonable time period.

Using the extensive analysis documented in this report as summarized in the Evaluation Summary Matrix included as Table 6-13 ("the Matrix"), Table ES-4 below further refines the reasonableness of each alternative studied. The "Meets Study Purpose" column below is derived from Column Y of the Matrix, the "Implementable" column is a combination of Columns N, P, and S of the Matrix, and the "Cost Effective" column reflects whether the alternative had a Benefit / Cost ratio of greater than 1.0 as shown in Column U of the Matrix.

Table ES-4: Evaluation of Reasonableness of Alternatives

Alternative		Meets Study Purpose?	Cost Effective?	Implementable?		Reasonable
				Funding	Implementation Period	
1	Future No Action	No	Yes	Viable	--	No
2	Expanded TDM/Rideshare	Partially	Yes	Viable	<5 year	No
3	Congestion Pricing	Partially	No	Uncertain	Unknown/Long	No
4	New or Improved Interstate Bus	Partially	Yes	Uncertain	< 5 years	No
5a	Improved Regional Bus	Partially	Yes	Uncertain	< 5 years	No
5b	Improved Local Bus	Partially	No	Uncertain	< 5 years	No
5c	New I-95 Corridor Regional Bus	Partially	No	Uncertain	< 5 years	No
6a	New or Improved Commuter Rail	Partially	No	Uncertain	5-10 years	No
6b	New Local Commuter Rail	Partially	No	Uncertain	5-10 years	No
7	New or Improved Freight Rail	Partially	Yes	No	5-10 years	No
8	Land Use Scenario	Partially	Yes	Uncertain	Unknown/Long	No
9a	Ramp Metering	Partially	No	Viable	< 5 years	No
9b	High Occupancy Vehicle (HOV)/High Occupancy Toll (HOT)	Fully	Yes	Viable	Unknown/Long	No
9c	Reversible Lane	Partially	Yes	Viable	<5 years	No
10	Widen I-295 to three lanes in each direction	Partially	No	No	5-10 years	No
11	Widen I-295 to three lanes in each direction	No	No	No	Unknown/Long	No
12	Widen I-95 to three lanes in each direction	Fully	Yes	Viable	<5 years	Yes
13	Alternatives 2, 4, 5a, 5b, and 8	Partially	Yes	Uncertain	Unknown/Long	No
14	Alternatives 2, 4, 5a, 5b, 8 and 12	Fully	Yes	Uncertain	Unknown/Long	No

As can be seen, the Study Team found that Alternative 12 – widening the Portland Area Mainline of the Turnpike to 3 lanes in each direction - is the only alternative that fully meets the Study Purpose, is cost effective, and is readily implementable.

1.6 Study Team Recommendations

Based on the technical analysis and evaluation of existing and future conditions, feedback provided by the Public Advisory Committee and the public, and given the results of the Alternatives Analysis, the Study Team recommends that the MTA proceed as follows.

1. Implement Alternative 12 to Address Safety and Congestion Issues Using a Phased Approach. The Study Team recommends that the MTA implement Alternative 12 to improve safety and reduce congestion by developing a consistent 6-lane highway from Exit 44 to Exit 52 or 53 in a phased approach before levels of service reach unacceptable levels.

   The Study Team recommends that the first phase widen the mainline to three lanes in each direction from Exit 44 in Scarborough to a point just north of Exit 48 in Portland, and should begin as soon as possible. Using the conservative annual growth rate in the Study (1.5%), this first phase needs to be completed prior to 2025.

   The Study Team recommends that the second phase widen the mainline from just north of Exit 48 in Portland to a point near Exit 52 or Exit 53 in West Falmouth before levels of service reach unacceptable levels, to be determined based upon traffic levels and available funding. Using the 1.5% annual growth rate, this second phase should be completed prior to 2030. Actual traffic growth rates could alter the timing of these phases.

2. Turnpike Capacity Preservation Measures. Given the substantial financial investment necessary to widen as recommended above, it is reasonable to preserve this new capacity as long as possible to attempt to slow or avoid the need for a future widening. Accordingly, the Study Team also recommends that the MTA work with partner agencies to prudently pursue the following Turnpike capacity preservation measures that the MTA.

   a. Transportation Demand Management (TDM). Consistent with the STPA goals of managing transportation demand and system efficiency over the long term, the Study Team recommends that the MTA continue to support and potentially enhance TDM efforts. In particular, the MTA is encouraged to build upon its efforts in the areas of:

      - Employer TDM, including GoMaine;
      - Expansion of park & ride facilities;
      - Continued safety enforcement; and
      - Expansion of ITS initiatives.

   b. Transit. The Study Team recommends that the MTA consider partnering with other state and local agencies, municipalities, and other stakeholders to support a coordinated regional approach to bus and rail infrastructure and service which, pending further analysis, could include a new transit service along the Turnpike corridor, identification of smaller transportation hubs for local

or regional buses, perhaps at existing or future MTA park & ride facilities, and assessing the need for additional parking at the Portland Transportation Center.

c. Land Use. The Study Team recommends that the MTA consider prudently supporting local and regional land use initiatives and policies designed to allow robust economic growth in a way that minimizes impacts on highway capacity, the environment and communities. Specifically, the Study Team recommends that the MTA support the efforts of regional planning organizations and the municipalities through which the Turnpike passes between Exits 44 and 53 to develop coordinated and consistent Transit Oriented Development (TOD) plans that promote higher density development in proximity to designated transportation hubs, which may include MTA park and ride facilities.

3. Continue Best Practices to Mitigate Impacts on Protected Resources. Finally, the Study Team recommends that the MTA continue to evaluate its deicing program in an attempt to minimize the impacts that salt and chlorides will place on the watersheds of the four urban impaired streams in the Exit 44 to 53 widening area. The design of the widened highway and vegetation should also consider impacts on protected resources.

Portland Area Mainline Needs Assessment

Alternative Evaluation Matrix: Summary of Measures of Effectiveness (MOEs) compared to Future (2040) No-Build Alternative

7/9/2018

			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
		Category	Transportation Measures								Environmental Measures				Cost/Funding Measures					Implementation Measures			Summary Measures	
	Alt #	Description of Alternative	Safety Benefits on Maine Turnpike	Mainline Turnpike Capacity	Change in Mainline Turnpike Demand	Mainline Turnpike Volume to Capacity Ratio	Regional Off-Turnpike Benefits	Vehicle Miles Traveled (VMT)	Vehicle Hours Traveled (VHT)	Change in Transit Ridership	Regional Air Quality	Change in Regional Impervious Pavement	Change in Regional Impervious Pavement within Urban Impaired Stream Watershed	Potential Wetland Impacts	Initial Capital Cost (2018 Dollars)	Capital Funding Viability	O&M Cost (2018 Dollars)	O&M Funding Viability	Potential Toll Revenue Impacts[8]	Legal/Policy Obstacles	Timeframe to Implement	Likely Implementation Agency	Benefit/Cost	Address Study Purpose
	1	Future No Build (2040 Baseline)	202 crashes (Exits 44-53, 2012-2016)	3600 vehicles per hour by direction currently and in 2040 (LOS F by 2040)	Mainline Peak Demand = 4920 Vehicles[1]	Mainline Peak Demand V/C = 1.37[1]	460 mi (286 mi Near Capacity) (174 mi Over Capacity)	Approximately 930,000 miles[2]	Approximately 23,000 hours[2]	Approximately 1000 Transit Trips[3]	Approximately 138 ppm of NOx and 66 ppm of HC[4]	Approximately 6,000 acres of existing impervious pavement[5]	Approximately 1600 Acres of existing impervious pavement in urban impaired stream watersheds	Yes or No	N/A	N/A	$0.9M	N/A	Change in Future Revenue	N/A	N/A	N/A	N/A	No
TDM Alternatives	2	New/Expanded Transportation Demand Management (TDM) Programs	Safety Improved (-1.0% reduction)	No Change	-52 vehicles (1.1%)	V/C =1.35	No/Limited Change	Reduction (-0.5%)	Reduction (-0.3%)	No/Limited Change	NOx (Reduction -0.5%) HC (Reduction -0.4%)	No/Limited Change (+4)	No/Limited Change (0)	Yes	$5.2M	Yes	$1.35M	Yes	Reduced Revenue	No obstacles	Short implementation period (< 5 yrs)	Maine Turnpike Authority	13.5	Partially - needs additional action to meet Study Purpose
TDM Alternatives	3	Congestion Pricing on Maine Turnpike	Safety Improved (-5.1% reduction)	No Change	-257 vehicles (5.2%)	V/C =1.30	Increases miles near or over capacity (+9.2 mi)	No/Limited Change	Increase (+0.7%)	No/Limited Change	NOx (No/Limited Change) HC (Increase +0.3%)	No/Limited Change (0)	No/Limited Change (0)	No	$2.6M	Yes	$0.05M	Yes	Additional Revenue	Higher obstacles	Unknown or Long Implementation period (> 10 yrs)	Maine Turnpike Authority	-93.46	Partially - needs additional action to meet Study Purpose
TDM Alternatives	4	Public Transportation: New or Improved Interstate Bus Service	No/Limited Safety Improvement Change (-0.8% reduction)	No Change	-40 vehicles (0.8%)	V/C =1.36	No/Limited Change	Reduction (-0.1%)	No/Limited Change	Increases (100 new trips) [10%]	NOx (Reduction -0.1%) HC (Reduction -0.1%)	No/Limited Change (0)	No/Limited Change (0)	Yes	$2.1M $40.7M[6]	Uncertain	$0.75M	Uncertain	Reduced Revenue	No obstacles	Short implementation period (< 5 yrs)	Concord/ Greyhound/ Other Intercity bus provider	5.75	Partially - needs additional action to meet Study Purpose
TDM Alternatives	5a	Public Transportation: New or Improved Regional Bus Service	No/Limited Safety Improvement Change (-0% reduction)	No Change	-1 vehicle (0.1%)	V/C =1.37	No/Limited Change	Reduction (-0.2%)	Reduction (-0.1%)	Increases (90 new trips) [9%]	NOx (Reduction -0.2%) HC (Reduction -0.2%)	No/Limited Change (0)	No/Limited Change (0)	No	$3M	Uncertain	$1.7M	Uncertain	No/ Limited Change	No obstacles	Short implementation period (< 5 yrs)	Regional Bus Provider	4.30	Partially - needs additional action to meet Study Purpose
TDM Alternatives	5b	Public Transportation: New or Improved Local Bus Service	No/Limited Safety Improvement Change (-0.1% reduction)	No Change	-3 vehicles (0.1%)	V/C =1.37	No/Limited Change	No/Limited Change	No/Limited Change	Increases (320 new trips) [32%]	NOx (No/Limited Change) HC (No/Limited Change)	No/Limited Change (0)	No/Limited Change (0)	No	$7M	Uncertain	$2M	Uncertain	Reduced Revenue	No obstacles	Short implementation period (< 5 yrs)	Local Bus Provider	0.26	Partially - needs additional action to meet Study Purpose
TDM Alternatives	5c	Public Transportation: New I-95 Corridor Regional Bus	Safety Improved (-2.1% reduction)	No Change	-108 vehicles (2.2%)	V/C =1.34	No/Limited Change	Reduction (-0.6%)	Reduction (-0.6%)	Increases (430 new trips) [43%]	NOx (Reduction -0.6%) HC (Reduction -0.6%)	No/Limited Change (0)	No/Limited Change (0)	Yes	$22.5M[9]	Uncertain	$6.4M	Uncertain	Reduced Revenue	No obstacles	Short implementation period (< 5 yrs)	Regional Bus Provider	0.56	Partially - needs additional action to meet Study Purpose
TDM Alternatives	6a	Alternative Modes - Expanded Amtrak, New Mountain Division Commuter Rail & New Lewiston Auburn Commuter Rail (See back page for breakdown)	No/Limited Safety Improvement Change (-0.5% reduction)	No Change	-26 vehicles (0.5%)	V/C =1.36	No/Limited Change	Reduction (-0.3%)	Reduction (-0.2%)	Increases (232 new trips) [23%]	NOx (Reduction -0.5%) HC (Reduction -0.4%)	No/Limited Change (0)	No/Limited Change (0)	Yes	$258.8M[7]	Uncertain	$11.9M	Uncertain	Reduced Revenue	Limited Obstacles	Medium implementation period (5 to 10 yrs)	NNEPRA/ Amtrak	0.55	Partially - needs additional action to meet Study Purpose
TDM Alternatives	6b	Alternative Modes - New Commuter Rail Service to Westbrook, West Falmouth & Biddeford (See back page for Breakdown)	Safety Improved (-1.5% reduction)	No Change	-72 vehicles (1.5%)	V/C =1.35	No/Limited Change	Reduction (-0.4%)	Reduction (-0.3%)	Increases (380 new trips) [38%]	NOx (No/Limited Change) HC (Reduction -0.1%)	No/Limited Change (0)	No/Limited Change (0)	Yes	$68.5M	Uncertain	$9.0M	Uncertain	Reduced Revenue	Limited Obstacles	Medium implementation period (5 to 10 yrs)	NNEPRA	0.17	Partially - needs additional action to meet Study Purpose
TDM Alternatives	7	Freight Transportation - New or improved intermodal freight service	No/Limited Safety Improvement Change (-0.1% reduction)	No Change	-7 vehicles (0.2%)	V/C =1.36	No/Limited Change	Reduction (-0.6%)	Reduction (-0.4%)	No/Limited Change	NOx (Reduction -0.6%) HC (Reduction -0.5%)	No/Limited Change (0)	No/Limited Change (0)	Yes	$34.4M	No	$2.9M	No	Reduced Revenue	Limited Obstacles	Medium implementation period (5 to 10 yrs)	MaineDOT	3.88	Partially - needs additional action to meet Study Purpose
TDM Alternatives	8	Land Use Scenario	Safety Improved (-1.8% reduction)	No Change	-92 vehicles (1.9%)	V/C =1.34	Reduces miles near or over capacity (-59.9 mi)	Reduction (-4.1%)	Reduction (-4.4%)	Increases (225 new trips) [23%]	NOx (Reduction -4.1%) HC (Reduction -4.3%)	No/Limited Change (0)	No/Limited Change (0)	No	$2.7M	Uncertain	$0.08M	Uncertain	Reduced Revenue	Limited Obstacles	Unknown or Long Implementation period (> 10 yrs)	Municipalities	1.72	Partially - needs additional action to meet Study Purpose and highly unlikely by 2040
TDM Alternatives	9a	Ramp Metering	Safety Improved (-32.4% reduction)	No Change	-1,327 vehicles (27.0%)	V/C =1.00	Increases miles near or over capacity (+20.0 mi)	No/Limited Change	Increase (+1.0%)	No/Limited Change	NOx (Increase +0.1%) HC (Increase +0.3%)	No/Limited Change (+5)	No/Limited Change (< +1) [< 1.0%]	Yes	$11.6M	Yes	$0.05M	Yes	No/ Limited Change	Limited Obstacles	Short implementation period (< 5 yrs)	Maine Turnpike Authority	0.35	Partially - needs additional action to meet Study Purpose
TDM Alternatives	9b	High-Occupancy Vehicle (HOV)/ High-Occupancy Toll (HOT) Lanes	Safety Improved (-25.9% reduction)	Full Increase in Capacity (5400) [50% increase]	No Change (0%)	HOV/HOT Lane V/C = 0.85 2 Lane V/C= 0.94	Reduces miles near or over capacity (-13.1 mi)	Increase (+0.2%)	Reduction (-0.3%)	No/Limited Change	NOx (Increase +0.3%) HC (No/Limited Change)	No/Limited Change (+38)	Increase (+17) [+1.1%]	Yes	$162M	Yes	$0.7M	Yes	No/ Limited Change	Higher obstacles	Unknown or Long Implementation period (> 10 yrs)	Maine Turnpike Authority	1.24	Fully
TDM Alternatives	9c	Reversible Lane	Safety Improved in peak direction (-25.3% reduction) No improvement in off-peak direction	Directional Increase in Capacity 3600 (Off-Peak Direction) [0%] 5400 (Peak Direction) [50%]	No Change (0%)	2 lane V/C = 1.08 (Off-Peak) Reversible lane V/C = 0.82 (Peak) 2-lane V/C = 0.96 (Peak)	Reduces miles near or over capacity (-6.5 mi)	Increase (+0.2%)	Reduction (-0.3%)	No/Limited Change	NOx (Increase +0.2%) HC (No/Limited Change)	No/Limited Change (+28)	Increase (+9) [< 1.0%]	Yes	$137.3M	Yes	$0.6M	Yes	No/ Limited Change	Limited obstacles	Short implementation period (< 5 yrs)	Maine Turnpike Authority	1.43	Partially - needs additional action to meet Study Purpose. Addresses study purpose in short-term, but will result in undesirable level of service in non-peak direction in 5 to 10 years.
Highway Capacity Alternatives	10	Widen I-295 to three-lanes in each direction	Safety Improved (-4.2% reduction)	No Change	-211 vehicles (4.3%)	V/C =1.31	Reduces miles near or over capacity (-21.8 mi)	Increase (+0.3%)	Reduction (-0.2%)	No/Limited Change	NOx (Increase +0.3%) HC (No/Limited Change)	No/Limited Change (+55)	Increase (+9) [+3.0%] Based on 330 Acres within I-295 watershed	Yes	$265.8M	No	$0.6M	No	Reduced Revenue	Higher obstacles	Medium implementation period (5 to 10 yrs)	MaineDOT	0.43	Partially - needs additional action to meet Study Purpose
Highway Capacity Alternatives	11	Widen I-295 to three-lanes in each direction with tolls	Safety Reduced (6.8% increase)	No Change	+378 vehicles (7.7%)	V/C =1.47	No/Limited Change	Increase (+0.4%)	Increase (+1.9%)	No/Limited Change	NOx (Increase +0.2%) HC (Increase +1.0%)	No/Limited Change (+55)	Increase (+9) [+3.0%] Based on 330 Acres within I-295 watershed	Yes	$271.3M	No	$0.8M	No	Additional Revenue	Higher obstacles	Unknown or Long Implementation period (> 10 yrs)	MaineDOT	-0.66	No
Highway Capacity Alternatives	12	Widen Turnpike to three lanes in each direction from Exit 44 to 53	Safety Improved (-29.3% reduction)	Full Increase in Capacity (5400) [50% increase]	No Change (0%)	V/C =.91	Reduces miles near or over capacity (-13.6 mi)	Increase (+0.2%)	Reduction (-0.3%)	No/Limited Change	NOx (Increase +0.2%) HC (No/Limited Change)	No/Limited Change (+42)	Increase (+17) [+1.1%]	Yes	$158.8M	Yes	$0.5M	Yes	Additional Revenue	Limited obstacles	Short implementation period (< 5 yrs)	Maine Turnpike Authority	2.80	Fully
PAC Requested Combinations	13	TDM, Interstate, Local and Regional Bus, and Land Use (Alternatives 2, 4, 5a, 5b, and 8)	Safety Improved (-2.1% increase)	No Change	-107 vehicles (2.2%)	V/C =1.34	Reduces miles near or over capacity (-60.3 mi)	Reduction (-4.6%)	Reduction (-4.7%)	Increases (416 new trips) [42%]	NOx (Reduction --4.5%) HC (Reduction -4.7%)	No/Limited Change (+4)	No/Limited Change (0)	Yes	$21.1M	Uncertain	$5.88M	Uncertain	Reduced Revenue	Limited Obstacles	Unknown or Long Implementation period (> 10 yrs)	Multiple Entities	3.12	Partially - needs additional action to meet Study Purpose
PAC Requested Combinations	14	TDM, Interstate, Local and Regional Bus, and Land Use with Widened Turnpike from Exit 44 to 53 (Alternatives 2, 4, 5a, 5b, 8, and 12)	Safety Improved (-32% reduction)	Full Increase in Capacity (5400) [50% increase]	-107 vehicles (2.2%)	V/C =.89	Reduces miles near or over capacity (-65.9 mi)	Reduction (-4.0%)	Reduction (-4.7%)	Increases (416 new trips) [42%]	NOx (Reduction -3.9%) HC (Reduction -4.3%)	No/Limited Change (+46)	Increase (+17) [+1.1%]	Yes	$179.9M	Uncertain	$6.38M	Uncertain	Additional Revenue	Limited Obstacles	Unknown or Long Implementation period (> 10 yrs)	Multiple Entities	3.97	Fully

	How Alternative will be Measured	Increase/ decrease in crashes and crash rate based on Highway Safety Manual Methodology	Change in Mainline Turnpike Capacity	Change in Peak Demand on Maine Turnpike between Exits 46 and 47	Resulting Volume/Capacity Ratio on Maine Turnpike between Exits 46 and 47	Number of miles in PACTS region near or over capacity	Change in VMT	Change in VHT	List all applicable social benefits identified	Reduction, No Change, Increase with NOx and HC gradations	Measure of change in impervious pavement compared to regional totals	Measure of change in impervious pavement in urban impaired stream watersheds within I-95 between exits 44-53	Identified for potential wetland impacts due to new infrastructure construction	$ M of 2018 $$	Measure of available funding	$ M of 2018 $$	Measure of available funding	Change in tolling revenue compared to No Build in 2040	Yes, No, with Detail if needed	Short, medium, long term implementation period	Agency/Entity likely responsible for implementation	B/C ratio	Address Study Purpose
	Evaluation Summary by MOE	Anticipated Safety Improvement > 1%	Full Increase in Turnpike Capacity	Reduction in Peak Demand > -1%	Resulting V/C Ratio < 0.8	Reduces miles near or over capacity >-1.0 miles	Reduction in Vehicle Miles Traveled >-0.1%	Reduction in Vehicle Hours Traveled >-0.1%	Increase in Transit Trips > +1%	Reduction in both NOx and HC > -0.1%	Decrease in Impervious Acres >=-1%	Decrease in Impervious Acres >=-1%	No		Funding currently identified or available		Funding currently identified or available	Additional Revenue Anticipated	No obstacles	Short implementation period (< 5 yrs)		B/C > 1.0	Fully Addresses Study Purpose
		No/Limited Safety Improvement Change (-1% to +1%)	No Change in Turnpike Capacity	No/Limited Change in Peak Demand (-1% to +1%)	Resulting V/C Ratio 0.8 to 1.0	No/Limited Change to miles near or over capacity (-1.0 to 1.0 miles)	No/Limited Change to Vehicle Miles Traveled (-0.1% to 0.1%)	No/Limited Change to Vehicle Hours Traveled (-0.1% to 0.1%)	Decrease in Transit Trips (-1% to +1%)	No/Limited Change One or Both NOx and HC (-0.1% to 0.1%)	No/Limited Change (-1% to +1%)	No/Limited Change (-1% to +1%)			No or Limited Funding currently identified		Uncertainty of funding	No/Limited Revenue Change Anticipated	Limited obstacles	Medium implementation period (5 to 10 yrs)		B/C at 1.0	Partially Addresses Study Purpose
		Anticipated Safety Reduction >=1%	Reduction in Turnpike Capacity	Increase in Peak Demand >+1%	Resulting V/C Ratio >1.0	Increases miles near or over capacity >+1.0 miles	Increases in Vehicle Miles Traveled >+0.1%	Increases in Vehicle Hours Traveled >+0.1%	Decrease in Transit Trips >-1%	Increase in both NOx and HC >+0.1%	Increase in Impervious <=1% Acres	Increase in Impervious <=1% Acres	Yes		No Funding currently identified		No Funding currently identified	Reduced Revenue due to capacity constraints	Higher obstacles	Unknown or Long Implementation period (> 10 yrs)		B/C < 1.0	Does Not Address Study Purpose

Footnotes

1 Mainline vehicle demand NB PM Peak between Exits 46 and 47. Range of volumes between exit 44 and 53 both directions (AM and PM) exceeding capacity by 2040 is approximately 400 to 1300 vehicles
2 Vehicle miles traveled & vehicle hours traveled in PACTS region during PM peak hour
3 Change in transit share during the peak hour using PACTS mode share model
4 2040 regional air quality emission levels are approximately 25% of 2015 air quality emission levels
5 Acres of impervious pavement on roadways in PACTS region
6 Assumes capital cost for buses and a new parking lot vs. capital cost for buses and new parking structure at Portland Transportation Center
7 Includes costs for Amtrak Downeaster siding improvements, new service from Portland to Lewiston/Auburn, and new service for Mountain Division
8 Assumes potential revenue change from a constrained Maine Turnpike in Portland region only.
9 Assumes improvements to park and ride lots, all local bus improvements in alternate 5b, and large capacity buses for regional routes.

DRAFT - SUBJECT TO DISCUSSION

Project Website: www.maineturnpike.com/Projects-Planning/Planning-Projects/PAM.aspx

Table 6-1: Evaluation Summary Matrix