Quantitative TDM Assessment for the Greater Toronto and Hamilton Area

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Background:

Cities around the globe are trying to improve transportation systems' performance – reducing congestion, increasing mobility, and enhancing accessibility – to improve economic competitiveness and quality of life for residents. Metrolinx, in partnership with the Province of Ontario, municipal governments, and local transit providers, is actively trying to achieve these goals in the Greater Toronto and Hamilton Area (GTHA).

To this end, this research explored opportunities in the GTHA to improve system performance not by investing in new infrastructure, but rather by improving the utilization of existing roadways and public transit systems. The goal of this research was to determine if opportunities existed to implement Transportation Demand Management (TDM) strategies in the GTHA. More specifically, ***the research addressed the questions:***

- ***How and where can demand be shifted in time,*** from periods with very high demand, to times when demand is less so congestion can be managed?
- ***How and where can demand be shifted in space***, from one roadway with very high demand to a parallel roadway with lower demand, so congestion can be managed?
- ***How and where can demand be shifted from private automobiles to public transit*** such that roadway congestion is reduced and transit utilization is increased?

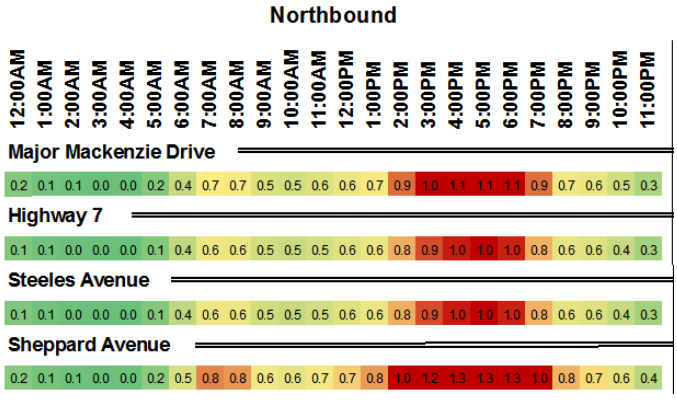
Global Examples:

Before analyzing opportunities in the GTHA, peer global cities were examined to determine what methods have been used elsewhere to manage demand. These include:

- ***London, UK*** implemented a ***"cordon pricing"*** scheme where auto users are required to pay 8£ to enter the downtown area. In addition to dissuading auto use in the central city, this revenues raised from this program are dedicated to public transport;
- ***Singapore*** created an ***Electronic Road Pricing*** scheme that charges drivers for use on congested sections of freeways; the charges vary dynamically based on the level of congestion on the roadway.
- ***Vancouver, BC*** instituted an additional ***parking tax of 21%*** to dissuade driving and help fund public transport measures.

Shifting Demand in Time:

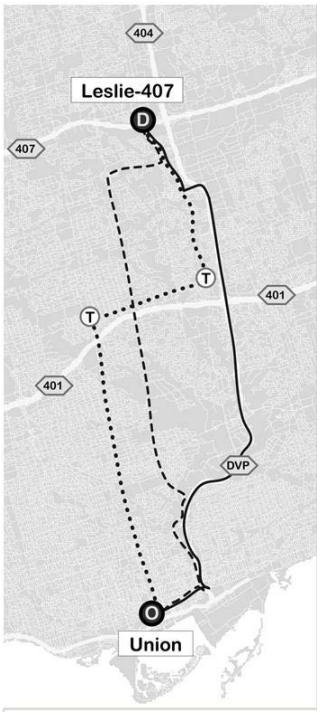
The goal of this part of the study was to attempt find corridors in the GTHA where benefits can be gained by encouraging travelers to begin their trips 30 to 60 minutes earlier or later, to avoid very heavy congestion on major roadways. In these cases, simply providing information to travelers should help manage demand and improve performance. Opportunities for this kind of shift were examined on: the Don Valley Parkway; Highway 401 east and west of the City of Toronto; the Gardiner Expressway; and the Queen Elizabeth Way. Results of the analysis are shown here for the Don Valley Parkway northbound between Sheppard Ave. and Major Mackenzie Drive.



On the diagram, the colour codes show the roadway performance for each hour of a typical weekday. Green sections indicate free-flowing traffic; yellow sections are slower but moving; and red sections represent significant congestion. In this case, if someone wanted to travel any time between 3 and 7pm, the roadway performance would be poor. In order to avoid the congestion, the traveler would have to begin their trip before 2pm or after 7pm. Few options exist in this corridor to shift demand in time in a way that is likely to attract travelers. In the analysis, very few opportunities to shift travel in time were identified.

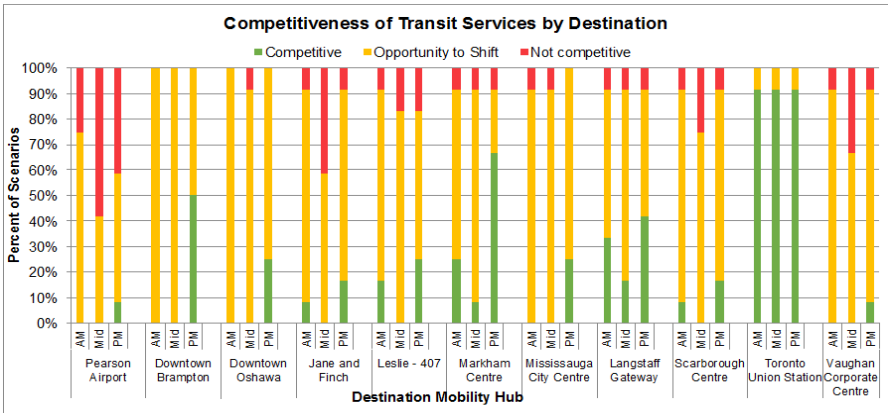
Shifting Demand in Space or Mode:

This part of the study identified corridors where parallel alternatives existed to congested roadways. If some travelers were to switch from the most heavily congested routes to an alternative, congestion could be significantly reduced. Suppose a commuter wanted to travel from the area of Leslie at Highway 407 to Union Station in downtown Toronto. The most likely auto path for that traveler is by car on the Don Valley Parkway. But, when the DVP is severely congested, do other roadway paths or transit options exist that may be better for the traveler?



Two alternatives to the DVP were considered in this analysis – traveling by car using Bayview Avenue and traveling by transit on York Region Transit to the TTC. The costs to the traveler of completing this trip by the three options – DVP, Bayview and combined transit were estimated for different periods of the day – morning peak, midday and afternoon peak. The results suggest that each of these alternatives "costs" travelers (in terms of time and money) about the same in the southbound direction throughout the day. This is largely the result of having to pay for parking in the downtown core. In the northbound direction, travel by auto along the DVP is the least expensive path. If measures were taken to improve transit service in the corridor (i.e. lower the cost of transit by increasing frequency of service or speed) or to increase the cost of auto travel (through road tolling or increased parking charges), travelers would redistribute themselves across the alternatives so that the whole system would improve.

Similar analyses were conducted between many mobility hubs in the GTHA. The results are shown in the figure to the right. Again, the colours represent the potential for transit to compete with the shortest auto path in trips destined for the mobility hubs shown on the bottom of the diagram. For some trips – particularly those to and from Union Station in Toronto – only minor improvements in transit or modest economic signals for drivers – would redistribute trips such that alternative modes or paths will become more attractive and congestion will be mitigated.



Conclusions and Directions Going Forward

The research conducted was intended to identify travel corridors in the GTHA where with limited intervention and no new infrastructure, the overall transportation system performance could be improved. The approaches analyzed included shifts in time, space and mode. For shifts in time, very few opportunities exist. The conclusion is that the region's freeways are at or near capacity for long periods of the day. Opportunities to shift in space and mode require that the cost of travel in certain corridors be changed to influence behaviour. In some cases, modest improvements to alternative roadways or transit routes can influence travelers to change the path they travel between origins and destinations. In other cases, economic signals, such as road pricing or parking charges are necessary to motive the desired outcomes. Metrolinx is assessing the research completed as part of an overall transportation demand strategy for the region, in conjunction with their jurisdictional partners.