

Portland Area Mainline Needs Assessment



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To

MTA, PAM PAC Members



Project Correspondence

From

PAM Study Team with the assistance of Charles Colgan

Subject

Evaluation of Induced Demand



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.