Solving Traffic Congestion in Toronto

Executive Summary

The GTHA covers a land area of over 7000 km2 and is inhabited by 6.5 million people. With an average commute time of 82 minutes, the commute time is the longest in Canada and one of the longest in North America. Hosting the 401 as the busiest highway, and the Yonge-University line the second busiest transit line in North America by volume, transportation has been rightly at the forefront of political debate – both municipally and provincially [1]. Although political views vary, there is a consensus that in order to maintain its competitiveness as an economic centre, attract ongoing tourism, and remain a livable region, the GTHA area must have safe, fast and reliable transportation mechanisms. According to the ‘Cost of Congestion’ report issued by Metrolinx, it is estimated commuters lose $3.3 billion annually due to delays and increased vehicle operating costs, while Toronto’s economy loses another $2.7 billion in lost economic output [2]. This report seeks to provide an implementation strategy to allow the GTHA to develop into a congestion-controlled environment.

Considering the GTHA hosts a bustling economy, an educated populace, and is endowed with seemingly endless space, it is worth questioning – how did the largest Canadian city arrive in such a desperate state? Perhaps the area’s established nature is, in essence, the very reason for the limited foresight that led to this state.

Toronto, like many North American cities, saw the majority of its growth when cars were the dominant means of transportation. Correspondingly, the city is a product of urban sprawl. As Toronto expanded ever-rapidly and evolved, it did so, partly due to the rate in which it expanded, without considering the limitations of sprawl or the new urban forms that emerged. Although the problem was foreseeable to planning and modelling experts alike, ideas were naturally resisted on a social level. The wide array of population densities within the area commonly lead to contrasting opinions of mode choice, especially when the stakes involve areas as intimate as one's own neighbourhood. Politically, infrastructure spending between the 1980s to present was relatively inactive, allowing travel times to increase as the city lay idle in development. This idle state only further fostered the lack of an innovative culture within controlling organizations.

The GTHA is composed of both public and private transportation, with mode shares composed of approximately 70% private, 20% public, and 10% human powered modes (walking and cycling). Correspondingly, the infrastructure of the city is 5,200km of roadway, 535km of above-ground rail, and 68km of underground rail [3]. These systems are managed by a combination of the provincial and municipal government. The municipal government controls local roadways and transit lines, while the provincial government oversees inter-city connections, as well as safety and regional planning. Metrolinx was established to oversee and influence local plans. The federal government provides funding.

This report analyzed a series of cases in transportation with the intent of applying the lessons learned to the GTHA.

The first case study analyzed a 2007 report the Organisation for Economic Co-operation and Development (OECD) nations. The report identified a need for demand management, suggesting more infrastructure will only increase demand instead of resolving the root cause of the problem: land use planning and transportation management. The document hosted a series of recommendations to manage congestion, including tolls and taxation, crash screens and traffic control centres to coordinate traffic incidents, roadwork delay management, and other logistical strategies.

The second case analyzed management strategies, including strategic planning and policies, and congestion management models. The findings dictate macro drivers for congestion must be understood and addressed, as historically failures in the problem definition due to narrow scope frequently lead to implementation failure. Correspondingly, there is need for a holistic perspective, including: coordinating land use and transport planning, and using the collaboration of these fields to design a system with predictable travel times to proactively manage demand.

The third case study analyzed transportation systems within Tokyo, Japan. Tokyo uses trains of varying speeds to move passengers effectively for both long and short distances, while the homogeneous social patterns allow for unified progress. Japan’s cultural acceptance and focus on industrial engineering and human factors has made their system easy to use and convenient.

The fourth case analyzed the benefits experienced in other cities from big data and transportation monitoring systems. The study draws upon parking examples in New York and Los Angeles, while analyzing transportation route planning in Santander, Spain. Particularly, the use of these intelligent systems may alleviate street stopping, which has been of particular concern to Mayor John Tory.

The fifth case study analyzed transport mode management, outlining common benefits and drawbacks of each system. The case identified the need for decision makers to understand the limitations of the systems and multi-mode integration to maximize system accessibility. Furthermore, the case outlined the importance of politicians to continue the progressive legacy of their predecessors, as cancellations do not equate to forward progress.

The findings of the five cases were compiled to create an implementation strategy. It is recommended the strategy be implemented in two stages. Stage 1 targets short-term, quantifiable gains, while stage 2 focuses on long-term social and process changes that would benefit from support established from stage 1. The Implementation strategy may be found in Table 1 and

Table 2 below. A staged approach was utilized to experience small gains to support items that require social or process change.

Table 1 - Stage 1 Recommendations

Recommendation	Priority	Time to Implement
Crash Scene Screens	1	< 6 months
Signal Coordination	1	< 6 months

Improve Roadwork Management Coordination	1	< 6 months
Improve Pre-trip Traffic Guidance and Road Traffic information	1	6-12 months
Conversion of HOV lanes to toll lanes.	2	12-24 months
Area / Cordon pricing	2	12-24 months
Pilot Big Data Solution for Toronto Traffic (including Parking)	2	6-12 months
Implement Real Time traffic data collection systems (e.g. SmartSander)	2	12-24 months
Increase bicycle infrastructure	2	6-48 months
Promote multi-mode integration of transit systems	2	10+ years

Table 2 - Stage 2 Recommendations

Recommendation	**Priority**	**Time to Implement**
Systems-approach review of Metrolinx effectiveness and capability to provide integrated transportation framework. Look at structure and processes – compare with best practices, identify gaps and implement improvements	1	4 years
A “Magna Carta” for politicians, restricting plan cancellation without a feasibility analysis and backing from industry experts	1	4 years
Focus on human factors and industrial engineering to make public transit of comparable comfort to private transportation	1	Ongoing, longer term
Social change encouraged through an informative marketing campaign and pilot projects	1	Ongoing, longer term
Collaborate with researchers and provincial bodies to understand, convey and implement development plans that are sustainable over the long term.	2	Ongoing, longer term
Focus on nodal transportation and rapid transit to reduce train travel time	2	10+ years

References:

[1] Holcim. “Expanding North America’s Busiest Highway” [Online]. Holcim.com. Accessed: April 24, 2015. Available: <http://www.holcim.com/referenceprojects/expanding-north-americas-busiest-highway.html>

[2] OVGuide. “Line 1 Yonge–University Video | Tourism and Events” [Online]. OVGuide.com. Accessed: April 24, 2015. Available: <http://www.ovguide.com/line-1-yonge-university-9202a8c04000641f80000000002dfcae>

[3] Metrolinx. “Costs of Road Congestion in the Greater Toronto and Hamilton Area: Impact and Cost Benefit Analysis of the Metrolinx Draft Regional Transportation Plan” [Online]. Greater Toronto Transportation Authority, December, 2008. Accessed: April 24, 2015. Available: <http://www.metrolinx.com/en/regionalplanning/costsofcongestion/ISP_08-015_Cost_of_Congestion_report_1128081.pdf>

[4] Urban Development Services. “A Transportation Vision for the City of Toronto Official Plan” [Online]. City of Toronto. Accessed: April 24, 2015. Available: <http://transit.toronto.on.ca/archives/reports/trans_vision.pdf>