



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix A: PAC Meeting Minutes

HNTB Corporation

August 2018

Maine Turnpike Authority
Public Advisory Committee Meeting
Portland Area Mainline Needs Assessment
June 28, 2017
4-7 pm

1. The Public Advisory Committee (PAC) for the Portland Area Mainline (PAM) Needs Assessment was convened for its first meeting at 4:00 P.M. on June 28, 2017, at the Maine Turnpike Authority headquarters located in Portland, Maine.

Committee Members present:

Paul Bradbury, *Chair*, Portland Jetport
Lt. Eric Baker, State Police
Chris Branch, City of Portland
Peter Carney, Long Creek Watershed Management District
Jim Cohen, Portland Regional Chamber
Kristina Egan, GPCOG/PACTS
Nancy Grant, Bicycle Coalition of Maine
Ed Hanscom, MaineDOT
Greg Jordan, Greater Portland Transit
Ann Peoples, City of Westbrook
Nathan Poore, Town of Falmouth
Steve Sawyer, MBTA
Mike Shaw, Town of Scarborough
Kara Wooldrik, Portland Trails

Committee Members Absent:

Josh Benthien, Northland
Mark Dion, Maine State Legislature
John Melrose, NNEPRA
Scott Morelli, City of South Portland
Brian Parke, MMTA

Staff/Consultants present for the Maine Turnpike Authority:

Peter Mills, Executive Director
Bruce Van Note, Director of Policy and Planning
Sara Zografos, Planner
Doug Davidson, Chief Financial Officer
Erin Courtney, Public Relations
Carol Morris, Morris Communications
Paul Godfrey, HNTB
Matthew Pelletier, HNTB
Charles Colgan, Professor Emeritus of Public Policy & Planning, Muskie School, USM

2. **Welcome & Introductions.** Peter Mills welcomed the Public Advisory Committee (PAC) and gave a brief overview of the current state of the highway system in and around Greater Portland. He pointed out that the section of Turnpike under assessment (Exits 44 to 52) is designed to carry regional traffic

passing through the area and around Portland, and that I-295 is designed to take travelers in and out of downtown Portland. He noted that the Turnpike route is the same length and takes approximately the same travel time. He also talked about the other actions taken by the Turnpike to mitigate traffic, including bus routes (ZOOM), contributing to the Wells Transportation Center, running the GoMaine program at an annual cost of \$120,000 and maintaining Park and Ride lots.

3. **Housekeeping.** Carol Morris explained the roles and responsibilities of the PAC, which is to provide educated opinions, ask questions, and represent their constituents throughout this process. The expectation is that PAC members will attend all the meetings (four over the course of the next year) and provide guidance for the Turnpike Authority's decision making.
4. **Schedule and Process.** Paul Godfrey went over the study schedule, process and proposed timing for future PAC meetings. The next scheduled PAC meeting is Tuesday, November 14, 2017, same time and location.
5. **Regional Transportation Systems.** Bruce Van Note provided information on the study's role in context to the regional transportation system. He gave a brief history of the Turnpike, citing that tourism and regional traffic has long been its focus and talked about the need for maintaining highway capacity and the importance of highways in serving regional traffic. Van Note stated the mission of the MTA and noted that MTA customers pay a premium to drive on the Turnpike and they expect and deserve quality. Towards the mission of providing a top quality toll interstate highway experience, the MTA strives to implement solutions to problematic conditions on the Turnpike before they reach a crisis point. He noted that the Turnpike is a limited access highway, meaning that the number of places to enter or exit the road are limited, which allows traffic to sustainably travel at higher speeds more safely than on a road with many smaller intersecting roads and no control of access. Stated more simply using an analogy, a pipe with no holes carries water much better than a pipe with many holes. The same is true for roads and vehicles. While the Turnpike only represents 1% of the state's highway miles, it carries 10% of the state's vehicular traffic, along with 55% of interstate truck traffic. He discussed I-95/I-295 livability implications and that this section of the Turnpike provides access to many of the key economic drivers in Southern Maine. He also referenced the Maine Legislature's recently passed bill authorizing the Turnpike Authority to examine the potential of a Gorham Connector, and noted that this possibility needs to be taken into account when assessing the needs of the Portland Area Mainline section of the Turnpike.
6. **Regional Economic Systems.** Charlie Colgan presented on *Economic Growth and Transportation Choices for Greater Portland*. He began by discussing the population increase in Cumberland County as compared to the rest of the state. Cumberland County's population had grown to 21% of its projected 2010-2040 level by 2016; the rest of Maine's population increased by only 2.3 of its projected level. Cumberland County employment grew to 21% of its projected 2010-2040 employment by 2015. Outside of Cumberland County, Maine's overall employment increased by a bit more - 22.3% - but because job loss was much higher, those counties have a longer road back. Cumberland County accounted for 27% of job losses in the recession, but 45% of the recovery. Cumberland County's role in recovery has been important in leading the state back to recovery, with the health care sector as the largest employer in the state and a primary reason why Portland/Cumberland County has grown faster than the rest of the state. At the end of the recovery, Cumberland County's net job gain will be 350% higher than the State of Maine overall.

Charlie noted that there has been a shift from consumption of goods to services, and online shopping

is more prevalent; which all have a negative effect on retail. However, while this means the purpose of auto trips has changed, the number of trips has not. He explained that, “migration shapes everything,” and reiterated the need for Maine to attract workers of all kinds from outside the state. He noted that land is still cheaper the further out you go from metropolitan areas. He noted that as the baby boomer generation downsizes or dies, there will be a large stock of housing available to people and this surplus could make a big difference in housing patterns. Lastly he discussed mobility as it relates to technology. He believes mobility will remain high because Portland has no appetite for the kind of density needed to make transit a viable option for the majority. He summarized by noting that modest growth is expected on current trends, but faster growth is needed; there will be more dense growth than in the past, but not dense enough to make significant change; and mobility will remain high, but technology will change significantly.

After the presentation, Carol opened the room up for questions from the PAC. A PAC member asked about employment statistics and how are telecommuters accounted for within these? Charlie answered that these statistics are typically categorized by place of business, so telecommuters would be captured. Peter Mills asked about the growth outside of Portland versus growth in Portland itself. Charlie answered that most of the growth will happen outside of Portland. A PAC member asked where would the downsizing senior population live? Colgan answered that most people, when asked, say they want to live at home.

7. Carol called for a 10-minute break in order for attendees to get pizza.

8. **Existing Conditions.** Paul Godfrey provided an overview of the road’s existing conditions. Major takeaways are:

- The road carries between 34,000 to 52,000 vehicles daily on average over the year (this is a two-direction volume). The low number is between Exits 52 and 53, the high number is Exits 46 and 47. Traffic typically peaks around 4 pm.
- Average annual daily traffic dropped during the Recession but for the past three years has been climbing rapidly, in part due to cheap gas. There has been a more than a 13 percent increase since 2013.
- The length of time vehicles are on this section of road (trip length) has been decreasing steadily since 2011. This means people are using the Turnpike to avoid local congestion.
- Levels of service (congestion, ability to move freely) are rated A to F, with F being failing. The Turnpike Authority takes action of some kind when levels of service reach E. Currently there are three locations on the mainline and one ramp location that show level of service E. Seven mainline sections and ten ramps are at level of service D.
- Turnpike crash rates on this section are higher than the southern section of the Turnpike and I-295 north of Portland, but much lower than the section of I-295 that goes through Portland.

9. **Questions from June 28, 2017 PAC meeting**

- In response to Paul’s analysis of traffic volume within the study area, a PAC member asked to see a graph showing the price of gas by year as well. Paul will follow up.
- It was asked what percentage traffic increased from 2016 to 2017. Paul said that the increase from 2016 to 2017 is not much, but explained that in 2007 the MTA started this very same discussion on capacity we are having today, but the recession hit and traffic fell off.

- A PAC member asked how does the road operate? If we are looking only at summer PM traffic on the worst days, how bad is it? Is it just a few days during the summer? Paul answered that generally, these are the same levels we would see on any weekday in July/August.
- In response to the video simulation Paul showed, it was asked what level of service was represented? Paul answered LOS D/E.
- A PAC member commented that he sees LOS F on Western Avenue/Skyway Drive daily. Cars can't get onto the interstate fast enough. He wanted to know if this was modeled? Paul responded that we did not model Western Avenue/Skyway Drive, but did include the intersections on Skyway Drive where they intersect with the Maine Turnpike.
- A PAC member asked about the crash statistics, 60 crashes per 100,000 vehicle miles traveled. How many crashes? What does this mean? She asked if we could share the number of crashes that occurred due to winter storms. This prompted a discussion about fatalities on the Turnpike, with Lt. Baker stating that in 2016 there were six fatalities, actually five fatal accidents as one involved two people. Peter Mills also discussed the need for roadside clearing as it pertains to safety. As part of this discussion, a PAC member asked what is the seasonality of these events? Are 80% happening in the winter? Can you correlate to cause? How much does this play into it? Paul said we are really on the edge of the tipping point in terms of safety. He said once we start seeing these issues at non-peak times, the system is failing. Paul will follow up with more information on the breakdown of the crash statistics.
- A PAC member commented that he was surprised with the Level of Service result. He didn't expect it to be that low.
- Another PAC member commented that he drives it every day and wasn't surprised to see the low Level of Service.
- A PAC member asked what speeds people are currently traveling in this area? She sees it as a good thing that people are driving closer to the speed limit. Paul responded that traffic typically travels above the posted speed limit, which is primarily what we are seeing during non-congested times. When traffic is congested, we are seeing speeds right around the posted speed limit. Another PAC member asked what is the magnitude of this problem? What percentage of daytime hours are we trying to accommodate in the course of a year? Is induced traffic a part of this? For the number of daytime hours' question, Paul responded that we typically look at the 30th highest hour volume when analyzing a roadway. The 30th highest hour volume, also known as the design hour volume (DHV), is the one-hour period in the design year that most appropriately assesses operating conditions. For freeway facilities such as the Maine Turnpike, industry standard suggests using the 30th highest hour volume – meaning just what it indicates, that there are 29 other volumes that are higher during the year. For the induced traffic question, induced traffic occurs when new automobile trips are generated. This can occur when people choose to travel by car instead of public transport, or decide to travel when they otherwise would not have. This is more affected by local land use, but induced travel can be realized if additional roadway capacity is added. This will be more thoroughly discussed at the third PAC meeting when we discuss/evaluate alternatives.
- A PAC member commented on how changes with the Turnpike would impacts I-295, saying from a system perspective, it makes sense for through traffic to use the Turnpike rather than I-295. Peter Mills said he is concerned that the Turnpike is under-utilized. The Turnpike has to divert people onto the Turnpike rather than I-295. Once the construction on Falmouth Spur is

complete, he said the MTA will be promoting using Exit 52 rather than I-295 for northbound through coastal traffic.

- A PAC member asked about the Falmouth spur access, saying there is access on the spur to get on I-295 to go north, but not to the south. He asked if there is any thought for an on/off spur for northbound traffic? Another PAC member noted that when the MaineDOT I-295 corridor study was done in 2010, it evaluated a full service interchange at Exit 11. This is still something to be mindful of.

10. Public Comment:

- A member of the public commended the MTA for robust public process and hopes it will expand its outreach so more members of the public will be present for the next meeting. He stated that adding more lanes doesn't decrease congestion. He wanted to emphasize one piece of STPA (Sensible Transportation Policy Act), that we must assess the full range of reasonable options and must give preference to those others before going to road widening. He also mentioned climate change as an issue and needing to cut greenhouse gases emissions. He ended by saying we should reduce the number of vehicle miles traveled and urged for a strong analysis of TDM.

The meeting ended at 7 pm.

Maine Turnpike Authority
Public Advisory Committee Meeting
Portland Area Mainline Needs Assessment
October 5, 2017

1. The Public Advisory Council (PAC) for the Portland Area Mainline (PAM) Needs Assessment was convened for its second meeting at 4:08 P.M. on October 5, 2017, at the Maine Turnpike Authority headquarters located in Portland, Maine.

Council Members present:

Paul Bradbury, *Chair*, Portland Jetport
Lt. Eric Baker, State Police
Josh Benthien, Northland
Chris Branch, City of Portland
Peter Carney, Long Creek
Jim Cohen, Portland Regional Chamber
Kristina Egan, GPCOG
Ed Hanscom, MaineDOT
Greg Jordan, Greater Portland Transit
John Melrose, NNEPRA
Ann Peoples, City of Westbrook
Nathan Poore, Town of Falmouth
Steve Sawyer, MBTA
Mike Shaw, Town of Scarborough
Kara Wooldrik, Portland Trails

Also Attending: John Duncan, PACTS

Staff/Consultants present for the Maine Turnpike Authority:

Peter Mills, Executive Director
Bruce Van Note, Director of Policy and Planning
Sara Zografos, Planner
Erin Courtney, Public Relations
Carol Morris, Morris Communications
Paul Godfrey, HNTB
Matthew Pelletier, HNTB

2. **Review and revise proposed transportation and land use changes.** Paul Godfrey started the meeting by asking the PAC to discuss what they think reasonable land use and transportation assumptions will be for the future (2040). Focusing on the shortlist of potential projects that was provided, he asked what are plausible reasonable projects

that might come forward that we should consider as part of our future—stating that we aren't concerned with all projects, but only those that will really influence how people will move regionally. The goal is to validate and update the list provided and get feedback so that we can use this list in trying to analyze what the future may hold. Carol Morris asked if 1) there is anything on the list that we have missed that would move the needle? 2) Which of these are likely to happen and would change traffic volumes and how people get around significantly? Using the list provided, Godfrey went item by item to discuss which projects the PAC sees as feasible and reasonable assumptions to include.

- A PAC member asked: are we looking at things that would impact any section of the turnpike or only those that would impact the PAC area? Godfrey responded that we should identify projects that would impact the PACTS region and projects that would impact capacity.
- John Duncan, Executive Director of PACTS, who attended the meeting by invitation to provide clarity on PACTS projects, identified that Exit 32 corridor is unlikely to happen.
- Godfrey asked Peter Mills to give update on the Gorham Spur status and what had recently happened with the Maine Legislature. Mills explained that we needed to know if the MTA was able to even consider building a spur, as he wasn't sure if the authority existed within our enabling act. Mills explained that MTA asked the legislature if congestion in this area was something the MTA should consider addressing. The Legislature's response was to approve MTA's authority and bonding capacity for this potential project.
- A PAC member commented that the extension of METRO should be categorized as Bus Rapid Transit (BRT) expanded service. And we should be thinking about how this changes the landscape for the future if it becomes a full service with all the amenities of light rail. Godfrey commented that this would be important to include, but will need more clarity in terms of when and where it might be implemented by 2040. Morris asked for the projected ridership numbers from Greater Portland METRO.
- A PAC member commented on the I-295 Exit 4 Interchange project listed. Currently travelers taking Exit 4 don't have the ability to get from South Portland to I-295 south. This project would add a ramp to allow for this movement. However, the impact is local in terms of how traffic in South Portland gets to I-295.
- A PAC member commented on the State and High Street Two-Way Conversion project, stating that the City of Portland has no plans to do this.
- A PAC member noted that the Portland HUB Link Bus Circulator is a concept for which there has been a study done, linking the Jetport, the Portland Transportation Center and the Amtrak station.

- A PAC member said that the City of Portland is looking at an autonomous vehicle route in Portland from Portland Transportation Center to the Casco Bay Ferry.
- A PAC member asked about the interchange improvements to Cumberland listed: Does this mean a new interchange? Mills answered that both the town and MTA have agreed that a new interchange for Cumberland is off the table.

After further discussing what PAC members thought was worthy of being on the short list, Godfrey asked if there are any **other transportation or land use changes we should be considering in modeling future conditions out to 2040.**

- A PAC member suggested we add the PACTS short-term regional transit development plan, which will provide a plan to optimize the system from the user perspective. It is a system-wide improvement that will be small, but should be considered.
- A PAC member said Portland would be doing a smart signal corridor on Forest Avenue from I-295 to Woodfords Corner, using smart traffic signal technology to help with traffic flow. This has the ability to give buses priority.
- A PAC member commented that there are issues with I-295 and that it could be helpful to improve the Falmouth intersection at Route 1, 295 and the I-95 spur. Also, promotion of the equidistance in terms of using the spur vs. I-295. The member also stated that the corridor that has the most problems right now is I-295. Bruce Van Note added that a key factor in MaineDOT's ongoing study to address I-295 is the assumption that the MTA will add capacity to the Turnpike in the Portland area.
- A PAC member asked if there would be other improvements to Route 22/114? Mills responded that MTA would likely be obliged to study this as an alternative to a Gorham spur. Godfrey stated that a new road would have a big impact. He said if a spur is built, it would put a significant amount of traffic on the Turnpike. He asked, do we include the spur in the Traffic Demand model? Or not? Do we test both assumptions: One with a new spur and one without a new spur. It was generally agreed by the PAC that both options should be looked at for this study.
- A PAC member asked are we trying to capture housing starts? Should we be trying to measure new housing demand? Godfrey responded that it is reasonable to assume in the future there will be more homes and more development. PACTS is working to figure out to what degree should this occur and where. What is important for this study is *where* the growth is occurring.
- A PAC member brought up the issue of autonomous vehicles – how will this potential change in transportation affect modeling? Paul noted that, to date,

there is no agreement in the industry as to what it will mean in terms of transportation patterns and numbers.

- A PAC member suggested that investments to the Portland Transportation Center should be on the list, as the talk is of a \$40 million investment and affiliated parking garage, which would have an effect on highway demand.

Mills then gave a quick update on the corridor under discussion. In preparation of potential future widening, MTA is preparing to adapt the Cummings Road Bridge. There are three other impediments to adding lanes: Stroudwater Bridge, the railroad bridge and the bridge over Warren Avenue. All of these are in the mid-range planning stages. Another major project is Exit 45 itself, as the interchange is old and in need of replacement.

- A PAC member commented that there is real growth in the region now, not just recovery from the recession, and there were congestion issues with both I-295 and the Turnpike this summer, which affects the Jetport. The Jetport is half as busy in January as it is in August, and the peak airport traffic airport overlays the time period when the Turnpike is at its busiest.

Godfrey then asked the PAC to shift their attention to the land use list. One of the major items on the land use list is the new Dirigo Plaza in Westbrook, now being called “The Ridge”.

- A PAC member said that this project has now been approved and the property sale closed. This is a significant retail development project that will add 1500 peak hour trips and improvements to nine intersections around the area. Two of the intersections are at turnpike exits.
- A PAC member commented that there is development opportunity in Falmouth at the intersection of I-295, the 95 spur and Route 1. If the layout changes and ramps were removed, it would create frontage on Route 1, with open, available acreage. It’s not a matter of if, but when, and certainly within the range of this study’s time frame.
- A PAC member noted that people want more parking and wondered what the study would assume about parking.
- A PAC member commented that the West End in South Portland has done rezoning so as to need less parking.
- It was also noted that West Commercial Street in Portland has received approval to go ahead with the enlarged cold storage unit. Another PAC member commented that this should not affect traffic to a large extent.

3. **What we heard at the first PAC meeting (existing conditions).** Godfrey began by discussing that based on the first meeting, PAC members seemed surprised at the level of service results information on the Turnpike, and didn't necessarily see the slower speeds and traffic as a big issue. He reminded them that some folks mentioned that the Turnpike might be underutilized when compared to I-295, so why are there concerns about potential capacity issues on the Turnpike?
4. **When is it appropriate to address highway capacity and safety issues?** To help answer these questions, Godfrey went through a brief presentation on the MTA's financial obligations and how the MTA differs from the MaineDOT with regards to its funding model.

MTA Financial Obligations and Funding Model

- MTA is funded differently from state DOTs
- Turnpike sells bonds to investors in order to run the Turnpike, and there is the expectation that the Turnpike will maintain their investment (the road). The MTA must maintain the road to meet their responsibilities.
- Having a good bond rating means the MTA can secure good interest rates when borrowing.
- If the MTA does not maintain the road appropriately, it can lose control of the road. Bondholders can step in and MTA's control can cease.
- MTA creates 4-year and 30-year plans to identify future improvements
- MTA understands that users pay a premium to travel the turnpike, and turnpike users expect and deserve a high level of service.
- MTA "flow of funds" provides funding for needed capital improvements
- The MTA has a history of implementing projects in advance.
- MaineDOT funding limited to gas tax, state bonds, and federal support; their funding sufficient for preservation and maintenance only.

Godfrey also talked about the benefits of directing traffic to the Turnpike, noting that the Turnpike is designed to accommodate higher volumes of traffic and it is more appropriate to direct regional and long-distance traffic there as opposed to I-295. This can reduce traffic on I-295 as well as on local roads. There has been an increase in short distance trips between Exits 45 and 53 and much of the growth in the Portland region is because people are using the Turnpike as their local road.

- A PAC member commented that we have never seen traffic like we saw this past summer.
- A PAC member asked if there is any kind of Origin/Destination traffic information. What are these travelers' ultimate origins? Godfrey responded that the latest was from 2010 and that we can share this data.

5. **What does an STPA study look like?** Godfrey explained that this Portland Area Mainline Needs Assessment is being done under the guidelines of what would be consistent with the Sensible Transportation Policy Act (STPA) and the Turnpike's enabling act, as amended.

- STPA is a State of Maine law focused on transportation planning process
- STPA enacted in 1991 as part of a statewide referendum
- Requires that all transportation planning, capital investment, and project decisions must:
 - Minimize effects of transportation projects on public health, air and water quality, land use and other natural resources
 - Evaluate a full range of transportation alternatives; including TSM, TDM, transit, and existing system improvements

Godfrey explained that we would need to evaluate a full range of reasonable alternatives before widening and asked the PAC to consider what these might be for a limited access highway. Godfrey then presented the draft list of alternatives that are currently within the scope of the assessment:

List of Alternatives in Current PAM Study Scope

- No Action (required as a benchmark)
- Congestion Pricing, including tolling alternate routes
- Bus Transit (expanded, new)
- Travel Demand Management (TDM), Transportation System Management (TSM)
- Intelligent Transportation Systems (ITS)
- Enforcement and Incident Management
- Land Use Alternatives
- Widening
- Capacity improvements to local streets
- New local road alignments

Godfrey asked the PAC to consider what are the requirements of a reasonable alternative? He suggested that the alternative must address all or part of the problem, and must be within the control of the MTA, as if it isn't with their control, is it a reasonable alternative to evaluate? He also noted that alternatives couldn't negatively impact the MTA revenue.

- A PAC member commented that although this isn't about I-295, directing traffic to I-95 helps mitigate I-295 issues and asked how does this study play into this? Godfrey responded that there is a fair amount of traffic on I-295 that could be readily shifted to the Turnpike. He also said that I-295 is more congested than the Turnpike, but we need to be mindful of how any changes would affect the Turnpike, as well as every place else.

- A PAC member suggested that Rail be added to the list of alternatives
- A PAC member suggested that inner city bus/carpool be added to the list.
- A PAC member asked why bike/ped isn't on the list. Godfrey responded that bicycles and pedestrians aren't currently allowed on the Turnpike, so should it be considered? Another PAC member said that bike/ped activities, just like land use, need to be considered, but it is not a strategy that the MTA could employ. Godfrey suggested bike/ped should be attached to capacity improvements to local streets. A PAC member responded that lot of the list isn't within the turnpike control. Turnpike can't employ all alternatives listed.
- A PAC member commented that we should figure out what is most rational and the widest ranging action to take, saying it is better to have a wide range of things to look at.
- A PAC member commented that the best alternative may be a combination of alternatives, all things that move the needle cost effectively.
- A PAC member asked if it is okay for us to not be in the mindset of combinations of approaches and with that said, many interchanges are not close to town centers – how do you bridge the transportation gap from interchanges to downtowns if folks are using transit?
- A PAC member commented that a transit improvement isolated to the Turnpike is not going to move the needle; it needs to be more comprehensive.
- A PAC member was concerned about reasonable alternatives needing to have no impact to the MTA revenue, and doesn't want this to be an overarching impediment. The PAC member wondered if that criterion was necessary. Another PAC member suggested that the criterion be changed to "an alternative cannot affect MTA's bond rating.
- A PAC member asked what proportion of traffic on the Turnpike is freight related, saying if trucks themselves become problematic, what should we do? Godfrey responded that we are seeing growth in commercial traffic – the question might be to what degree does it have an economic impact in terms of the importance of the ability to move goods freely?
- A PAC member said we should make sure look closely at the STPA to consider all alternatives even though it may be that we look at all of them and still realize we need to widen.
- A PAC member commented that transit improvements should be reviewed in a tiered basis.

6. Public Comment:

A member of the public stated that it was helpful to discuss the potential conflict between a narrow focus on not affecting revenue vs. not affecting the bondholder. The way this process is done, reasonable people would see this as a thorough process.

A member of the public commented that he agreed the MTA should add bike/ped and rail to list of alternatives. He also commented that STPA requires that we must examine all alternatives and must give preference to other modes before widening.

A member of the public commented that he was confused by comments about the rail to Lewiston/Auburn and asked if folks were aware that a Lewiston/Auburn rail study has been mandated? Godfrey said he was not aware; a PAC member commented that the study is close to being awarded and MaineDOT has funded \$250,000 for the study and tasked NNEPRA with managing the study.

The meeting ended at 6:45 p.m.

Maine Turnpike Authority
Public Advisory Committee Meeting
Portland Area Mainline Needs Assessment
January 24, 2018

1. The Public Advisory Council (PAC) for the Portland Area Mainline (PAM) Needs Assessment was convened for its third meeting at 4:00 P.M. on January 24, 2018, at the Maine Turnpike Authority headquarters located in Portland, Maine.

PAC Members Present: Josh Benthien, Kristina Egan, Mike Shaw, Ed Hanscom, John Melrose, Chris Branch, Paul Bradbury, Nathan Poore, Greg Jordan, Kara Wooldrick, Peter Carney, Eric Baker,

Staff/Consultants present for the Maine Turnpike Authority: Peter Mills, Bruce Van Note, Sara Zografos, Ralph Norwood, Rachel Lambert, Paul Godfrey, Elizabeth Roberts, Ariel Greenlaw, Matthew Pellatier, Carol Morris

Members of the Public Attending: Phelps Turner, Conservation Law Foundation; Alan Reed, Gorham, George Rheault

2. **Review traffic projects through 2040.** Paul Godfrey started the meeting by explaining the purpose of future no build condition as being used as a means of measuring how effective potential alternatives may be. Elizabeth Roberts presented estimated traffic growth rates for 2025 and 2040. Traffic engineers at HNTB determined that an annual growth rate of 1.5% was appropriate and conservative after reviewing historical data and previous studies. The historic Maine Turnpike annual growth from 1996-2016 was 2.3%.
 - A PAC member asked: In past exercises like this, was the growth rate chosen at that time – how did that number compare to the actual 2.3% historic growth rate?
 - Paul Godfrey responded during the previous study in the mid-nineties a 2.75% growth rate was used. It was specific to the southern section of the turnpike.
 - A PAC member asked: Is the 2.3% growth rate stated for the entire turnpike or just the Greater Portland area being considered?
 - Godfrey responded that the 2.3% rate is specifically for the Greater Portland area.
 - A PAC member asked: If growth is heavy on the southern section of the turnpike and starts running into capacity problems and it is determined that that section of the turnpike needs to be expanded to four lanes in each direction, how would that impact the Greater Portland area? Has what's been going on in the southern section been considered in this process?
 - Godfrey responded that every 4-5 years the Turnpike Authority does a safety and capacity study that takes a 20-30 year look at the turnpike and uses it as a basis for understanding when capacity problems may begin to arise. There are sections in the south that may need to be evaluated in the upcoming years. This is not included in current analysis and right now

it is assumed that out to 2040 there are no other major transportation improvements included.

- A PAC member asked: Indirectly I-295 is impacted through this study, what have been the growth rates on I-295 during the same timeframe of 1996-2016 in the Portland area? Does anyone have this information and has it been reviewed?
 - Godfrey responded that DOT has the information, but they have not focused on it for this study. There is information in upcoming slides on what the projected growth on I-295 is going to be in coming years. Another PAC member responded that during the last 20 years in the Portland area has been about a 10% total increase. Godfrey noted that increases vary based on location on I-295, with some locations at 10% and others at 20%, but all are less than Maine Turnpike increases.

Roberts presented Level of Service (LOS) during PM design hour in the northbound direction. LOS is the industry standard that traffic engineers use to measure a roadway's available capacity (number of vehicles that a road can accommodate). This provides a quantitative method of evaluating potential improvement alternatives. LOS is assigned a letter grade from A through F. By 2025, sections of the Turnpike from mile marker 46 to 48 will reach a rating of F, meaning that the section will be operating at a higher demand than there is capacity, creating traffic issues. Sections from mile markers 45-46 and 48-52 received an E rating, meaning these sections will be operating near capacity.

- A PAC member asked: Based on the memo sent ahead of the meeting, this information is based on the 30th busiest hour, so there's thousands of other hours during the year where we're doing better than this to varying degrees?
 - Godfrey explained that the 30th highest hour is the standard for design hour. A graph of traffic volume for every hour would typically flatten out around the 30th hour. So while the 30th hour is a higher hour, the hours below would be similar in volume. The 30th hour used in the analysis is a summer hour; a fall peak hour would only have 3% less traffic.
- A PAC member asked: As the LOS deteriorates does the traffic growth rate change because people will find alternate routes so they don't have to deal with the traffic congestion?
 - Godfrey confirmed that people will find other routes when LOS declines.

Roberts presented information on Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT). By 2040, VHT will grow faster than VMT, meaning that people will be spending more time in their cars to go less distance. Ideally, VHT and VMT would be similar. Greater growth in VHT than VMT indicates more traffic congestion.

- PAC Member: I understand that many people are moving into Portland to be able to walk, use public transportation, etc. That does not match the increased traffic growth projections.
 - Godfrey responded that there are people are moving into urban areas for these reasons, but the greatest growth in residency is still in towns west of Portland.

Godfrey and Roberts presented traffic simulations.

Conclusions:

- The turnpike has sections today that are operating at an undesirable Level of Service (LOS E-F) during design hour.
- As traffic and congestion increases, crashes will also likely increase.
- If growth continues as expected, in the next five years we will see more sections operating at an undesirable LOS, which will cause more breakdowns in operation. To the driver, this will result in increased travel time, difficult maneuverability (lane changes, merges, and diverges), reduced corridor reliability, and a higher number of traffic incidents.

Summary of Alternatives and Pro/Cons Brainstorm

- **Alt#1 Future No Build (baseline comparison for all other alternatives)**

- No comments

- **Alt#2 New/Expanded TDM Programs**

Description: This alternative will evaluate potential benefits from the Park and Ride lots, GoMaine, telecommuting, etc.

- Pros
 - Aligns well with design hourly volumes and peak hour transportation rates previously presented
 - Energy efficient
 - Low cost to implement
 - More environmentally friendly
 - Potential for programs to grow (it is currently underutilized) through organizations working on this goal
 - Technology is advancing
 - Younger generation is more open to idea of shared economy and may be open to these options; Uber and others breaking barrier of riding with those they do not know
- Cons
 - Some people like freedom and independence
 - Less likely to alleviate through-traffic
- Other comments:
 - May not solve problem but could be a component. May be worth looking into creating a regional transportation association toward this end
 - This alternative is under-utilized and under-incentivized

- **Alt#3 Congestion Pricing on the Turnpike**

Description: This alternative will evaluate the implementation of Congestion Pricing on the Maine Turnpike to reduce demand

- Pros
 - Will relieve traffic on Turnpike
 - Low cost to implement
 - Technically feasible to implement
 - Will help push people to alternative forms of transportation
 - Will flatten peak demand
 - Equity for those causing congestion
- Cons
 - Currently against the law
 - Will increase traffic on other arterials and local roads
 - Lower income users may be priced out of mobility
 - Will be VERY unpopular with public
- Additional comments
 - Should be socially equitable, so low income users could still afford

- **Alt#4 New/Improved Intercity Bus Service**

Description: This alternative will evaluate the expansion or enhancement to Intercity Bus Service to the Portland Region.

- Pros
 - This has regional implications
 - Is a relatively low capital cost (would subsidies be welcome?)
 - Established network in place
 - Potential growth through things like a Breez-type service, possibly only during peak hours / airport and other connections
 - Opportunity for Bus Rapid Transit
- Cons
 - Would mostly help only through-traffic - would not alleviate commuter traffic
 - Only cause a small movement of the needle

- **Alt#5 New/Improved Local Bus Service**

Description: This alternative will evaluate expansion or enhancement to Local Bus Service within the Portland Region

- Pros
 - Six-year plan to boost ridership already in the works
 - Opportunities for growth exist either through increased and better commuter times and new routes/stops
- Cons
 - None stated

- **Alt#6 New or Expanded Commuter Rail**

Description: This alternative will evaluate expansion or enhancement to Commuter Rail Service to Portland Region.

- Pros
 - Greater attraction to train than bus for consumers
 - Currently Brunswick line is expanding
 - Portland station is now one of top 10 in New England, more active than Hartford, CT
- Cons
 - High cost to implement
 - Freight rail has priority

- **Alt#7 New or Improved Intermodal Freight Service**

Description: This alternative will evaluate expanded or enhanced intermodal freight rail service.

- Pros
 - None stated
- Cons
 - Would not influence high volume, high speed truck freight
 - Private industry, no leverage

- **Alt#8 Land Use Scenario**

Description: This alternative will evaluate increased bus and transit ridership, reduced trips and trip lengths based on enhanced land use scenarios

- Pros
 - Planning is constantly evolving, this is an opportunity to educate municipalities
- Cons
 - Turnpike Authority has no ability to influence
 - Implemented locally. Would take a long time to implement

- **Alt#9 New/Expanded TSM Programs**

Description: This alternative will evaluate potential benefits from the implementation of new/expanded TSM programs such as ramp metering and enhanced ITS. This also includes evaluation of autonomous vehicles.

- Pros
 - Makes existing system more efficient

- Low cost to implement
- Could work together with ITS technology for improvements on I-295 and other major local connectors
- Cons
 - Lots of unknowns

- **Alt#10 Tolling Strategies**

Description: This alternative will evaluate the impacts/benefits of different tolling strategies, such as tolling I-295 in addition to Maine Turnpike (*current federal law severely restricts tolling of existing interstates and this is not currently being evaluated by MaineDOT or Maine policymakers*), and Regional Tolling, which would involve removing interchange tolls (*potential MTA revenue impacts*).

- Pros
 - Could be used in combination with other systems (like widening) to balance with I-295
- Cons
 - Likely to add traffic to the Turnpike
 - Can't toll the interstate without exceptions

- **Alt#11 Widen Turnpike**

Description: This alternative will evaluate the impact of widening the Maine Turnpike from Exit 44 northward up to Exit 53, as the traffic analysis indicates.

- Pros
 - Consider potential opportunity to add zip lane instead of lanes both Northbound and Southbound
- Cons
 - High initial capital cost
 - More impervious surface

- **Alt#12 Widen Other Roadways**

Description: This alternative will evaluate the impact of widening other existing roadways based on future congestion levels.

- Pros
 - None stated
- Cons
 - I-295 has lots of elevated road – expensive
 - Also lots of ROW concerns for I-295

Public Comments:

- Conservation Law Foundation: Would like to see sensitivity analysis for oil and gas prices. Is Turnpike's revenue allowed to be used for alternatives mentioned? If so, many seem very feasible, but less so without the funding from MTA? Is MTA able and willing to consider this structure change?
 - o Comment from Peter Mills: MTA already funds/partially funds GoMaine and other initiatives. Bondholders have tolerated this, but is also not a blank check. Has to be a project with strong results.
- A member of the public: Would like to see greater public outreach about this project and public hearings. Thinks there's some gaps in alternatives mentioned. Studies show that adding lanes alone will not solve congestion issues. Encourages group to seriously look at other alternatives other than adding lanes. (Note: Peter Mills is drafting a response to CLF's follow up letter, both of which will be available to the PAC shortly.)
- Turnpike Commuter from Gorham: Commutes daily on the turnpike. Would also like more public notice for meeting. Would like to have meetings at times that are more convenient times for public. Very against alternatives that increase tolls. Thinks Amtrak should be a good alternative. Would like to see added bus routes/more frequent routes. Would like electric vehicle charging stations (Mills noted that this is in process). Thinks to reduce traffic and congestion toll booths should be eliminated and gas tax should be increased to compensate.

Maine Turnpike Authority
Public Advisory Committee Meeting #4
Portland Area Mainline Needs Assessment

April 25, 2018

1. The Public Advisory Council (PAC) for the Portland Area Mainline (PAM) Needs Assessment convened for its fourth meeting at 4:06 P.M. on April 25, 2018, at the Maine Turnpike Authority headquarters located in Portland, Maine.

Council Members present:

Paul Bradbury, *Chair*, Portland Jetport
Lt. Eric Baker, State Police
Josh Benthien, Northland
Chris Branch, Portland
Peter Carney, Long Creek
Tim Doyle, MMTA
Kristina Egan, GPCOG/PACTS
Ed Hanscom, MaineDOT
Greg Jordan, Greater Portland Transit
John Melrose, NNEPRA
Ann Peoples, Westbrook
Nathan Poore, Falmouth
Mike Shaw, Scarborough
Kara Wooldrik, Portland Trails

Guest: Herb Thompson, MaineDOT

Staff/Consultants present for the Maine Turnpike Authority:

Peter Mills, Executive Director
Bruce Van Note, Director of Policy and Planning
Erin Courtney, Public Relations
Carol Morris, Morris Communications
Paul Godfrey, HNTB
Elizabeth Roberts, HNTB
Ariel Greenlaw, HNTB
Matthew Pelletier, HNTB
Sarah Maloney, HNTB
Kevin Hooper, Hooper Associates

2. **Welcome and Introductions.**

Morris briefly opened the meeting, discussed some housekeeping items followed by introductions of everyone present.

3. How will a decision be made on which alternatives to move forward?

Morris explained that the MTA will be making its decision based on the analysis and feedback from the PAC and the the public. She provided an update on the outreach process:

- Presenting to local municipalities in May
- Soliciting electronic feedback from public via website/social media
- Hosting a public open house in early June at the Maine Mall

Morris then explained that over the course of this meeting, the PAC should consider the following questions while reviewing each alternative and Measure of Effectiveness (MOEs):

- a) Does this alternative solve the problem?
- b) Does this alternative create other unfixable problems? And,
- c) Can this alternative be implemented?

Morris explained that there would be a lot to absorb today – 22 MOEs and 15 alternatives for a total of 330 data points.

4. Matrix Review

Godfrey explained that the matrix analysis was computed using:

- PACTS travel demand model: gives sense of what happens vehicular and mode share throughout the region
- Where the PACTS travel demand model couldn't be used, industry standard methodology (FHWA, AASHTO, other state DOTs) was used. Tried to use locally based information to the fullest extent possible and incorporated national data where appropriate

No Build:

- Study benchmark

MOE A: Safety Benefits

- Purpose: Look at how the different alternatives could impact safety on the Maine Turnpike in our study area using Highway Safety Manual methodology with Crash Modification factors
- Seven alternatives have a safety benefit

MOE B: Mainline Turnpike Capacity

- Purpose: This MOE measures any change in capacity on the Turnpike
- Increased capacity: HOV/HOT, widen the Turnpike
- Reversible Lane only adds capacity in one direction

MOE C: Change in Turnpike Demand

- To simplify, picked the busiest section of the Maine Turnpike between Exits 46

and 47; by the year 2040 this section of highway if allowed to grow unconstrained would be roughly 1300 vehicles over capacity; this won't happen if capacity is constrained in some way

- Section of Turnpike is between 400 and 1300 vehicles over capacity along the entire length (different at different locations)
- Found five alternatives that show a decent amount of reduction in overall demand, the TDM (1%), Congestion Pricing (5%), Land Use (2%), Ramp Metering (27%), Widen I-295 (4.2%)
- A PAC member asked: Ramp metering – where do those vehicles go? Godfrey answered that we designed ramp metering (a traffic light on the on ramp that meters the amount of traffic that can enter) so that it would take the necessary vehicles off the road. Those vehicles will take another route – potentially creating a problem somewhere else in the transportation system.
- A PAC member asked: How does ramp metering affect conditions on Skyway Drive and Western Avenue? Godfrey responded: They are more congested.

MOE D: Turnpike Volume to Capacity Ratio

- Because many alternatives do not reduce the volume on the turnpike by a significant degree, there is little impact
- A PAC member asked: What amount of vehicle or demand reduction is needed to get the v/c ratio to 1.0? Godfrey answered: 1300 an hour for this busiest stretch.
- A PAC member asked: Is the 400-1300 range based on 30th highest hour? Godfrey: Yes

MOE E: Regional Off-Turnpike Benefits

- Answers the question: Does the Alternative affect capacity off Turnpike?
- There are 18 communities in the PACTs model, which was used to calibrate this MOE
- By the year 2040, under the No Build scenario, there are 460 miles forecasted to be at or over capacity (in relation to the 3200 miles that exist, roughly 15%)
- A PAC member asked: Are those 460 miles arterials, major and minor collectors? Godfrey answered that that is correct.

MOE F: Vehicle Miles Traveled

- This MOE measures the number of vehicle miles traveled based on the PACTS model, which includes 18 communities and 3200 miles of roadway
- There are six alternatives that have a benefit in VMT: Most significantly land use (because of the denser, more walkable village-type layout of residences and retail/commercial), with the remaining having a moderate reduction
- All alternatives that increase capacity tend to increase VMT because people will drive further to get to a route that is faster

MOE G: Vehicle Hours Traveled

- This alternative measures how long people would be sitting in their cars during the

peak hour

- We are looking for anything we can to reduce the number of vehicle hours traveled, this measure relates to reduction of emissions and means people are in their vehicles less
- Nine alternatives that have a reduction in VHT – shining star is again the land use; other alternatives have moderate reduction in VHT
- Several alternatives increase VHT: ramp metering, congestion pricing, and widening I-295 with tolls. This is because when people divert elsewhere, it results in a longer time in the car.

MOE H: Change in Transit Ridership

- This shows a regional benefit, more opportunity for less congestion
- Five alternatives have a notable increase in transit ridership – the biggest is local bus service – decreasing headways, use of Bus Rapid Transit – roughly a 30% increase as compared to existing
- Other alternatives increase 10-20% percent
- A PAC member asked: On the transit alternatives, were those air quality impacts just on the Turnpike or the whole region? Godfrey: The impacts were to the entire PACTS region. One of the things to note is that the local bus alternative has no real change in VMT/VHT because BRT gives buses a priority – the down side is that those driving the same route as the buses are getting held up and causing more emissions.
- A PAC member asked: Congestion pricing resulted in no change in transit ridership? Godfrey: Because there was no change included in the transit network in this alternative, there are no new additional users. It assumed that people would just find an alternate route. PAC member responded: Should this be modeled differently? Godfrey said they would look at this.

MOE I: Regional Air Quality

- The tool called the EPA Motor Emissions Vehicle Software tells us quantity of pollutants that occur for each alternative that are emitted into the atmosphere
- Six alternatives have a reduction in both NoX and Hydrocarbons (TDM, interstate, regional bus, commuter rail, freight, and land use
- Six alternatives had no or limited change
- Two alternatives increased both – widen I-295 with tolls and ramp metering (pushing people to go longer and further
- A PAC member asked: Is the future electrification of vehicles going to be taken into account? Godfrey: Our 2040 air quality estimates are roughly 25% of what the current pollutants are anticipated to be today. This is taking into consideration electric and more fuel efficient vehicles. This number is based on a November 2017 projection from the EPA.
- A PAC member asked: In alternatives where the highway is widened, congestion is

relieved but this takes the cork off repressed demand for vehicles that are now going to take more trips; we see a slight increase in VMT on widening the Turnpike but no change in NoX. How do increased trips get calculated in that? Godfrey: Our model does not include additional trips for induced demand. With regards to air quality, stop and go has a worse impact than going at higher speeds. Because we are increasing speeds there is a slight benefit to air quality without the stop and go. The PACTS model does not account for this because it would not produce a balanced alternatives comparison. The PAC member asked: Is there a way to include induced demand in the analysis, as it is a more accurate predictor of what will happen to VMT and NoX? Godfrey asked Kevin Hooper to expand on this. Hooper: We are assuming in the PACTS model that the number of trips made by people are going to be the same for each alternative, trips being generated by houses, business, etc. Each of the alternatives does have an effect on the modes that are taken, such as shift from transit to carpool. This is different from induced demand. Induced travel would assume that with no congestion, making driving easier, there would be more trips generated. That is hard to accurately account for. In land use, trip patterns change dramatically because everything is condensed – number of trips and mode splits do change. The PAC member responded: Including induced demand was done during a previous train study the PAC member was involved with, so she will follow up with Godfrey on that.

- A PAC member asked: None of the alternatives looked at a transit improvement along I-95? Godfrey: Correct, there was no alternative that evaluated, or that has been recommended to be evaluated, anything along this corridor for a regional bus. The PAC member responded: This should be looked at, so will follow up after the meeting.

MOE J: Change in Regional Impervious Pavement

- Currently there are 6,000 acres of impervious pavement in the entire region
- We identified that six alternatives have an increase in impervious pavement – but all six are less than 1%
- A PAC member asked: Does this analysis just look at net increase or does it look at best practices for pavement? Godfrey: It is a simple measure and only looks at increases in impervious pavement.

MOE K: Urban Impaired Stream Impacts

- There are four urban impaired streams in our corridor
- Any potential increases in this area have environmental implications if not addressed
- There are a handful of alternatives where the amount increased: the three widening alternatives and HOV/HOT (where additional pavement is added for additional lanes)
- A PAC member commented: One of the biggest problems in Long Creek is chlorides; Best Management Practices s don't treat chlorides – only way to address them is

reduce their use. Metals can be mitigated but chlorides are most problematic, as there is a significant cost associated. The numbers in the stream are some of the highest in the state. Godfrey: Do low salt areas help address that? The PAC member responded: They are mostly dealing with private property, driven by expectations, not much interest on private side to reduce salt use because people want clear parking lot and sidewalks. Land owners in this area are paying \$1.5M per year into this area (MTA included) to help mitigate impacts.

MOE L: Potential Wetland Impacts

- Caveat: Study team looked at this MOE as a litmus test, as in building new infrastructure there is potential for impacts
- Ten have this potential for impacts, which can be mitigated
- A PAC member asked: Do the capital costs include mitigation? Godfrey: No, the level of costs are unknown value at this point.

MOE M: Initial Capital Costs

- Even though these alternatives would be implemented over a long period of time, used 2018 dollars to do apples-to-apples comparison
- Included construction costs only, no engineering, mitigation, etc.
- We didn't rank these as this the cost is not necessarily a factor based on the funding stream. These are provided for information only
- A PAC member commented: \$235M on rail for capital costs includes new service in Lewiston/Auburn and for the Mountain Division. He noted that these need to be broken out because the cost for mainline rail portion is negligible. Godfrey responded: Correct. Some are more likely than others, so we will break them out.

MOE N: Capital Funding Viability

- There are a handful of alternatives that could be funded by the Turnpike Authority
- Those that are yellow consistent to alternatives in play today (bus, rail, TDM)
- Due to the magnitude of funding and lack of identified capital, several are shown as "no" or red.
- A PAC member asked: on the freight rail, wouldn't funding be "uncertain" because it is private. As opposed to "no"? Godfrey responded: Yes, because its private it doesn't have as much traction as others and could have been put in that category. Van Note asked: Where are people funding rail privately? It requires subsidies typically. The PAC member responded: It depends on the region and the market, but yes, typically it does.

MOE O: Operations and Maintenance Cost

- Typically each alternative has a cost to keep it going every year

- These costs are represented in 2018 dollars
- These were not ranked because the amount is not the more important issue, it's how likely the funding source could be

MOE P: Capital Funding Viability

- These rankings are generally the same as in the Operations and Maintenance Cost MOE

MOE Q: Potential Toll Revenue Impacts

- Reducing volume of traffic on Turnpike reduces revenue from tolls
- Three alternatives will likely generate revenue
- Turnpike widening increases revenue because it increases the number of vehicles that can use the road safely and comfortably
- Four alternatives have no change
- Seven could negatively impact toll revenue

MOE R: Legal/Policy Obstacles

- This is a subjective alternative, but the study team wanted to find a way to acknowledge legal constraints, general consensus. Funding was kept out of this mix.
- There are no obstacles to TDM and enhancements of the bus system
- Six alternatives have limited obstacles: Rail, Land Use, Widening the Turnpike,
- A PAC member commented: Labeling Land Use as "limited" is being optimistic (hard to get communities on board)
- A PAC member commented: Land use is extremely difficult. Planning is an evolutionary, long term process.
 - A PAC member commented: We should be optimistic about land use because a lot of regions are making lots of progress on this and there is no reason smart growth can't happen, While it may be a lofty goal, it might be more achievable than we are giving it credit for.
 - A PAM member commented: I think the goal was to outline concrete obstacles. Godfrey: We wanted to at least acknowledge that at times there is some level of resistance that exists, and this is why this MOE is so subjective.

MOE S: Timeframe to implement

- Purpose: Generally what would be the timeframe to implement these alternatives?
- A handful could be implemented in the next five years
- Some that would take longer: commuter rail (L/A, Mountain Division), freight rail, widen I-295
- Congestion pricing, land use, HOV/HOT, Widening with tolls would all take longer
- A PAC member commented: Why HOV/HOT in longer than 10 years? Godfrey: Because there is a law in place that would not allow it so it would take time to

get legislation approved, etc.

MOE T: Likely Implementation Agency

- Six would fall under the Turnpike umbrella

MOE U: Benefit/Cost

- This is a traditional method of analysis
- The process is to monetize the benefits and then compare them to the cost
- Improve safety, reduce travel time and more are considered monetizable benefits
- Generally looking for alternatives with a number of 1.0 or greater
- Shining star here is TDM – for every \$1 you put in you get \$15 back
- A PAC member asked: Benefit/Cost does not include engineering, wetland mitigation, or right of way? Godfrey: We did not include those. Generally magnitude of engineering is 10% of project cost, the rest can be nothing to sizable. Generally, my opinion would be if you have a Benefit/Cost of 1.5 or 2.0 you are in a solid place even with these other costs not included.

MOE V: Address Study Purpose

- How does this alternative tie back to the study purpose? Focus on safety and mobility as well as benefits to the regional transportation system
- Two fully addressed: HOV/HOT and Widen Turnpike
- Many partially, they would need help to meet the study purpose
- Widening I-295 with tolls did not meet the study purpose at all

5. Discussion

Q. Was there anything in the anything in the analysis that surprised you?

- A PAC member asked: Can you reduce pricing at the Spur during commuter hours to encourage people to use I-95? That would also help alleviate the I-295 issue. Godfrey: right now there is a Turnpike discount program that does that. To what degree would this solve other problems?
- A PAC member stated: This region has high expectations for how much traffic they should incur to get to destination. Feels widening is a quicker and better answer but wants to make sure that we get the most bang for our buck for the region.
- A PAC Member stated: With congestion pricing, hard to believe people would avoid Turnpike. Godfrey: At a 50% increase in tolls during the peak period, the effect on reducing demand was 'small'.
- A PAC member stated: Anything that might push traffic onto a local road and off Turnpike is a concern. Like any issue we face today, there are short-term, medium and long term goals. Short term is widen road, long term is land use. As for more public transportation – this is a training thing. Takes time to train people. Again, any additional traffic off turnpike onto local roads not an option.

- A PAC member asked: Why is benefit/cost only 2.0 for Land Use? Land use has the largest regional benefit and a low cost. Godfrey responded: Safety benefits are related to Turnpike, and I-295 only..
- A PAC member stated: The regional bus service option is missing a major element: a route along turnpike corridor (similar to Breeze and Zoom – along a corridor). This is a big omission as it is currently. Peter Mills asked: Why doesn't that happen now? The PAC member responded: Money.
- Peter Mills commented on Working Paper #1 – Autonomous Vehicles: This has a highly unpredictable impact in the next 20 years; additional people using the road that weren't before make it a net zero. A PAC member responded: it's all about how we shape the market. Another said that the effects are unknowable right now.
- Herb Thomson, MaineDOT, commented: The central importance of capital funding viability seems to be a huge question over everything else. He then asked what was the thinking behind the no on I-295 widening options? Morris answered: It was a combination of lack of funding and public perception. He also asked: Land Use – should that even be an alternative? It's not either/or, and the same with transit alternatives. We should just be doing these.
- A PAC member commented: Wetlands issues are scary because it is not quantifiable; land use just takes so much longer – talking 30-40 years from when the plan is in place. In combination, he thinks regional transit, land use and widening I-95 are a good solution.
- A PAC member stated: Agrees with what Thompson said, not and either/or. From the trucking industry standpoint, it's safety first and then efficiency, practicality and achievability; widening jumps to the top. In an ideal world I-295 should be widened too, congestion pricing is scary, ramp metering decreases safety and increases wear and tear on the vehicles, He pointed out that their members (MMTA), i.e., trucks, move 80% of freight that gets to homes in Maine
- A PAC member stated: Something we have talked limitedly about is where millennials are going, they are more likely to walk, ride their bike, etc. They want to live in Portland. Many people on peninsula don't own a car. Thompson responded that there is research that conflicts with this though, that when you get have family you often want to be in the big house – when those millennials start building families that trend might change.
- A PAC member commented: From a public safety standpoint, there is currently an issue with the Turnpike. That congestion we are seeing now causes time delays to respond to crashes, causes secondary crashes, troopers can't through and traffic is backing up onto ramp and mainline – especially at Exit 46. There is better response and safety with wider road. It gives the public

room to get by, in this particular stretch there is no place for cars to go around so it's a matter of safety for the general public and its dangerous for the troopers.

- A PAC member commented: Globally, we are talking about transportation. I-95 is a key corridor. The Jetport is a gateway to national and international travel – especially during the summer. It is important what these core roads do for our economy – for short and long haul and connectivity. There's no panacea, but these are key corridors in combo with bus, rail, etc., its critical to keep them flowing. Not just the Turnpike. If the bus is stopped because they can't get through, even the alternative can't happen. Also, glad to see that didn't see the ramp metering come out in green, that would be an alternative that just dumps all the traffic onto other roads. Is there a possibility of putting safety of the region beyond the Turnpike? NOTE: Currently being evaluated. .
- A PAC member asked: What is the process from here? Are we are going to cull out L/A and Mountain Division from Alternative #6? Those are remote possibilities – but mixed in is the easiest low-hanging fruit, which is the rail mainline. Can we look at mainline rail from Exit 53 to Commercial Street rather than the way it is set up now? Commuter rail system moves faster than the bus. Currently, it obscures a more productive discussion by including Lewiston/Auburn and the Mountain Line.
- A PAC member commented: This project is triggering a lot of thinking about what needs to happen in the region. From living in other places, clear there are lessons to be learned from Bay Area and Boston -- that it's difficult to build your way out of congestion. Concerned about highway alternatives that don't take into account the induced demand that would occur over time. The Turnpike has specific goals but we should try to include investments around public transportation in the long term. One outcome to a commitment towards lane use should be to add public transportation to complement anything we do on the road side.
- A PAC member commented: Widening the Turnpike will be a perpetual cycle – we will be back here in 20 years. Looking at the alternatives, putting the TSMs and TDMs together to offset the potential widening seems like a viable alternative.
- A PAC member commented: The build out option is less and less desirable and we can address the communities end goals through different combinations, but it ends up being a community effort. Hopes that at the end of the process, others can commit to some options that the MTA might not be advancing.
- A PAC member commented: The role of I-295 is going to be long distance access to Portland and South Portland, particularly east of Allen and Stevens Ave. The Turnpike is going to be the through-corridor. We ought to look hard at the benefit/cost options that are high in this and small in scope. There are reasonable projects that can contribute to the overall benefit that is achieved in the region. Should think about HOV as a way of developing synergy for developing better public transportation.
- A PAC member asked: Is there a way to model a sequencing of things to look at these in conjunction? Godfrey responded: Yes, if we get a sense of where people's fingers are pointing, we could look at what a combination of things might present, both short and long term.
- A PAC member commented: Is there a way to show a stepped or tiered alternative that combines some of these alternatives and their interaction effects? Lastly, don't discount ramp metering – some places might be okay. All over the place in Arizona – they flowed really well. Wouldn't take

an arterial to go around as long as there was flow.

- A PAC member commented: Ramp metering would go over like a lead balloon in Maine. And cars are idling. It is not efficient.
- A PAC member commented: As long as people are moving they are happy
- A PAC member commented: When thinking safety, think of the health of travelers. The best thing to do is get people out of cars; not convinced increasing speeds increases safety.
- A PAC member asked: Are HOV and Widening the same linear cost in capitalization? Godfrey responded: Yes, the HOV/HOT alternative builds another lane in each direction. Generally the overall utilization of just HOV lane is low and other two lanes will still be over capacity. Mills commented: You need the third lane either way. The PAC member asked: Could Widening today be HOV/HOT in the future? Godfrey responded: Yes.
- A PAC member asked: Are there more accidents in this area? Could you do a Reversible Lane in these areas and phase them in? Where are the safety issues? Could some pieces of work fix a great deal of the safety as well? Godfrey responded: Exit 44 to Exit 48 is the stretch that needs this the most.
- A PAC member asked: For the Reversible Lane, is the traffic in Portland directional? Godfrey responded: Generally it is directional – the exception is Exits 44-47 in the south, there is a heavy dual direction peak. The challenge is building more pavement in each direction
- A PAC member commented: Wants to see minimization for impacts on local roads. This is a top priority. Wants to look at a group of options, not just one – zero in on a variety of options that work together to solve the problem. Also, we don't know what is going to happen in 20 years.
- A PAC member commented: Agree that we can't build our way out of a congestion problem, but a three-lane highway is not overly excessive. Our tolerance for waiting here is minimal. In the long-term, need education and outreach to help set the expectations of the motoring public.
- A PAC member commented: In terms of Right of Way (ROW) widening the Turnpike and I-295 can be done within available ROW. For rail, would there be any? What other costs? Godfrey responded: We can bump up engineering costs. For permitting, we can't tell what wetlands would cost without a detailed evaluation – maybe identify a rule of thumb. The PAC member responded, at a minimum, note that those aren't accounted for in the calculation.

6. Review of follow up items to provide to PAC

Morris and Godfrey reviewed the items that they understood from discussion needed additional information. These were:

- Induced demand effects
- Regional I-95 bus route with stops/connections to downtown
- Break out commuter rail into separate pieces
- Combine alternatives
- Phase short, medium and long term alternatives
- Add transit enhancements to congestion pricing
- Synergy of HOV and rapid bus
- Adapt cost/benefit ratio to beyond turnpike
- Enhance reduced price congestion pricing for Spur

7. Public Comment:

One member of the public spoke:

1. Thanks to Paul and the team for the analysis – while they don't agree with everything, they appreciate getting them in advance of the meeting
2. Encouraged to hear discussion of combining alternatives; none of which did enough to achieve the v/c to alleviate the congestion. Suggests modeling some of the aggregate impacts on v/c ratio for non-widening alternatives
3. Induced demand issue that he raised and June 2017 and January 2018 PAC meeting needs to be part of the modeling. At a minimum, alternatives 10, 11, and 12 should be reassessed. Modeling is not accurate without induced demand.
4. Some alternatives that are reasonable under STPA haven't been identified or assessed here. Should present this to the group and assess these:
 - a. Eliminate the Turnpike volume discount program because this incentivizes more driving (Two PAC members noted that this would put more traffic on local roads.)
 - b. Shoulder travel at certain times of the day should be looked at, as this is a strategy employed elsewhere
 - c. TSM strategy should include driver info systems, CMS, VDS and variable speed control –
 - d. The last alternative that could be considered would be overall increased tolls – not just congestion pricing

8. Closing:

Morris thanked everyone for the good discussion. The meeting was adjourned at 7 pm.

Maine Turnpike Authority
Public Advisory Committee Meeting for the
Portland Area Mainline Needs Assessment

June 19, 2018

1. The Public Advisory Committee (PAC) for the Portland Area Mainline (PAM) Needs Assessment convened its fifth meeting at 4:07 P.M. on June 19, 2018, at the Maine Turnpike Authority headquarters located in Portland, Maine. Notice of the meeting was published on the MTA website, in newspapers, and sent to MTA email lists, and was reported in multiple news stories in the Portland Press Herald and on local TV.

Council Members present:

Paul Bradbury, *Chair*, Portland Jetport
Lt. Eric Baker, State Police
Josh Benthien, Northland
Chris Branch, Portland
Peter Carney, Long Creek
Kristina Egan, GPCOG/PACTS
Ed Hanscom, MaineDOT
Greg Jordan, Greater Portland Transit
John Melrose, NNEPRA
Brian Parke, MMTA
Ann Peoples, Westbrook
Nathan Poore, Falmouth
Mike Shaw, Scarborough
Steve Sawyer, MBTA

Herb Thompson, MaineDOT

Staff/Consultants present for the Maine Turnpike Authority:

Peter Mills, Executive Director
Bruce Van Note, Director of Policy and Planning
Erin Courtney, Public Relations
Carol Morris, Morris Communications
Paul Godfrey, HNTB
Elizabeth Roberts, HNTB
Ariel Greenlaw, HNTB
Matthew Pelletier, HNTB
Sarah Maloney, HNTB
Kevin Hooper, Transportation Consultant
Charles Colgan, Professor Emeritus of Public Policy & Planning, Muskie School, USM

2. **Welcome and Introductions.** Van Note briefly opened the meeting by thanking the PAC members for their dedication to this process followed by introductions of everyone present. He stated that while this is the last formal PAC meeting, there will be more opportunities to weigh in.

Morris then laid out the agenda for the meeting:

- Start with questions from the last meeting

- Presentation on Induced Demand by Charlie Colgan
- Review of the four new alternatives suggested by the PAC
- Discussion and Public Comment

3. Questions from last meeting. Godfrey began by addressing the 15 questions/requests/comments raised at the last PAC meeting:

1. Would Congestion Pricing Add Transit Ridership: The original analysis didn't allow the model to be dynamic. Re-ran congestion pricing and capacity alternatives with a dynamic model – changes to results were very small – ended up with 1-3 trips shifting between vehicle and transit, even with enhanced transit. Because of congestion pricing, shifts are not occurring to transit but to other roads
2. Can we test a transit alternative along I-95 corridor?
 - a. Yes – now known as Alternative 5c
 - b. Will cover this later
3. Can the impacts of chlorides be lessened on Long Creek Watershed?
 - a. Turnpike passes through four urban impaired watersheds
 - b. Study team met with MTA to learn how authority applies salt, best practices and looked more broadly at what other agencies do
 - c. Turnpike's best practices consistent and similar with other agencies
 - d. But there is opportunity for authority to do something above and beyond what they are doing – plants exist that can pull salt out of the soil.
 - e. Worked with Peter Carney on this and created a white paper explaining details. It will be available on the website.
4. Can we include additional capital costs – wetland mitigation, engineering, ROW in the cost and cost benefit estimates?
 - a. We went back and included these
 - b. Those costs are now higher
 - c. This plays out in the benefit cost ratios (slightly lower benefit/cost ratios)
5. Can we break out rail alternative MOEs into smaller more specific routes?
 - a. Original alternative included improvements to Amtrak system, rail to L/A, and rail on the Mountain Division line
 - b. We don't have B/C results tonight but can give high level results:
 - c. 6A: Improvements to Amtrak line had the best value;
 - i. Mountain Division has the most potential for ridership but it has the highest cost because there isn't currently rail infrastructure in that area
 - ii. 6B – local rail – will cover later in meeting
6. Can we move freight rail funding to Uncertain instead of No?
 - a. Originally categorized as No, indicating no viable funding source
 - b. If the PAC has strong feelings to uncertain instead of no we can do that – PAC did not indicate a strong response, so rail stays at No
7. Can we expand safety benefit to entire region, not just Maine Turnpike?
 - a. Originally, we only applied safety criteria to Maine Turnpike or I-295
 - b. We have followed up and created a module that helps us do this, based on Vehicle Miles Traveled (VMT). Generally speaking, as traffic volumes increase or decrease, so do the number of crashes. Our module allows us to forecast any change in the number of crashes - and the resulting safety benefit - based on the volume increase or decrease..
 - c. Benefit/costs have been updated to include safety region-wide
 - d. We are still including Crash Modification Factors (CMF) for I-295 and 95 when adding additional capacity

- e. No significant change to safety benefit results for each alternative because most alternatives already have reduced VMT (except for capacity alternatives) and the related volume change reductions are similar. Capacity alternatives benefit from improved CMF due to additional lanes
8. Can we analyze a combination alternative?
- a. Yes – done. We'll present two this evening, one that includes the widening alternative and one without it. Carol reached out to hear what your top five alternatives were – these combined alternatives are the result of your responses
9. Can we phase in any alternatives?
- a. Yes – any recommended alternative that comes out of this process needs further evaluation as to the detailed methodology and how it will be phased (based on cost, construction impacts, funding challenges, etc.)
 - b. A PAC member asked – if there is a combo of alternatives that emerges, is it possible to phase them in over time – some can be done more quickly (park and ride for instance, but some may require design/analysis/partnerships). Answer is yes.
10. Can we look at an alternative that combines High Occupancy Vehicle (HOV) and Bus?
- a. Yes – everyone received a copy of the new HOV/HOT (High Occupancy Toll) white paper
 - b. Based on Turnpike data, during peak travel times, if you make a lane for vehicles with two people+, you will actually just create a de facto third lane; it's only when you get to three or more people in a vehicle do you identify a capacity advantage for the HOV lane.
 - c. From these findings we don't recommend that HOV be implemented now, but it can happen in the future as needed
 - d. A PAC member asked: Do the results in Alternative 9b take into account the 3-person scenario; the answer is no – alternative evaluation did not change
 - e. A PAC member asked: is the white paper on this WP #3? Answer: It is not a different document – it is just additional research added into the existing paper at the end.
11. Would like to see an alternative that eliminates the MTA toll discount program and what the effects would be?
- a. Evaluated a 50% surcharge in the congestion pricing alternative and that didn't move enough traffic away from the Turnpike to fix the capacity problem. Traffic that did move had a negative effect on local and rural roads that are not designed to handle high volumes of traffic. The results of this alternative are reasonably representative to the results we saw when we removed the discount.
 - b. MTA discount program is very popular with the public. Any change in this program and toll setting in general is a policy decision statutorily allocated to the MTA Board.
12. Can we look at using the shoulder for travel?
- a. We created a part-time shoulder use paper
 - b. There are states and agencies that use the shoulder for travel occasionally or all the time
 - c. The intent is to do this on a temporary basis
 - d. FHWA provides a guideline on when it is appropriate to use shoulders for additional travel
 - e. Basic conclusions:
 - i. There are volumes when you can see a benefit in safety – there are volumes where you see a worsening – the volumes in this region fit into the category of seeing a decrease in safety;
 - ii. Closely spaced interchanges are bad as it creates an increase in junction crashes
 - iii. Potential emergency response issues; emergency vehicles then cannot use the shoulder to go around vehicles and get by
 - iv. A shoulder lane creates less capacity than adding an additional lane, as there is only 60-70% capacity in the shoulder lane
 - v. Key reason for those implementing shoulder use: limited rights of way and limited funding. Those constraints don't exist here.
 - vi. Shoulder use may require Maine statutory or rule changes.

- f. A PAC member asked: What is the threshold? Answer: Existing shoulder not wide enough – would need to reconstruct the shoulder and make it wider to use it
 - g. A PAC member asked: Did you run a cost? Answer: No. But we can run a cost for that and share it in Draft Report, clarifying that widening would still be the more effective approach.
13. Can we look at enhanced driver information systems?
- a. We have many (closed circuit TV, etc.). Could the authority do something that would help improve traffic flow through the region?
 - b. Looked at what's being done currently and what we could do
 - c. Findings:
 - i. MTA is doing high level system management measures (VMS, HAR)
 - ii. Upgrading is in process – adding travel time/distance signs with route choice
 - iii. There are enhancements above and beyond that, including fiber optic lines for communication and upgrading outdated technology and software to existing driver information systems.
 - iv. State Troop G dedicated already solely to the Turnpike
 - v. Incident Response by State Farm already in place
 - vi. Authority is evaluating and updating the TSM system on ongoing basis
 - d. A PAC member asked – is there an app out there that can help you determine when to leave? A PAC member responded, yes, Waze and Google Maps – and they are free. Godfrey will get more details from Greg Stone at MTA on partnerships that are currently happening and update the white paper.
 - e. A PAC member asked – how can we get traffic off I-295 and onto the Turnpike – can we work with Waze to get their help with that? Answer: Yes, strategy is in the works; Van Note – MTA will be beginning an ad campaign to tell people it's the same distance in July. Similar to above, Godfrey will get more details on Waze and Google Map partnerships and update white paper.
 - f. At City of Portland workshop – discussion on moving away from I-295 being the preferred route from regional traffic, and instead getting people to use the Turnpike - possibly calling I-295 by another name or number or something like that to differentiate what people perceive is the way to go
14. Can we look at managing the problem by increasing tolls?
- a. We did look at reasonable congestion pricing, and it did not move enough traffic. If you quadruple the toll you could move the needle BUT if you do this traffic will move onto local roads or to I-295 where you don't want it. Because of what we see in the worsening of traffic on local roadways, we don't see that as a viable alternative
 - b. A PAC member questioned the order of magnitude on the regional off-turnpike disbenefit – 9.2 miles more near or over capacity out of a 460 mile network – what does that really mean? Answer: that is the amount of traffic that goes off the Turnpike with 50% surcharge. If you increase the toll more it's going to have an effect (peak hour); The PAC member responded: is that 3-4% increase a useful metric for evaluating? Which 9.2 roads is it? Answer: It will be roadways adjacent to the highway, and that 9.2 miles of over capacity roadways still doesn't solve the problem.
 - c. A PAC Member asked: B/C is -93.46 – why is that so severe compared to everything else? Answer: The disbenefits significantly outweigh others, it has a safety disbenefit, air quality disbenefit; it's the regional disbenefits that really drive this; disbenefit is the same things as a cost
 - d. Also, this would upset toll payers; toll rates are a sensitive topic (as you can imagine). Again, toll setting is a policy decision statutorily allocated to the MTA Board.
 - e. A PAC member asked if the Turnpike widening would be an increased cost to the Turnpike; what would the toll cost increase be? Answer: there's no increase in tolls anticipated – funded is already secured ; Van Note stated that the current 30-year plan does not call for a toll increase until 2031
15. Does the model account for Induced Demand?
- a. Great segue into Charlie's discussion of Induced Demand

- 4. Induced Demand Presentation by Charles Colgan.** Charlie introduced himself and stated he has not reviewed any of the other issues surrounding this analysis, and has no opinions one way or the other on the widening or any other alternative being evaluated. He started his presentation with the question: does the phenomenon of induced demand mean that the widening of the Turnpike in this stretch would have a very short shelf life? Would widening not solve congestion problems for long because traffic would fill in because of induced demand?
- Definition of Induced Demand: Induced demand is simply if congestion or other factors are causing people to not use the road or to use it at overcapacity, the cost of travel on that road goes up (increased time translating to increased cost); if congestion is alleviated the cost of travel goes down and demand goes up; this is a straightforward theory of demand.
 - About 25 years ago Anthony Downs wrote a book “Stuck in Traffic”; the seminal work on this question of induced demand; why in some areas has all the construction not resulted in any reduction in travel time, etc.? This is called triple convergence: the three reasons why more vehicles move to or return to a newly built or expanded roadway:
 - o People whose previous travel has moved to another route due to congestion – and now that the road is uncongested they switch back
 - o People who have switched their time of travel (traveled earlier or later)
 - o People who switch their mode of travel (to train or bus or whatever is available and go back to using the highway once it is uncongested)
 - These all converge onto the new or wider highway.
 - This phenomenon is widely observable around the country
 - o Example: San Jose, California. Two ways to get to San Jose: Take Highway 101 and go up the East or West Bay
 - o Before Charlie moved there they doubled the lane capacity because the congestion was so bad (south of San Francisco Bay feeding into Silicon Valley). It was completed four years ago
 - Congestion on the road is better than it used to be but not much
 - Must leave at 6am to avoid congestion in AM and after 7 pm in the PM – there is strong induced demand because people shifted time of travel, not route, because there are just two routes to take
 - Induced demand DOES shorten the life of highway expansion
 - It is a problem in metropolitan and fast growing areas
 - It is a problem that very few places have done much to solve because economic growth simply overwhelms the transportation system – the result being continuously spreading urban areas as people commute further and further to get to work. People commute over an hour and a half because that’s what they can afford to purchase in terms of housing.
 - Will induced demand be a problem if the Maine Turnpike is widened in this section?
 - o Based on Tony Downs’ triple convergence theory:
 - Route change – was accounted for in the PACTs model
 - Mode change – was accounted for in the PACTs model
 - Time of travel – are people shifting times today? Is the congestion likely to be enough to cause a shift in the time of travel?
 - In 1996 when Colgan did the pilot study on congestion pricing here in Maine, he proposed looking at a modest increase on the toll on Friday and Sunday on five summer weekends. The response from the tourist industry said no one will care – but also indicated that it would hurt the tourist industry
 - The result of that effort was to pass state legislation banning congestion pricing
 - An experiment was eventually run where you can travel for free and this experiment concluded that even traveling for free did not move enough traffic to make a difference in the weekend problem – the reason being was that because there was no

peak travel time – congestion began around 2:30 pm until about 7:30 at night. It was a 4 to 5-hour plateau (not a peak).

- People had already moved their time of travel as much as they could
- Paul showed Charlie the traffic numbers now on the Turnpike – there is currently a classic peak because the congestion hasn't gotten to the point where people shift their time
- This means the third source of triple convergence, the only one not modeled, won't have a large effect
- Eventually, the highway becoming congested again. The question is not whether it will eventually happen but will it happen soon enough within the investment horizon to make the project uneconomical. The answer is no.
 - When that time comes in 3-4 decades, we will also be dealing with a very different transportation system in which intelligent automobiles and highways will be able to manage traffic in ways we do not currently have. We are at the leading edge of a revolution in technology.
- Conclusion: induced demand will not be a major constraint on this roadway; there will be induced demand in the future but we'll have other tools by then. Induced demand is NOT likely to limit the benefits of the roadway enough to flip the B/C ration
- A PAC member asked about triple convergence, as embedded in this discussion, the traffic is happening elsewhere; are there other sources of induced demand aside from those three? Another PAC member added would induced demand come from new person trips -- latent demand – trips that aren't happening today but begin to happen because of the new capacity and travel, etc.? Colgan responded this is possible, but transportation is a derived not a primary demand – you don't go out on the road for the fun of it, you go on the road because you need to get from A to B for a reason; transportation is derived from other factors that create the demand for the trip. The general assumption is that you will go from A to B as needed, perhaps with adjustments such as Sat/Sun instead on Monday – different route, different mode, etc.
 - Theoretically possible that a reduction in the cost of travel could induce some demand for example from out of state visitors
 - Look at Cape Cod, there are two choke points – and there are people who won't visit because of that traffic, who won't buy a summer house there.
 - While that could happen here, is that a large enough pool to impact? The answer is no, probably not.
- A PAC member asked: what is the correlation between additional lane miles and vehicle miles traveled? Colgan responded:
 - In the long run there is a close relationship - increased lane miles are associated with increased trips
 - In the short run when you look at operations relative to the rest of the transportation system operating at that time, the correlation largely deals with economic factors
 - When forecasting for the Turnpike, the best long-term demand explanation is economic growth in Maine; the thing that determines short-term demand in the summer is primarily the economy and the weather
 - Reference in *Press Herald* article – his argument is in the long run, roads attract capacity and always fill up. The problem economists have not been able to answer is: do roads lead to people or do people lead to roads?
 - Generally believed that population and economy drive long-term demand for road infrastructure
- A PAC member commented that the Interstate highway system north of Bangor was built at an uncongested time and that hasn't generated demand.
- A PAC member commented that there is a reason you can drive 75 mph up north – you can build it and that doesn't mean it is going to reach capacity.

- A PAC member had a question around the I-295 shift that shows that I-295 is more congested than the Turnpike right now – if we can find more ways to divert traffic – not sure PACTs model adequately shows it, what would the impact then be on shortening the time frame of the benefit of the expansion?
 - o Mode and route shifts are modeled in the model
 - o What wasn't modeled is the shifting of time
 - o I-295 is an interesting question – not because it affects the widening here but because in the future, I-295's ability to be widened is extremely limited so the widening of the Turnpike is the last capacity expansion that can be done on the interstate system passing through the Portland metro area.
 - o The way in which that would have to be managed in the future is likely with dynamic pricing – where I-295 and 95 are dynamically priced and pricing is set as traffic flows on both roads in real time. (in California this is seen – a new interstate was built that is tolled and the old highway is free. Dynamic signage provides time and distance for each – what you will save in time if you pay the toll price. The price changes every 10 minutes so they can manage the two highways. This has only been in existence now for a few years so a full evaluation hasn't been done. But it is great because it tells the drivers the price so they can choose whether to pay it or not
- A PAC member commented that that is relying on the Turnpike to help solve the I-295 problem and asked if I-295 is more susceptible to induced demand. Colgan responded yes.
 - o I-295 is more pricing friendly than 95 is
 - o Appropriately charging for the marginal road space is the answer
 - o The Turnpike's commuter discount is an average pricing mechanism – if you travel frequently your average contribution to the cost of maintaining the road goes down; you should be paying for marginal cost for space on the road like the airlines do (airlines know how to induce demand and use dynamic pricing; different is that the planes are a perishable product unlike the Turnpike
 - o Congestion pricing simply will not work on the Turnpike alone – needs to be ON BOTH ROADS
- A PAC member commented: coming northbound you could price the interconnect price, but southbound if you are on I-295 it is free until you pay to get on the Turnpike.
- Godfrey said one of the things they looked at is how could you manage I-295 vs. the Turnpike – what if you widen the Turnpike? There is strong potential to shift a notable amount of traffic – take 600 to 700 vehicles off of I-295 and onto the Turnpike if you were able to dynamically price them both. The hurdle is Federal Highway doesn't allow that except under the pilot program, which may not allow this – so a big challenge to get there.
- A PAC member commented that CT and OR have pushed for this but Maine has not pushed hard. CA can do that because they pay for the roads 100% with no federal funding
- A PAC member commented that in ten years there could be a real shift in how we are delivering transportation services. VMT pricing is increasing – there will be even more of a decline in gas tax because of electric vehicles. Doesn't think there is a 40-year horizon before we are talking about paying for our roads in a real way. Colgan responded: if the widening is justified now, the next generation dealing with this will do so in a much different way. The PAC member responded that between pricing solutions and autonomous vehicle technology, there will be ways of expanding highway capacity without widening.
- A PAC member commented that if I-295 was privatized this whole issue would go away. Mills said Turnpike would have to buy I-295 and pay off the federal lien on it, with a needed bill coming through Congress to make this possible.
- A PAC member commented that there is a bill in front of Congress to toll interstates. Godfrey said federal law sections (IceT and T21) would allow you toll an interstate, and the money that is collected has to go back into specifically identified capital improvements – diverting the money to somewhere else is an unknown possibility at this time. He said CT wants to toll interstates and state roads and this could have political challenges. Colgan said that in Texas there are hundreds of miles of highway with tolls, but they have room that CT doesn't.
- A PAC member asked: So the PACTs model was capable of modeling induced demand, however there was no large effect on the alternative? Answer: Correct, the volumes that we talk about in 2040 we assume that traffic can grow unconstrained.

- A PAC member asked with regards to no land use changes between 44 and 48 - how does the PACTs model evaluate land use changes that occur from enhanced capacity? Colgan said the long range forecast shows some reconcentration from people leaving the peninsula – some of that has been accounted for if Colgan’s earlier driver numbers are still being used. Land use around the interchanges is planned by the communities, for example Falmouth has tried to spur development at Exit 53, some of which was successful until the recession came along. It is possible that the highway would support a long-range plan of adding housing and commercial development along or near the highway. It is likely that an uncongested highway would support more growth than a congested one. Some places favor the additional foot traffic from congestion, some don’t. The general rule about the relationship between growth and transportation costs is that land costs dominate everything – they are so much more important for both residences and businesses.
- The PAC member responded that the white paper underestimates the effect that induced demand has; travel time does play a big factor in where people relocate. Colgan responded that in general, commercial growth including light industry spreads out into an arc running from Biddeford/Saco through Falmouth and maybe even Freeport – the arc does influence and is a long-term pattern of growth in the region – development occurs closer to the suburbs and farther out because people need land. The one question he would have about land use and the highway is the question of how the highway influences further development on the periphery of Greater Portland. This has not been examined. If the highway becomes congested, that could be a disincentive for some types of development - or an uncongested highway could be easier for commercial development in the outskirts. It comes back to local land use plans and municipal plans – if there is a clash there between what these communities want to do, this needs to be talked about – if there is a consistency there that should also be noted as well.

5. Presentation of New Alternatives. Godfrey explained that based on the requests from the PAC, the study team analyzed four new alternatives:

Alt 5c: I-95 Regional Bus Route – Greenlaw explained there would be two routes:

- a northerly route (starting in Biddeford/Saco and working its way up to Exits 46, 47 & 48) and a southerly route (starting in Gray going to Portland).
- Evaluated using 15 min headways, and running it all day
- There was a sizeable reduction of vehicles on the turnpike.
- Approximately 108 vehicles would shift and a 43% increase in ridership in the area.
- One negative is that it still does not move the needle enough. Turnpike would still have overcapacity issues.
- A PAC member said he would like the opportunity to work on refining the alternative because he feels some things have been overestimated. Thinks capital and operating costs are overestimated and driving down benefit/cost ratio. Godfrey responded that they should sit down to discuss.
- A PAC member asked if headways increase, does it reduce ridership? Greenlaw explained that if the buses come frequently enough, it does not impact ridership.
- A PAC member asked for a review of components that go into the benefit/cost ratio. Greenlaw stated that safety, transit ridership and travel time savings for VMT, VHT were the major components.
- A PAC member asked how long it would take from Biddeford/Saco to get to Exit 48? Another PAC member responded that it would take approximately 30 to 40 minutes. The Study Team checked the analysis and determined that from Biddeford to Exit 48 (stopping at Saco, Exit 45, 46, 47, and 48) would take approximate 40 to 50 minutes.

Alt 6b: Rail – breakout of three local commuter routes:

- The three routes are West Falmouth using Exit 53, Westbrook area using Mountain Division, and another using Biddeford/Saco through existing Amtrak rail
- Biggest number of riders were through the Westbrook line (77 riders during peak hour)
- Indicated a 30 % increase in transit ridership, but volume capacity was still not enough to move the needle on Turnpike capacity.

- Godfrey said one of the things they will be following up with is the benefit/cost for each of the three routes. He said that Westbrook to the Portland Transportation Center had real benefits and there is an opportunity in this region for its transit potential. He noted if riders could be delivered closer to Portland's downtown, the route would likely perform even better, with additional transit ridership. While it might not fix the issue for the Turnpike, we shouldn't lose sight of how this could benefit the region.
- A PAC member commented that the new retail development coming into Westbrook has discussed wanting rail to be accessible from that location and this is a change from what we heard about six months ago.

Alt 13: Combined Alternative – TDM, interstate bus, regional bus, local bus & land use

- Godfrey explained that the results of combining these alternatives are not cumulative
- The result is about 60% of the former total when added up because within these modes, there is competition. For example, TDM competes with local and regional bus.
- A PAC member said: Anecdotally disagree – commuting to Boston from Maine—thinks people will use the route more with more choices, because someone has the opportunity to go when you want and come back when you want. Godfrey responded: if you add up each of the individual parts, there is the potential for 180 trips removed from the Turnpike, and the combined number was roughly 107 – about 60%. The PAC member responded that it should be greater than 100% as the combined total should be greater than the sum of its parts, not lower. Godfrey indicated that a discussion with the PAC member on this topic would be worthwhile.
- Godfrey said this alternative has a strong benefit/cost and regionally it is excellent, but again it doesn't move enough vehicles as it relates back to the Turnpike.
- A PAC member commented that he agreed with the other PAC member who said the interaction effect should not be in competition. Godfrey said he is happy to share the results from other studies and details that help make sense of this.
- A PAC member asked why we had not run 5c in the combined model rather than 5a. Godfrey explained that we had not had results on 5c at the time; that we could swap this out to see the effects and based on what he knows it would look good regionally but not solve the turnpike issue. The PAC member asked if the alternative could be re-run with 5c.
- Van Note agreed that could be done.

Alt 14: Combined Alternative with Widening I-95

- Godfrey explained that this includes the same alternatives as previous but with widening of the Turnpike. Again, the results are not cumulative.
- From a regional and turnpike perspective it has a strong benefit/cost ratio. Addresses study purpose.
- A PAC member commented: That the turnpike widening itself had a benefit/cost of 2.8 and the combined has a benefit/cost of almost 4. Seems that there is some synergy happening here. Godfrey responded that overall regional benefits help when you combine these from a regional perspective.

6. Public Outreach and comments available. Morris handed out packets that provided information on the public outreach efforts. She said that because we were running short on time she would not explain extensively but told members what was in it:

- Quantitative summary of comments that were received from social media & MTA website
- Media purchase
- List of media coverage received
- Verbatim comments received from all monitored outlets
- Letters received

7. Next Steps. Godfrey stated we have evaluated 19 alternatives and 8 white papers to date and next steps are:

- HNTB provides draft recommendation in mid-July

- HNTB presents to Turnpike Authority July 26. The meeting is open to the public and brief comments can be offered to the board;
- Any additional public comments must be received by the Turnpike Authority by August 17
- HNTB to finalize report and the Turnpike Board will vote in September
- Partnership opportunities to be discussed with MTA staff this summer

8. Comments from the PAC.

- A PAC member commented that with Alternative 14, you have a roadmap. If widening happens first because it is under the Turnpike's control and then other things are phased in – then you can add congestion pricing if need be (phased). It would be helpful to show phasing of the steps to show this can be a 50-year solution.
- A PAC member commented that no one item is going to get us where we want to be from traffic/congestion standpoint. There is a short-term piece, medium-term and long-term piece. Widening the turnpike is a short-term solution and a reasonable solution. Alternative transportation should always be explored; land use is an incredibly heavy lift, we have tried this many times and regional planning is difficult, not something one community can handle on their own. In Scarborough alone – cluster neighborhoods more in vogue now but reality is most people want a few acres if they can afford it and it takes a lot to change that thought process.
- A PAC member commented: from the commercial vehicle industry's perspective, there is a need for additional capacity and MMTA supports additional capacity.
- A PAC member commented: hypothetically if you widen, when could construction be expected to be completed (44-53 no phasing)? Godfrey explained it would be close to four years: 12-18 months for permitting, design would go in parallel, bridge construction one year; mainline construction one to one-and-a-half years.
- A PAC member asked can you get all those bridges done in one year? Godfrey said maybe. Last time widening was purposely done more slowly but you can do a lot of things in a short period of time.
- A PAC member said it is extremely hard to offer definitive support or don't support – gut is saying a widening is eventually going to be necessary but having a hard time thinking the need is that urgent – and maybe there is time to try out some of these alternatives. Looking at the whole big picture, where does the Gorham east/west spur come into play? If robust transit is coming, could Gorham east/west high frequency transit system be a better option? Sprawl effect is insignificant from widening of turnpike, but could be more so for Gorham. Really leaning towards slow it down – but eventually necessary
- A PAC member commented that if you have been on I-295 in the last year or 18 months, that is downright dangerous because of congestion and the only practical safety valve we have is to widen 95. Sooner than later we are going to need to figure out what to do about I-295.
- A PAC member commented: First, appreciate all the work that has been done. It has been an outstanding process and managed really well and the level of data analysis has been excellent. Would like to echo the other PAC member's concept of sequenced approach; while preparing for time frame of widening, try to implement some of these other measures.
- A PAC member commented: agrees with sequenced approach as well. Thinks 5c is better to include than 5b; look at best alternatives – may require additional analysis to increase B/C Ratio – if you had 5c in there you'd probably get a better ratio out of it. Thinks it is good to look at when is the widening really necessary – start doing the bridge work now since it needs to get done anyway then move into the widening based on additional traffic analysis. Where are we in 1-2-3 years? Get your permitting done, look at alternatives and a less aggressive schedule.
- A PAC member commented that Morris and Godfrey have done a great job communicating with the PAC and have been so responsive to their questions. Thanks MTA for convening this group because it is the conversation that needs to happen regionally. Hopes that everyone around the table will engage in how to move the region forward. One aspect to add is that we think actively about trying to divert I-295 traffic onto 95 and combine that action with these other alternatives; might be able to delay this investment this way and then there might be more info on autonomous vehicles – we'll know a lot more in five years (could expand the Turnpike's capacity a lot) and allow for pricing to tie in better. These are ideas, and now that this process is close to

complete it would be appropriate to start a more formal process in terms of a formal position from PACTS. Morris asked if this happen before the end of summer? The member responded that if they wait until fall to discuss, we can be more thoughtful to how we regionally think about this.

- Thomson (MaineDOT) echoed thoughts about problems on I-295 that are serious and immediate. It's a focus of MaineDOT to mitigate some of that stress on I-295. He has some reservations about waiting. We need to take measures fairly soon; a few years ago I-295 was not as big a problem and this has grown quickly – Turnpike traffic has as well. MaineDOT's I-295 report is about ready to see the light of day.
- A PAC member commented: in the long term what MaineDOT sees is that connected and automated vehicles will play a role in I-295 and there is strong potential for it to improve the capacity on I-295; not sure how it will work on the surface streets but they are also interested in the regional issues: access to Portland and South Portland. The big thing is to look at this regionally and the communities that are affected by I-295.
- A PAC member said: Alternative 14 is good approach to the overall solution; the benefit ratio is really high on that one as well; in terms of the timing the likely implementation agency is important. The ones MTA is the direct implementation agency for are 2 and 12, and both are capable of being done (short implementation period too). In addition, regarding I-295 issues – some of these are within the Turnpike's control and they are high benefit cost ratios. It will be a benefit to the peninsula if we can get traffic off I-295. He is not a fan of wait and see (but supports all alternatives under 14). The time to implement is now. He would encourage and push agencies to make that happen, and there is more going on than the Turnpike Authority can handle alone – need municipalities, legislature, planning agencies.
- A PAC member commented that it is so important to get things going through PACTS/GPCOG and push through.
- A PAC member commented that 17 acres of wetland is not an easy lift; the success with the Corps and the DEP is going to be that you have successfully explored alternatives and they will want to make sure those other alternatives are part of the package. It would be a positive move if everyone sitting around the table committed to being a partner in making the whole thing work. Start with more than one element, not widen the turnpike for the sake of just widening and you'll be more successful that way. Because the Turnpike doesn't have control of everything, we need to partner – make a commitment in the region to tackle the problem; I-295 to Brunswick also a problem.
- A PAC member said there are serious congestion problems on the local streets – if you can get off at Exit 46 for instance, adding capacity isn't going to help there. He brought this up to PACTS committee meeting that they need to start looking at it, it's more about the congestion on local roads and streets that connect into them.
- A PAC member commented that just doing the widening doesn't make sense – don't lose the opportunity to involve other alternatives.
- A PAC member said he is more neutral because he can't speak on behalf of the State Police but as someone who works on the road and lives in Brunswick, this is a dangerous road. There is not space to do jobs efficiently. For the general public, the guardrail blocks both sides, shoulders are not wide enough, high traffic between summer and winter months, it is important for the safety of his people working that they get the space they need (there is the move to the left law but no space to move). He encourages things to happen sooner rather than later for safety of the general public – a crash stops all the traffic (on the other side too).
- A PAC member commented that the good thing about these meetings is you get to hear everyone else's thoughts. Taking a second round at this, I-295 was a big deal for him from the beginning – didn't realize how other people felt and he still feels strongly about it and still believes in the need to widen. There has to be a comprehensive regional plan approach to this and I-295 has to be brought into it. And what do we really think Gorham east/ west is going to be in the future? The needle pushes towards now than later but if we can look at it holistically, it will come together better.

9. Public comment: No members of the public or previous attendees attended the meeting. The meeting concluded at 7:08.



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix B: Public Comments

HNTB Corporation

July 2018



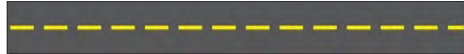
Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix B-1: Public Comments

Portland Area Mainline Needs Assessment



Maine Turnpike Authority
HNTB Corporation
Kevin Hooper Associates
Morris Communications

Date

June 19, 2018

To

Maine Turnpike Authority

**Project
Correspondence**

From

Carol Morris, Morris Communications

Subject

PAM Public Outreach Report

HNTB



- The Portland Area Mainline (PAM) Needs Assessment Study began in the Spring of 2017. A Public Advisory Committee (PAC) was formed in April 2017 to assist the MTA in the process of identifying and analyzing a range of alternatives to be considered in addressing capacity issues.
- The initial PAM Study scope specified ten alternatives for analysis; the PAC added another nine during the process. Additionally, eight technical papers were prepared to respond to topics either identified in the PAM Study scope or as requested by the PAC
- In May 2018, the Maine Turnpike Authority (MTA) and Morris Communications launched a public information campaign to alert the public to the needs assessment around increasing capacity issues on the mainline of the Maine Turnpike.
- The objective of the campaign was to solicit specific feedback on the 19 alternatives under consideration. The timing of the public information campaign was based on the common finding that the public provides more, and more useful, feedback when they are provided with specific items on which to comment.
- There were five PAC Meetings from June 2017 to June 2018; all were publicized via local media and were open to the public, with a designated time for public input. Attendees were not numerous but included several private citizens and the Conservation Law Foundation.
- Five municipal select board/city council meetings took place in May and June 2018 for Study Area communities; all were televised via local cable channels.
- A public open house was held in early June and input could also be provided via social media and a dedicated link on the MTA website.
- The attached packet includes:
 - A quantitative summary of the input from the public from the dedicated MTA web link, MTA social media sites, and the public open house.
 - The media purchase publicizing the meeting and the opportunity to provide feedback online. A press release was also distributed.
 - A list of media coverage that was the result of this package.
 - Verbatim comments from designated MTA web link.
 - Verbatim social media comments
 - Written feedback submitted to the MTA from attendees at the public or PAC meeting
 - A letter from Peter Mills, MTA Executive Director, in response to a February letter from the Conservation Law Foundation.



Maine Turnpike Authority Portland Area Mainline (PAM) Needs Assessment
Report on Public Feedback Specific to PAM Needs Assessment
June 18, 2018

Social Media Comments: 15

Facebook: 8

Twitter: 7

Messages:

- Widen 4
- Don't Raise Tolls 2
- Try Other Options 3 (one a reporter, one CLF)
- Other Suggestions: 3 (1-Trucks should use all lanes, 2-295 too busy)
- Whimsical/Unrelated 3

Website Comments: 28 (Some with multiple messages)

Messages:

- Widen 12
- Don't Raise Tolls 4
- Use Other Options 8
 - HOV/HOT 1
 - Light Rail 2
 - Use a Mix of Options 5
- Other Suggestions 6 (Examples: adding Exits and EZ pass lanes)

(See reverse for Public Meeting Comments)

Public Meeting Comments

(Note: Meeting was attended by about 10 individuals; there was no limit on number of dots attendees could place.)

| | Comments | Red Dot: No | Green Dot: Yes |
|--|--|------------------------|---------------------------|
| Alt 1 - No Build | | 3 | |
| Alt 2 - TDM | Combine with widening | 1 | 3 |
| Alt 3 - Congestion Pricing | I can't change my commute time-will cost me more-no thanks | 2 | 1 |
| Alt 4 - Interstate Bus | | | 2 |
| Alt 5a-Regional Bus | Breez should go Portland, Falmouth, Yarmouth, Augusta | | 2 |
| Alt 5b -Local Bus | I commute to Lewiston – won't help | 1 | 1 |
| Alt 6a - Commuter Rail | I love trains but far too costly – cheaper in long run to widen pike | 1 | 1 |
| Alt 6b - Corridor Commuter Rail | Too expensive for commuters and taxpayers | | |
| Alt 7 - Freight Rail | | | 2 |
| Alt 8 - Land Use | | | 2 |
| Alt 9a - Ramp Meter | | 2 | |
| Alt 9b - HOV/HOT | | 3 | |
| Alt 9c - Reversible | | 2 | 1 |
| Alt 10 - Widen 295 | What about Hadlock Field? | 1 | 2 |
| Alt 11 - Widen+tolls | | 1 | 1 |
| Alt 12 - Widening 95 | So far, this one makes the most sense to me | | 4 |
| Alt 14 – Combined Alts w Widening | | | 1 |

Notes for the Maine Turnpike Authority Meeting
January 24, 2018

Alan Reed
232 Main Street
Gorham, ME 04038

General Comments

Notice of the meeting-where was it posted prior to the meeting if it was indeed, a “public” meeting? There also needs to be an agenda posted. I just happened to notice it a few days prior in the online Portland Press Herald.

At a minimum, the targeted public side should focus on information via the **active part of the ME Turnpike EZ Pass website-where tolls are paid**. Outreach by posting upcoming meetings would be a positive step, well in advance to prepare.

Meeting time needs to be compatible with public access-after work hours, such as 6 pm, and clearly noted.

Workshop Comments

- Changing how people use the road, such as encouraging ridesharing, adding bus/transit or making it more expensive to take the Turnpike during peak traffic hours
 - Any toll increases are not favorable, especially at peak times. You cannot change people’s work schedules and punish them by raising tolls to discourage them from using the pike at these times and will only incite ill will towards the pike.
 - Ridesharing is taking place at certain locations (Kennebunk is one of them).

All arguments about “out-of-staters” shouldering the brunt of tolls and increases, regardless of the point of entry, and despite the numbers game used is pointless. While it may be true more of them use the pike at different points, it is because there are less people in ME than out-of-state. Even if one skews the numbers for the point of contention, Mainers still end up being the victims of progress. It is well noted that the New Hampshire Turnpike system uses a similar argument about raising their tolls, particularly for the Portsmouth to Hampden I-95 corridor. Theirs is a rather short spur and besides using the Route 1 road, out-of-staters have no other alternatives of getting to the Maine coast efficiently and cost effectively. At the same time, those from Maine going south have a similar, no other option, issue.

Widening the turnpike (again) is not going to help with capacity. Notwithstanding the environmental impacts, this is not the solution for bottlenecks or other traffic problems. The evidence is clear by example of runways at a given airport.

There was talk of several “phone apps” and conversations about using a GPS to detour traffic at high volume times. This is only another distraction from paying attention to signs and good driving habits.

More consideration needs to be with partnering with Amtrak and other public/private transportation sources, such as the Concord Trailways bus system. If there is a concern about pulling toll revenue away

by these means, then the Maine Turnpike system should find a “mission statement” appropriate to its function.

If you really want to eliminate bottlenecks and many capacity issues, eliminate the tolls collection. As a commuter across Maine, New Hampshire, and Massachusetts on a daily basis, the vast majority of traffic problems are a result of:

- inclement weather **(no solution)**,
- driver distraction-*ie.* inside the vehicle and “rubbernecking” or “curiosity” from accidents **(only education and enforcement of laws can help here)**,
- and slowing down for toll collections **(this can be remedied by eliminating tolls)**.

For once, Maine should exercise its independence from other states and eliminate tolls, which are used to subsidize other ventures, regardless of the perception of “minimal” impact from toll revenue.

Increased fuel taxes are the best way to even the playing field for all drivers, regardless of where their point of origin is.

The Maine Turnpike has long been paid off and its high time that our state take ownership of what its drivers have accomplished with their tolls and the employees of the pike take pride that their mission has been accomplished.

Maine Turnpike Authority - Portland Area Mainline Needs Assessment
Public Comments Received via MTA website
October 27, 2017 - June 13, 2018

| Date Submitted | Record ID | First Name | Last Name | Email | Comment |
|-----------------------|-----------|------------|------------|--------------------------|---|
| 10/27/2017 9:07:33 PM | 13 | Karl | Tarbox | karltarbox2016@yahoo.com | The best thing you could do to help Portland traffic, especially 295, is to widen the Turnpike from Scarborough to Falmouth, and sign through traffic off of 295. Sign 295 for local tr affic. |
| 5/24/2018 4:57:46 PM | 14 | Tim | Lambert | tim.lambert@outlook.com | Suggestion 1: Don't increase the tolls. Make tolling free for EZ-Pass users between Exits 42 and 53 during off-peak hours. Increasing tolls will only encourage use of secondary roads, increasing congestion in towns, and defeating the purpose of having a turnpike. |
| 5/24/2018 4:57:52 PM | 15 | Tim | Lambert | tim.lambert@outlook.com | Suggestion 1: Don't increase the tolls. Make tolling free for EZ-Pass users between Exits 42 and 53 during off-peak hours. Increasing tolls will only encourage use of secondary roads, increasing congestion in towns, and defeating the purpose of having a turnpike. |
| 5/24/2018 4:58:59 PM | 16 | Tim | Lambert | tim.lambert@outlook.com | Suggestion 2: Widen, and make tolling free between 42 & 53 for EZPass users. Encourage use of the turnpike to keep cars moving freely between Scarborough-Portland. This would reduce pollution and reduce wear and tear on local roads. |
| 5/24/2018 4:59:26 PM | 17 | Tim | Lambert | tim.lambert@outlook.com | How to pay for widening: Save money by switching to toll-by-plate for non-EZPass like the Mass Turnpike. This would eliminate ongoing maintenance and utility use at the toll plazas and save on personnel costs. Regarding widening: Remember to think about cyclists and pedestrians when you build new bridges. |
| 5/30/2018 6:58:41 PM | 18 | Dan | Dwuer | Airmail3@yahoo.com | Widen to six lanes and get it into the courts ASAP so I might see it before I die. Kittery tolls? An absolute joke. Yeah, Maine is a tourist based economy.. Couldn't prove it by the actions of the turnpike authority. Total state is an absolute joke. |
| 5/31/2018 10:38:35 AM | 19 | scott | trebilcock | trebilsc@gmail.com | Widen Please do not charge more for use in greater Portland area. We are already over charged for the short distances between exits. If anything - make it free in greater Portland similar to the Lewiston/Auburn area. |
| 5/31/2018 12:03:17 PM | 20 | Christine | Becotte | tig@metrocast.net | I commute from Springvale to exit 48, five days a week, and I work 2nd shift. I hate the idea of option 3. I can't do anything about my commute time. I would put my two cents in for widening the interstate in that area. |
| 5/31/2018 5:36:11 PM | 21 | David | Weeden | Dw0359@sbcglobal.net | I am in favor of alternative 12. |
| 5/31/2018 6:17:25 PM | 22 | Sue | Warner | Suzwarnr@gmail.com | I already spend over \$40/mont in tolls to get to and from work each day. Penalizing commuters by charging even more is not acceptable. Find some other way to deal with 295. |
| 5/31/2018 8:11:52 PM | 23 | Nick | Cher | njdcnsc@live.com | Add an EZPASS lane closer to the on lane ramp at the Maine Mall entrance. Cutting across multiple lanes at the entrance is extremely dangerous. |
| 6/2/2018 12:05:43 AM | 24 | Bruce | Cole | brucejcole@gmail.com | I commute from Kennebunk on I-95 to Maine Mall (Exit 46), then get on I-295 thru Portland to reach Brunswick. I would use Falmouth spur instead, except northbound tolls are higher there than southbound. If the NB toll were to match the SB toll I expect some of the NB traffic that is merely "passing thru" Portland to points north of Falmouth would be diverted. |
| 6/2/2018 8:52:46 AM | 25 | Sam | Wesley | swesley93@gmail.com | Portland Resident: Alternative Number #6 is the most appealing. Light commuter rail is already popular in heavily congested areas such as the Massachusetts Bay Area and provides examples that we can apply here in Maine. |
| 6/3/2018 10:35:53 AM | 26 | Lorraine | Swift | Swift@gmail.com | YOU ALL ARE FUCKING NUTS. |
| 6/4/2018 11:19:42 AM | 27 | Ed | Zelasko | ed_zelasko@yahoo.com | We aren't the biggest city but it's time to come up to the twenty first century. Commuter rail service and widening the turnpike and 295 are long overdue and definitely needed. |
| 6/4/2018 12:06:25 PM | 28 | Rachael | Teras | RTerasB@aol.com | We really need a exit in Cumberland, near the burger King. So Many people have to get off at the West Falmouth Exit and travel to get to the Cumberland / Windham / Gray area. There are many new housing developments going in, and that have gone in, with no good way other than going to the Gray Exit or West Falmouth. |
| 6/4/2018 9:13:55 PM | 29 | Arthur | Vose | arthur.vose@gmail.com | It should be tolled and widened. |
| 6/6/2018 8:14:42 AM | 30 | Neal | Weinstein | weinlaw@maine.rr.com | you need 3 lanes from Portland to Gray, not West Falmouth. 295 needs to be widened to Bunswick and ideally Topsham. Every day, summer or winter, 295 is backed up and traffic stopped. add an exit off the turnpike for Ogunquit, and another by North Saco/Scarborough, Cascade Road, at flag Pond Road to alleviate some of the daily traffic at the Saco exit. |
| 6/6/2018 6:03:16 PM | 31 | Mark | Johnson | mjohnson@smrtinc.com | Widening is a simple and expedient response that is only palliative. A mix of solutions studied, with visionary land-use, will yield better and more sustainable results. Until people pay the true cost for their transportation and land use decisions, we will not achieve a responsible solution. |

| Date Submitted | Record ID | First Name | Last Name | Email | Comment |
|----------------------|-----------|------------|-----------|-----------------------------|--|
| 6/7/2018 8:36:27 AM | 32 | Derek | Pelletier | dpellet@gmail.com | This is a regional issue and it is myopic to focus solely on the turnpike piece. Increasing the supply of highway will only provide short-term benefits but has long-term costs that are difficult to undo. The objective should be in providing solutions for moving people and cargo rather than focusing on moving cars and trucks. |
| 6/7/2018 9:55:40 PM | 33 | Kenneth | Lovejoy | krlbhltl@hotmail.com | I went to Maine a couple of years ago and you should be ashamed to charge to drive on that wore out piece of crap. Tear down all toll booths fire all the rude people, which is all of them, and open it up for free. that is what it is worth. It is no better than the rest of the roads up there, why charge people to drive on it. It is a joke. |
| 6/8/2018 7:28:31 AM | 34 | John | Dostal | jdostal@maine.rr.com | Widen the road pure and simple. I am not in favor of congestion pricing. 295 should also be widened. If tolling starts on 295 then all tolling should be barriers across the mainline not at exits. Use easy pass to its fullest. Lower prices for easy pass. |
| 6/9/2018 9:45:55 AM | 35 | A | C | | Please don't expand highway capacity without first making bus, rail, & bike connections much stronger. It's common knowledge that highway expansions create more traffic. These decisions impact my desire to stay in ME. Other states take the research seriously, and invest in sustainable modes of transportation. Why should I stay and see my tax dollars wasted on outdated transportation ideas? |
| 6/9/2018 9:46:50 AM | 36 | A | C | | Please don't expand highway capacity without first making bus, rail, & bike connections much stronger. It's common knowledge that highway expansions create more traffic. These decisions impact my desire to stay in ME. Other states take the research seriously, and invest in sustainable modes of transportation. Why should I stay and see my tax dollars wasted on outdated transportation ideas? |
| 6/9/2018 9:56:53 AM | 37 | William | Steinbock | william.steinbock@gmail.com | Please implement solutions like expanded public transit & TDM prior to new construction. If a new lane is needed, build a reversible lane 1st that favors HOV. I drive this stretch of road regularly & have rarely felt it was overly congested. Please prioritize progressive solutions with minimal impact on the environment that will increase accessibility for all Mainers, not just those with cars. |
| 6/9/2018 9:58:01 AM | 38 | Loretta | Gagne | | I drive on I-95 during rush hour & yes, there's congestion, but I would say the delays aren't a big deal. Are you considering how many minutes of delay are people experiencing & what is reasonable to ask of people to experience? I don't want to see ME rush to expand highways if the delays are only during certain times of day and for only a few minutes. We can't afford it. |
| 6/9/2018 2:57:44 PM | 39 | Cliff | Colville | CJCIII@msn.com | I have traveled this turnpike section weekly for the past eight years and support new lanes. Most people already avoid the congested periods if they can. Higher fees primarily penalize those that don't have this flexibility. Car-pooling, bus and land-use should always be encouraged to restrict traffic growth; however, these will not negate the need for additional lanes in the shorter-term. |
| 6/12/2018 7:23:21 AM | 40 | William | Doherty | billy.dthekid@comcast.net | Why Doesn't Maine get up with it's surrounding States? I drive on Rt. 95 in Ma., it's 4 lanes., I drive through N.H. on rt. 95 it's 4 lanes, I drive up 95 (Maine turnpike) & it's 3 lanes, then down to two lanes. If your going to widen the two lanes to 3, why not make it 4 lanes so in ten years your not faced with this same congestion issue. |

Facebook

"If you increase tolls during peak hours, that will just push some people to the side roads which can't handle the traffic either. Case in point-Rt 100 from Auburn to Gray is over run with heavy traffic because of the toll in New Gloucester."

- Ann Gagne (June 6, 2018)

"Allow trucks to use all 3 lanes too many automobiles are riding the middle lane and messing traffic."

- Jake McDaniel (June 6, 2018)

"Probably from all the people trying to avoid 295 on their way home from work."

- Jeremy Nelson (May 31, 2018)

"I just hope the solution isn't to push cars onto other roads by raising tolls. Widen the pike, get rid of toll plazas, implement toll-by-plate for the folks who can't afford the \$10 EZ-Pass."

- Tim Lambert (May 31, 2018)

"Widen the pike to 3 lanes to mile 101. Judging by the tree removal in the high 90mm area, that is the plan anyway. No real need of it north of mm86, but the MTA might as well be a government organization with how good they are at wasting money anyway."

- Aaron Flagg (May 31, 2018)

"295 need to have 3 lanes to at least mm 28. 95 should be at 3 lanes to at least mm 100."

- Adam Stone (May 31, 2018)

"It's to avoid 295 through Portland."

- Gary Garrett (May 31, 2018)

"Try not to be short sighted the problem continues north to mm63, and the ORT at New Gloucester should have been 2 lanes or a flashing sign to alert drivers that they do not have to slow down (very frustrating I never encounter slow downs at Hampton NH ORT)"

- Cheryl Guay (May 31, 2018)

Twitter

“@benbragdon It’s that time of the afternoon when I silently debate the merits of spending \$5 and driving to Portland from Augusta on the @MaineTurnpike hassle-free, or risk taking 295 and being subjected to some god-awful, bumper-to-bumper traffic nightmare.”

- @GriffinClubMerv

“That should be the turnpike’s slogan: It Costs More and It’s Longer, But At Least Your Moving. My strategy is to take 295 until I see traffic back up, giving me about 4 seconds to decide to veer off and try to take back roads. I have never chosen well.”

- @benbragdon

“Paying off your debt and removing tolls would help”

- @windpa11 (May 31, 2018)

“I don’t think you have much choice, sooner than later you’re going to have to put in addition lanes. Start with a reversing system and add a single lane on one side. More public transportation needs to be blended too. Tolls are just an ugly thing that has happened.”

- @HoundDavid (May 31, 2018)

“More roads → more traffic → more congestion”

- @TomGNosal

“In other words, if you build it, they will come... Read what @CityLab said related to #TurnpikeWidening proposal. @MaineTurnpike @PeteL_McGuire”

- @KelleyBouchard

“Since last June, @CLF has been urging the @MaineTurnpike to account for #InducedDemand in its modeling of future congestion, and to comply with #Maine law by assessing all reasonable alternatives to expansion. Still waiting. @PeteL_McGuire @PressHerald.”

- @phelpsturner

BOB FULLER

July 13, 2018

To: PETER MILLS, MTA

Re: Widening Turnpike in Greater Portland, YES!

Dear Peter,

Please excuse the informality of this letter.

I am the former long time owner of WBLM Radio and several other music stations in Portland and one of the two current owners of 92.5/96.3 Big JAB Sports Radio plus 95.5-95.9 Sports and WLOB talk radio 100.5/1310 AM.

I thought that the traffic situation between Scarborough and Falmouth was bad 20 years ago and I am aware that widening the Turnpike was delayed by the great recession.

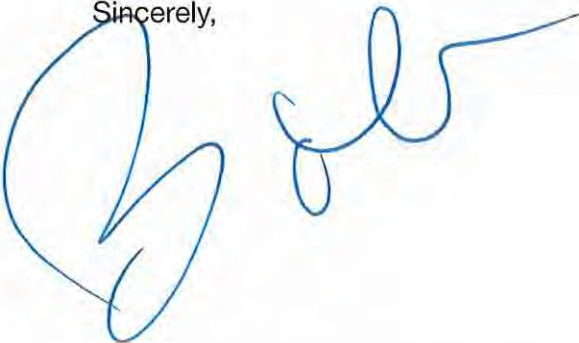
Our radio station studios and offices are on Warren avenue close to exit 48, so our people are in that area regularly and during certain parts of the day it's a nightmare on that section of The Turnpike. And it's only going to get worse.

Most of the alternate ideas and those against the project have come up with some the most ridiculous proposals and all this does is delay the project and cost more money.

I just wanted you to know that I fully support the widening and the sooner the better.

Thanks Peter, for hearing me out.

Sincerely,

A handwritten signature in blue ink, appearing to be 'Bob Fuller', with a large, stylized 'B' and a long, sweeping horizontal line extending to the right.

January 24, 2018

Comments of Conservation Law Foundation to the Maine Turnpike Authority's (MTA) Public Advisory Committee (PAC) concerning the Portland Area Mainline (PAM) Study

Dear PAC Members:

My name is Phelps Turner and I am a Staff Attorney at the Conservation Law Foundation's (CLF) Maine Advocacy Center, where we advocate for a Maine powered by affordable clean energy with air free from dirty pollution, for a Maine with clean waters, and for a Maine with less pollution from cars and trucks, with cleaner alternatives to driving, and with better and more affordable public transit options.

In accordance with the press release issued by the MTA on January 17, 2018, CLF makes the following comments on the issues of future traffic growth on the Turnpike and future operations of the Turnpike. These comments focus on those two issues, building on comments that CLF made during the first two PAC meetings, which were held on June 28, 2017 and November 14, 2017.

1. A Full Evaluation of Alternatives is Required by Law. The January 17, 2018 press release includes discussion of "potential solutions should the [traffic] forecast indicate road capacity will be inadequate," and lists several solutions currently under consideration by the PAC. This list appears to track the list of alternatives set forth in the February 2, 2017 Scope of Services submitted to the MTA by HNTB. See pp. 10-15. While both lists appear at first glance to cover a range of alternatives, there are limitations to both, as discussed below.

CLF urges the PAC and the MTA to comply with the legal requirement that they evaluate a "full range of reasonable transportation alternatives." See Sensible Transportation Policy Act (STPA), 23 M.R.S. § 73(3)(B). Because the list in the press release is not explicit about all of the individual alternatives under consideration, and because the HNTB Scope of Services qualifies several of the alternatives in a manner that limits full consideration¹, CLF urges the PAC to develop, and evaluate, an explicit, comprehensive list of alternatives.

CLF emphasizes that in order to comply with the STPA, the PAC and the MTA must not only assess a full range of alternatives, but must also "give preference to transportation system management options, demand management strategies, improvements to the existing system, and other transportation modes before increasing highway capacity through road building activities." See 23 M.R.S. § 73(3)(B).

¹ For example, HNTB excludes an assessment of rail service, indicates that only one alternative incorporating carpool, vanpool and bus transit will be evaluated using the travel demand model, only two tolling strategies will be evaluated using the travel demand model, and the assessment of land use alternatives will be qualitative only.

2. Adding Lanes Will Not Reduce Congestion. One of the “potential solutions” discussed in the January 17, 2018 press release, and in prior PAC meetings, is the addition of lanes to the Turnpike. CLF emphasizes that studies clearly show that adding more lanes to roads does not solve congestion problems. That is, we cannot build our way out of congestion by adding more lanes. Further, there is strong evidence of induced demand resulting from road improvements, such as the addition of new lanes.

That adding lanes does not solve congestion is supported by the principle of “triple convergence,” according to which new lanes will add capacity in the short term, but will increase demand and reduce capacity as drivers move, or “converge,” from (1) other modes of transportation; (2) other routes; and (3) other times. This principle is clearly laid out in a study by Gilles Duranton and Matthew A. Turner, entitled “The Fundamental Law of Road Congestion: Evidence from U.S. Cities.” *American Economic Review* 101(6): 2616-52 (2011). (A copy of this study is attached.)

Therefore, CLF encourages the PAC and the MTA to thoroughly evaluate and seriously consider alternatives to additional lanes.

3. More Outreach Required. CLF urges the PAC and the MTA to expand its outreach to potentially impacted communities, so that there is greater public awareness of this project and its implications, and greater participation in this stakeholder process.
4. Link between Transportation and Climate Change. Given the real and immediate risk posed by climate change here in Maine, and given that the transportation sector now accounts for 54% of Maine’s greenhouse gas emissions, we need to cut the state’s transportation emissions by, among other things, electrifying our fleet and reducing vehicle miles traveled (VMTs). CLF urges the PAC and the MTA to consider alternatives to lane expansion that can address congestion and reduce emissions, including, among others, transportation demand management strategies.

Thank you for your time and attention to this matter.

June 8, 2018

Comments of Conservation Law Foundation concerning the Maine Turnpike Authority's Portland Area Mainline Study and Alternatives Assessment

Dear Maine Turnpike Authority:

My name is Phelps Turner and I am a Staff Attorney at the Conservation Law Foundation's (CLF) Maine Advocacy Center, where we advocate for a Maine powered by affordable clean energy with air free from dirty pollution, for a Maine with clean waters and for a Maine with less pollution from cars and trucks, with cleaner alternatives to driving and with better and more affordable public transit options.

On behalf of CLF, I have attended each of the four Public Advisory Committee (PAC) meetings concerning the Maine Turnpike Authority's (MTA) Portland Area Mainline (PAM) Study, and have participated in the public comment period in each one of those sessions. I'm writing to provide a summary of our comments and concerns about the MTA's actions to date.

I. A Full Evaluation of Reasonable Alternatives is Required by Maine Law.

CLF again urges the MTA to comply with the legal requirement that it evaluate a "full range of reasonable transportation alternatives." See Sensible Transportation Policy Act (STPA), 23 M.R.S. § 73(3)(B). The MTA's evaluation of alternatives to date is flawed for several reasons.

First, the MTA improperly presents its proposed alternatives as single, mutually-exclusive alternatives, and finds that no one alternative is able to individually achieve a volume to capacity ratio necessary to alleviate the projected increases in congestion. The MTA should evaluate the cumulative benefits of implementing one or more combinations of the proposed alternatives in order to understand the extent to which multiple alternatives could alleviate projected congestion.

Second, the MTA failed to account for induced demand in its modeling. Its consultant expressly admitted this during the April 25, 2018 PAC meeting. The MTA's failure to model induced demand means that its findings are flawed, in particular with respect to the lane expansion alternatives. The MTA should re-analyze its proposed alternatives, in particular with respect to the lane expansion alternatives, after adding induced demand to its modeling.

Third, there are reasonable alternatives that the MTA has not yet been assessed, and that must be evaluated to ensure compliance with the law. These include:

- Elimination of the MTA's current "Volume Discount Program," which gives drivers discounts of up to 50% off their monthly fare when taking a certain number of one-way trips, and thus incentivizes increased travel on the Turnpike;

- Allowing shoulder travel at certain times of day, a strategy that can alleviate congestion without constructing new lanes;
- Other Transportation System Management (TSM) alternatives, including driver information systems, changeable message signage, vehicle detection systems, and variable speed control; and
- Increased Turnpike tolls, as a means for dis-incentivizing Turnpike travel.

CLF again emphasizes that in order to comply with the STPA, the MTA must not only assess a full range of alternatives, but must also "give preference to transportation system management options, demand management strategies, improvements to the existing system, and other transportation modes before increasing highway capacity through road building activities." See 23 M.R.S. § 73(3)(B). Any decision by the MTA must express how it is giving preference to those options, strategies and modes.

II. As a Result of Induced Demand, Adding Lanes Will Not Reduce Congestion.

CLF again emphasizes that studies clearly show that, based on the well-established principle of induced demand, adding more lanes to roads does not solve congestion problems. Rather, adding more lanes induces more driving, and thus increased congestion, as drivers converge from other modes of transportation, other routes and other times of travel. Thus, we cannot build our way out of congestion by adding more lanes. If the MTA moves forward with this lane expansion, we're likely to be having a similar debate in the not-so-distant future about expanding from 3 to 4 lanes in both directions.

III. There Have Been Shortcomings in Public Outreach and Public Process.

CLF has consistently urged the MTA to expand its outreach to potentially impacted communities, so that there is greater public awareness of this project and its implications, and greater participation in this stakeholder process. CLF remains concerned that the MTA has failed to make greater efforts to ensure public participation from all the communities potentially impacted by the expansion during the PAC stakeholder process, and during other MTA processes concerning the proposed expansion.

Public outreach with respect to the four PAC meetings, and for the public meeting at the Maine Mall, was limited. As a result, public awareness of the meetings was limited, and only a handful of members of the public participated at each of the PAC meetings. Additionally, the meeting time for each PAC meeting was the same, that is, late afternoon/early evening, which likely prevented some members of the public who otherwise might have been interested in attending from doing so.

These shortcomings in public outreach and public participation with respect to the MTA's PAM study and the associated stakeholder process are not trivial and cannot be compensated for by later participation, given that public participation was not maximized during the identification of reasonable alternatives, and any participation will now necessarily be reactive rather than proactive. In other words, the scope of any future public participation will be limited to plans and alternatives that have already been identified and evaluated.



IV. The Link between Transportation and Climate Change.

Given the real and immediate risks posed by climate change here in Maine, and given that the transportation sector now accounts for 52% of Maine's greenhouse gas emissions, we need to cut the state's transportation emissions by, among other things, electrifying our fleet and reducing vehicle miles traveled, or VMTs. CLF urges the MTA to choose alternatives to lane expansion that address congestion and reduce emissions, including, among others, transportation demand management (TDM) and transportation system management (TSM) strategies.

Sincerely,

/s/ Phelps Turner

Phelps Turner
Staff Attorney
Conservation Law Foundation
53 Exchange Street, Suite 200
Portland, ME 04101
207-210-6439 xS014
pturner@clf.org



Maine Turnpike Authority Comment Sheet
June 7, 2018

Please write any additional comments you have for the Turnpike on this sheet. Your completed sheet can be turned in to a staff member at the Open House, or mailed to:

Erin Courtney
Maine Turnpike Authority
2360 Congress St
Portland, ME 04102

Or comment online by going to www.maineturnpike.com and click on MTA Growing Pains – the comment form is on the bottom of the page. Thanks very much!

See attached

Please provide your EMAIL if you want to receive updates from the Turnpike Authority:

@

Hello, I went to your Maine Mall presentation today 6/7/2018. Normal PR stunt for you. Forgone conclusion that you want to make wider roads, more exits and bypasses to Gorham and Sanford. Shame on you! We need to first get rid of the Turnpike Authority since it should have been done years ago. Second use 90% of toll revenue to fund clean green passenger and freight railroads in Maine.

We should raise the price tractor-trailer trucks pay for tolls 10-20 fold since that may start to cover the damage they cause to roadways and the deaths they cause by fatal truck accidents.

If it is not clear I do not want any of your turnpike expanded (ever) and want to see us transform our primary roadways to rail transit with connecting local bus, Uber and bicycle connections.

You PR stunt with stickers and comment labels are a great way to avoid direct feedback from the public and divide and concur. Stop wasting my tax dollars on expensive consultants (HNTB) let the public give you feedback in a public place with news reports and television, so that the public can tell you what they think of this most polluting, fuel using carbon increasing method of transport.

How is it the rest of the world is moving to electrified railways and we are wasting time and our tax dollars on more asphalt? Are there any rail experts hired in your organization? Please stop this joke of an input process and tell the public like it really is; Your organization is a self fulfilling prophecy and has little public oversight and is basically semi autonomous. You have decided, why not state the obvious.

Your big analysis of freight and passenger is really flawed in so many ways. Assumptions are dead wrong. I really cannot waste more time on this.

Your website does not even allow input greater than 400 characters! Great way to shut the public out. I would like to see the Maine Turnpike authority abolished and the turnpike put back under the DOT with voter approved inputs.

Thank you for your considerations and reading this.

Paul Weiss
Cumberland ME
weissp@me.com

Maine Turnpike Authority

2360 Congress Street
Portland, Maine 04102

Daniel E. Wathen, Augusta, Chairman
Robert D. Stone, Auburn, Vice Chairman
Thomas Zuke, Kennebunk
John E. Dority, Augusta
Michael J. Cianchette, Cumberland
Ann R. Robinson, Portland
Karen S. Doyle, Chief Financial Officer MaineDOT, Ex-Officio

Peter Mills, Executive Director
Douglas Davidson, Chief Financial Officer & Treasurer
Peter S. Merfeld, P.E., Chief Operations Officer
Jonathan Arey, Secretary & General Counsel

March 2, 2018

Mr. Phelps Turner, Esq.
Conservation Law Foundation
53 Exchange Street, Suite 200
Portland, Maine 04101

Re: Your letter to PAM PAC of January 24, 2018

Dear Mr. Turner:

Thank you for your attendance and written commentary. We are forwarding your letter of January 28 and this response to the PAC members.

The purpose of our 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 highway mobility for the region in a manner that is consistent with the Sensible Transportation Policy Act, enhances the regional transportation system, and meets Maine Turnpike Authority responsibilities and reasonable customer expectations.”

The Public Advisory Committee is evaluating a dozen alternatives that include public transit, freight rail, TSM, and TDM as well as adding lanes. Of those identified for study, a number fall under the TDM umbrella.

While not every alternative was included in our consultant's initial scope of services, we have since added new ones through the PAC process. If you have still others to consider, let us know as soon as possible because we are already evaluating those that have been identified so far.

The Turnpike is highly receptive to considering solutions of any practical nature and has a history of having done so:

- The Turnpike has built and currently maintains, plows, and paves 11 Park and Ride lots containing space for about 900 cars.
- We operate the ride matching service known as Go Maine that covers the state.
- We will soon open 32 electric vehicle charging stalls in Kennebunk, 16 on each side of the highway.

- The Turnpike was instrumental in setting up and supporting the Wells train station as a regional transportation center.
- The Turnpike donated the land for the new bus station at Exit 75 in Auburn.
- For many years the Turnpike has supported the express "Zoom" bus to carry commuters between Biddeford and Portland on Maine's busiest highway.

There is already a demand management component built into the Turnpike's business model. Access to the road requires paying a toll. The Turnpike receives no state or federal subsidies. Some of the highest rates per mile are paid in the area around Portland because so many of the trips are short and the minimum toll is 50 cents except for in-state users entitled to a volume discount.

As a non-profit public agency, the Turnpike has no special motivation to advocate for more or larger highways. It still collects tolls even when highways are congested. Indeed, the worst congestion in the state occurs on the Turnpike about a dozen times each year on summer Sunday afternoons as tourists leave the state.

Where solutions are feasible, the Turnpike has a duty to bring to public attention those conditions that threaten the functionality of the highway. That is the case right now with traffic on the road around Portland.

Your assertion that "adding more lanes to roads does not solve congestion problems" is drawn from the 48 page working paper from Duranton and Turner for NBER of Cambridge, Massachusetts. The authors also state, "The removal of bottlenecks on busy roads, or other similar expansions, may lead to sufficient time gains to justify the investment."

The Maine Turnpike is an old and well-established road that is vital to the regional economy. Its purpose for the past 70 years has been to provide an artery for through traffic. The road can only continue to serve its fundamental function by remaining open and uncongested wherever that is feasible. In the Greater Portland area, the Turnpike provides an alternative to I-295 and relieves congestion on city streets and avenues and within residential and business destination areas.

The Turnpike provides the public with safe and reliable mobility on Maine's most economically important highway without taxpayer support. To fulfill this mission, we understand the importance of the environment. This means conducting studies in accordance with the STPA. It also means providing a Turnpike free from chronic and unnecessary congestion which is important for air quality and human welfare as well as for the economy.

We agree that broader public outreach is a good thing. Once the PAC has provided feedback on the package of alternatives, we intend to take this information out to the public for more electronic and face-to-face feedback.

Yours truly,



Peter Mills
Executive Director, Maine Turnpike
207 858 6400 cell

BOB FULLER

July 13, 2018

To: PETER MILLS, MTA

Re: Widening Turnpike in Greater Portland, YES!

Dear Peter,

Please excuse the informality of this letter.

I am the former long time owner of WBLM Radio and several other music stations in Portland and one of the two current owners of 92.5/96.3 Big JAB Sports Radio plus 95.5-95.9 Sports and WLOB talk radio 100.5/1310 AM.

I thought that the traffic situation between Scarborough and Falmouth was bad 20 years ago and I am aware that widening the Turnpike was delayed by the great recession.

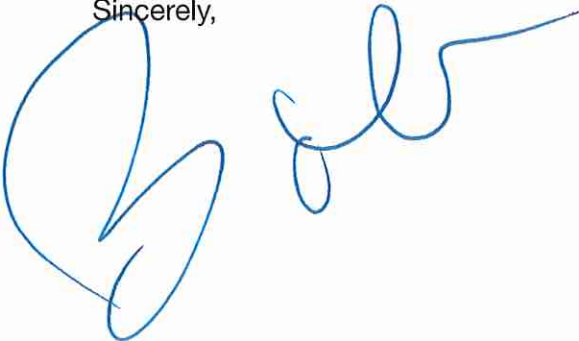
Our radio station studios and offices are on Warren avenue close to exit 48, so our people are in that area regularly and during certain parts of the day it's a nightmare on that section of The Turnpike. And it's only going to get worse.

Most of the alternate ideas and those against the project have come up with some the most ridiculous proposals and all this does is delay the project and cost more money.

I just wanted you to know that I fully support the widening and the sooner the better.

Thanks Peter, for hearing me out.

Sincerely,

A handwritten signature in blue ink, appearing to be 'Bob Fuller', with a large, stylized 'B' and a long, sweeping horizontal line extending to the right.

MAINE MOTOR TRANSPORT ASSOCIATION

142 Whitten Road

P.O. Box 857

Augusta, Maine 04332-0857

(207) 623-4128 • FAX (207) 623-4096 • www.mmta.com

"The spokesman for the Maine Trucking Industry"

August 20, 2018

Maine Turnpike Authority
2360 Congress Street
Portland, ME 04102

RE: Portland Area Mainline Study Comments

To whom it may concern;

As you know, the commercial trucking industry has participated in the Portland Area Mainline Study working group that has convened to recommend solutions consistent with the PAM Mission Statement. The trucking industry's main concerns throughout this process has been safety, economic and environmental issues and we believe they are all tied together in a prospective solution.

As the voice of Maine's trucking industry, the Maine Motor Transport Association is first and foremost a safety organization and we can all agree that safety on all of Maine's roads is essential for both cars and trucks. We believe that widening areas of the Turnpike with the greatest traffic volume can bring about short term and long term safety benefits by mitigating the growing congestion. Reducing congestion also has the added benefit of less idling for both trucks and cars, which is better for our environment.

Widening the Turnpike will also add capacity, which will improve Maine's economic prospects. An efficient transportation infrastructure is critical to attracting and retaining investment from an economic perspective and it can be an essential component to Maine's overall prosperity and quality of life.

Will widening sections of the Turnpike magically fix the intermittent bottlenecks and tie-ups? Certainly not. But we do think that widening will have the most immediate impact on safety, the economy and the environment and it is the most effective and efficient way to address the concern.

As an aside, we would like to take this opportunity to voice our objections to efforts that would disallow commercial motor vehicles to utilize the new capacity, should the Turnpike be widened. We do not intend for our support for widening to be construed as support for far left lane CMV restrictions.

Thank you for the opportunity to provide our perspective on this very important issue.

Sincerely,



Brian Parke
President and CEO

August 20, 2018

Mr. Daniel E. Wathen, Chair
Mr. Robert D. Stone, Vice-Chair
Mr. Michael J. Cianchette, Member
Mr. John E. Dority, Member
Ms. Ann R. Robinson, Member
Mr. Thomas J. Zuke, Member
Ms. Karen S. Doyle, Ex-Officio Member
Maine Turnpike Authority Board
2360 Congress Street
Portland, ME 04102

**Re: Comments of Conservation Law Foundation concerning the Maine Turnpike Authority's
Portland Area Mainline Needs Assessment Draft Alternatives Analysis Report**

Dear Mr. Wathen, Mr. Stone, Mr. Cianchette, Mr. Dority, Ms. Robinson, Mr. Zuke, and Ms. Doyle:

Conservation Law Foundation (CLF) appreciates the work of the Maine Turnpike Authority (MTA) staff and its consultants in preparing and producing the Portland Area Mainline Needs Assessment Draft Alternatives Analysis Report. CLF believes that the Draft Report identifies appropriate steps to address what the MTA has identified as growing safety and capacity challenges on the Portland-area section of the Turnpike between Exits 44 and 53. Unfortunately, instead of choosing the alternative that would best meet those challenges – and avoid the issues that are now clear concerning past efforts to address capacity needs on the sections of the Turnpike south of Exit 44 – the Draft Report identifies Alternative No. 12 (widening to three lanes) as the only alternative that satisfies both the study purpose and the definition of a reasonable alternative. In fact, Alternative No. 14, which combines Alternative No. 12 with Alternative Nos. 2, 4, 5a, 5b, 8 and 12, allows the MTA to meet its current capacity challenges and avoid future, post-expansion capacity challenges, like those now existing south of Exit 44.

For more than a year, CLF has actively engaged in the public process concerning the MTA's Portland Area Mainline needs assessment, including participation at Public Advisory Committee (PAC) meetings and submission of written comments. Throughout our participation, CLF has advocated for a complete assessment of reasonable alternatives and for preference to be given to non-construction alternatives. While CLF appreciates the MTA's Draft Report, CLF disagrees with the Draft Report's recommendations, and urges the MTA to modify the recommendations, as follows:

- Adopt Alternative No. 14 (a combination of Alternative Nos. 2, 4, 5a, 5b, 8, 12); and
- Perform an updated needs assessment after phase one of widening (Exits 44 to 48).

By taking these steps, the MTA can address current and future capacity needs, and thereby further its mission of providing safe and reliable travel on the Turnpike. These steps will also support the MTA's applications to the relevant permitting authorities concerning the widening of the Turnpike.

I. The MTA should Adopt Alternative No. 14 to Satisfy Capacity Needs, Further the MTA’s Mission and Support the MTA’s Permit Applications for Expansion.

In its Draft Report, the MTA found that Alternative No. 12 is the only alternative that “was identified as fully meeting the Study Purpose and meeting the definition of a reasonable alternative.” See Report at 147 (emphasis in original).¹ As described in the Draft Report, Alternative No. 12 involves widening the Turnpike between Exits 44 and 53 from two to three lanes in each direction. *Id.* at 124-127. In addition to adding 18 miles of new lanes (9 miles in each direction), Alternative No. 12 involves:

- The reconstruction of several bridges, including the Stroudwater River, Maine Central Railroad and Warren Avenue bridges;
- The reconstruction of side road underpasses and existing drainage structures not already designed for additional mainline lanes;
- A 17-acre increase of impervious pavement in Urban Impaired Stream Wetlands; and
- Potential wetlands impacts.

Id. Thus, the proposed widening is likely to result in a number of short- and long-term negative environmental impacts, including storm water impacts, on the areas under and adjacent to the Turnpike. The relevant permitting authorities will consider these factors when making decisions about the Turnpike expansion. CLF’s proposals aim to mitigate these negative impacts by avoiding post-expansion congestion, and thus avoiding the need for unnecessary additional widening, which will likely improve the MTA’s chance of obtaining the relevant permits for widening.

Based on feedback it received from CLF and from some PAC members, the MTA recently modeled two alternatives which comprise a combination of alternatives. In particular, Alternative No. 14 includes the widening in Alternative 12 and:

- Alternative 2 – New/Expanded Transportation Demand Management (TDM) Programs
- Alternative 4 – Public Transportation: New or Improved Interstate Bus Service
- Alternative 5a – Public Transportation: Improved Regional Bus Service
- Alternative 5b – Public Transportation: New or Improved Local Bus Service
- Alternative 8 – Land Use scenario

Id. at 131-133. The MTA found that this alternative satisfies the study purpose, but declined to consider it because, according to the alternatives matrix, the timeframe to implement was “unknown or long implementation (> 10 yrs).” *Id.* at 143. Notably, however, the text concerning Alternative No. 14

¹ The MTA is required by the Sensible Transportation Policy Act (STPA) to evaluate a “full range of reasonable transportation alternatives” to highway construction. See 23 M.R.S. § 73(3)(B). While the STPA does not define the term “reasonable transportation alternative,” the MTA states in its Draft Report that, “[t]o be considered reasonable, strategies need to address the study purpose, be cost effective, and be capable of being implemented within a reasonable time period.” See Report at 2.

indicates that the alternative “can be readily implemented,” and that the timeframe is only an issue with respect to the land use scenario. *Id.* at 133.

The solutions included in Alternative No. 14 offer a suite of actions that the MTA can engage in to address capacity needs, now and in the future. For example, efforts to reduce transportation demand now will help prevent future capacity needs after the widening of the Turnpike. Further, these actions come at little to no cost to the MTA, and will result in positive impacts, both in terms of mitigation of future environmental impacts, and positive public relations. The MTA can implement these and the other actions outlined in Alternative No. 14 in large part by partnering with other entities, including, Zoom, Metro, Concord Coach, municipalities and large employers.

As part of implementing Alternative No. 14, CLF proposes that the MTA create a working group to promote and advance these non-construction solutions. The working group could include state agencies (in particular, the Maine Department of Transportation), municipalities, organizations (in particular, the Greater Portland Council of Governments), transit companies (including Zoom, Metro and Concord Coach), environmental non-governmental organizations, and large employers.

Because it involves increasing transit service and reducing Turnpike demand, Alternative No. 14 will help prevent post-expansion congestion, like that currently being experienced south of Exit 44.² Just 14 years ago, the Turnpike south of Exit 44 was expanded from two to three lanes to address congestion being experienced on that section of the highway. In the intervening time, traffic has increased and congestion has returned. This is a textbook example of induced demand, the well-established principle that adding more lanes to roads does not solve congestion problems; rather, adding more lanes induces more driving, and thus increased congestion, as drivers converge from other modes of transportation, other routes and other times of travel.

Finally, the Greater Portland Council of Governments (GPCOG) and the affiliated Portland Area Comprehensive Transportation System (PACTS) recently expressed support for Alternative No. 14. *See* PACTS Executive Committee August 7, 2018 Agenda, Attachment C.³ As PACTS’ Position states, widening the Turnpike is important for regional mobility, but

[i]mplementing other measures to manage demand, expand bus service, and pursue smart growth land patterns are critical complements to the widening project. Not only are these measures in the best interest of the region’s residents, they are also in the Turnpike’s best interest. Slowing the growth in congestion will preserve the long term capacity of the highway, either fully alleviating the need for further, costly widenings, or, at the very least, pushing that expenditure further into the future.

² Because it will reduce current and future congestion, Alternative No. 14 will reduce greenhouse gas emissions, and will therefore help mitigate the real and immediate impacts of climate change here in Maine, where the transportation sector now accounts for 52% of Maine’s greenhouse gas emissions. *See* Maine Department of Environmental Protection, “Seventh Biennial Report on Progress toward Greenhouse Gas Reduction Goals,” January 2018, available at: <http://www.maine.gov/tools/whatsnew/attach.php?id=778255&an=1>.

³ Available at: https://www.gpcog.org/wp-content/uploads/2018/08/08_07_18-PACTS-ExecComMtgPacket.pdf.



In the event the MTA declines to adopt Alternative No. 14 in its entirety, the MTA should expressly commit to adopting key aspects of Alternative No. 14, in particular partnering with transit-related entities to promote the advancement of new and improved local, regional and interstate transit.

II. The MTA Should Expressly Commit to Performing an Updated Needs Assessment after Completing the First Phase of Widening between Exits 44 and 48.

In its Draft Report, the MTA recommends addressing safety and congestion challenges by adding highway capacity using a phased approach. See Report at 148. More specifically, the MTA recommends two phases of widening, the first between Exits 44 and 48, to be completed by 2025, and the second between Exits 48 and 53, to be completed by 2030.

CLF applauds the MTA for recommending a phased approach to expansion, which will provide the MTA with an opportunity to reexamine capacity needs after the first phase of widening is complete, and avoid any unnecessary widening. An updated assessment in 2025 is also prudent because it is likely that conditions will change over the next seven years. Thus, CLF urges the MTA to expressly commit to an updated needs assessment after phase one is complete, in order to determine whether widening between Exits 48 and 53 is still warranted.

Thank you for your time and attention to these important matters.

Sincerely,

Phelps Turner
Staff Attorney
Conservation Law Foundation
53 Exchange Street, Suite 200
Portland, ME 04101
207-210-6439 x5014
pturner@clf.org

Cc: *By First Class Mail and E-mail:*
Mr. Peter Mills
Executive Director
Maine Turnpike Authority
2360 Congress Street
Portland, ME 04102
pmills@maineturnpike.com

By E-mail:
Erin Courtney, Public Relations, MTA (ecourtney@maineturnpike.com)
Carol Morris, President, Morris Communications (cmorris@morriscomm.net)
Sean Mahoney, Executive Vice President, CLF (smahoney@clf.org)

Ariel Greenlaw

From: Van Note, Bruce A. <bvannote@maineturnpike.com>
Sent: Wednesday, August 22, 2018 8:48 AM
To: 'Carol Morris'; Courtney, Erin T.; Paul Godfrey; Ariel Greenlaw
Subject: Bradbury PAM Conclusions

From: Paul Bradbury [mailto:phb@portlandmaine.gov]
Sent: Tuesday, August 21, 2018 7:08 PM
To: Van Note, Bruce A. <bvannote@maineturnpike.com>
Subject: Re: FW: Update on MTA PAM Process

Good afternoon Bruce,

I appreciated the opportunity to serve on the Maine Turnpike Authority's Public Advisory Committee (PAC) for the Portland Area Mainline Needs Assessment from exit 44 to exit 52. The Portland Area Mainline Needs Assessment (PAM) with the Public Advisory Committee's input provided a comprehensive analysis of alternatives for meeting the mainline turnpike capacity requirements through the forecast year of 2040. This assessment was commenced based on 2016 data showing this section of mainline reached a failing level of service E in both northbound and southbound directions during peak times.

Obviously the availability and level of service of the Maine Turnpike especially within this corridor which includes exit 46 is critical to the Portland International Jetport. The Jetport can't provide a best in class connection to the national and international air transportation system without convenient and efficient roadway access to its campus. The Turnpike's exit 46 is the primary provider of this access. The past two years have seen record passenger growth that has only accelerated through the first half of 2018. The total passenger volume for July 2018 reached 245,375 up 21% over July of 2017. This results in nearly 8,000 passengers a day accessing the Jetport this July.

I provide these numbers to emphasize the growth period we are now experiencing. I have not seen this level of growth at the Jetport since the mid 90s and want to be sure the infrastructure needed to accommodate this capacity is in place. This infrastructure must provide safe and free flowing capacity through our primary road access from the Maine Turnpike at exit 46. The PAC reviewed many alternatives under the PAM, but only one namely ***Alternative 12: Widen Turnpike to three lanes in each direction from Exit 44 to 53*** provides the following:

- Full increase in capacity
- Overall capital funding viability
- Overall O&M funding viability
- A short implementation of less than 5 years
- Allows for the reduction of traffic on I-295
- Can be completed by the Maine Turnpike Authority as the sole implementation agency

I want to be sure these aspects of Alternative 12 are understood and fully recognized. The implementation of this alternative is critical to meeting current capacity needs, which may be under estimated in the short term at the 1.5% annual growth rate used under the PAM assessment.

The Maine Turnpike Authority has the resources and capability to proceed with Alternative 12 now and I believe it is critical to the region that we move forward on its implementation.

I know the Jetport and other agencies support and are ready to assist with other alternatives noted in the assessment including: Alternative 2 - Expanded Transportation Demand Management (TDM), Alternatives 4, 5a, 5b, 5c - Expanding Bus Service, and Alternative 8 - Land Use Planning. I believe these multi-agency efforts are an important part of meeting our 2040 regional goals, but should not be allowed to slow action on Alternative 12.

Again thank you for the opportunity to serve on the PAC and please feel free to contact me if I can provide additional support.

Best,

Paul

Paul H. Bradbury, P.E.

Airport Director

Portland International Jetport

1001 Westbrook Street

Portland, ME 04102

Office: 207-874-8877

Direct: 207-756-8029

email: phb@portlandmaine.gov

website: www.portlandjetport.org



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix B-2: Media Purchased for Portland Area Mainline Needs Assessment Public Meeting

Media Purchased for Portland Area Mainline Needs Assessment Public Meeting – June 7, 2018



THURSDAY, JUNE 7, 4:30-6:30 PM
MAINE MALL/CENTER COURT AREA
(Between H&M and Acropolisale)

The Maine Turnpike Authority invites you to share your thoughts with us as we work to address growing traffic volumes on the Turnpike between Scarborough and Falmouth. We are planning for the future, and we want to know what you think. Come see us at the Maine Mall on June 7th to review the proposed solutions. Or visit www.mainturnpike.com/options to read them online and submit your questions or comments now through June 10th.



maineturnpike.com

Print Advertising

The MTA ran the following print ad in seven weekly papers one week prior to the public meeting:

Biddeford Courier (published Thursday)
South Portland Sentry (published Friday)
Scarborough Leader (published Friday)
Kennebunk Post (published Friday)
The Weekly Sentinel (published Friday)
Yarmouth Shopping Notes (published Tuesday)
Portland Forecaster (published Wednesday)

Digital Advertising

MTA ran digital ads through spectrum digital that targeted 26 zip codes in 4 counties for a total target population of 207,400. Total impressions over 7 day period was 300,000 reaching 75% of target audience a frequency of 2:08 times.



Radio Advertising

MTA ran an “Own the Week” campaign through Portland Radio Group to promote the June 7 public meeting. It included 152 10-second commercials on four radio stations from Friday, June 1 through Thursday, June 7. 38 10-second commercials aired on the following stations: WPOR, WCLZ, WGAN and Coast. Below is the text of the various radio ads that aired:

(Friday to Tuesday) Maine Turnpike Authority wants your feedback on future options to prevent Turnpike traffic congestion in the Portland area. Go to the Maine Mall this Thursday June 7, 4:30-6:30 or go to Maine Turnpike.com.

(Wednesday) Maine Turnpike Authority wants your feedback on future options to prevent Turnpike traffic congestion in the Portland area. Go to the Maine Mall tomorrow June 7, 4:30-6:30 or go to Maine Turnpike.com.

(Thursday) Maine Turnpike Authority wants your feedback on future options to prevent Turnpike traffic congestion in the Portland area. Go to the Maine Mall today, 4:30-6:30 or go to Maine Turnpike.com.

Wayfinder Signs

MTA had four large signs produced that were placed in the Mall Tuesday, June 5 adjacent to where the MTA booth was to be set up on Thursday.

Summary

The MTA spent thousands of dollars to promote this event in addition to advertising the event through press releases, notifications on social media pages and the MTA website. There was also earned media surrounding the event which is outlined in further detail in the accompanying report.





Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix B-3: Media Coverage of Portland Area Mainline Needs Assessment



Media Coverage of Portland Area Mainline Needs Asseement

Online News: 4
TV: 12

Total National Audience: 0
National Media Value: \$0.00
Total Audience: 211,649
Media Value: \$2,377.04

Online News (4, Aud: 42,358, \$35.70)

Default

JUN
7

09:00 PM EST



Maine Turnpike Authority asks for feedback on traffic concerns... 16 hours ago

Maine Turnpike Authority leaders hosted a meeting at the Maine Mall Thursday night, looking for feedback on traffic concerns. (WGME) SOUTH PORTLAND (WGME) – Maine Turnpike Authority leaders hosted a meeting at the Maine Mall Thursday night, looking for feedback on traffic concerns. The MTA is

📍 wgme.com



👤 21,276

\$ 17.33

JUN
7

05:32 PM EST



Maine Turnpike Authority works to address worsening traffic pr... 19 hours ago

Share Shares Updated: 5:29 PM EDT Jun 7, 2018 Hide Transcript Show Transcript WEBVTT HEY, JIM. >> PRETTY MUCH A FOREGONE CONCLUSION. THEY WILL ADD AN EXTRA LANE IN EACH DIRECTION ALONG THAT STRETCH RIGHT NOW THIS A FOUR-LANE HIGHWAY = EXPANDING TO SIX LANES WOULD ONLY BE A FIRST FIRST

📍 wmtw.com



👤 9,705

\$ 8.90

JUN
6

05:17 AM EST



Turnpike widening plan seen at capacity in seven years 2 days ago

Details about a long-planned project to widen the Maine Turnpike between South Portland and Falmouth show that some parts of the heavily traveled highway will exceed capacity within seven years. That information comes from a citizen advisory committee charged with looking at alternatives to ease

📍 sunjournal.com



👤 2,422

\$ 1.67

JUN
6

04:03 AM EST



Dire traffic outlook adds urgency to plan for widening 11 mile... 2 days ago

Memorial Day holiday traffic was heavy on the Maine Turnpike in Portland. A committee that looked at ways to ease congestion concluded that expanding the four-lane highway to six lanes in the 11-mile stretch from South Portland to Falmouth is the only way to fully address the issue. Staff photo by John

📍 pressherald.com



👤 8,955

\$ 7.80

TV (12, Aud: 169,291, \$2,341.34)

Default

JUN
8

05:00 AM EST



Good Day Maine on CBS 13 4 hours ago

TO MOVE AHEAD WITH THE EXPANSION. THE D-H-H-S COMMISSIONER APPEALED THE JUDGE'S RULING YESTERDAY. THE MAINE TURNPIKE AUTHORITY REPORTS TRAFFIC VOLUME HAS JUMPED THREE TO FIVE PERCENT EVERY YEAR. NOW-- STATE OFFICIALS ARE ASKING SHOPPERS AT THE MAINE MALL FOR ADVICE. LAST

📍 Portland-Auburn



👤 5,242

\$ 39.80 (E)



JUN
8

05:00 AM EST



Good Day Maine on CBS 13 4 hours ago

TO CREATE A PLAN FOR MEDICAID EXPANSION-- AND HOW LONG HE HAS, AS HE CHALLENGES THE DECISION. CURBING CONGESTION ON THE MAINE TURNPIKE. WHY HIGHWAY OFFICIALS ARE TURNING TO THE PEOPLE FOR ADVICE ON WHAT TO DO-- AND HOW LONG YOU HAVE TO COMMENT. MORE ON THOSE STORIES COMING UP... BUT

📍 Portland-Auburn



👤 5,242

\$ 39.80 (E)



JUN
8

04:00 AM EST



CBS Morning News 5 hours ago

really appreciating with this proposal is the mixture of uses.'mp;quot; NEXT-- RESIDENTS WILL HAVE A CHANCE TO WEIGH IN ON THE PROJECT. THE MAINE TURNPIKE AUTHORITY REPORTS THE AMOUNT OF TURNPIKE TRAFFIC HAS JUMPED THREE TO FIVE PERCENT EACH YEAR-- AND NOW, STATE OFFICIALS ARE ASKING
































































📍 Portland-Auburn



👤 2,903

\$ 22.04 (E)



| | | |
|--|---|---|
| <div>JUN 8</div> <div>01:00 AM EST</div> | <div>  The Late Late Show With James Corden 8 hours ago </div> <div> <p>A MEETING ON MAKING THE TURNPIKE BETTER. THE MAINE TURNPIKE AUTHORITY WAS AT THE MAINE MEETING ON MAKING THE TURNPIKE BETTER THE TURNPIKE AUTHORITY WAS AT THE MAINE MALL TODAY ASKING SHOPPERS TO BECOME SUPERVISORS.</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  3,302 </div> <div>  \$ 56.18 (E) </div> </div> |  |
| <div>JUN 7</div> <div>11:00 PM EST</div> | <div>  CBS 13 News at 11 10 hours ago </div> <div> <p>TURNPIKE BETTER. THE MAINE TURNPIKE AUTHORITY WAS AT THE MAINE MEETING ON MAKING THE TURNPIKE BETTER THE TURNPIKE AUTHORITY WAS AT THE MAINE MALL TODAY ASKING SHOPPERS TO BECOME SUPERVISORS.</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  26,485 </div> <div>  \$ 521.26 (E) </div> </div> |  |
| <div>JUN 7</div> <div>10:00 PM EST</div> | <div>  FOX23 News at Ten 11 hours ago </div> <div> <p>WE'apos;LL KEEP YOU POSTED AS THE STORY DEVELOPS IN THE DAYS AHEAD. 'mp;gt;'mp;gt; A MEETING ON MAKING THE TURNPIKE BETTER. THE MAINE TURNPIKE AUTHORITY WAS THE MAINE MALL ASKING SHOPPERS TO BECOME SUPERVISORS. DAN McCARTHY IS REPORTING LIVE ON THE STEPS THEY ARE TRYING TO ADDRESS</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  17,646 </div> <div>  \$ 347.30 (E) </div> </div> |  |
| <div>JUN 7</div> <div>07:00 PM EST</div> | <div>  CBS 13 News at 7 14 hours ago </div> <div> <p>PORTLAND-AREA SECTION OF THE DAN. 'mp;gt;'mp;gt; Reporter: GREGG IT WAS ESSENTIALLY ONE STOP SHOPPING TONIGHT FOR THE MAINE TURNPIKE AUTHORITY AS I SPOKE TO SOME OF THE SHOPPERS WHO ARE MAKING THEIR WAY INTO THE MAIN MALL THIS EVENING TO TALK ABOUT SOME OF THE TRAFFIC CONCERNS ON THE</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  32,103 </div> <div>  \$ 631.83 (E) </div> </div> |  |
| <div>JUN 7</div> <div>06:00 PM EST</div> | <div>  CBS 13 News at Six 15 hours ago </div> <div> <p>THAT'apos;S WHAT WE ARE THINKING AT THIS POINT. THAT IS A LOOK AT YOUR FORECAST. 'mp;gt;'mp;gt; Anchor: THANKS SO MUCH. HAPPENING RIGHT NOW THE MAINE TURNPIKE AUTHORITY LOOKING TO THE PUBLIC FOR IDEAS TO EASE TRAFFIC ON ONE OF THE BUSIES STRETCHES. FOCUS ON THE PORTLAND AREA SECTION</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  29,753 </div> <div>  \$ 267.69 (E) </div> </div> |  |
| <div>JUN 7</div> <div>05:00 PM EST</div> | <div>  CBS 13 News Live at Five 16 hours ago </div> <div> <p>'mp;gt;'mp;gt; Dan: THAT'apos;S RIGHT. FOR THE PASSED HOUR OR SO SHOPPERS HAVE BEEN STOPPING IN TO THIS SECTION OF THE MAINE MALL IN SOUTH PORTLAND TO SPEAK WITH MAINE TURNPIKE AUTHORITY. AS YOU CAN SEE BEHIND ME THERE ARE A LOT OF OPTIONS TO CHOOSE FROM AS THEY TRY TO SETTLE CONGESTION</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  20,591 </div> <div>  \$ 185.26 (E) </div> </div> |  |
| <div>JUN 7</div> <div>05:00 PM EST</div> | <div>  WMTW News 8 @ 5 16 hours ago </div> <div> <p>STEVE: IMAGINE STAND-STILL TRAFFIC ALONG EVERY EXIT FROM SCARBOROUGH TO FALMOUTH DURING RUSH HOUR. MEGHAN: THE MAINE TURNPIKE AUTHORITY SAYS ITS PLANNING NOW WHAT TO DO ABOUT TRAFFIC CONGESTION SO THAT DOESN'apos;T HAPPEN IN THE FUTURE. WMTW NEWS 8'apos;S JIM KEITHLEY IS LIVE ALONG THE</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  14,303 </div> <div>  \$ 128.69 (E) </div> </div> |  |
| <div>JUN 7</div> <div>04:00 PM EST</div> | <div>  WMTW News 8 @ 4 17 hours ago </div> <div> <p>EXITS DURING RUSH HOUR. THAT IS WHAT WILL HAPPEN THEY SAY IF SOMETHING IS NOT DONE. ADDING AN EXTRA LANE IN BOTH DIRECTIONS WOULD HELP A LOT, THE MAINE TURNPIKE AUTHORITY SAYS THAT WILL ONLY HELP SO MUCH AND THEY NEED TO COLLABORATE WITH BUS SERVICES. PROMOTING WHITE -- RIDESHARING PROGRAMS. THEY NEED</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  8,896 </div> <div>  \$ 80.04 (E) </div> </div> |  |
| <div>JUN 7</div> <div>04:00 AM EST</div> | <div>  CBS Morning News 1 day ago </div> <div> <p>THE TOPIC WILL LIKELY HAVE TO WAIT UNTIL THE FALL-- WHILE THEY RESEARCH THE GUN RULES IN NEIGHBORING TOWNS. TODAY THE MAINE TURNPIKE AUTHORITY IS HOLDING ANOTHER PUBLIC MEETING ABOUT CONGESTION ON THE PORTLAND STRETCH OF THE TURNPIKE-- STRETCHING FROM SCARBOROUGH TO FALMOUTH. THE M-T-A</p> </div> <div> <div>  Portland-Auburn </div> <div>   </div> <div>  2,825 </div> <div>  \$ 21.45 (E) </div> </div> |  |



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C: Working Papers

HNTB Corporation

July 2018



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C-1: Autonomous Vehicles – Working Paper #1



Autonomous Vehicles: Working Paper #1

A Summary of Current Conditions and their Implications for
Transportation Planning



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1. Overview

Each day brings fresh news regarding the advent of Autonomous Vehicles (AV's). Automobile manufacturers are teaming with Artificial Intelligence (AI) firms to hasten production of AV's. Newcomers to the auto industry such as Google and Apple are rapidly developing self-driving technology. Transport service providers such as Uber are testing AV deployments even as they reevaluate their business models for the future. And transportation planners are beginning to consider how their future networks may be impacted by an influx of vehicles that no longer need drivers.

The purpose of this white paper is to provide the Maine Turnpike Authority and others with professional insight regarding the implications of AV's on the transportation planning process. The paper will proceed in the following manner:

- 2 will provide an overview of AV's and their current place in today's transportation system.
- 3 will discuss the potential impact of AV's on roadway capacity.
- 4 will address the likely impact of AV's on vehicle-miles traveled on the transportation network.
- 5 will briefly summarize the "State of the Practice" with respect to long-range planning for AV's.
- 6 will survey the literature to lay out some potential timeframes for AV deployment.
- Finally, **Error! Reference source not found.** will draw conclusions from the analysis with specific application to the Maine Turnpike Authority's planning processes.

2. Automated Vehicles: A Present-Day Snapshot

Although the term "Autonomous Vehicle" is used very broadly, the National Highway Traffic Safety Administration (NHTSA) has actually defined five distinct levels of vehicle automation. These levels attempt to quantify automation along a continuum. They are widely referenced in the AV literature and are pertinent to understanding the likely progression of AV technology as it is rolled out to the public.

The five levels defined by NHTSA are as follows:

- **Level 0 – No Automation.** At this level, the driver is in sole and complete control of all primary vehicle functions (steering, brakes, and acceleration).
- **Level 1 – Function-Specific Automation.** Level 1 automation incorporates one or more control functions that operate independently of each other. This would include functions such as pre-charged brakes that are designed to apply full-braking power when (a) the driver touches the brakes, however lightly, and (b) the vehicle senses a collision is likely to occur.
- **Level 2 – Combined-Function Automation.** This level involves automation of two or more primary control functions that work together to relieve the driver of specific responsibilities. An example would be adaptive cruise control coupled with lane centering, whose functions automate the tasks of both acceleration/deceleration and steering.
- **Level 3 – Limited Self-Driving Automation.** This level of automation enables the driver to relinquish virtually all driving functions under certain traffic or environmental conditions. The vehicle continuously monitors conditions and will alert the driver if the vehicle needs to transition

back to human control. Humans are expected to be present and ready to take control (with sufficient transition time) if alerted by the vehicle.

- **Level 4 – Full Self-Driving Automation.** Level 4 automation cedes all driving functions to the vehicle, which monitors roadway conditions and maintains control for the entire trip. This would include both occupied and unoccupied travel. Human input is limited to providing destination input; drivers are not expected to be available to assume control at any point of the trip.

The Society of Automotive Engineers (SAE) goes on to add a distinction between Level 4 and Level 5 automation. According to SAE, Level 4 automation would provide the capability for the vehicle to cede control to a human driver in certain conditions. However, the vehicle would have the backup capability to exit the roadway and safely stop if the human was unable to respond in a timely manner. Under the SAE's "Level 5 automation" definition, the vehicle would be completely responsible for all operations under all roadway and environmental conditions.

It is helpful to think of the levels of automation in terms of responsibility for monitoring the driving environment. For levels 0 through 2, the human driver is responsible, supplemented (to increasing degrees) by the automobile. For level 3 and beyond, the AV system is responsible for monitoring the driving environment, with various levels of backup responsibility delegated to on-board passengers.

The most advanced level of automation in use today is Level 3. The Uber self-driving taxi tests in Tempe (Arizona) and Pittsburgh, as well as the Google self-driving car project (now referred to as "Waymo"), are examples of Level 3 automation. All AV testing on public roads in the United States involves having a driver present in the vehicle. As of February 2018, no states have authorized unoccupied vehicles to be operated on public roads.

Autonomous vehicles were envisioned as far back as 1939, when GM presented an exhibit at the World's Fair (entitled *Futurama*) predicting a future automated highway system.¹ Up until the late 90's, the prevailing concept of an automated highway rested on intelligent infrastructure guiding AV's. A successful test of "driverless vehicles" in 1997 on I-15 in San Diego relied on magnets embedded in the roadway that were read by vehicular sensors connected to an on-board computer. This concept was predicated on the assumptions that additional protective measures would be taken to protect the roads from sudden incursions (e.g. animals unexpectedly dashing in front of a vehicle).

However, the past 20 years have seen a move toward automation that is driven more by vehicle-mounted sensors that do **not** require communication with roadside infrastructure. Rather, the sensors feed the onboard computer which autonomously makes decisions regarding speed and direction. Numerous auto manufacturers are aggressively moving forward with AV development on this model. Some examples of ongoing and planned AV deployments include the following:

- In 2017, Tesla rolled out an "Enhanced Autopilot" option on all its vehicles. This option provides adaptive cruise control, forward collision warning, auto-steer, and self-parking (in certain conditions). Additional features (e.g. automatic lane changing and connecting between freeways) will be rolled out over time via software updates.² This existing system is considered to operate somewhere between Level 2 and Level 3 automation.

¹ Anderson, James et al. *Autonomous Vehicle Technology: A Guide for Policymakers*. Rand Corporation (2016), pg. 29.

² <http://www.businessinsider.com/tesla-enhanced-autopilot-system-self-driving-features-2017-6/>

- General Motors has filed a Safety Petition with the U. S. Department of Transportation for its self-driving “Cruise AV,” a vehicle purported to be “the first production-ready vehicle built from the start to operate safely on its own, with no driver, steering wheel, pedals or manual controls.” GM has asked permission to start safely deploying the vehicle in 2019.³
- Bloomberg and the Wall Street Journal have both reported that Apple is seeking to roll out a self-driving electric car by 2020, although Apple has not confirmed these reports. Apple CEO Tim Cook has stated only that Apple is “focusing on autonomous systems.”⁴
- Ford Motor Company has partnered with Argo AI to develop a virtual driver system for Ford’s first fully autonomous vehicle, scheduled to roll out in 2021.⁵
- Reuters reports that Uber has established a non-binding deal with Volvo to purchase up to 24,000 self-driving cars.⁶ The self-driving system to be deployed in the Volvo vehicles is under development by Uber’s Advanced Technology Group. The system has been tested extensively during self-driving experiments in Tempe and Pittsburgh.

Self-driving technology has also made advances in the realm of trucks. For example:

- In October 2016, in a test run performed in the state of Colorado, a self-driving truck delivered 2,000 cases of Budweiser from Fort Collins to Colorado Springs—a journey of about 130 miles.⁷ The interstate portion of the journey conducted with no assistance from the driver. However, a car drove ahead of the truck to ensure the travel lane was free, and the truck was surrounded by the Colorado State Patrol.
- In the state of Nevada, Daimler’s *Freightliner Inspiration Truck* has been approved for autonomous driving on public highways. However, as a safety precaution, a driver still needs to be behind the wheel.

These developments make it clear that autonomous driving is at the forefront of a great deal of research, development, and testing. Moreover, these developments involve more than just the traditional automakers, but also involve experts in the realms of computer software and artificial intelligence. Nevertheless, no unoccupied vehicles are operating on the road today. Level 3 autonomy represents the most advanced stage of development on America’s highways at present.

3. Impact of AV’s on Roadway Capacity

The expectation for AV’s is that they have the potential to enhance roadway capacity. In other words, AV technology is widely expected to enable more vehicles to use the road during peak periods. The capacity improvements are the results of the following potential changes:

³ <http://www.gm.com/mol/m-2018-jan-0112-cruise-av.html>

⁴ <https://www.macworld.co.uk/news/apple/apple-car-release-date-rumours-3425394/>

⁵ <https://medium.com/self-driven/why-we-created-argo-ai-aa3f43ebefb6>

⁶ <https://www.reuters.com/article/us-volvocars-uber/volvo-cars-to-supply-uber-with-up-to-24000-self-driving-cars-idUSKBN1DK1NH>

⁷ <https://www.technologyreview.com/s/603493/10-breakthrough-technologies-2017-self-driving-trucks/>

- **Platooning on highways.** AV's could potentially increase freeway capacity by traveling closer together at higher speeds. The State Smart Transportation Institute cites studies suggesting that roadway capacity could double as AV's come to dominate the vehicle fleet.⁸
- **Denser and more responsive flow through intersections.** AV technology deployed at signalized intersections could move vehicles through traffic signals with greater density and with less response time. This would potentially increase traffic signal throughput and reduce delays.
- **Fewer accidents.** The Federal Highway Administration (FHWA) estimates that fully 25% of roadway congestion is related to non-recurring traffic incidents ranging from a flat tire to a multi-car collision.⁹ Further, studies suggest that approximately 90% of motor vehicle incidents are caused, at least in part, by human error.¹⁰ If AV technology were to virtually eliminate "human error," then the number of accidents could be reduced by up to 90% and roadway congestion would subsequently be reduced by over 20%.
- **Narrower lanes.** Lane-centering technology has the potential to more precisely locate vehicles within designated lanes. Consequently, travel lanes in the future could potentially be narrower. The ability to provide more lanes within a given width of pavement also represents added capacity.

Clearly, AV technology holds great promise for improving the ability of the existing transportation network to serve rush-hour traffic. However, these predictions for benefits to roadway capacity should be viewed with a measure of caution for the following reasons:

- **Market penetration.** For the highway capacity improvements to be realized, the market penetration of AV's will need to be sufficiently high (likely 50% or greater) to justify the designation of dedicated AV lanes. For the intersection improvements to be realized, AV's will likely need to comprise 95% or more of the vehicle fleet.¹¹ Such levels of market penetration are likely decades away.¹²
- **Required infrastructure.** As noted above, the improvements in highway capacity will depend on the designation of "AV Only" lanes. The improvements in intersection capacity will likely require vehicle-to-infrastructure communication with the traffic signal controllers. Such infrastructure modifications will require substantial planning, analysis, and investment. Moreover, these improvement to highways and traffic signals will be of limited value unless the local roadway network is sufficient to handle the surge in peak-period throughput.
- **Safety offsets.** While AV technology has the potential to reduce or eliminate the contribution of "human error" to traffic accidents, there are other ways in which AV technology could *compromise* safety. These so-called "safety offsets" include the following:
 - The potential for hardware and software failures;
 - The potential for malicious hacking into AV systems;
 - The likelihood that improvements in safety will ultimately yield increased risk-taking by drivers, sometimes referred to as "offsetting behavior" or "risk compensation"; and

⁸ <https://www.ssti.us/2016/12/automated-vehicles-will-bring-big-highway-capacity-increases/>

⁹ https://ops.fhwa.dot.gov/program_areas/reduce-non-cong.htm

¹⁰ Multiple traffic safety studies identified via hyperlink at the following site:

<http://cyberlaw.stanford.edu/blog/2013/12/human-error-cause-vehicle-crashes>

¹¹ Eno Center for Transportation. *Preparing a Nation for Autonomous Vehicles*. October 2013. Available on-line at <https://www.enotrans.org/>.

¹² A survey of possible timelines for deployment will be presented in 6.

- The potential for increased hazards in situations in which human-driven vehicles are mixed in with autonomous vehicles driving in high-speed platoons.

The bottom line with respect to AV's and roadway capacity is: Don't expect too much, too soon. The improvements are contingent on (a) achieving a high market share of fully-autonomous vehicles (recognizing the current market share is 0.0%), and (b) providing some measure of infrastructure to prioritize AV traffic flow. This will require considerable time and planning. The benefits are likely to be very small during the initial stages as the nation adapts to a mix of AV's and human-driven vehicles.

4. Impact of AV's on Vehicle-Miles Traveled (VMT)

The advent of autonomous vehicles promises to dramatically change the way in which people use the roadway network. Some of these changes will tend to diminish the mileage that one drives, while others will have the opposite effect. This section will summarize the various ways in which AVs are likely to impact VMT and will attempt to draw some preliminary conclusions regarding the extent to which VMT is likely to change.

4.1 Factors tending to reduce VMT

The primary characteristic of AV's that is likely to reduce VMT is *reduced vehicle ownership*. Based on the assumption that possession of fewer vehicles will lead families to undertake driving less frequently, there are two ways in which the advent of AV's is likely to reduce vehicle ownership:

- **Costs.** Particularly in the early stages of deployment, AV's will be extremely expensive. Estimates of the exact cost vary wildly since the technology is still in a developmental phase. A single sensor component being employed by Waymo¹³ is stated to cost approximately \$7,500.¹⁴ When this cost is added to hardware, software, and research and development costs, it is very possible that the self-driving capability *alone* will initially add \$25,000 to the cost of a vehicle.¹⁵ It is likely that some families will choose to have fewer vehicles to mitigate the price increase.
- **Ridesharing capability.** Self-driving capability means that one vehicle could serve multiple people throughout the day. For example, depending on family schedules, one AV could conceivably transport both parents to work and still get the kids to school. Or a family that doesn't need its AV during the daytime hours could share it with a neighbor who has a need for mid-day mobility. Research noted by the Eno Center for Transportation found that "a single shared AV could replace between nine and thirteen privately owned or household-owned vehicles, without compromising current travel patterns."¹⁶ Depending on the extent to which drivers are willing to share rides, AV's could clearly support a lifestyle with lower vehicle ownership.

Additionally, VMT in urban settings may be reduced slightly due to more efficient travel. Trips that today may involve extensive cruising in search of a parking space could be replaced by a shorter trip in which an AV delivers its occupant to the destination, followed by a trip to a designated AV parking area.¹⁷ However,

¹³ Waymo is a sister company of Google, both of which fall under the holding group *Alphabet*. In December 2016, Waymo assumed control of the effort that began as Google's driverless car project.

¹⁴ <http://www.businessinsider.com/googles-waymo-reduces-lidar-cost-90-in-effort-to-scale-self-driving-cars-2017-1>

¹⁵ A court filing in Waymo's lawsuit against Uber revealed that Google alone has spent \$1.1 billion in the development of software and hardware for AV's. Such massive outlays will need to be recovered by the eventual purchase price of AV's when they come to market.

¹⁶ Eno, pg. 7.

¹⁷ Litman, Todd. *Autonomous Vehicle Implementation Predictions*. Victoria Transport Policy Institute, December 2017, pg. 13.

such VMT reductions are likely to be minor, and are certainly speculative at this early stage in the transportation planning process.

4.2 Factors tending to increase VMT

In contrast to the small number of AV-related factors that will tend to drive VMT downward, there are many factors associated with self-driving vehicles that will apply upward pressure to VMT. Some of the more prominent factors are discussed below.

- **Serving the underserved.** AV's will provide new mobility options for people that are underserved today—namely, underage drivers and the elderly. Pent-up demand from these groups that are largely unable to drive themselves will tend to generate more VMT. Analysis performed by KPMG suggests that this factor alone could boost VMT by more than 15%.¹⁸
- **Empty trips.** Although ridesharing may tend to reduce vehicle ownership, it will also create a new phenomenon—empty trips. Vehicles that serve multiple people throughout the day will necessarily spend some portion of the day traveling empty, during intervals between dropping off one occupant and picking up a new occupant. Modeling performed by the Eno Center for Transportation suggests that 10-13% of all travel with an AV fleet will be empty.¹⁹ This will tend to increase VMT.
- **Potential transit changes.** If AV taxis tend to replace conventional mass transit on a broad scale, the result will be greater VMT.
- **Lower “productivity cost.”** One deterrent against driving today is the cost in productivity of being behind the wheel—a cost that escalates when stuck in traffic. AV's help to diminish this “productivity cost” by enabling drivers to work during their trip. By reducing part of the cost of driving, AV's could encourage *more* driving and thus push VMT upward.
- **Suburban growth.** In the long term, a reduction in the productivity cost of driving could end up encouraging greater development in suburbs and exurbs. A more dispersed land use pattern would tend to increase VMT.

Most experts seem to suggest that AV's will have a net effect of *increasing* VMT. The VMT-suppressing effects of reduced vehicle ownership will likely be more than offset by the addition of empty trips as well as the addition of trips serving underage drivers and the elderly. And unless proactive measures such as road pricing and land use management are implemented, the sudden bump in in-vehicle productivity will likely encourage more driving and more dispersed settlement.

At this juncture, there is no consensus on whether the AV-related improvements to capacity will be sufficient to offset the anticipated growth in VMT. As the Rand report notes, “...the overall effect of AV technology on congestion is uncertain.”²⁰

¹⁸ KPMG estimated that providing mobility to the underage and the elderly would boost overall VMT by 500 billion. The analysis used 2014 as a baseline, in which nationwide VMT was 3.0 trillion. See KPMG's document entitled *The Clockspeed Dilemma* (November 2015), available on-line at <https://assets.kpmg.com/content/dam/kpmg/pdf/2016/04/auto-clockspeed-dilemma.pdf>

¹⁹ Eno, pg. 18.

²⁰ Anderson, pg. 15.

5. AV's and the State of the Practice of Transportation Planning

The development of autonomous vehicle technology is fast-moving, and many of the implications of the technology are still uncertain. Some of the questions that currently cloud the transportation planning process include:

- Will AV technology ultimately increase congestion? Or will it reduce congestion?
- How readily will people adopt vehicle sharing and ridesharing?
- How long will it take for the technology to become affordable?
- How long will it take for AV's to be fully authorized for travel throughout the United States?

While there is general acceptance that widespread deployment of AV's is forthcoming, uncertainty remains concerning the timing and the implications of that deployment. As a result, AV planning efforts have lagged AV technology development. Generally speaking, transportation planning is advancing on three fronts: the public sector, the private sector, and transportation consultants. Some examples of activities occurring on each of these three fronts are summarized in the subsections that follow.

5.1 Transportation Planning & the Public Sector

The uncertainty noted above has meant that public sector agencies and officials are moving forward slowly. Some examples of public sector action include:

- The Colorado Department of Transportation (CDOT) recently announced their intent to add capacity to C-470 south of I-70, on the west side of Denver. The new capacity would initially be in the form of express lanes that would be available for drivers willing to pay a toll. However, the CDOT project manager, Ben Davis, noted that one of the express lanes could be designated as an AV lane at some point in the future. Davis further noted that this was the first time that automated vehicles had been explicitly mentioned in any of CDOT's formal planning documents.²¹
- Randy Iwalski, Executive Director of the Contra Costa County Transportation Authority, stated in a presentation that his agency was now using 3,200 vehicles per hour per lane (vphpl) as a rule of thumb for freeway planning in the future. This represents an increase of 60% over the more traditional figure of 2,000 vphpl, accounting for his agency's estimate of the capacity-related improvements that may be associated with AV technology.²²
- Currently, about 21 states have passed legislation related to autonomous vehicles.²³ In some instances, the legislation was simply a matter defining terms such as "fully autonomous vehicle" and "automated driving system." In other instances, states provided more far-reaching support for the testing of autonomous vehicles, subject to certain safety standards (e.g. requiring a driver behind the wheel during testing on public roads). States like Arizona, Nevada, and Pennsylvania have been at the forefront in facilitating testing by tech giants such as Uber and Waymo.²⁴ At the other end of the spectrum, approximately 20 states, have taken no legislative action whatsoever regarding AV's.²⁵

²¹ <http://www.govtech.com/fs/infrastructure/AV-Lanes-Could-Play-into-Colorados-Traffic-Reduction-Plans.html>

²² <https://www.ssti.us/2016/12/automated-vehicles-will-bring-big-highway-capacity-increases/>

²³ <http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx>

²⁴ Waymo was formerly known as 'the Google self-driving car project'.

²⁵ <https://www.autoinsurance.org/which-states-allow-automated-vehicles-to-drive-on-the-road/>, accessed 1/30/18.

Involvement at the public sector level has primarily been involved with establishing a legal framework for deploying and testing autonomous vehicles. Beyond that, agencies are opting to take limited preliminary steps in integrating AV's into the planning process.

5.2 Transportation Planning & the Private Sector

While public sector action has been measured and cautious, private sector input to the transportation planning process has been far more aggressive. A brief industry survey found that, in some cases, entities with a financial stake in the advancement of AV technology were acting as strong advocates for proactive planning in support of AV deployment. For example:

- The Madrona Venture Group, a venture capital firm with headquarters in Seattle, recently released a “vision paper” recommending an aggressively-phased conversion of I-5 to “all autonomous.” The paper recommended that transportation planners in the Seattle-Vancouver region implement the following steps on the I-5 corridor between the two cities:
 - Immediately allow vehicles with Level 3 autonomy (or higher) to use the existing HOV lanes;
 - By 2025 (or earlier if a tipping point has been reached), allocate a dedicated lane for autonomous vehicles;
 - By 2030, limit non-autonomous vehicles to a single lane; and
 - By 2040, restrict usage by non-autonomous vehicles to certain time periods—typically during weekends and overnight periods.
- In Wisconsin, officials with Foxconn Technology Group have been strongly advocating the planned deployment of AV-related infrastructure in the vicinity of its planned 500-acre facility in Mount Pleasant, Wisconsin. Foxconn has advocated the provision of a dedicated AV lane on I-94 running between Milwaukee's Mitchell International Airport and the factory (a distance of roughly 20 miles) to facilitate the movement of cargo. The company has also revealed plans for employees to park in lots on the west side of I-94, with AV's ferrying employees from these lots to one of the two planned campuses. The Wisconsin Department of Transportation (WisDOT) has stated that it is “strongly committed” to supporting upgrades that would facilitate the movement of autonomous vehicles in the region.²⁶

These two instances suggest that AV planning will be driven, in part, by powerful private sector entities with a financial stake in the successful deployment of AV technology. Large corporations like Foxconn that provide jobs for literally tens of thousands of residents can have enormous influence in the planning process.

5.3 Transportation Planning & Consultants

Much of the AV-related literature stems from consultants and “think tanks” such as the Rand Corporation, the Victoria Transport Policy Institute, the Eno Center for Transportation, the Reason Foundation, and various academic institutions. These entities can be expected to scan industry developments and advise public sector agencies regarding how to be both prudent and proactive in guiding the deployment of AV technology.

²⁶ <https://www.jsonline.com/story/news/politics/2017/12/08/foxconn-wants-use-driverless-vehicles-move-thousands-employees-racine-county/931773001/>, accessed January 2018.

Some of the common themes cited in a survey of literature from various consultant groups are cited below.

Planning should be sequential and gradual. The Victoria Transport Policy Institute (VTPI) has laid out a template for AV planning whose broad strokes are shared by many others. The template suggests that AV planning should follow this general progression:²⁷

1. Clear the legal barriers to support initial AV deployments.
2. Develop a framework for testing AV performance.
3. Evaluate the costs and benefits of AV technology under actual operating conditions.
4. Study and, if appropriate, support specific AV applications requiring minimal modification to infrastructure (e.g. demand response services).
5. Make progressive changes if AV's prove to be both effective and common. A progressive series of changes could include:
 - Dedicating highway lanes to AV use;
 - Making modifications to roadway design criteria; and
 - Imposing restrictions on human driving.

In short, the sequence laid out by VTPI proposes to deploy and test AV technology, verify the benefits, and make changes as necessary to take advantage of the benefits. The key takeaway is that public sector agencies should be hesitant to make substantial changes before the technology has proven to be beneficial through both *observed behavior* and *widespread acceptance*.

Broad deployment of AV technology could take a while. Many consultants warn that it will take some time for the vehicle fleet to reflect a high share of AV's. For example, VTPI asserts that two conditions would need to be met in order for AV's to comprise a majority of the vehicle fleet by 2035:

- Most new vehicle purchases after 2025 would need to be autonomous; and
- New vehicle purchase rates would need to triple. This means that many low- and middle-income people that currently purchase used vehicles would instead need to choose to spend significantly more to purchase a new vehicle.²⁸

In other words, for AV's to make up a majority of vehicles by 2035, they would need to be affordable to most people within the next seven years, and they would need to be so attractive that they would generate new vehicle purchases at unprecedented rates. Even if both conditions were met—a situation viewed by VTPI as very unlikely²⁹—nearly half the fleet in 2035 would still be human-driven. So even though it is important for agencies to think through the implications of AV deployment, there is time to respond to the new technology with thoughtful deliberation.

Think about land use and road pricing. With the productivity cost of driving going down, it is virtually inevitable that, all else being equal, people will choose to drive more. This could create a near-term boost in travel and long-term population shifts away from densely settled population centers. If suburban sprawl

²⁷ Litman, pg. 24.

²⁸ Litman, pg. 20.

²⁹ VTPI projects that the vehicle fleet will be approximately 20% autonomous in 2035 (Litman, pg. 20).

is a concern, then some combination of road pricing and land use policies will eventually be required to curtail the unintended consequences of “productive driving.”

Some planning challenges are coming into focus. While the exact nature of the changes to be wrought by AV’s is still fuzzy, some upcoming tasks are becoming clear. Engineers and planners will need to consider the following in the years to come:

- *Exclusive lane designation.* Engineers will need to begin identifying the point at which it makes sense to dedicate lanes to AV’s. This will require making decisions regarding the level of service that should be maintained for non-AV’s. Who should be given priority when allocating infrastructure, AV’s or non-AV’s? This is the sort of question that transportation professionals will likely need to grapple with in years ahead.
- *Regional model updates.* The nature of trip-making will change when AV’s become a more prevalent portion of the vehicle fleet. The advent of empty trips (e.g. cruising between one drop-off and a subsequent pick-up), the addition of new trips (primarily related to underserved populations such as underage drivers and the elderly), and changes in parking patterns will combine to alter prevailing transportation patterns. As a result, planners will need to continually monitor evolving trends in order to keep regional models current and relevant.
- *Consistency in signing.* The Rand report provided the following short-term recommendation for State DOT’s: “Require stricter conformance to road signing requirements, particularly those that involve construction or some alteration to the roadway. This would both aid human drivers and ease some of the perception requirements for AV’s.”³⁰ Testing has consistently revealed that AV’s have had some of their most challenging passages through traffic incidents and work zones. The more uniform the implementation of traffic control measures in such instances, the greater the likelihood of successful AV navigation.

The imminent growth of AV’s portends changes in infrastructure. However, as VTPI notes, “To be prudent, such infrastructure changes should only occur after autonomous vehicle benefits, affordability and public acceptance are fully demonstrated.” Planners should be vigilant but not hasty.

All signs point to caution. At this point, the only certainty with respect to autonomous vehicles is that the technology is advancing rapidly in the wake of billions of dollars spent in research and development. The pace with which the technology will roll out and be embraced by the traveling public, as well as the ramifications of this technology for the world of transportation, are still clouded in uncertainty.

Therefore, most advisors are suggesting cautious moves for public sector agencies. As the Rand report notes, “at this point, aggressive policymaker intervention is premature and would probably do more harm than good.”³¹

6. Possible Timeframe for AV Deployment

A review of the literature suggests that the timeframe during which AV’s will penetrate America’s vehicle fleet will be better measured in *decades* than *years*. The subsections that follow present four key factors that will combine to prolong the deployment of autonomous vehicles.

³⁰ Anderson, pg. 21.

³¹ Anderson, pg. 24.

Factor #1 – More Technological Progress Is Needed

The Victoria Transport Policy Institute report cites several authorities that warn against an overly-ambitious view of the rapid deployment of fully autonomous vehicles.³² According to this report:

- Artificial intelligence expert Yoshua Bengio has stated, “I think people underestimate how much basic science still needs to be done before these cars or such systems will be able to anticipate the kinds of unusual, dangerous situations that can happen on the road.”
- Raquel Urtasun, director of Uber’s self-driving vehicle lab, said, “Having self-driving cars at a smaller scale, on a small set of roads, we are fairly close. To see at an Uber scale we are far...Nobody has a solution to self-driving cars that is reliable and safe enough to work everywhere.”
- Gill Pratt, CEO of the Toyota Research Institute, has stated that autonomous driving “is a wonderful goal, but none of us in the automobile or IT industries are close to achieving true Level 5 autonomy.”
- Huei Peng, director of the Michigan Mobility Transformation Center, said that “it may be decades before a vehicle can drive itself safely at any speed on any road in any weather.”

In short, AV technology is still years away from being able to handle “exceptional” conditions that, while rare, are nevertheless an integral part of achieving true Level 5 autonomy.

Factor #2 – Lessons from History

History suggests that major automotive innovations can take decades to become commonplace. For example:

- *Automatic transmissions.* The first automatic transmission was introduced in 1940 model year vehicles. However, they were not both consistently reliable and affordable in North America until the 1980’s.
- *Air bags.* Ford and General Motors began to offer cars equipped with air bags in the early 1970’s. However, air bags did not become commonplace in American cars until the 1990’s.
- *In-vehicle navigation.* The first in-vehicle navigation systems rolled out in the early 1980’s. However, their growth was initially very slow. Two events (spaced years apart) helped to open in-vehicle navigation to the traveling public. First, in 2000, President Clinton signed a bill ordering the military to cease the scrambling of GPS signals used by civilians. This provided for the *availability* of highly-reliable positioning data. Second, the smartphone revolution that began in 2007 with the first release of the iPhone provided a means of delivering the now-available GPS data to the masses. Today, it is likely that over 80% of drivers have in-vehicle navigation at their fingertips via the smartphone.
- *Hybrids.* Hybrids are an example of technology that showed initial promise yet grew slowly. In fact, hybrids today appear to be in decline. The first commercially-available hybrids were available in 1997. Their market share reached a peak of 3.3% in 2012, when fuel prices were flirting with all-time highs. However, the combined effects of declining fuel prices and growth in electric vehicles have caused hybrids to decline to a market share of about 2%.³³

³² Litman, pg. 17.

³³ Litman (pp. 18-19) discusses various technologies and deployment timeframes.

As the examples above illustrate, even the fastest-moving advances have taken 20 years or more to become commonplace. Factors that contribute to a longer timeframe are *expense* and *proven benefits*. Hybrid technology, which was relatively expensive and provided modest benefits (in the context of declining fuel prices), was slow to become mainstream. By contrast, in-vehicle navigation—a very helpful technology that became virtually free as smartphones became ubiquitous—burst onto the scene relatively quickly. AV technology will likely be slow to become mainstream until its costs are reasonable and its benefits are clear.

Factor #3 – Non-Technological Barriers to Deployment

The barriers to deployment of AV technology are not purely technological. Numerous parties have a stake in the ultimate deployment of autonomous vehicles, including policymakers, regulators, insurance providers, the environmental lobby, and consumer advocates. Navigating the social, legal, and regulatory challenges of AV's could be more daunting than the technological hurdles. Ajay Chopra of Fortune magazine summed up the coming conflicts when he recently wrote, "AV technology is improving rapidly. Soon technological capability won't be the greatest impediment to adoption; societal friction will be. This friction will delay full autonomy for at least a decade..."³⁴

Factor #4 – The Fleet Replacement Process

Replacement of the vehicle fleet is a gradual process, especially given the improvement in quality and durability of vehicles in recent decades. It takes an estimated 15 years for the existing vehicle fleet to be replaced. This means that once fully autonomous vehicles are available, it will still take approximately 15 years before they dominate the marketplace. And that figure would only hold true if all new vehicles being purchased were autonomous. Given that (a) non-autonomous vehicles will almost certainly continue to be manufactured and sold, even after fully autonomous vehicles are deployed; and (b) autonomous vehicles will be considerably more expensive than conventional automobiles, it is plausible that the fleet replacement cycle could extend for 20 to 25 years or beyond.

Given these considerations, it is difficult to pinpoint the likely time at which AV's will rule the road. The Reason Foundation asserts that full fleet replacement is at least 30 years away—10 years to work through the technological, legal, and regulatory barriers, and 20 years to permeate the vehicle fleet.³⁵ Todd Litman of the VTPI provides a longer-term estimate, asserting it will take 30-50 years for AV's to reach 90% market share.³⁶ Both Reason and the VTPI agree that AV's won't reach 50% market share for at least 20 years. This suggests that transportation planning can move forward with reasonable confidence that the vehicle fleet will be majority human-driven through approximately 2038.

³⁴ <http://fortune.com/2017/07/22/driverless-cars-autonomous-vehicles-self-driving-uber-google-tesla/>

³⁵ Poole, Robert. What Do Autonomous Vehicles Mean for the Future of U.S. Highways? Reason Foundation Commentary posted on January 6, 2016. Available on-line at <https://reason.org/commentary/what-do-autonomous-vehicles-mean-fo/>

³⁶ Litman, pp. 19-20.

7. Summary

Considerable technological advancement has been made in the development of autonomous vehicles. Entities such as Waymo, Uber, and Tesla routinely make headlines, pushing the envelope with respect to self-driving vehicles. Nearly every major automobile manufacturer has established a projected release date for delivery of autonomous vehicles. Clearly, the race is on.

Nevertheless, the consensus is that we are still about 10 years away from the point at which fully autonomous vehicles are legally driving on America's public highways. Both technological and institutional barriers remain that will slow the march to full autonomy.

It is generally believed that the advent of AV's will ultimately increase the number of vehicle-miles driven nationally. This is primarily due to the convergence of three factors: (1) the diminished "productivity cost" of driving will tend to induce more travel; (2) population groups that are currently underserved (e.g. underage drivers and the elderly) will have new mobility options; and (3) movements made by empty vehicles will add perhaps 10-13% to the "occupied" VMT total.

Whether the additional VMT will cause more congestion, or whether the additional VMT will be offset by AV-related capacity improvements, is a matter of debate.

In the future, engineers and planners will need to grapple with issues such as dedicated AV lanes, roadway redesign, road pricing, and land use policies. But before these issues come to the fore, it will be necessary to establish a legal and regulatory framework that will enable the testing of AV's in actual conditions. Further design and implementation of AV-related infrastructure should only proceed if the tests are successful, provide clear benefits, and are broadly accepted by the public.

The research did not uncover anything to suggest that traditional planning processes should be put on hold pending greater clarity with AV development. There is no reason to believe that fully autonomous vehicles alone will bring congestion relief within the next 20 years. In fact, it's possible that AV's will create more congestion.

The Maine Turnpike Authority should move forward with its long-range planning, being mindful that AV development is ongoing and should be monitored.

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Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C-2: Congestion Pricing – Working Paper #2



Portland Area Mainline Needs Assessment

Congestion Pricing: Working Paper #2



HNTB Corporation
April 2018

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1. Overview

The authors of this whitepaper have performed a high-level industry survey of agencies that employ congestion pricing in some form. This whitepaper will describe the methods used for both conventional toll facilities and managed lanes.

Agencies that have made use of congestion pricing fall into two broad categories:

- Conventional toll facilities like the Maine Turnpike, in which all vehicles using the roadway are tolled, and the tolls are in effect around the clock.
- Managed lane facilities with variable tolls, in which at least one of the following is true:
 - Tolls are not applied 24/7; and/or
 - Only selected lanes are tolled.

The following table depicts the share of average daily traffic that originates within the Portland Area Mainline (PAM) zone, from Exits 44 through 53:

Table 1 – Average Daily Traffic in PAM Zone

| Origination Point | Average Daily Traffic |
|--------------------------|------------------------------|
| Exit 44 to Exit 45 | 35.4% |
| Exit 45 to Exit 46 | 47.2% |
| Exit 46 to Exit 47 | 53.7% |
| Exit 47 to Exit 48 | 53.3% |
| Exit 48 to Exit 52 | 50.5% |
| Exit 52 to Exit 53 | 42.2% |
| Overall Average | 47.3% |

Less than half of all mainline traffic operating within the PAM zone actually began its trip at some point between Exits 45 and 53. Therefore, the ability to manage traffic is constrained if congestion pricing is applied solely to traffic that begins within this zone. Less than half of all traffic in the zone would have its behavior impacted by this approach to congestion pricing.

In order for congestion pricing to be effective within the PAM zone at a reasonable price, it should be applied to all trips—not just those that start within the zone. The drawback of this approach is that half of all tolled trips on the Maine Turnpike do not travel through the PAM zone. Thus, the proposed congestion pricing scheme would impact many vehicles that do not contribute to the traffic-related issues on the Maine Turnpike in Greater Portland.

2. Conventional Toll Facilities

Transportation agencies have undertaken various methods for implementing congestion pricing on conventional toll facilities, as outlined below.

2.1 Port Authority of New York and New Jersey

The Port Authority of New York and New Jersey (PANYNJ) operates four bridges and two tunnels that connect New York and New Jersey. PANYNJ applies peak-hour pricing on weekdays (6-10am and 4-8pm) as well as weekends (11am-9pm). During off-peak periods, cars pay \$10.50; the rate jumps to \$12.50 during peak hours. Thus, peak-hour prices are 19% higher than off-peak. Cash prices are set at \$15.00 and do not vary by time of day.

2.2 New York State Thruway Authority

The New York State Thruway Authority (NYSTA) employs congestion pricing at both the Spring Valley plaza (4-6pm) and on the new Tappan Zee Bridge (7-9am). However, congestion pricing only applies to commercial vehicles. Passenger cars pay no toll at Spring Valley, and they pay a consistent toll on the Tappan Zee. Some unique elements of this plan include:

- The fare is structured so that peak fares are two times higher than off-peak fares;
- There is a 45-minute “shoulder period” at the front end of the peak period in which rates gradually rise, and then there is another 45-minute shoulder at the back end during which rates gradually fall back to off-peak levels; and
- The peak/off-peak distinction only applies to E-ZPass customers. Cash-paying customers pay the “peak period” rate at all times.

2.3 Chicago Skyway

The Chicago Skyway is an 8-mile toll facility on I-90 on the southeast side of Chicago, operated for the City of Chicago by lease to a private entity. Like NYSTA, the Skyway applies peak-period pricing only to commercial vehicles. All commercial vehicles pay a 40% surcharge from 4am to 8pm. The surcharge applies to both cash and E-ZPass customers; the rates are the same regardless of payment type.

2.4 The Toll Roads of Orange County

This All-Electronic Tolling (AET) facility encompasses four different state routes (CA-73, CA-133, CA-241, and CA-261) running generally north-to-south in Orange County, CA. Peak period pricing generally applies for an hour in the morning and another hour in the evening. For vehicles equipped with a transponder (FasTrak), the peak period surcharge ranges from 10% to 29%, depending on the toll plaza. For customers without a transponder who have set up an “ExpressAccount”, which entails pre-registering the vehicle’s license plate and pre-arranging a method of payment, the tolls are \$1.00 higher than the FasTrak tolls. Customers choosing the “One Time Toll” option pay the “peak period” rate at all times.

2.5 State Route 520 Floating Bridge, Seattle

The Washington State Department of Transportation (WSDOT) operates this AET facility—one of four toll facilities in the Seattle area operated by the Department. Tolls on SR-520 vary throughout the day according to a pre-determined schedule. For vehicles equipped with a Good to Go! transponder, the weekday fare can range from as low as \$1.25 (from 11pm to 5am) to as high as \$4.30 (from 7-9am and again from 3-6pm). On weekends, the Good to Go! fare ranges from \$1.25 (11pm to 5am) to \$2.65 (from 11am to 6pm). Customers that choose to pay by mail are required to pay a \$2 surcharge per transaction.

The table below provides a brief summary of the various peak-period pricing policies at these five facilities.

Table 2 – Peak-Period Pricing at Conventional Toll Facilities

| Facility | Peak Pricing Period | Peak vs. Off-Peak Differential |
|-----------------------|--|---|
| PANYNJ | 6am-10am (weekday mornings) 4pm-8pm (weekday evenings) 11am-9pm (weekends) | 19% for passenger cars |
| NYSTA | 7-9am (Tappan Zee) 4-6pm (Spring Valley) | 100%, applied only to commercial vehicles |
| Chicago Skyway | 4am-8pm | 40%, applied only to commercial vehicles |
| The Toll Roads | 7:30-8:30am (SB) 5-6pm (NB) | 10% to 29%, depending on location |
| SR-520 Bridge | 7-9 am & 3-6pm (Weekdays) 11am-6pm (Weekends) | 244% (weekdays) 112% (weekends) |

In summary, congestion pricing strategies on conventional toll facilities vary significantly. The following points are focused on customers equipped with a valid transponder:

- The length of the peak period varied from as short as 1 hour to as long as 16 hours.
- Some agencies applied a two-tiered system, with a peak period price and an off-peak period price. Other agencies used a more graduated approach, with rates that gradually transition between the off-peak price and the peak price.
- Some agencies applied peak-period pricing to all vehicles; other focused the strategy solely on commercial vehicles.
- For some agencies, the peak price was only 10-20% higher than the off-peak price. For other agencies, the peak price was as much as 240% higher.
- Some agencies assessed the same fares to ETC and non-ETC customers. Others held non-ETC prices at a higher rate.

3. Managed Lane Facilities

Numerous managed lane facilities are now in operation around the country. Some facilities employ dynamic pricing, in which prices respond to traffic conditions. Other facilities employ time-of-day pricing, in which rates are published in advance to respond to historically-determined peak periods. The table below summarizes some of the rates in effect at selected managed lane facilities.

Table 3 – Managed Lane Fares

| Facility | Type of Pricing | Typical High Fare | Typical Low Fare | Ratio |
|--|-----------------|------------------------------|----------------------------|------------------------|
| I-95 Express Lanes <i>Miami, FL</i> | Dynamic | \$10.50 | 50¢ | 21:1 |
| Katy Freeway <i>Houston, TX</i> | Time of Day | \$3.20 | 40¢ | 8:1 |
| SR-91 <i>Orange County, CA</i> | Time of Day | \$9.80 (EB) \$5.45 (WB) | \$1.60 | 6:1 (EB) 3.5:1 (WB) |
| I-66 Inside-the-Beltway <i>W. of Washington, D.C.*</i> | Dynamic | \$21.50 (EB) \$17.00 (WB) | \$2.75 (EB) \$4.25 (WB) | 8:1 (EB) 4:1 (WB) |

** I-66 ITB rates were drawn from Friday, February 1, 2018. Eastbound tolls are in effect from 5:30-9:30am, and Westbound tolls are in effect from 3pm to 7pm. Maximum and minimum rates on this facility can vary significantly from day to day.*

On the whole, rates at managed lane facilities experienced a greater range of fluctuation than rates at conventional facilities. This was likely driven by two factors:

- First, most managed lane facilities had an obligation to provide a specified level of service for their customers. This requirement created a situation where the facility must, on occasion (i.e. periods of peak demand), be very aggressive in its pricing in order to manage the demand.
- Second, most managed lane facilities were configured in such a way that free alternative routes were readily available. Therefore, drivers could easily evade high priced tolls by shifting into the free lanes, albeit at a diminished level of service.

By contrast, conventional facilities generally had no statutory requirement to provide a given service level, and alternative routes were generally more difficult to access. As a result, the operators of these facilities were typically inclined to be less aggressive with implementing pricing differentials.

4. Summary

Any “congestion pricing” scheme for the Maine Turnpike should be modeled after the schemes that have been implemented at the conventional facilities cited herein. A congestion pricing scheme intended to reduce congestion in the Greater Portland area should consider the parameters outlined below.

A differential of 50% for E-ZPass customers would be a reasonable place to start. This is well-positioned inside the range of differentials used at various conventional facilities today. Experience suggests that a toll differential of 50% would yield a reduction of 5-10% in traffic volumes during the tolling period.

The differential should be applied to both passenger cars and commercial vehicles. Commercial vehicles only comprise approximately 5% of peak-period traffic on the Maine Turnpike. Therefore, if the surcharge were applied solely to commercial vehicles, there would be very little benefit in terms of peak-period capacity.

On the Maine Turnpike, E-ZPass rates are (in some instances) capped by the cash rate in effect for the same movement. Therefore, it will be critical to increase cash rates as well. The cash rates will need to be adjusted such that they will not constrain the implementation of the E-ZPass peak-period surcharge. For sake of simplicity, the cash rates should probably be kept constant throughout the day.

The timing of the application of a toll differential depends on the periods in which capacity is a constraint.



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C-3: The HOT/HOV Alternative – Working Paper #3



Portland Area Mainline Needs Assessment

The HOV/HOT Alternative: Working Paper #3

The feasibility of an HOV/HOT lane on the Maine Turnpike



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1. Overview

The Maine Turnpike Authority has been exploring various options for addressing growing traffic demands on the Maine Turnpike in Greater Portland. Alternative 12 involves the addition of a travel lane in each direction between Exits 44 and 53. The purpose of this white paper is to provide a high-level assessment of the feasibility of designating the added lanes as High Occupancy-Toll (HOT) lanes. Usage of these lanes would be restricted to vehicles that are either carrying multiple occupants or are willing to pay a higher toll rate. The general intent of the lane is to provide congestion-free travel for vehicles that are willing to either carpool or are otherwise willing to pay a premium fare.

2. Definition of High Occupancy-Toll Lanes

The HOT concept is unique among conventional toll roads. In the United States, there are no conventional toll facilities with lanes designated for high-occupancy vehicles (HOVs) or for single-occupancy vehicles (SOVs) that are willing to pay an additional toll. Therefore, it is necessary to impose some definition of the concept prior to providing an assessment.

The following points outline a high-level concept of operations (ConOps) for an HOT facility on the Maine Turnpike in Greater Portland. It represents one of many possible approaches, and it helps identify the choices that must be addressed in the process of implementing such a facility.

- The HOT lanes represent a third lane being added to each direction of travel. The far-left lane in each direction would be designated as the HOT lane.
- Usage of the HOT lanes would be restricted to two groups of users:
 - **High-occupancy vehicles, or HOVs.** The definition of an HOV is typically either 2+ (e.g. 2 or more people in the vehicle, including the driver) or 3+. This ConOps assumes a requirement of 3 or more occupants.
 - **Single-occupancy vehicles (SOVs)** that are willing to pay a toll. In order to manage the demand, the toll would be related to the level of usage of the road—the higher the usage, the greater the toll. This toll would be added to the “base toll” assessed to all users of the Maine Turnpike.
- Access to the HOT lane would be open. Vehicles would be free to move in and out of the 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 thru 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.
- Vehicles wishing to use the HOT lanes must have a transponder. Transponders would be equipped with a switch that would enable the driver to identify the vehicle as either an HOV or an SOV. Vehicles without a switchable transponder could use the facility, but they would be charged as SOVs, regardless of the number of occupants in the vehicle. An example of such a transponder (currently in use on selected HOT facilities in Virginia) is depicted in Figure 1.



Figure 1 – Example of Switchable Transponder

- Small gantries would be positioned at frequent intervals (e.g. every three-quarters of a mile) to detect users of the HOT facility. The gantries (see example in Figure 2) would be equipped with E-ZPass antennas as well as with enforcement cameras.
 - Vehicles with a transponder in “SOV” mode would be identified and charged appropriately; vehicles with a transponder in “HOV” mode would be identified but not charged.
 - Vehicles without a transponder would have an image taken of their license plate and would be processed as a violator.



Figure 2 – Example of small gantry over HOT lane

- Vehicle detections of either transponder readings or license plate images would be constructed into trips. Trips in the HOT lanes will be charged as either a flat fee (e.g. \$1.00 per trip) or as a rate per mile (e.g. 10¢ per mile traveled in the HOT lanes).

- All vehicles using the Maine Turnpike would be charged a base fare determined by the originating and destination interchanges, as per current practice. The HOT lane fare would be added on top of this “base” fare for travel on the Turnpike.
- HOV enforcement would be performed by state troopers making visual observations. Troopers located immediately downstream would be equipped to identify whether a vehicle is self-declared as HOV or SOV. Vehicles declared as HOV would be visually inspected to determine whether it meets the required number of passengers. Figure 3 illustrates how areas could be integrated into the median for use by enforcement vehicles.

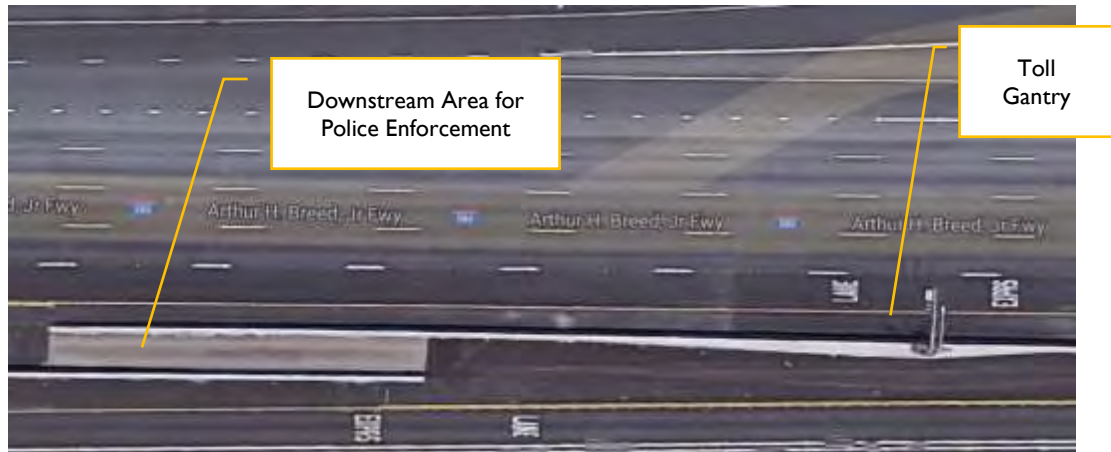


Figure 3 – Example of Enforcement Area

- Advanced signing would make drivers aware of the current price in the HOT lane. Thus, drivers could decide whether to use the lanes based on real-time information regarding pricing. An example of advanced signing is depicted in Figure 4.



Figure 4 – Example of advanced signing regarding HOT lane pricing

In summary, the Concept of Operations outlined above illustrates one approach to implementing an HOT lane on the Maine Turnpike. The fundamental high-level decisions that would need to be made to operate an HOT facility would include eligibility requirements, access control, methods of enforcement, toll collection method and fare structure. Various toll agencies have taken different approaches to each of these decisions; final decisions would be made further into the planning process.

3. Comparable Facilities

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.

3.1 Variable Tolling

The concept of variable tolling is commonly applied at various managed lane facilities. Variable tolling generally occurs in one of two forms:

- **Time of day.** The “time of day” approach to variable tolling elevates tolls during periods of the day when congestion is known to occur. This approach is employed on managed lanes on State Route 91 in Orange County, I-25 in Denver, and the Katy Freeway in Houston.
- **Dynamic.** The “dynamic” approach to variable tolling is one in which a tolling algorithm is employed to translate real-time traffic conditions into continually-changing toll rates. As congestion grows, the algorithm responds in such a way that the price escalates in response. Examples of managed lanes on which this approach is employed include 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.

Generally, the dynamic approach is considered to be more responsive to real-time changes in traffic conditions, while the time of day approach is considered to be more customer-friendly due to its predictability.

3.2 Open Access

The concept of “open access” to a priced managed lane has grown in popularity on the West Coast.

- The Alameda County Transportation Commission (Alameda CTC) employs open access on I-580. The facility operates on an 11-mile stretch of interstate between the towns of Pleasanton and Livermore, CA. Alameda CTC plans to expand the “open access” concept to a 14-mile stretch of I-680 between Pleasanton and Milpitas, CA.
- In October 2017, the Metropolitan Transportation Commission (MTC) opened express lanes on I-680 in Contra Costa County. It is a 13-mile facility operating between Walnut Creek and San Ramon, CA.

Figure 5 provides an illustration of the open access facility on I-680 in Contra Costa County. As the graphic illustrates, dashed lines indicate that vehicles are free to safely maneuver into and out of the HOT lanes at any point. Roadside signs as well as painted verbiage identify the lane as a high-occupancy toll lane, or “Express lane”.



Figure 5 – Open access facility on I-680 in Contra Costa County

Theoretically, vehicles in an open access HOT lane would be able to weave in and out of the lane, carefully avoiding the toll zones. However, three factors tended to mitigate this activity:

- First, because the gantries were fairly small, they were not very expensive to install. Consequently, they could be installed at relatively frequent intervals to make it more difficult to avoid them. Alameda CTC endeavored to install gantries at intervals of ± 0.75 miles.
- Second, the HOT lanes tended to be used during heavily-traveled time periods. High traffic volumes made frequent lane-changing maneuvers (i.e. to avoid a tolling point) more difficult to accomplish.
- Third, agencies can adopt business rules to minimize the impact of drivers attempting to dodge the tolling points. For example, when Alameda CTC reconstructed trips in the managed lanes, it identified the first and last tolling point traversed, and assumed that all intermediate tolling points were also traversed. In other words, the intermediate readings were not necessary to construct the trip.

3.3 Tolerated Lanes Embedded Within Conventional Facility

Only one facility in the United States—the Veterans Expressway in Tampa—involves the addition of priced managed lanes to a conventional toll road. The Veterans Expressway is a 16-mile facility oriented north-to-south that connects Lutz, Florida to downtown Tampa. The roadway is generally two to three lanes in each direction. The “express lanes” portion of the facility is planned to be opened in three phases:

- The first phase involves the addition of 1 lane in each direction to the southern 8.5 miles of the roadway. The additional lane will be tolled at the same rate as the rest of the facility. However, the express lanes will only have one entry point and one exiting point in each direction. In other words, only vehicles traveling the entire 8.5-mile distance can use the express lanes.

- The second phase involves the addition of 1 lane in each direction to the northern 7.5 miles of the roadway. Once again, the additional lane will only have one entry and one exit, and it will be tolled at the same rate as the rest of the facility.
- The third phase involves the implementation of “dynamic pricing” on the express lanes. As the lanes become more heavily traveled, the price will automatically rise to prevent congestion. The dynamic price will be added to the base toll rate that is assessed to the users in the parallel General Purpose (GP) lanes.

All drivers wishing to use the express lanes will need to have a transponder. There is no provision for HOVs to travel for free; all drivers must pay.

The first phase opened in December 2017, and the second phase is tentatively scheduled to be completed in the spring of 2018. Dynamic pricing will be implemented once construction is complete, though the timetable for implementation is unclear.

4. Feasibility Considerations

The high-level ConOps outlined in Section 2 describes *how* an HOT lane could be implemented. However, a more fundamental question is: Does an HOT lane make sense for the Maine Turnpike in Greater Portland? The following factors should be considered in addressing this question:

- **Overall usage.** Usage of a priced managed lane on a 4-lane interstate highway would be minimal unless the average traffic volumes exceed about **65,000 vehicles per day (vpd)**. At present, average daily volumes on the busiest portion of I-95 in Greater Portland are slightly under **49,000 vpd**. It would likely be 15-20 years until average daily volumes reached the level at which a priced managed lane would receive a reasonable level of usage.
- **HOV usage.** The Maine Turnpike Authority conducted a detailed survey of vehicle occupancy in 2010. The results are summarized in Table 1.

Table 1 – HOV Usage on the Maine Turnpike

| HOV Level | Weekday Usage | Friday Usage | Weekend Usage |
|----------------------------|---------------|--------------|---------------|
| 2 or more occupants | 37.2% | 55.8% | 69.9% |
| 3 or more occupants | 13.1% | 16.7% | 27.3% |

The data in Table 1 illustrates some of the challenges associated with implementing an HOT lane on I-95.

- If HOV2+ were selected as the requirement for the HOT lane, it would offer virtually no incentive for carpooling. Based on the data above, if all HOV2+ vehicles shifted to the new HOT lane, then the new HOT lane would have more traffic than each of the other two lanes. The new lane—accounting for one-third of the highway’s capacity—would be serving *more* than one-third of the traffic.
- If HOV3+ were selected as the requirement for the HOT lane, and if all vehicles with three or more occupants shifted to the HOT lane, then the volume in the GP lanes would drop by at least 10-15%, and even more on weekends. This would likely free up enough capacity in the GP lanes such that, for many years, there would be little incentive for SOVs to pay a toll to use the HOT lanes.

Thus, millions of dollars could be spent to dynamically toll a lane that would be virtually unused by SOVs for a long time.

- **Flex transponders.** The Maine Turnpike Authority does not operate any HOT lanes. Consequently, the Authority does not issue switchable transponders that allow users to self-identify as HOVs. Implementing an HOT lane would require the Authority to add these devices to their inventory—a potentially expensive undertaking.
- **Orientation.** HOV and HOT lanes are generally designed to connect residential areas to urban centers. The proposed lanes for I-95 in Greater Portland represent a very different orientation, since these lanes lie on the outskirts of the urban core of Portland. In other words, the lanes are not fed by a high-populated residential center, and they do not feed a high-density urban center. At the very least, adding HOT lanes on I-95 between Exits 44 and 53 would represent an unconventional approach to boosting capacity.
- **Equity.** The addition of a HOT lane to an already-tolled facility raises questions of equity. Is it fair that a new lane, whose construction is likely to be funded by current toll-payers, should be restricted in its use? In other words, if a frequent commuter today is paying a daily toll of \$1.00, and if that toll is being used to finance the construction of the new lane, should that frequent commuter be eligible to use that new lane?
- **Best approach.** If congestion is a concern in the corridor, is the best approach to simply impose dynamic tolling on one lane? If the precedent has already been established that the facility is a toll road, why not dynamically price the entire roadway? Would this be a more effective way to encourage discretionary trips to shift away from peak-period travel?

In short, it is important to consider the question of why an HOT lane is being considered for incorporation into an existing tolled facility.

- If the goal is to add revenue, it would be more equitable to increase tolls for everyone and make the lane available to everyone.
- If the goal is to manage capacity, it would be more effective to adjust tolls for everyone rather than to simply adjust tolls on a single lane.
- If the goal is to encourage carpooling, then an HOV3+ requirement would be appropriate. But this raises an equity concern of requiring toll-paying SOVs to fund a project while excluding them from eligibility.

5. HOV Only Alternative

At the request of the PAC, an HOV only alternative was evaluated that would allow buses to utilize the additional lane. From Section 4 of this report, HOV 2+ and 3+ utilization was identified as follows:

Table 2 – HOV Usage on the Maine Turnpike

| HOV Level | Weekday Usage | Friday Usage | Weekend Usage |
|---------------------|---------------|--------------|---------------|
| 2 or more occupants | 37.2% | 55.8% | 69.9% |
| 3 or more occupants | 13.1% | 16.7% | 27.3% |

As seen from the table above, an HOV 2+ scenario would essentially operate as a defacto third lane as the percentage for weekday, Friday, and weekend are all above 33%. An HOV 3+ scenario could be more viable to operate as a true HOV lane and provide a travel time advantage compared to the general-purpose lanes.

This alternative would also provide an opportunity for buses traveling through the region to gain a travel time advantage. Using MTA data, the number of charter buses traveling through the Study Area was estimate. Charter buses are defined as class 3 vehicles that travel greater than 60 miles along the Maine Turnpike. Based on data from the Maine Turnpike Authority and 2010 origin-destination survey less than 10 charter buses will travel along the Maine Turnpike, within our study corridor, during the peak hour.

Based on the above analysis, number of buses traveling in the study corridor is limited. Bus utilization would be limited to charter buses i.e. busses making longer trips passing thru the study corridor. Local busses and even regional busses tend to make shorter trips along the turnpike and may not utilize the HOV lane. Because the alternative won't necessarily reduce congestion, and lane utilization would be lower than the HOT/HOV alternative, the HOV only alternative is not recommended as a standalone option.

6. Summary

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.

The obstacles to such a facility are not technical. As outlined in Section 2, it is certainly possible to establish how such a lane *could* operate. The key components—namely, dynamic pricing, open access, and self-identification as HOVs—are in place at various facilities throughout the country. Rather, the obstacles are more behavioral and customer driven. They include the following:

- On a per-lane basis, the levels of traffic on the Maine Turnpike in the study area were much lower than the levels observed on existing managed lane facilities in the United States. This indicated 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 tasks of raising revenue and managing traffic are 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 technically feasible, but not practicable today, and would likely be an expensive venture that would not be the most effective means of providing quality service in an equitable fashion. HOV for 2+ occupants would result in reasonable utilization of an HOV lane (approximately 37% to 70%), but HOV 3+ would have limited utilization. However, looking forward, this alternative could again be analyzed for practicality in the future and could be implemented on a policy basis if a third lane is built.



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C-4: The Reversible Lane – Working Paper #4



Portland Area Mainline Needs Assessment

The Reversible Lane: Working Paper #4

The congestion-reduction potential of a single reversible lane



HNTB Corporation
April 2018

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1. Overview

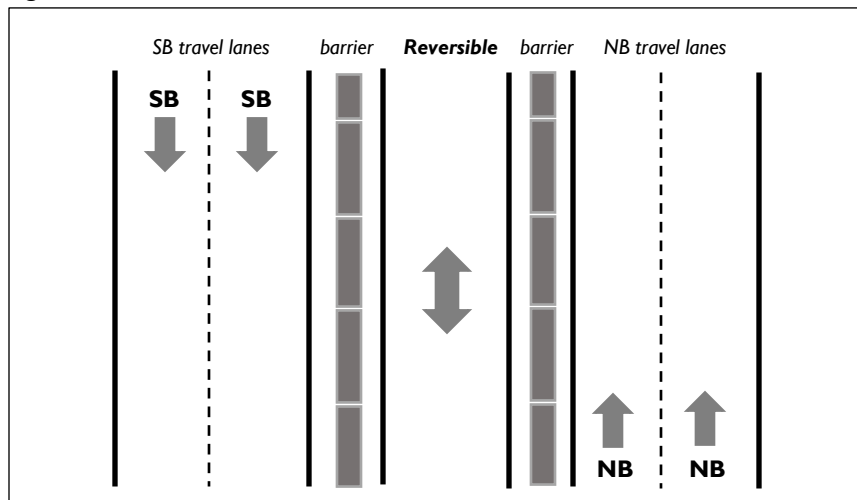
The purpose of this white paper is to provide a high-level assessment of the feasibility of using a Reversible lane to address the growing traffic demands on the Maine Turnpike in Greater Portland. The paper will focus primarily on traffic operations. It will **not** focus on exploring the constructability of such a lane, nor will it provide a detailed review of the capital or operating costs. Rather, the paper will focus on this question: Given the forecasted traffic volumes on the Maine Turnpike through 2040, might a Reversible lane provide the capacity required to meet the demands of peak-hour traffic in the years to come?

2. Reversible Lane Definition

For purposes of this analysis, a Reversible lane will be defined as a single, wide lane (12'-lane, 12' shoulder, 4' shoulder) constructed in the median of the Turnpike, whose orientation can be configured to serve traffic in the peak direction. During periods in which Northbound (NB) traffic was heaviest, the lane would be oriented in the NB direction, thus providing three general purpose lanes for NB traffic, while still providing two lanes for Southbound (SB) traffic. The same lane could have its direction reversed relatively quickly (e.g. an hour or less) to serve peak traffic in the SB direction.

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 1 provides a schematic overview of the Reversible lane.

Figure 1 – Reversible Lane Overview



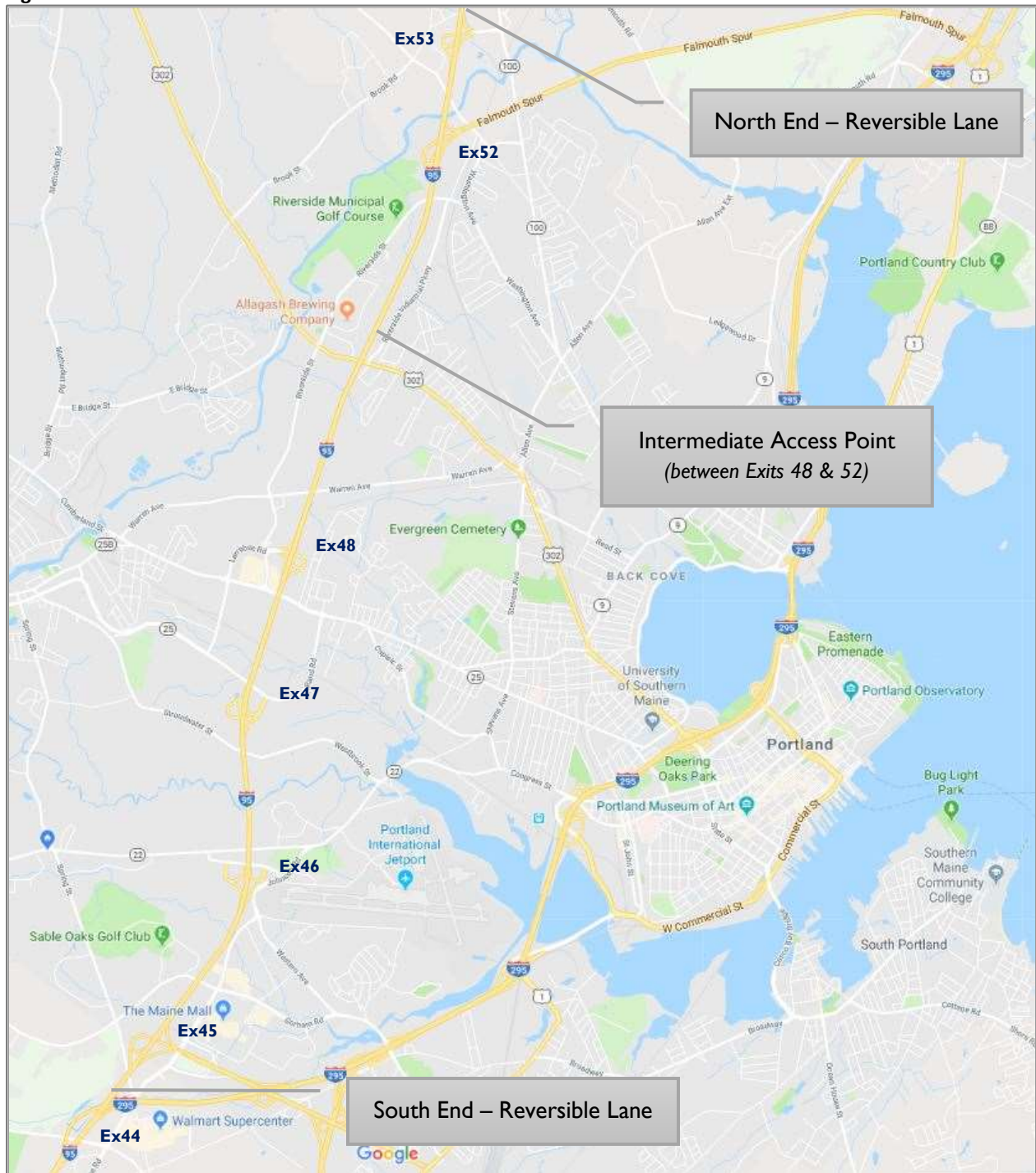
Some specific characteristics of the Reversible lane assumed for this analysis are listed below:

- The southern end of the Reversible lane would be at some point between Exits 44 and 45.
- The northern end of the Reversible lane would be at a point just north of Exit 53.
- Each direction would provide only two points of entry to the Reversible lane:
 - In the NB direction, the entry points would be (a) at the southern end, at a point between Exits 44 and 45; and (b) at some point on the segment between Exits 48 and 52.

- In the SB direction, the entry points would be (a) at the northern end, at a point just north of Exit 53; and (b) at some point on the segment between Exits 48 and 52.
- Each direction would also provide only two points of egress from the Reversible lane:
 - In the NB direction, the egress points would be (a) at some point on the segment between Exits 48 & 52; and (b) the northern terminus at a point just north of Exit 53.
 - In the SB direction, the egress points would be (a) at some point on the segment between Exits 48 & 52; and (b) the southern terminus at a point between Exits 44 and 45.
- The full length of the Reversible lane would operate in the same direction, either NB or SB. The lane would **not** have the capability of serving NB traffic for one portion of the corridor and SB traffic for a separate portion of the corridor.

The Reversible lane represents an approach whereby a single lane is provided to support peak directional traffic flows. For safety purposes, the Reversible lane is barrier separated with limited access and egress points. 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. On the following page, Figure 2 provides an overview of the corridor and identifies the key elements of the Reversible lane.

Figure 2 – Corridor Overview



3. Reversible Lane Examples

Several facilities across the United States and Canada employ reversible lanes to serve alternating flows of peak-period traffic. A selection of these facilities is summarized below:

3.1 San Diego-Coronado Bridge

This five-lane bridge connects the cities of San Diego and Coronado in southern California. The middle lane was reversible, enabling the bridge to provide three lanes to serve peak directional flows.

Figure 3 – San Diego-Coronado Bridge



3.2 Old Tappan Zee Bridge

Prior to its replacement in 2017, the old Tappan Zee Bridge over the Hudson River provided seven lanes. With a reversible middle lane, the bridge could provide four lanes to serve the peak direction (eastbound in the morning, westbound in the evening).

3.3 Golden Gate Bridge

The Golden Gate Bridge has six lanes. Moveable barrier enables the bridge to operate in one of three configurations: 4 NB / 2 SB, 3 NB / 3 SB, and 2 NB / 4 SB. The balanced 3/3 configuration is the most common, but the imbalanced configurations serve intense peak-period traffic flows.

3.4 Lee Roy Selmon Expressway Reversible Lanes

This facility, operated by the Tampa-Hillsborough Expressway Authority, is a three-lane reversible facility that connects Brandon, Florida to downtown Tampa. All three lanes are devoted to the same direction of travel, serving Westbound (WB) inbound traffic in the morning and Eastbound (EB) outbound traffic in the evening. During the mid-day hours, the lanes have a split configuration, whereby the western portion of the facility serves WB traffic with the eastern portion of the facility serves EB traffic.

3.5 I-95 Express Lanes (Northern Virginia)

This facility, approximately 27 miles in length, operates between Garrisonville, Virginia and the Capital Beltway (I-495). It provides two lanes in the peak direction (NB in the morning, SB in the evening). The facility does **not** have the capability of providing one lane in each direction simultaneously. Access was controlled by gates at each possible entry point. Vehicles that have three or more occupants may travel

for free if they are equipped with a switchable transponder that enables the vehicle to designate itself as a high-occupancy vehicle (HOV).

3.6 Southeast Expressway

This 5.5-mile facility on Massachusetts State Route 3 operates between the Furnace Brook Parkway in Quincy and Morrissey Boulevard in Boston. The route has a total of eight lanes. In the morning peak (5am-10am), the facility operates with five NB lanes (heading toward Boston) and three SB lanes. In the evening peak (3pm-8pm), it operates with three NB lanes and five SB lanes (coming out of Boston). At other periods, the facility operates in its “original” configuration of four lanes in each direction. This facility actually has two sets of barrier (as illustrated in Figure 4), such that the vehicle in the “Reversible lane” has barrier on either side of it. When the lane operates in the 4 NB/4 SB configuration, the two sets of barrier are pushed together.

Figure 4 – Southeast Expressway in Boston



3.7 Interstate 30 in Dallas

This facility operates in a similar fashion to the Southeast Expressway. The I-30 Reversible lane is embedded within a 9-mile portion of I-30, also known as the East R.L. Thornton Freeway. The facility, which operates between South Haskell Ave. and North Galloway Ave., is primarily eight lanes. The Reversible lane enables the facility to operate with five westbound (inbound) lanes in the morning peak and five eastbound (outbound) lanes in the evening peak. Outside of the peak hours, the facility operates in a balanced 4 EB / 4 WB configuration.

Figure 5 – Interstate 30 in Dallas



Reversible lanes have been effectively employed on both bridges and on roadways as a means of better allocating capacity to support peak directional traffic flows. In some cases—such as the Lee Roy Selmon Expressway reversible lanes and the I-95 Express Lanes in Virginia—the reversible lanes represent *new* capacity added to relieve congestion. In other cases, the reversible lanes represented a means of mitigating congestion by more effectively utilizing *existing* capacity. Either way, reversible lanes provided a means for serving peak demand while minimizing the total number of lanes required on the roadway or bridge.

4. Potential Usage on I-95 in Greater Portland

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. Access and egress points would be limited. As Figure 2 illustrates, access and egress was limited to the extreme ends of the corridor (i.e. between Exits 44 and 45 at the south end and just north of Exit 53 at the north end) and at one intermediate access point between Exits 48 and 52. Consequently, some groups of users would be unable to use the Reversible lane. For example:

- Any NB driver wishing to exit the 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 SB driver entering at Exit 52 would be unable to use the Reversible lane unless the destination was Exit 42 or south.
- **All** drivers whose origin and destination was between Exits 45 and 53 would be unable to use the lane.

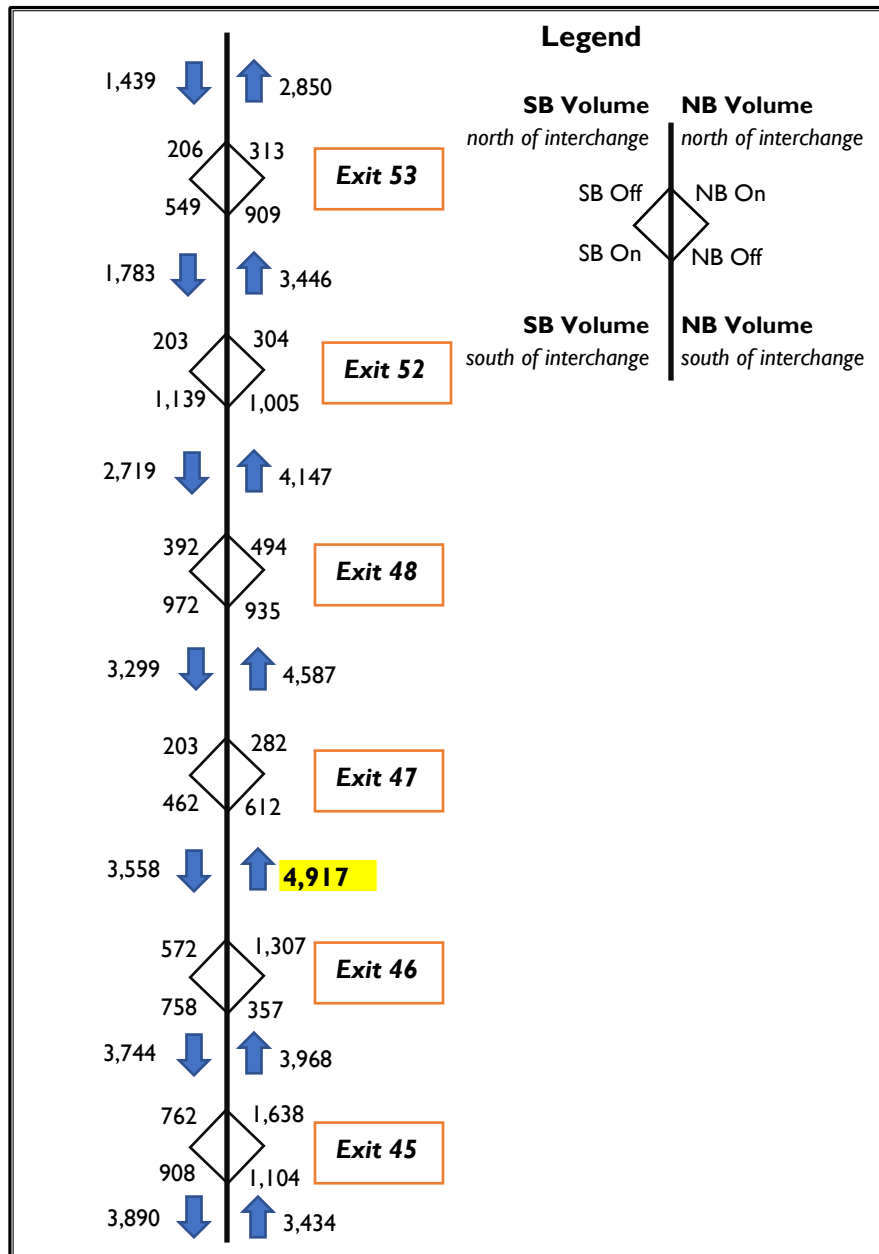
Therefore, it was necessary to examine the trip patterns of drivers through the corridor to examine whether a Reversible lane would be useable by enough drivers to make it useful. Trip patterns by E-ZPass

users in the peak hour were reviewed to estimate the extent to which the Reversible lane would impact traffic flows. These estimates are summarized in the following two subsections.

4.1 Northbound Usage

Northbound travel through the corridor experiences its peak during the afternoon on Fridays during the summer. Figure 6 summarizes the projected NB peak-hour traffic flows through the corridor in the year 2040.

Figure 6 – Projected 2040 NB Peak-Hour Traffic (Summer PM)



As Figure 6 illustrates, the peak NB volume is 4,917 vph between Exits 46 and 47 (highlighted in yellow). The key question is: Would a Reversible lane get enough usage to provide adequate peak-hour capacity?

To address this question, peak-hour travel trends of E-ZPass users were reviewed with the following results:

- Of all NB vehicles entering the corridor south of Exit 45, **52%** could potentially use the Reversible lane (i.e. vehicles were heading to destinations north of Exit 48).
- Of all NB vehicles traveling between Exits 48 and 52, about **56%** could potentially use the Reversible lane (i.e. vehicles were heading to destinations north of Exit 53).

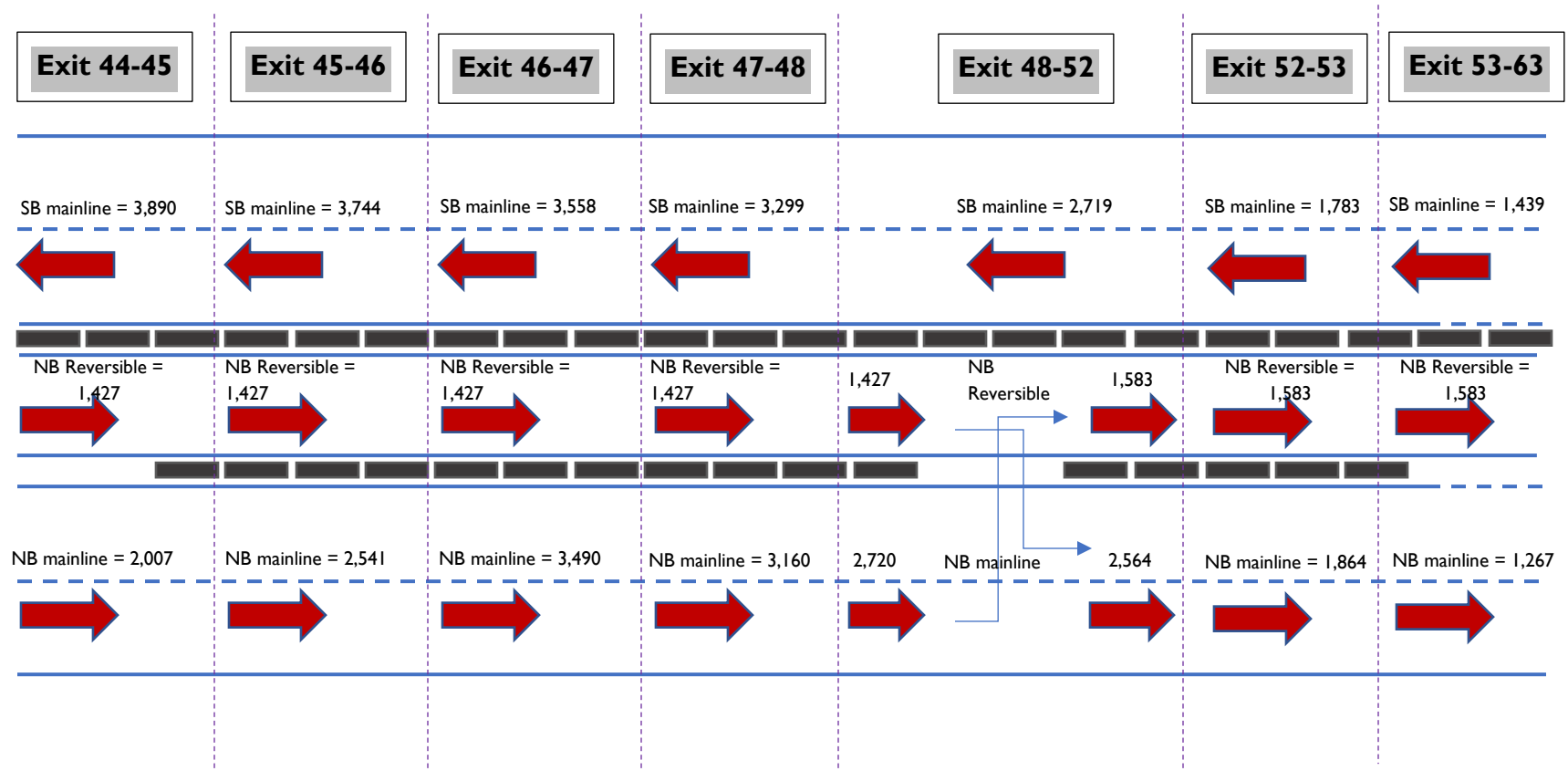
To predict utilization of the Reversible lane, the following two assumptions were made:

- At the southern entry point to the Reversible lane, 80% of travelers that *could* use the Reversible lane will choose to use it.
- At the intermediate access point between Exits 48 and 52, 50% of travelers that could use the Reversible lane will choose to use it. This percentage was lower than the assumed percentage at the southern entry point (80%) because this portion of the corridor was generally less congested. As a result, the Reversible lane would tend to provide less benefit.

Based on the analysis and the assumptions stated above, the mainline peak-hour volumes were calculated that could be expected with a NB Reversible lane during the 2040 PM peak. Figure 7 summarizes the results. When reviewing Figure 7, note the following:

- The diagram illustrates the mainline volumes corresponding to the segments of the Turnpike *between interchanges*. It does not illustrate the volumes on the intervening on- and off-ramps.
- Northbound traffic moves from left to right across the diagram. Southbound traffic moves from right to left.
- The black rectangular “blocks” represent barrier that separates the Reversible lane from the parallel general purpose (GP) lanes.
- The gap in the black blocks (in the segment between Exits 48 and 52) represents the intermediate access point between the GP lanes and the Reversible lane. At this point, Reversible lane traffic can shift to the GP lanes, and GP traffic can shift into the Reversible lane.

Figure 7 – Estimated Usage of the NB Reversible Lane during the 2040 NB Peak Hour (Summer PM)



The volumes summarized in Figure 7 suggest that a single Reversible lane oriented in the NB direction could be reasonably effective in supporting NB peak period traffic in 2040.

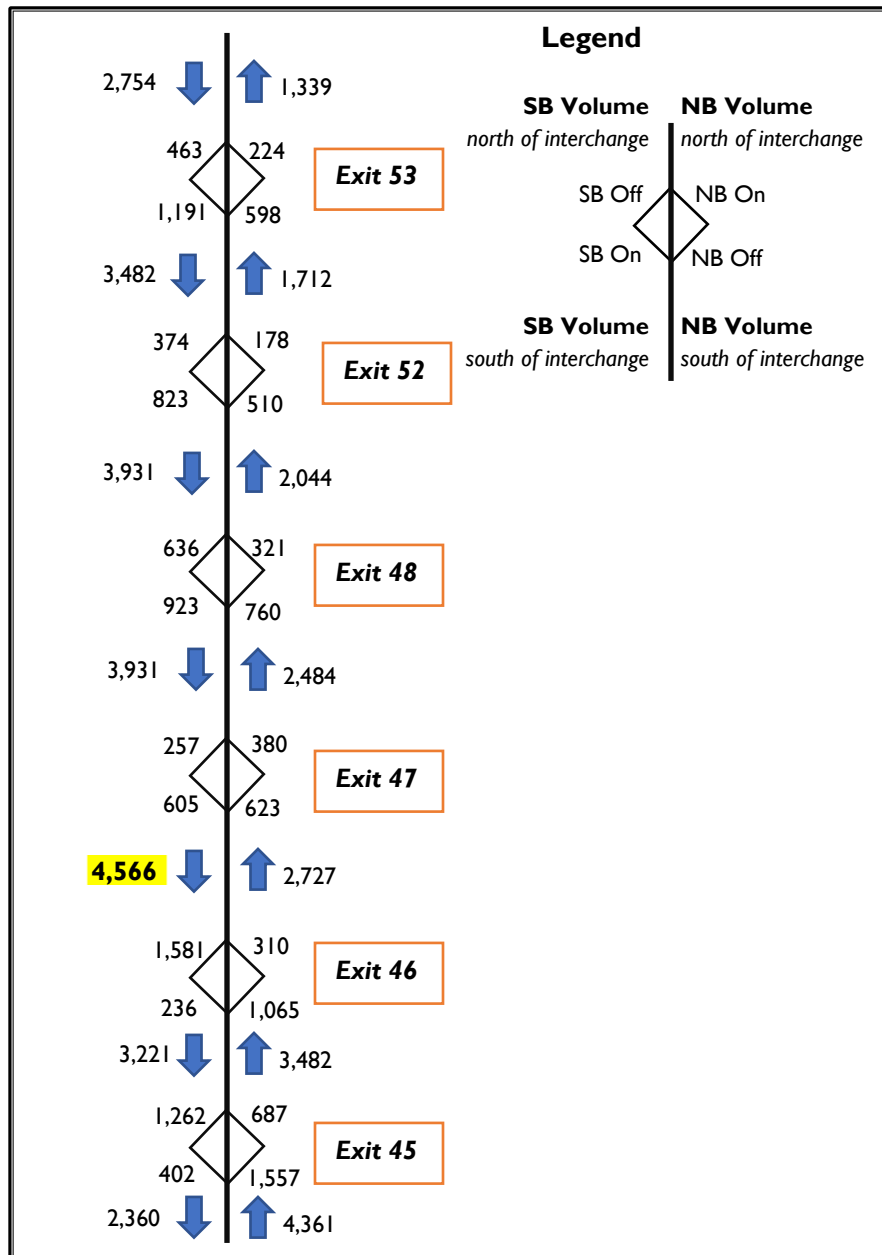
- The peak NB volume of 4,917 vph occurred between Exits 46 & 47. Nearly 3,500 vph was projected for the GP lanes—a heavy volume for a two-lane facility, but certainly within the assumed two-lane capacity of 3,600 vph. The remaining volume of 1,427 vph was allocated to the Reversible lane, which was well under the capacity of a single freeway lane.
- In the SB direction, traffic was very heavy south of Exit 47. Volumes reached nearly 3,900 vph between Exits 44 and 45—a level that exceeded the assumed capacity of 3,600 vph. However, the growth projections indicated that traffic levels between Exits 44 and 45 would not reach 3,600 vph until 2035.

Thus, it appeared that a Reversible lane would be adequate to support NB peak conditions for approximately the next 18 years. A configuration of three lanes to serve NB traffic would be sufficient to meet the peak directional demands, while the remaining two lanes would be sufficient for traffic moving in the off-peak direction.

4.2 Southbound Usage

Figure 8 depicts the projected SB peak-hour traffic flows through the corridor in the year 2040. Traffic in the SB direction reached its peak during the morning commuting period. Therefore, the SB peak period was represented by Fall AM peak conditions.

Figure 8 – Projected 2040 SB Peak-Hour Traffic (Fall AM)



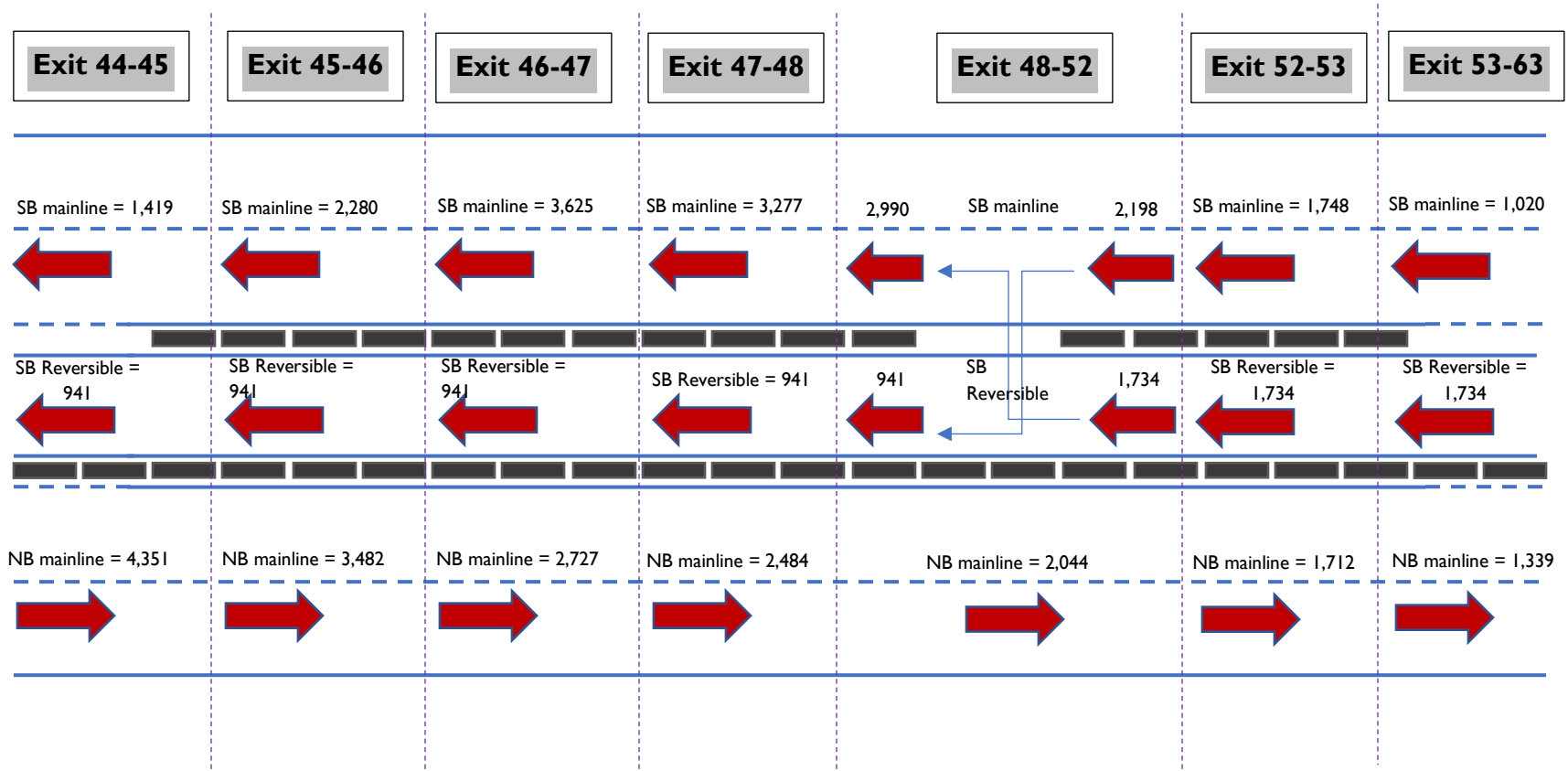
As with the NB peak volumes, trip patterns of E-ZPass users during the SB peak period were reviewed. This review indicated the following:

- Of all SB traffic approaching the corridor (north of Exit 53), **79%** would be able to use the Reversible lane—58% destined for Exits 45-48, and 21% destined for the south end of the corridor (with a destination of Exit 42 & south). The group destined for Exits 45-48 would need to exit the Reversible lane at the intermediate access point between Exits 48 and 52.
- Of all SB traffic on the mainline at the intermediate access point, **27%** were destined for Exits 42 and points south, and would therefore be able to use the Reversible lane.

It was further assumed that 80% of the vehicles that *could* use the Reversible lane (based on their destination) would in fact choose to use the Reversible lane.

Figure 9 illustrates the resultant volumes associated with a SB-oriented Reversible lane during the SB peak period (representing the Fall AM commuting period). As with Figure 7, this graphic depicts projected peak-hour volumes in the year 2040.

Figure 9 – Estimated Usage of the SB Reversible Lane during the 2040 SB Peak Hour (Fall AM)



Based on the volumes observed in Figure 9, it appears that a Reversible lane oriented in the SB direction would be adequate to handle traffic during the peak SB condition (Fall AM). As in the NB peak condition, the critical segment is between Exits 46 and 47. The segment volume of 4,566 vph is split between the GP lanes (3,625 vph) and the Reversible lane (941 vph). Granted, the projected GP volume slightly exceeds the assumed capacity of 3,600 vph for a two-lane section. However, this assumes that only 80% of the vehicles that *could* use the Reversible lane will in fact choose to use it. If this were to rise to 85%, then the GP lanes would be under capacity and the Reversible lane would still be flowing freely.

It is noted that the NB volume of 4,351 at the extreme southern end (between Exits 44 and 45) significantly exceeds the capacity of a two-lane freeway. However, given our knowledge of origin-destination patterns, the authors are confident 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, and they will subsequently connect to I-295 via the loop ramp on Route 703. This, in part, explains the abrupt drop-off in NB volumes north of Exit 45. 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 much more manageable. However, it could be expected that traffic volumes will be near capacity from 2024 through 2035 resulting in undesirable levels of service (LOS E/F).

5. Summary

The analysis of peak-hour conditions in the Portland Area Mainline corridor (from Exit 44 to just north of Exit 53) identified two critical periods:

- Northbound traffic typically reached its peak during the afternoon on Summer Fridays. The peak NB volume associated with this period is 4,917 vph, occurring on the segment between Exits 46 and 47.
- Southbound traffic typically reached its peak during the morning on fall weekdays. The peak SB volume associated with this period is 4,566 vph, also occurring on the segment between Exits 46 and 47.

Reversible lanes have been employed at numerous facilities to provide traffic relief to regions that experience heavy directional peaks. The purpose of this analysis was to evaluate whether this application would be helpful in the context of the Portland Area Mainline corridor.

The analysis suggests that a Reversible lane could provide congestion relief during these peak periods through 2035, but with several drawbacks. In general, peak volumes through the corridor may be adequately served by providing three lanes (two GP lanes plus one Reversible lane) in the peak direction while maintaining two GP lanes in the off-peak direction. Some segments, particularly at the southern end of the corridor, however, will be stressed prior to 2035. The disadvantages of a Reversible lane include building near the amount of pavement required for the Reversible lane (32') as for widening for two additional lanes in each direction (44'), no safety or mobility relief for the non-peak direction, and the ultimate need for the second additional lane by 2035. Essentially, a reversible lane is a short-term capacity improvement until off-peak traffic drives the need for an additional lane.



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C-5: Enhanced Driver Information Systems, ITS Infrastructure & Enforcement: Working Paper #5



Portland Area Mainline Needs Assessment



Enhanced Driver Information Systems, ITS Infrastructure & Enforcement: Working Paper #5

HNTB Corporation
June 2018

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1. Overview

As part of the Portland Area Mainline (PAM) Needs Assessment, current and possible future Enhanced Driver Information Systems (EDIS) strategies were evaluated. EDIS strategies improve the efficiency, safety and utility of a roadway network by safely maximizing the use of current and planned transportation infrastructure. In accordance with prudent asset management principles and the Maine Sensible Transportation Policy Act, effective and feasible strategies should be considered to maximize safety and mobility before adding highway capacity.

EDIS is part of the Transportation System Management (TSM) and Operation umbrella which also includes Active Travel Demand Management (ATDM) to monitor and adjust traffic demand and safety dynamically. Strategies listed throughout this document are based on information provided by the Federal Highway Administration¹. Technology and Intelligent Transportation System (ITS) infrastructure also play an important role in the effectiveness of EDIS strategies as they rely heavily on advanced technology and communication. However, robust ITS infrastructure and effective communication are not enough to ensure EDIS success; enforcement is also key in achieving traveler compliance and sustainability. Proper enforcement also helps manage non-recurring congestion, such as traffic accidents, that compliment typical EDIS strategies.

The purpose of this document is to provide information on Enhanced Driver Information Systems, ITS Infrastructure and Enforcement practices and compare it to the current and proposed practices of the Maine Turnpike Authority (MTA). The PAM Needs Assessment has already identified TSM/ATDM strategies for evaluation that could have significant impact on the Portland area mainline, however that will not be the focus of this document. A brief overview of TSM and ATDM strategies will be included to provide proper context for EDIS, ITS and Enforcement strategies and practices.

As will be seen below, current EDIS practices by the MTA are consistent with best practices and recommendations by the Federal Highway Administration. The MTA has implemented and currently maintains many EDIS strategies, complimented by TSM and ATDM, using ITS infrastructure with proper enforcement necessary to allow for successful implementation. The MTA is also continually improving its technology, ITS, and EDIS strategies to adjust to changing traffic conditions and customer expectations. At this time, no additional EDIS strategies were identified that should be evaluated and implemented above those already in use or currently under evaluation.

2. Definition of Enhanced Driver Information Systems (EDIS)

Enhanced Driver Information Systems is part of a broad concept of Transportation Systems Management & Operation (TSM). TSM focuses on the principles of managing and operating systems in an integrated, active and performance driven manner. EDIS focuses on communicating TSM strategies to the public in a safe, efficient and effective manner. Some of these strategies include:

- Traffic Incident Management;
- Traveler Information;
- Service Patrol;

¹ Federal Highway Administration (FHWA), "Active Transportation and Demand Management," last modified January 18th, 2018. <https://ops.fhwa.dot.gov/atdm/index.htm>

- Work Zone Management;
- Road Weather Management;
- Freight Management;
- Transit Management; and
- Managed Lanes.

These strategies involve effective communication and coordination with local media, municipalities, government agencies and other entities to provide safe and efficient travel.

3. Active Travel Demand Management (ATDM)

Also, as part of the TSM umbrella, agencies utilize Active Traffic Demand Management (ATDM) strategies along with EDIS to dynamically manage, control and influence traveler behavior to improve traffic operation and safety. Some of these strategies include but are not limited to:

- Adaptive Ramp Metering;
- Adaptive Traffic Signal Control;
- Dynamic Lane Reversal (Reversible Lane);
- Dynamic Lane Use Control;
- Dynamic Shoulder Use;
- Queue Warning System; and
- Dynamic Speed Control.

These ATDM strategies aid and enhance the broader TSM concept, but require more advanced EDIS to effectively communicate such strategies. For example: Dynamic Speed Control may be used as part of Road Weather Management to adjust speeds during times of inclement weather. Or, Dynamic Lane Use Control may be used as a part of Traffic Incident Management to inform motorist to shift lanes due to an accident upstream. To put it simply, ATDM focuses on the active management principle of TSM, while EDIS is how those strategies are communicated, which allows static management systems to operate dynamically. Figure 1 provides a conceptualized graphic of the ATDM cycle. Not all strategies are effective for every road network and thus need to be evaluated on a case to case basis.



Figure 1 – Active Management Cycle

4. Technology and ITS Infrastructure

Technology and ITS infrastructure are the backbone of any EDIS strategy. Advanced ITS infrastructure helps establish a dynamic system that assesses performance, evaluates and implements appropriate changes, assesses impacts, and then reassess performance in one continuous cycle. Some of the technologies utilized in ITS infrastructure as part of a EDIS strategy are:

- Fiber Optic cable network for faster, more reliable connection and communication;
- Variable Speed Limit (VSL) signs to reduce speeds during inclement weather, traffic incidents or as part of speed harmonization;
- Traffic count stations to monitor speed and traffic volumes;
- Roadway Weather Information Systems (RWIS) to monitor roadway conditions;
- Portable and fixed variable message signs (VMS) to warn and inform motorists of incidents, roadway conditions, weather information, and travel time data;
- Highway Advisory Radio (HAR) to provide motorists information on traffic conditions, weather and construction zones;
- Closed-Circuit Television (CCTV) system to monitor traffic conditions in real time; and
- Queue counters to detect queues forming on off-ramps; and
- Media alerts such as through the agency website, Twitter, Facebook, text updates, etc.

In optimal dynamic system: traffic count stations, RWIS, CCTV and queue counters would continuously monitor roadway conditions; then traffic controllers would communicate conditions and recommend appropriate action to travelers though VSL, VMS, HAR or Media outlet. Ideally these assets would be controlled and operated through a single location to maximize efficiency.

5. Enforcement

Even with effective EDIS to communicate TSM & ATDM strategies in place with proper technology and ITS infrastructure, Enforcement is needed to help achieve strategy success. Enforcement, or the threat of enforcement, has shown to reduce speeds, improve traffic flow and provide an overall benefit to the corridor.

The Maine State Police has sole responsibility for enforcement on the Maine Turnpike. Law enforcement services are provided by Troop G and their duties include enforcing speed limits, assisting disabled vehicles, providing traffic control during incidents, detecting and apprehending drivers under the influence, and enforcing other Maine State Laws. Troop G is funded entirely by the MTA and both share a state-of-the-art facility off Exit 46 giving the troop easy and safe access to the turnpike. The number of troops assigned (called the compliment) to the Maine Turnpike is made jointly by the MTA and Maine State Police, which patrols the turnpike, 24-hours a day 365-days a year. The current compliment consists of a lieutenant, five sergeants, three corporals and twenty-five troopers. At full strength, Troop G can have as many as thirty-five Troopers.

The MTA works jointly with the Maine State Police to promote and implement:

- Education;
- Safety;
- Community outreach;
- Effective communication; and
- Quick clearance of the roadway.

Another key role for the Maine State Police is managing congestion that occurs from accidents or breakdowns. This is done through quick and efficient response as well as providing traffic control to help warn motorists. These strategies improve safety and efficiency along the turnpike and help the effectiveness of incident management and other EDIS strategies used by the MTA.

6. MTA Current EDIS Strategies

The MTA already utilizes many EDIS strategies along the Maine Turnpike including:

- Incident Management
 - Incidents detected by CCTV and traveler 911 calls; communicated to other travelers through VMS signs, HAR and local media outlets including Twitter and Text alerts; VSL signs reduce speeds if necessary; and
 - Maine State Police helps manage incidents by creating awareness, providing traffic control and working cooperatively to quickly and safely clear the roadway.
- Traffic Signal Coordination
 - Traffic Signals at freeway junctions are coordinated to keep queues from spilling onto the mainline; and

- Queue counters are placed at certain exits to detect if queues could backup onto the mainline and then adjust signal timing accordingly.
- Traveler Information
 - General traveler information such as back-ups, weather events, special events, or safety messages are communicated through VMS, HAR systems and coordination through local media.
- Service Patrols
 - State Farm Sponsored Safety Patrol truck patrols the Maine Turnpike and provides roadside assistance to disabled vehicles;
- Work Zone Management
 - Traffic control plans are designed by consultants and implemented by contractors, sometimes in phases to reduce travel impacts; and
 - Work zones are sometimes aided by Local or State police to create awareness and to enforce speed limit reductions to improve safety.
- Road Weather Management
 - RWIS monitor road conditions; VMS relay weather conditions; and VSL reduce speeds if necessary.
- Freight Management
 - Certain section of the Turnpike does not allow trucks to travel in the left most lane to improve traffic flow and safety.

7. MTA Future EDIS Strategies

As Outlined in the previous section, the MTA already has a robust EDIS plan. Additionally, the MTA continues to evaluate opportunities to expand and improve EDIS strategies and technology to keep up with roadway demand, customer expectations, and ever-changing traffic conditions. Some of these improvements include:

- Expanding the fiber optic cable network to improve communication and reliability;
- Adding more VSL signs;
- Adding more VMS signs;
- Adding Travel Time VMS signs south of Exit 44 heading northbound and north of Exit 53 heading southbound to inform motorists of the delay on I-95 and I-295.
- Upgrading outdated technology and software such as the HAR and CCTV systems; and
- Integrating components to be controlled remotely from the Turnpike Communications Center located at the MTA headquarters off exit 46.

8. Conclusion

EDIS, part of the TSM umbrella, is an important traffic management tool that can improve travel safety and efficiency by improving performance dynamically through effective communication, utilizing existing and future transportation infrastructure. TSM, ATDM, Technology, ITS, and Enforcement play key roles in the effectiveness of EDIS and should be implemented cooperatively. As part of the Portland Area Mainline Study, current and future EDIS strategies utilized by the MTA were evaluated.

Based on this evaluation, it is apparent that strategies implemented by the MTA are consistent with current design practices and recommendations from the Federal Highway Administration. The MTA is also continually improving these strategies and technologies to adjust to changing market demand and traffic conditions. No additional strategies were identified that should be evaluated and implemented above those already in use or currently under evaluation.



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C-6: Part-Time Shoulder Use: Working Paper #6



Portland Area Mainline Needs Assessment



Part-Time Shoulder Use: Working Paper #6

HNTB Corporation
June 2018

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1. Overview

Part-time shoulder use is a transportation system management strategy that allows vehicles, usually restricted to certain classes, to use the left or right shoulder during specific time periods. Part-time shoulder use has been used in situations where there is limited right-of-way and recurring congestion due to lack of capacity, particularly when other alternatives to reduce congestion are infeasible or cost-prohibitive. There are three types of part-time shoulder use as outlined by the Federal Highway Administration (FHWA):

1. Buses only (BOS) to improve transit travel time and reliability;
2. Static Shoulder use (either for all classes or class specific) operating during peak periods; and
3. Dynamic Shoulder use to respond to real-time conditions.

While part-time shoulder use is a cost-effective strategy to reduce congestion during peak periods, it may not be an appropriate alternative if design requirements are not met or if it has an adverse effect on safety. Even if part-time shoulder use is deemed to be feasible, there are still unique design, safety, cost, implementation and operational challenges that need to be considered before being implemented.

This paper will serve to provide guidance on the state of the practice of part-time shoulder use and its implications on the Maine Turnpike between Exits 44-53.

2. Geometric Design Requirements

Implementation of part-time shoulder use occurs within the existing paved roadway envelope but may lead to shoulder redesign or other roadway infrastructure improvements to meet geometric requirements outlined by the FHWA. These requirements are:

- Adequate shoulder width and cross slope to accommodate a travel lane;
- Adequate vertical clearance and bridge width;
- Adequate physical and structural condition in terms of rideability and drainage; and
- Adequate stopping sight distance and lateral offset to obstruction.

Other considerations include determining if there are long enough roadway segment available and providing emergency refuge areas. Part-time shoulder use on short roadway segments could reduce the ability of the lane to handle congestion especially if there are interchanges present. The shortest roadway section utilizing part-time shoulder use in the United States from the FHWA guide is roughly 1.5 miles in Seattle, Washington. Emergency refuge areas are highly desirable because during shoulder use, by definition, the shoulder width will be reduced or eliminated. Based on the FHWA guide, emergency refuge areas should be placed every ½ mile, which may not be possible on bridge segments or if there is limited right-of-way. Therefore, a design exception would be required as shoulder width is a controlling design criterion. This often impacts other controlling design criteria and needs to be considered when determining if part-time shoulder use is feasible.

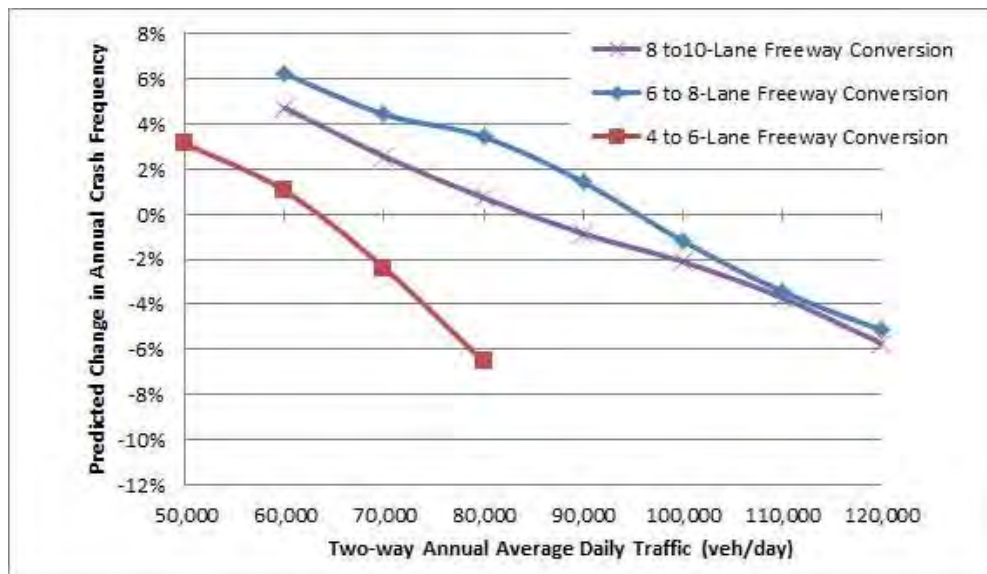
3. Safety

While research to date has not concluded whether part-time shoulder use negatively or positively impacts overall safety in the long run, there are a few conclusions that can be made based on existing data:

1. Crashes related to congestion may decrease;
2. Crashes related to driver behavior, confusion or suboptimal geometry may increase;
3. Crashes related to right-side ramp junctions may increase with right shoulder use; and
4. If part-time right shoulder use is utilized as part of an interchange system (i.e. closely spaced interchanges), crashes related to ramp junctions could further increase.

Overall, part-time shoulder use could reduce property damage only crashes and slightly increase fatal and injury crashes on a four 4- or 6- lane facility. This is because rear-end collisions would decrease, often associated with congestion, which have a lower probability to cause injury; and sideswipe, run-off the road and interchange related crashes would increase, due to driver confusion and the presence of multiple interchanges, which have a higher probability to cause injury. However, the perceived safety benefit is only valid with proper volumes and ideal geometric conditions, i.e. good sight distance, proper lateral and vertical clearance, etc.

Studies have shown that adding a lane and reducing shoulder width can improve safety if the volume is high enough. Graph 1 uses data from the Highway Safety Manual (HSM)¹ to compare the predicted change in annual crash frequency and Annual Average Daily Traffic (AADT) with a reduced shoulder width for different lane configurations. The graph represents an addition 12' travel lane and 4' reduced width shoulder.



Graph 1 – Predicted crash frequency associated with increasing number of freeway lanes and narrowing the right shoulder

¹ American Association of State Highway and Transportation Officials (AASHTO), “Highway Safety Manual, First Edition, with 2014 Supplement” (2014).

Graph 1 is used to help predict the potential safety impacts of part time-shoulder use, but there are a few limitations to the HSM methodology:

1. Graph 1 represents a full-time use lane and not a part-time use lane, therefore predicted crash frequency is only valid when the shoulder is open during peak periods;
2. Graph 1 cannot predict the safety impacts of a no shoulder scenario. 4' is the lowest shoulder width reduction available in the HSM; and
3. Graph 1 doesn't include potential safety impacts due to design exceptions or poor geometric conditions (i.e. sight distance, lateral offset, etc.) as their impacts vary from site to site.

Overall, Graph 1 is meant to show that as capacity is added and shoulder width is reduced, which is the case for part-time shoulder use, safety improves for roadways with higher AADT and safety reduces for roadways with lower AADT. Part-time shoulder use is the extreme case compared to the assumptions made in Graph 1, which includes some limitations when applied to part-time shoulder use as explained above. These limitations skew the overall safety impact and should be carefully considered before determining if part-time shoulder use is feasible.

4. Capacity

Lane utilization and capacity also need to be considered to determine if part time shoulder use is feasible. Vehicles have been found to travel 5-10 mph slower when using the shoulder as a travel lane. Slower speeds combined with a substandard shoulder and driver unfamiliarity result in a lower capacity. Based on simulations performed by the FHWA, part-time shoulders can expect to achieve a capacity of 1250-1700 vehicles per hour. A part-time shoulder use lane will achieve a lower capacity with a substandard freeway lane design (10' width), 50% single occupancy vehicle (SOV) utilization i.e. of the SOV's able to use the shoulder only 50% will, and no truck traffic. A part time shoulder use lane will achieve a higher capacity with a standard freeway lane design (+12' width), 100% single occupancy vehicle utilization and truck traffic. While part-time shoulder use will increase capacity of the roadway facility, it would only occur during peak periods and the capacity would be less than a typical travel lane. This is especially important to consider if congestion extends beyond peak periods, when widening may be a better option to avoid keeping the shoulder open for extended periods of time.

5. Cost

Part-time shoulder use may be a cost-effective solution to improving capacity issues in lieu of traditional widening, but there are still potential capital and operating & maintenance (O&M) costs to consider:

Capital Costs

- Engineering, testing, project management and feasibility documentation;
- Shoulder widening or reconstruction;
- Construction of emergency refuge areas;
- Ramp treatments such as widening or restriping;
- Maintenance and law enforcement training;
- Increased Emergency Patrols;
- Public Outreach; and

- Intelligent Transportation System (ITS) infrastructure.

O&M Costs

- Compliance enforcement;
- Sweeps (drive the facility) every day before opening to traffic;
- ITS maintenance and operations staff; and
- Roadway maintenance, sometimes complicated with snow removal.

Part-time shoulder use usually demands more training and public outreach than typical widening projects due to the lack of familiarity among the public and law enforcement agencies. Depending on the amount of reconstruction or widening of the shoulder required, costs could be greater than anticipated compared to a highway facility with adequate shoulder design or traditional widening. However, if bridge widening is needed for a third lane but not needed for part-time shoulder use, capital costs would be significantly less than traditional widening. Once part-time shoulder use is implemented, O&M costs could exceed traditional widening O&M costs due to the additional resources needed for enforcement and to maintain and operate ITS infrastructure.

6. Implementation & Operation

If part-time shoulder use is deemed feasible based on design, safety and capacity, there are a few implementation and operational challenges that need to be considered:

Legislative/Legal Action

- In some states, driving on the shoulder is prohibited by law;
- Complex part-time shoulder use projects may require a “request to experiment” submitted to the FHWA; and
- Depending on the complexity of ITS, further legislative action may be needed to establish a framework for implementation.

Enforcement

- Manual video enforcement or increased Police enforcement could be required to ensure shoulders aren’t being used during off peak hours; and
- Creates potential safety risk if vehicles are using the shoulder during off peak hours to accelerate/decelerate or maneuver through traffic.

Emergency Responses

- A substandard shoulder during peak hours reduces law enforcement official’s ability to respond to accidents and perform traffic management duties; and
- Emergency refuge areas help mitigate the risk but do not eliminate it.

7. Application to Maine Turnpike between Exits 44 and 53

Based on the FHWA guide and analysis of existing conditions, below are potential implications part-time shoulder use would have on the Maine Turnpike between Exits 44-53:

1. The right shoulder would have to be rebuilt and widened to at least 12' to accommodate part-time shoulder use (existing 8' shoulder);
2. The left shoulder would not be feasible for part-time shoulder use due to geometric constraints and the presence of bridge piers;
3. Further analysis would need to be done to determine if other design requirements are met or if a design exception is needed;
4. BOS would not be logical due to the current limited volume of bus traffic on the Turnpike;
5. Potential increase in ramp junction crashes, especially between exits 44-48;
6. By 2040, AADT's will be between 50,000 and 70,000 vehicles a day, resulting in a safety improvement for some sections and a safety reduction for others;
7. Less capacity available than adding an additional lane;
8. The number of short trips on the turnpike could reduce the effectiveness and capacity of the part-time shoulder use lane;
9. Reduced capital costs but potential increase in O&M costs as compared to widening;
10. State of Maine Law under MRS Title 29A, Chapter 19: Operation states: "8. Breakdown lanes. The operator of a vehicle may not overtake another vehicle on a limited-access way by driving on the shoulder or in the breakdown lane located on the right or the left of the travel lanes. [2003, c. 340, §6 (NEW) .]. While this is not a significant obstacle to overcome, it may still need to be rewritten to allow part-time shoulder use;
11. Increased public outreach, training and enforcement to educate the public and law enforcement on part-time shoulder use; and
12. Potential emergency response issues even with refuge areas.

8. Conclusion

There are many benefits to part-time shoulder use, especially for a facility with limited ROW and limited funding. However, design requirements, safety impacts, capacity constraints, Capital & O&M costs, implementation and operational challenges help planners and engineers determine if part-time shoulder use is feasible. Based on the findings of this technical memorandum as it relates to the Maine Turnpike between Exits 44 and 53, part-time shoulder use is not recommended for the following reasons:

- Potential increases in overall crashes, as well as fatality and injury crashes based on forecasted traffic volumes;
- Closely spaced interchanges, which may increase ramp junction crashes;
- Potential emergency response issues;
- Less capacity than adding an additional lane – will only be a short-term solution based on forecasted traffic volumes;
- Availability of ROW and funding to add an additional general-purpose lane; and
- Legal obstacles for shoulder use.

While part-time shoulder use is not recommended between Exit 44 and 53 for the Portland Area Mainline study, this does not mean that part-time shoulder use isn't feasible for other projects in Maine. A high-level bridge project where widening isn't feasible due to high costs may warrant part-time shoulder use to provide congestion relief. However, information from this report should be considered before part-time shoulder use is implemented.



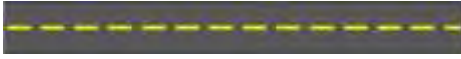
Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix C-7: Induced Demand – Working Paper #7

Portland Area Mainline Needs Assessment



Maine Turnpike Authority
HNTB Corporation
Kevin Hooper Associates
Morris Communications

Date

June 13, 2018

To

MTA, PAM PAC Members

**Project
Correspondence**

From

PAM Study Team with the assistance of Charles Colgan

Subject

Evaluation of Induced Demand

HNTB



Background

At the April 25, 2018 Public Advisory Committee (PAC) meeting for the Portland Area Mainline (PAM) Needs Assessment study, a discussion arose of whether the potential effects of induced demand associated with some or all of the Portland Area Mainline Study alternatives had been properly addressed. Following the PAC meeting, the MTA and PAM Team met with Dr. Charles Colgan to discuss this topic in further detail and develop a comprehensive response. The following paper defines induced demand and its presence in this Study, acknowledges that it can have significant effect in congested, urban regions, describes how the PAM alternatives analysis largely accounts for induced demand in its use of the PACTS travel demand model, and concludes that induced demand will only slightly accelerate traffic growth in this region and has a limited effect on the alternatives analysis prepared.

Definition of Induced Demand

Induced demand represents the increase in transportation demand that follows when an increase in transportation supply occurs, lowering the cost of traveling and encouraging additional demand for travel. As additional roadway capacity is provided, traffic volume growth is induced. Likewise, as additional transit service is provided, transit ridership is induced. And as more pedestrian facilities are provided, walk trips are induced. For the Maine Turnpike, traffic will continue to grow due to increases in population, employment, and the shifting of traffic from other routes. The underlying issue is to confirm that any investment in the transportation system does not quickly fill up with induced demand and result in a relatively immediate need to address the capacity and safety problem again.

Induced demand resulting from an increase in transportation capacity comes from:

- A change in the travel route for a trip taken by a motorist
- A change in the travel mode of a person making a trip
- A change in the time-of-day of a trip made by a person

The following describes each element in detail.

Change in Travel Route

A motorist tends to use the route that takes the least time to reach a destination. If additional capacity is provided on the Maine Turnpike or on I-295, vehicle speeds increase on the Interstate highways and vehicle trips are diverted from local roads to the highways. Likewise, as traffic congestion increases and travel speeds lower on the Maine Turnpike and I-295, vehicle trips will be diverted to local streets. These diversions affect more than the motorists who choose between Interstate and local street routes. As traffic congestion worsens (or lessens) on local streets as a result of the diversion from or to the Interstate, the local street motorists who otherwise had no intention of diverting to the interstate is faced with the need to make choices between local street options.

At any given level of total traffic, the more travel handled on the Interstate highway system, the less travel is handled on the local arterial street system. Likewise, the more travel accommodated on the arterial street system, the less is handled by the collector system. And the more accommodated by the collector system, the less is handled by the neighborhood street system.

In this alternatives analysis, change in travel route is accounted for by the PACTS travel demand model.

Change in Travel Mode

With the addition of new transit service or of more frequent transit service, induced demand for transit travel occurs. This shift to transit from passenger vehicles is expected to reduce traffic congestion along the transit route. Generally speaking, new rail routes have the greatest effect on transit induced demand, followed by light rail, then bus.

In this alternatives analysis, change in travel model is accounted for by the PACTS travel demand model.

Change in Time-of-Day for Travel

The selection of the time-of-day to make a trip can be affected by the expected travel costs. If traffic congestion at a specific time is severe, a motorist could choose to shift to a less congested time period. This phenomenon is referred to as peak spreading, or shifting to the shoulders of the peak. This shifting in time-of-day travel was evident in the original alternatives analysis for south of Exit 44 conducted for the Maine Turnpike in 1996¹. A congestion pricing study completed as part of this analysis showed clear evidence of peak spreading during peak weekend travel periods due to lengthy periods of congestion.

However, in this Study Area, an examination of historic hour-by-hour traffic volumes on the Maine Turnpike indicates there has been very little evidence of peak spreading over the past 15 years. The retention of distinct traffic volume peaks has occurred despite an increasing level of traffic congestion along the Turnpike mainline. A probable factor in the lack of peak spreading is the presence of a significant level of traffic that is regional or local to this corridor vs. through traffic or traffic destined for other regions of Maine. Northbound peak traffic volumes occur during the summer weekday. This peak traffic includes visitor traffic but is largely commuter based. Southbound peak traffic volumes occur during the fall weekday, which is predominantly commuter based. This is in contrast to the earlier peak congestion south of Exit 44 where a strong proportion of the traffic were visitors who were somewhat more able to change the time of their trip.

¹ Maine Turnpike Alternatives Study, December 1996

Change in time-of-day for travel is not accounted for by the PACTS travel demand model, but it is considered to be a limited part of induced demand in this region due to the evidence of limited current peak spreading.

Induced Development as Part of Induced Demand

Induced demand can also be present over the longer term, where it is seen in a shift in land use patterns. Transportation costs are one factor in decisions about where to locate residences and commercial facilities, although they are a relatively small factor relative to real estate costs. The form of land use change can affect travel demand. Low density, land intensive, and auto dominated development patterns (“sprawl”) tend to increase auto travel on all available routes. Denser land use patterns that are more amenable to transit and bike-ped travel has a smaller effect on transportation demand. Such development patterns are the product of an interaction between market forces and land use regulations and are not the result of road capacity choices per se.

Any induced demand that is the result of changes in residential or commercial development patterns (i.e., induced development) is not directly addressed in the PACTS travel demand model. The model can forecast travel demand that results from a pre-defined development pattern as demonstrated by the assessment of an alternative land use scenario (Alternative #8) as well as the base development pattern developed by GPCOG and PACTS. The Study Team finds that the scale and types of changes being evaluated will have only localized effects on development patterns that will have only minor effects on Maine Turnpike traffic volumes. As an example, the provision of local commuter rail service between the Portland Transportation Center and downtown Westbrook (Alternative #6b) could result in higher-density residential development near the Westbrook rail station (which in turn could increase transit ridership but would have minimal effect on Maine Turnpike traffic volumes).

A widened Maine Turnpike is not expected to induce additional development on the commercial property along the Maine Turnpike and its interchanges between Exits 44 and 53. New commercial development has been proposed in the vicinity of Exits 47 and 48, there has been recent commercial infill near Exits 46 and 45, and there continues to be transit-oriented development (TOD) talk for Exit 53. This development has occurred and continues to occur under the current 4-lane Turnpike cross-section. With a widened Turnpike, additional incentives for commercial development could occur between Exits 44 and 53, resulting in additional density. A widened Turnpike is unlikely to encourage further commercial sprawl beyond the study limits. Industrial development along Haigis Parkway near Exit 42 could benefit from less regional traffic congestion and would support Town of Scarborough economic development goals. Commercial development at Exit 36 (Saco), Exit 32 (Biddeford) and Exit 63 (Gray) are less likely to see any direct impact from reduced traffic congestion between Exits 44 and 53.

Conclusions

Induced demand results from the addition of transportation capacity. However, its potential effects in this Study Area based on the level of existing congestion, scale and type of proposed transportation system changes are anticipated to be limited. The effects of induced demand are unlikely to significantly shorten the period in which a widening of the Turnpike segment at issue is an effective means of addressing congestion, all else equal. Over the long term, population and economic growth will be the primary drivers to increased use of the highway and result in the need to readdress congestion at some point in the future. This is likely decades away based on forecasted growth. In the meantime, implementation of current non-highway capacity alternatives (examples: TDM, transit) and developing

technologies (examples: mobility as a service, autonomous or connected vehicles) could delay or perhaps even eliminate the need to add highway capacity to address this future challenge.

The two primary elements of induced demand – route choice and model choice – have been addressed with the use of the PACTS travel demand model.

Smaller elements of induced demand for this region, such as change in time-of-day travel and induced development, are not addressed with the PACTS travel demand model. It is our professional opinion, however, that changes in the time-of-day for travel will not occur to any significant degree. Nor are there expected to be any changes in overall levels of individual trip-making as a result of transportation system changes.

The types of transportation system changes being considered as part of this study (1) could have localized impacts on the types and densities of development between Exits 44 and 53 and (2) are likely to have only minimal impacts on development patterns south of Exit 44 and north of Exit 53. In the long run, their effects on Maine Turnpike traffic volumes are minimal.

At the same time, it is also recognized that an understanding of the intrinsic relationship between the transportation system characteristics and land use development patterns can lead to better informed decisions. This understanding could lead to municipal decisions being made to develop more efficient land use plans around any proposed transportation system changes.



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix D: Inventory of Transportation Infrastructure

HNTB Corporation

July 2018

1. List of Roadways - Interstate, US Route, State Route, Local road names
 - Freeways
 - Maine Turnpike/I-95
 - Interstate I-295
 - Maine Turnpike Approach (Route 703)
 - U.S. Routes
 - Route 302 (Forest Ave.)
 - State Routes:
 - Route 114 (Gorham Rd.)
 - Route 22 (Congress St)
 - Route 25 (Rand Rd./Westbrook Arterial)
 - Route 25B (Brighton Ave)
 - Local Roads:
 - Running Hill Rd.
 - Cummings Rd.
 - Skyway Dr.
 - Westbrook St./Stroudwater St.
 - Riverside St.
 - Larrabee Rd.
 - Warren Ave.
 - Backstrap Rd.
 - Leighton Rd.
 - Maine Mall Rd.
2. List of interchanges on the Maine Turnpike
 - Exit 44
 - Exit 45
 - Exit 46
 - Exit 47
 - Exit 48
 - Exit 52 (Falmouth Spur)
 - Exit 53
3. List of toll plazas on the Maine Turnpike
 - Exit 44 Toll Plaza to/from I-295
 - Exit 45 Toll Plaza to/from Route 703
 - Exit 46 Toll Plaza NB
 - Exit 46 Toll Plaza SB
 - Exit 47 Toll Plaza to/from Rand Rd
 - Exit 48 Toll Plaza to/from Larrabee Rd
 - Exit 52 Toll Plaza to/from I-295
 - Exit 53 Toll Plaza to/from Route 100
4. List of park and ride lots, by Maine Turnpike or others
 - South Portland, Near Exit 45 Toll Plaza
 - Portland, Exit 46 near MTA headquarters
 - Westbrook, Exit 47 on Westbrook Arterial
 - West Falmouth, Adjacent to Exit 53 Toll Plaza
5. List of transit providers that operate along or over the Maine Turnpike
 - Portland METRO
 - City of South Portland bus service

- BREEZ
 - ZOOM Bus
 - Concord Coachlines
 - Greyhound Bus
6. List of rail infrastructure along or over the Maine Turnpike
- Mountain Division
 - Pan Am

Employer Based Commuter Programs

1. GOMAINE: ride sharing service
 - a. Utilized by small and large companies alike
 - b. <https://www.gomaine.org/>
2. WEX
 - a. <https://cushmanconsult.files.wordpress.com/2017/10/wex-tdm-plan-092917.pdf>
3. IDEXX
 - a. Combined carpooling/LEV(Low emissions vehicle) parking spots (all spots are very close to the building)
 - b. Electric vehicle charging stations (right next to the building)
 - c. IDEXX will reimburse its employees if they purchase a Bus Pass through the metro system
 - d. We have a gym that as long as you use it 8 times a month, you are fully reimbursed the membership fee (obviously the main goal of the gym is not for people who ride bikes to work and need to shower but it is available to them)
4. UNUM (recommends and provides resources but there is no official TDM program)
5. Maine Medical Center
 - a. <https://mainehealth.org/-/media/maine-medical-center/files/brand/newsroom/modernization/project-updates/site-plan-application-for-east-tower-and-visitor-garage-expansion/written-submission-s---7-tdm-plan.pdf?la=en>



Portland Area Mainline Needs Assessment



Portland Area Mainline Needs Assessment Alternatives Analysis Report

Appendix E: Alternative 15 Evaluation Summary

Alternative 15 - Combined Alternative: TDM, Interstate, Local and I-95 Regional Bus, and Land Use with Widened Turnpike from Exit 44 to 53

This Combined Alternative was developed from recommendations from the Public Advisory Committee (PAC) during the final PAC meeting. This combined alternative includes several individual alternatives that were examined separately as part of the PAM Study. This Combined Alternative includes the following individual alternatives:

- Alternative 2 – New/Expanded Transportation Demand Management (TDM) Programs
- Alternative 4 – Public Transportation: New or Improved Interstate Bus Service
- Alternative 5b – Public Transportation: New or Improved Local Bus Service
- Alternative 5c – Public Transportation: New I-95 Corridor Regional Bus Service
- Alternative 8 – Land Use
- Alternative 12 – Widen Turnpike to Six Lanes

For Alternative 2, TDM programs provide tools to commuting travelers to reduce the demand for transportation, i.e., reduce the number of vehicles on the road. These tools include ride share programs, park and ride lots, and work from home opportunities.

For Alternative 4, the Primary Interstate Bus providers in the study area are Concord Coach Lines and Greyhound. Both Concord Coach Lines and Greyhound provide interstate bus service to Boston and New York and to Lewiston/Auburn. In this alternative, the Concord and Greyhound bus systems were evaluated to determine the potential effects of practicable system improvements including increased service and additional transit infrastructure.

For Alternative 5b, local bus providers included in this alternative are Greater Portland METRO and City of South Portland Bus Service. In this alternative, these bus systems were evaluated to determine the potential effects of practicable system improvements including more frequent service, and implementation of a bus rapid transit type system along key corridors.

For Alternative 5c, a new I-95 corridor regional bus assumes service from Biddeford/Saco to Gray with local Greater Portland METRO Service coordination. In this alternative, two new routes were created to determine the effects of a northerly (Exit 45-63) and southerly (Exit 32-48) route throughout greater Portland.

For Alternative 8, the Study Team assessed the benefits of an alternative land use pattern of growth and development that was originally identified and quantified under the Gorham East-West Corridor Study¹. Allocation of current population and employment forecasts into specific growth areas within the PACTS region identified in the Gorham East-West Corridor Study². These allocations were based on a modified distribution of population and employment growth designated as the Urban and Rural form.

¹ Maine Turnpike Authority, *Gorham East-West Corridor Feasibility Study*, (HNTB, March 2010)

² Ibid.

For Alternative 12, roadway widening alternatives are typically construction-based alternatives that require capital investment including engineering costs, wetland mitigation, and right-of-way acquisition. 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 are included in this alternative.

The approach for each individual alternative in the Combined Alternative 14 are described below.

New/Expanded Transportation Demand Management (TDM) Programs

Rideshare data was collected from rideshare services such as GoMaine³ as well as from major employers. Historic utilization data for the PACTS area park and ride lots provided by the MTA and MaineDOT⁴ was analyzed to determine the capacity for additional carpool/vanpool use. Data from the US Census⁵ and the United States Department of Labor was gathered and analyzed to determine trends in the portion of the workforce that is working from home. Further descriptions of the assumptions and methodology for the analysis of this alternative is in **Alternative 2 – New/Expanded Transportation Demand Management (TDM) Programs**.

Public Transportation: New or Improved Interstate Bus Service

Potential increases in interstate bus ridership were estimated using two methods – estimating passengers from Concord Coach Line plans for increasing service, and estimating passengers from information in the 2011 Interstate Feasibility Study for ridership from the Lewiston/Auburn area to Portland and points south. Further descriptions of the assumptions and methodology for the analysis of this alternative is in **Alternative 4 – Public Transportation: New or Improved Interstate Bus Service**.

Public Transportation: New or Improved Local Bus Service

Discussions with local transit providers helped identify practicable system improvements for the local bus services. These improvements included additional buses and the implementation of a Bus Rapid Transit system to allow for increased local bus service. The resulting increased frequency and decreased travel times were incorporated into the PACTS Travel Demand Model used to forecast local bus ridership. Further descriptions of the assumptions and methodology for the analysis of this alternative is in **Alternative 5b – Public Transportation: New or Improved Local Bus Service**.

Public Transportation: New I-95 Corridor Regional Bus Service

Discussions with regional transit providers helped identify practicable system improvements for regional bus service. These improvements developed into the creation of two new commuter routes: a northerly and southerly route along I-95. The southerly route would begin in Biddeford/Saco and continue north to include stops at the Maine Mall, Unum, and parking facilities in Portland. The northerly route would begin in Gray with stops in West Falmouth, Portland, Unum and the Maine Mall. Improvements to local bus routes and increased parking were assumed. Further descriptions of the assumptions and methodology for the analysis of this alternative is in **Alternative 5c – Public Transportation: New I-95 Corridor Regional Bus Service**.

³ GoMaine is the State of Maine rideshare program currently sponsored by MaineDOT and the Maine Turnpike Authority, www.gomaine.org.

⁴ Maine Department of Transportation Park n' Ride Utilization Study, 2011.

⁵ United States Census Data, American Community Survey 5-Year Estimates, https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

Land Use

The analysis of this alternative follows a methodology that is based on the approach followed under the Gorham East-West Corridor Study. Future distribution of job, population, and dwelling unit growth identified as the Urban and Rural form as part of the Gorham East-West Corridor Study,⁶ was used as the demographic base for the PACTS Travel Demand Model. Using this Urban and Rural form distribution, the PACTS Travel Demand Model was run with current job, population, and housing growth to determine the transportation impacts/benefits and increases in transit ridership for the Maine Turnpike and non-Turnpike roadways, as well as increased transit ridership for Year 2040. Further descriptions of the assumptions and methodology for the analysis of this alternative is in **Alternative 8 – Land Use Scenario**.

Widen Maine Turnpike to Three Lanes in each Direction from Exits 44 to 53

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. Further descriptions of the assumptions and methodology for the analysis of this alternative is in **Alternative 12 – Widen Maine Turnpike to Three Lanes in each Direction from Exits 44 to 53**.

Widening of the Maine Turnpike to three general purpose lanes plus the traffic demand reduction from the other alternatives 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. Therefore, this alternative does address identified capacity issues on the Maine Turnpike.

The key findings for this alternative are as follows:

- Greater than 30% reduction in crashes on the Maine Turnpike;
- An increase in Maine Turnpike roadway capacity;
- An expected reduction of approximately 183 vehicles during the peak hour;
- 4.0% reduction in regional VMT, and a 4.9% reduction in regional VHT;
- Increases Portland area transit ridership by an estimated 614 trips;
- A reduction of 68.8 miles of roadway in the region that are near or over capacity;
- 4.3 % reduction in vehicle emission pollutants;
- Has potential wetland impacts;
- 17 acre increase of impervious pavement in Urban Impaired Stream Watersheds;
- Can be readily implemented, except for land use. Timeframe to implement land use is unknown. Local municipalities would need to adopt aggressive land use and zoning changes;
- Has a Benefit/Cost ratio of greater than 4; and
- Does address Portland Area Mainline Needs Assessment Study Purpose

⁶ Maine Turnpike Authority, *Gorham East-West Corridor Feasibility Study*, (HNTB, March 2010)