Gardiner Expressway and Lake Shore Boulevard East Reconfiguration
Environmental Assessment and Urban Design Study

Alternative Solutions Evaluation
INTERIM REPORT *- Addendum*

MAY 2015

DILLON CONSULTING

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CPCS

HR&A

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1. INTRODUCTION

Waterfront Toronto (WT) and the City of Toronto (City) are jointly undertaking an Individual Environmental Assessment (EA) to determine the future of the eastern portion of the elevated Gardiner Expressway and Lake Shore Boulevard from approximately Lower Jarvis Street to approximately Leslie Street (referred to as the Gardiner East EA). The EA is being completed pursuant to the Ontario *Environmental Assessment Act* under the Ministry of Environment (MOE).

Determining the future of the Gardiner East is a significant decision for the City. It requires reflection about the future of the City and its relationship with the waterfront, addressing future transportation demands and accommodating new development opportunities in the waterfront area. This EA study integrates mobility needs and urban design/development objectives in the decision on how to address the deteriorated Gardiner Expressway East.

The Gardiner East EA commenced in 2009 with the preparation of the Terms of Reference (ToR) for the study. The ToR set out the study process to be followed in conducting the Individual EA, including a description of how the public, stakeholders, First Nations communities, and agencies will be consulted throughout the EA. The ToR was approved by the Minister of the Environment in December 2009.

In February 2014, an interim Alternatives Solution Evaluation Report was prepared by Dillon Consulting and was made available with a City Staff Report to the City's Public Works and Infrastructure Committee (PWIC) at its March 4, 2014 meeting.
http://www.toronto.ca/legdocs/mmis/2014/pw/bgrd/backgroundfile-67154.pdf

Presented in this 2014 report are the four alternative solutions that were developed and the results of the assessment and evaluation of these alternatives. The evaluation considered the costs/impacts and the benefits/opportunities of the four alternative solutions at that time: Maintain, Improve, Replace, and Remove (see **Figure 1**). As a result of this previous evaluation, the technically preferred alternative solution was identified as the Remove (Boulevard) alternative.

PWIC Referral Decision

The consultant's 2014 recommendation for the Remove alternative was supported in the City Staff report that was presented to PWIC on March 4, 2014. After careful consideration of the City Staff report and its recommendation for the Remove alternative, plus the deputations made to PWIC by various stakeholders, the following referral decision was made by PWIC:

1. *Work with WT and community stakeholders to review the recommended option [Remove] under the EA process to mitigate congestion concerns;*

2. *Prepare an additional option that combines the maintain and replace components to preserve expressway linkage and functionality between the Gardiner Expressway and the Don Valley Parkway, and evaluate it against the EA criteria and the following:*

Transportation functionality;
Impacts on key economic sectors;
Cost benefit;
Future land use considerations;
Public transit components;
Environmental Impacts; and
Neighbourhood growth and compatibility;

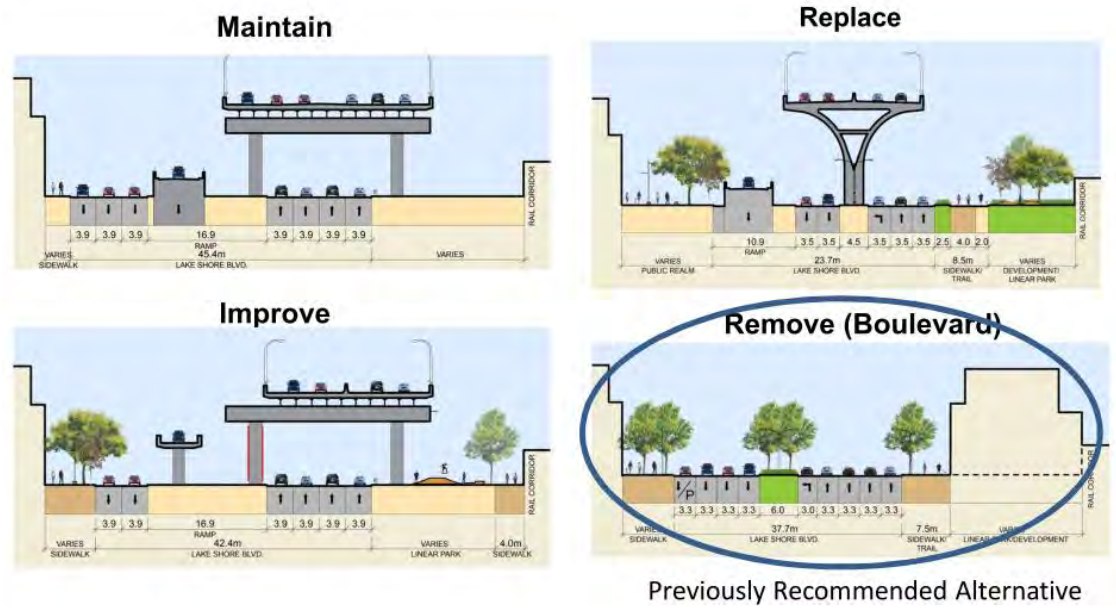
3. *Report back to City Council in February 2015, through the Public Works and Infrastructure Committee.*

On the basis of this deferral decision, the Gardiner East EA project team undertook the following work:

1. Optimized the Remove (Boulevard) alternative to improve auto travel times;
2. Developed a Hybrid alternative;
3. Studied Goods Movement and City Economic Competitiveness impacts; and
4. Assessed and compared the optimized Remove (Boulevard) alternative against the new Hybrid alternative.

This Report, which is to be considered as an addendum to the 2014 Interim Alternatives Solutions Evaluation Report, documents the results of the above work.

Figure 1: Previous Evaluated Alternatives



2. GARDINER EAST IN CONTEXT

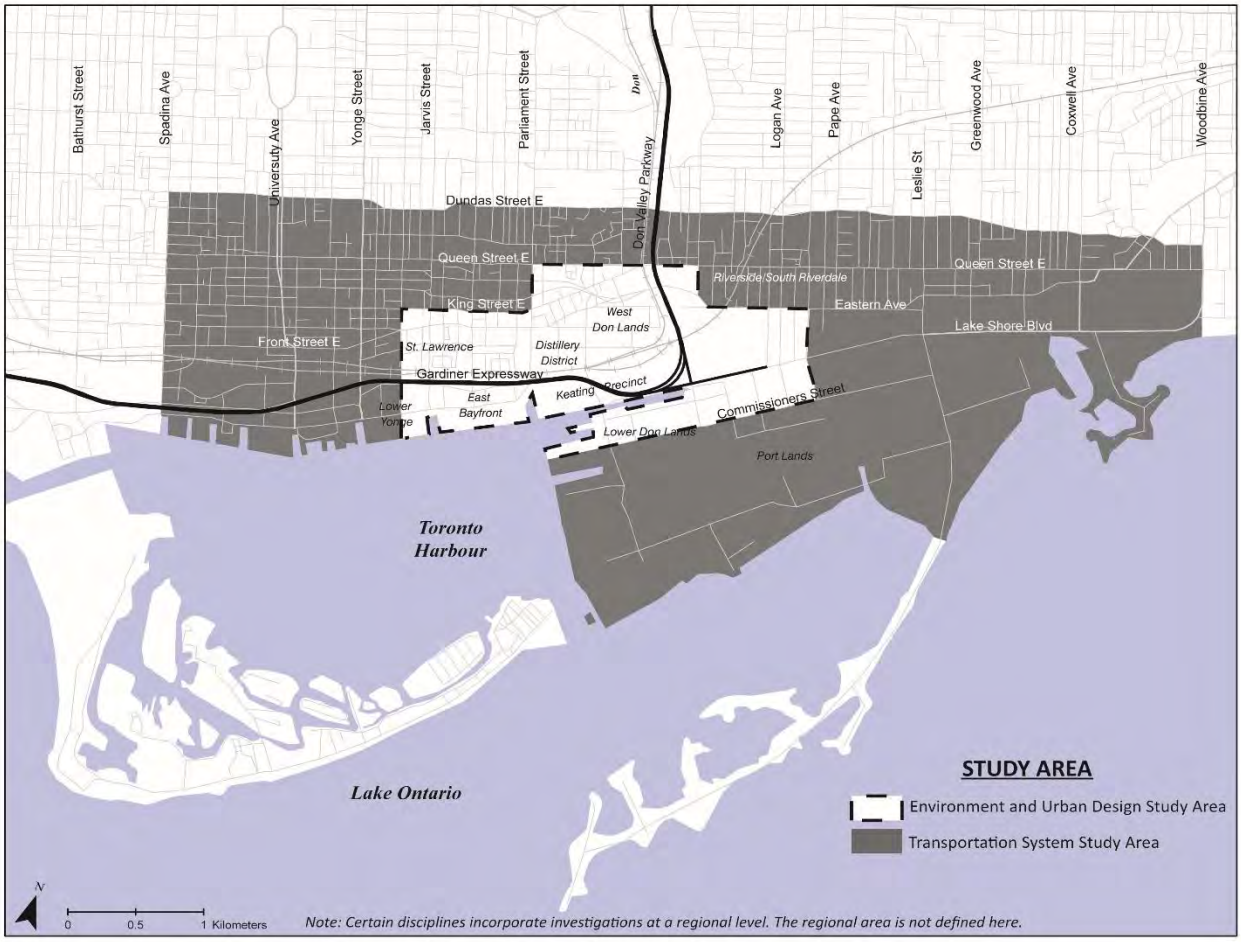
2.1. Study Area

The EA study area remains unchanged from that previously considered and extends from approximately Lower Jarvis Street to approximately Leslie Street. It includes lands beyond the immediate Gardiner/Lake Shore East corridor which could potentially experience disruption effects by any proposal being considered. This is expected to include lands south of King Street to the waterfront. The study area includes five emerging waterfront neighbourhoods: Lower Yonge, East Bayfront, Keating, Port Lands and South of Eastern. North of the rail viaduct the study area also includes West Don Lands, Distillery District, Cork Town and the St. Lawrence neighbourhoods. Regional investigation of Transportation and Economics requires a wider study area. The lands that extend from Dundas Street to Lake Ontario and from Spadina Avenue to Woodbine Avenue have been included in the transportation assessment work for the EA. **Figure 2** illustrates the study area.

Also of note is the anticipated First Gulf proposal for a commercial/retail development on the former Unilever Site. This proposed project is of significant size (the developer has proposed up to 50,000 new workers) and would serve as a major economic catalyst for the Port Lands, South of Eastern employment area and the larger City. As a development application has not yet been submitted to the City, details of the development are not yet available. Nevertheless, consideration of this proposal has been undertaken in the development and evaluation of the alternatives.

The study area and surrounding zone are in transition and undergoing tremendous change. There are large tracts of underdeveloped/vacant lands in the Gardiner/LSB corridor that are planned to be developed. Along with the five emerging neighborhoods mentioned above, the study area also includes well-established neighborhoods that are undergoing rapid change including: St. Lawrence Neighbourhood, Distillery District, Cork Town and Riverside/South Riverdale. The City of Toronto and Waterfront Toronto are also undertaking about fifteen other transportation and planning related studies in the larger area. This ongoing evolution will have a significant impact on the future of the Gardiner East corridor as the project has to be coordinated with the surrounding studies and plans.

Figure 2: Environment and Urban Design Study Area & Transportation System Study Area

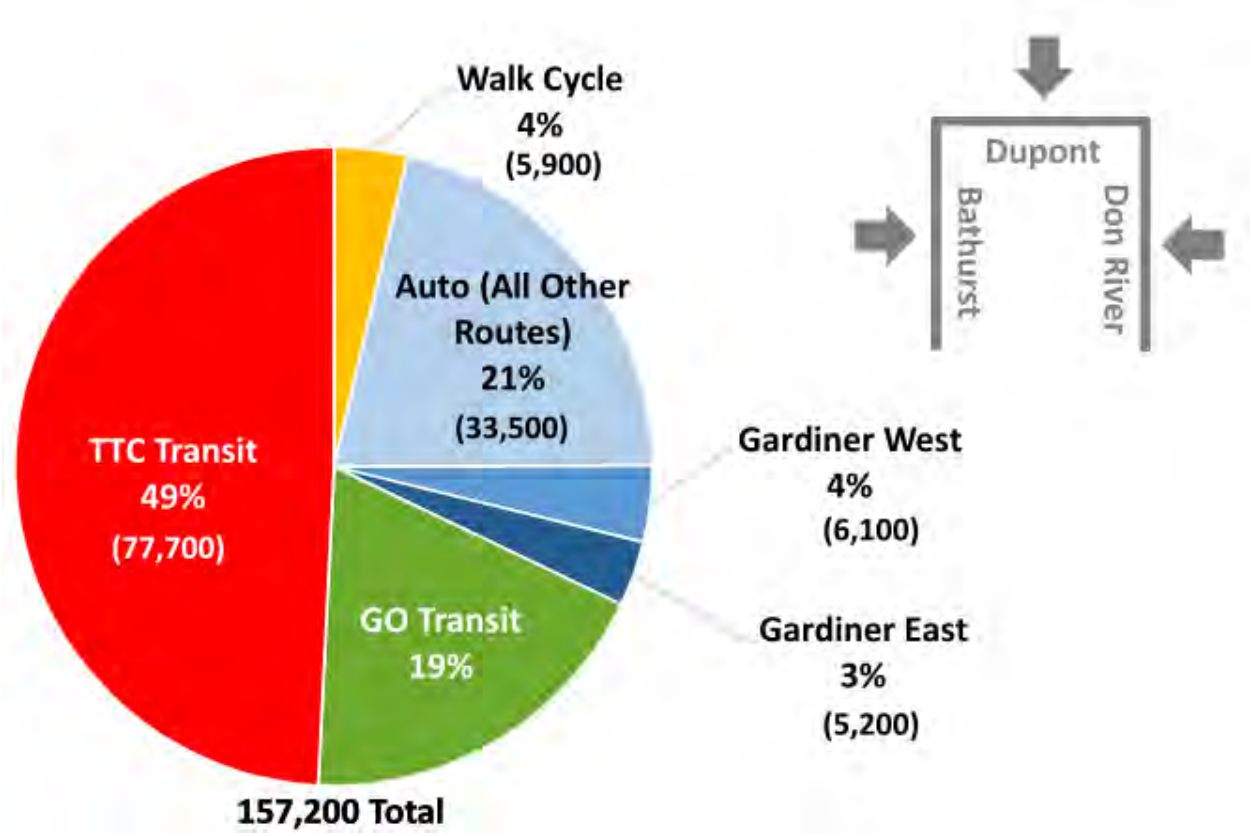


2.2. Transportation and Growth

Existing conditions (2013) and future conditions (2031) in the study area have been considered in the development and assessment of the alternative solutions. A 2031 full build-out date has been used for this study to assess the effects of the alternatives on the full development plans for the area, whether they are achieved by 2031 or at a later date. The potential construction impacts of the alternatives have been assessed on the basis of existing (2013) conditions although consideration was also given to developments expected in the short-term in the Study Area as per City approved precinct plans.

Population and employment in Downtown Toronto has continued to grow. As shown in **Figure 3** below, the existing condition (2011 data) shows that of 157,200 commuters per peak hour coming into the Downtown, 68% of those are via transit (49% TTC and 19% GO Transit) while 28% are via automobile. The Gardiner East portion represents 3% of all downtown commuter trips in the AM peak hour or about 12% of all auto commuter trips.

Figure 3: Downtown Commuter Trips (AM Peak Hour 2011)



It is expected that while auto volumes will increase on City streets in the future, the proportion of auto use by downtown commuters will decrease in the future with the expectation that 95% of new commuter trips will be made using transit.

The existing and future conditions, including population, employment, and transportation trends in the study area, provide the context for which the alternative solutions for the Gardiner East EA have been developed.

3. REMOVE (BOULEVARD) OPTIMIZATION

The Remove alternative (renamed to "Remove (Boulevard)" to clarify the changes that are proposed under this alternative) includes the following modifications to the corridor:

- Remove all of the 2.4 km elevated expressway east of approximately Jarvis Street, including removal of about 750 m (EB lanes) and 850 m (WB lanes) of the existing Logan on/off ramps;
- Rebuild the corridor with a new at-grade 8-lane tree lined Lake Shore Boulevard, west of the Don River and a new 6-lane at-grade boulevard east of Don River;
- Develop new public realm space within the corridor;
- Remove all road infrastructure along Keating Channel;
- Build new DVP ramp connection at east end of the Keating Precinct (2 lanes each direction);
- Build new Gardiner ramps west of Jarvis Street (3 lanes each direction); and
- Build new multi-use pathway along north side of Lake Shore Boulevard to extend to Yonge Street.

The basic configuration of the Remove (Boulevard) alternative remains largely the same as previously presented in 2014. **Figure 4** presents a rendering of the Remove (Boulevard) alternative at the east end of the corridor which shows a new two-way DVP ramp over the Don River that connects with the new Lake Shore Boulevard through the Keating Precinct lands.

Figure 4: Remove (Boulevard) Alternative (Looking north-west from Port Lands)

One of the key directions stemming from the March 4, 2014 Public Works and Infrastructure Committee meeting was to review the Remove (Boulevard) alternative and identify measures to mitigate congestion concerns. The original traffic model for the Remove (Boulevard) underwent a review to identify measures to maximize road capacity and reduce delays along the Lake Shore Boulevard corridor and intersecting streets. This was an iterative process that involved observations of the model simulation operations to identify network constraints; capacity analysis of the Lake Shore Boulevard corridor to test alternate configurations; coding of the simulation model to reflect the recommended adjustments; and a repeat of the process to confirm or further refine the adjustments. Traffic modeling was undertaken using the PARAMICS software for the system-wide modelling and the Synchro model for intersection-level optimization work.

The primary constraints considered within the boulevard section are related to competition for traffic signal "green time" between the following conflicting functions:

- High westbound (and eastbound) through traffic during peak periods;
- High eastbound left turn demand at some intersections;
- Southbound traffic demand accessing the boulevard; and
- Pedestrian crossing time.

Although a variety of alternate roadway configurations and cross-sections were considered (including some less conventional treatments such as Michigan U-turns), the optimization process resulted in sufficient improvement to the "conventional" Remove (Boulevard) configuration. The changes made to the Remove (Boulevard) concept included the optimization of the traffic signal timings and changes to the lane configuration, intersection design, and turn restrictions. Some of the key improvements are presented below and are detailed in **Appendix A**:

- Adjustments to the Gardiner Expressway cross-section and its interface with Lake Shore Boulevard, west of Jarvis Street (including maintaining three eastbound lanes east of Rees Street);
- Revised lane configurations at intersections — in particular, identifying opportunities to provide southbound dedicated right turn lanes on streets intersecting with the new Boulevard (e.g. at Jarvis Street);
- Road network adjustments (Queens Quay extension east of Cherry Street);
- Modifications to signal phasing patterns at some intersections (review of advance left turn phases; more efficient accommodation of the Cherry Street streetcar and Waterfront East LRT);
- Confirmation of pedestrian crossing requirements (assuming two-stage crossings where a wide median is available as a refuge, and single-stage crossings otherwise);
- Strategic turn prohibitions to maximize the efficiency of intersections (Lake Shore Boulevard at Cherry Street and at Queens Quay);
- Adjustments to the length of green signals at individual intersections to more efficiently allocate capacity between conflicting movements; and
- Improvements to signal coordination between adjacent intersections to minimize delays and reduce queue lengths.

It is noted that while the previous transportation model runs assumed a higher level of traffic demand reduction for the Remove (Boulevard) alternative (25% versus 15% assumed for the other alternatives), for the optimized Remove (Boulevard) model runs, the Remove (Boulevard) alternative was able to function at the same level of traffic demand reduction (i.e. 15%) as the Hybrid alternative . As such, the Remove (Boulevard) alternative is able to process the same volume of traffic as the Hybrid under its optimized configuration (70,500 trips are being processed for both models in the AM peak hour).

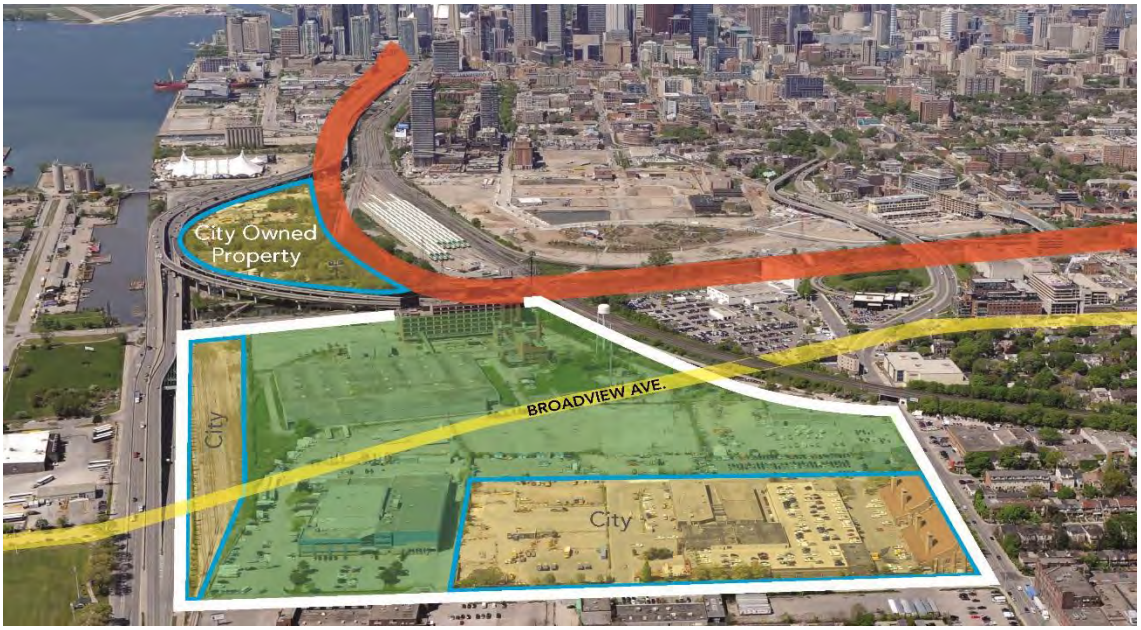
As a result of the Remove (Boulevard) alternative optimization activities, the additional travel times of Remove (Boulevard) over the 2031 future Baseline or Maintain alternative for the selected origin-destination trip pairs were reduced to a 3-5 minute increase. This is a reduction in travel time over the previously reported 5-10 minute increase of the Remove alternative in 2014. Note that even for the Maintain alternative; future auto travel times will increase over current (2014) travel times due to expected population and employment growth in the City. Modelled travel time data for the optimized Remove (Boulevard) alternative is provided in **Figure 9**, **Table 2** and **Table 3** (Section 6).

4. HYBRID DEVELOPMENT

4.1. Evolution of the Hybrid Concept

At the March 2014 PWIC meeting, First Gulf presented a high-level concept for a different alternative that maintains the freeway connection between the DVP and the Gardiner. This concept, as presented by First Gulf, is presented in **Figure 5** below. Under this concept a new DVP-Gardiner ramp connection would be created just south of the rail lands within the Keating Precinct. This concept provided the inspiration for the development of a Hybrid alternative by the Gardiner East EA Project Team.

Figure 5: First Gulf Hybrid Concept



In the development of a Hybrid alternative, **Figure 6** presents the various features/considerations in the Keating Precinct that were taken into account.

Figure 6: Hybrid Development Considerations

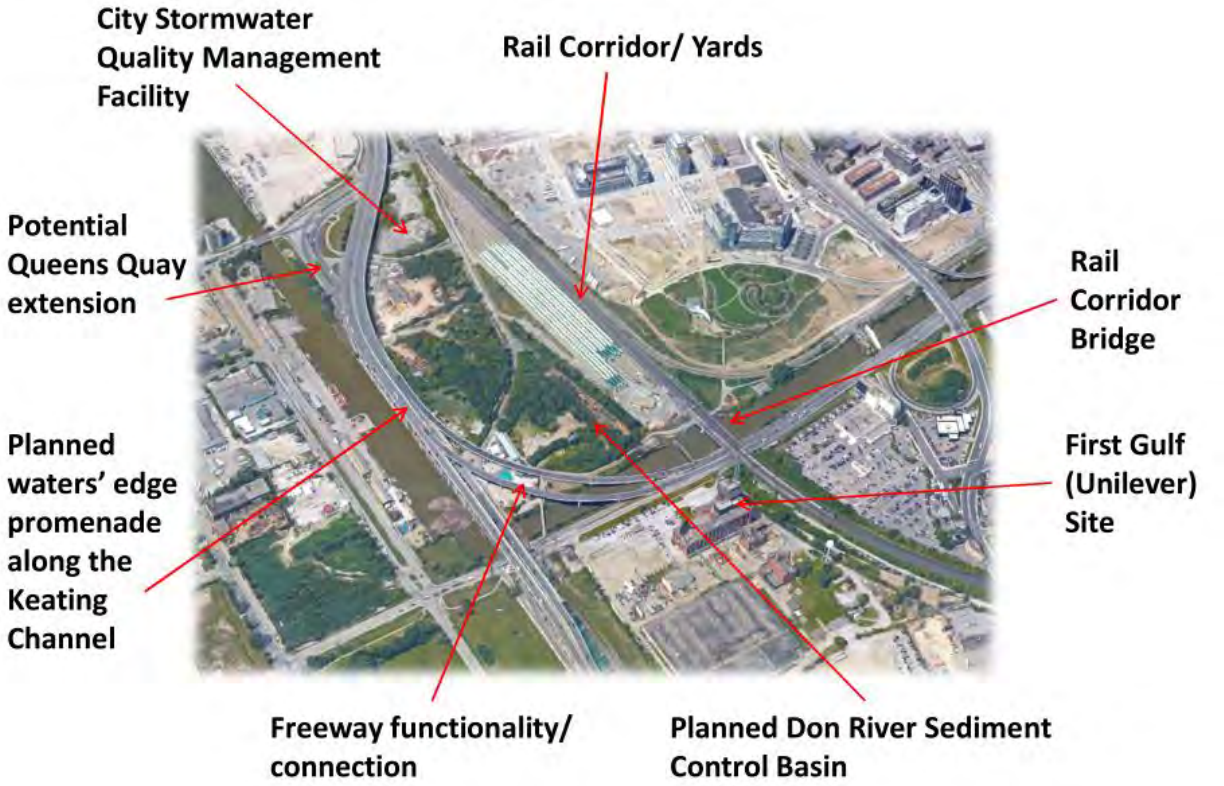


Image Source: Google Maps 2015

4.2. Hybrid Alternative

Taking into account the Hybrid concept presented by First Gulf and the existing features in the Keating Precinct, the Project Team developed several different designs and alignments for a Gardiner/DVP ramp through the Keating Precinct lands. Through this work, several considerations emerged as being key in the development of a Hybrid alternative including: 1) the need for a minimum safe design speed to connect DVP and the Gardiner; 2) the presence of the rail corridor and the rail bridge over the DVP which defines the starting point of DVP-Gardiner ramps; 3) the presence of the City's stormwater management facility on the east side of Cherry Street which limits the ability to develop a new ramp alignment directly south of the rail lands/berm and 4) minimizing effects to the planned Don Mouth Naturalization Project sediment management facility. Taking these considerations into account, it was determined that the existing Gardiner-DVP ramps are in the appropriate location for a Hybrid alternative.

The following describes the main elements of the Hybrid alternative developed by the Gardiner East EA project team:

- Rehabilitation of the East Gardiner deck;
- West of Cherry Street, retention of the existing Gardiner structure/ramps;
- Retention of the existing Gardiner-DVP on/off ramps;
- Removal of the existing Logan on/off ramps (about 750 m of EB lanes and 850 m of WB lanes);
- Rebuilding of Lake Shore Blvd. east of the Don River as a new six-lane landscaped boulevard including planned Broadview extension intersection;
- Construction of one new westbound Gardiner on-ramp and one new eastbound Gardiner off-ramp (each two lanes, about 450 m in length) at Cherry Street (in Keating Precinct);
- Construction of new approach roads to the new on/off Gardiner ramps that run under/north of the Gardiner through Keating (within footprint of current westbound Lake Shore Blvd. lanes);
- Extension of Queens Quay east of Cherry Street as a one-lane eastbound roadway;
- Building of new Lake Shore Boulevard/Queens Quay intersection (under DVP ramps);
- Realignment of Lake Shore Boulevard as per the Keating Precinct Plan;
- Extend multi-use pathway along north side of Lake Shore Boulevard; and
- Improvements to some of the existing LSB intersections west of Cherry Street.

Figure 7 provides a plan view of the Hybrid and **Figure 8** shows a rendering looking north-west from the Port Lands.

Figure 7: Hybrid Alternative (eastern section)

Figure 8: Hybrid Alternative (Looking north-west from Port Lands)

The transportation model results forecast that the Hybrid will result in travel time increases up to 3 minutes over the future Baseline or Maintain alternative for the selected origin-destination trip pairs. Note that even for the Maintain alternative; future auto travel times will increase over current (2014) travel times due to expected population and employment growth in the City. Modelled travel time data for the Hybrid alternative is provided in **Figure 9**, **Table 2** and **Table 3** (all in Section 6.0).

5. Goods Movement & Economic Development Studies

In response to PWIC direction to explore potential impacts related to Goods Movement and the City's Economic Competiveness, two additional studies were undertaken by specialist consultant firms. The following summarizes the studies that were undertaken. It is noted that the results of these studies are reflected in the evaluation of the Remove (Boulevard) and Hybrid alternatives as presented in **Section 6.0** of this report.

5.1. Goods Movement Study

CPCS (a consulting firm that specializes is goods movement and commercial transportation) was retained to carry out an analysis of goods movement in the Transportation Study Area considered in the Gardiner EA study. The objectives of the goods movement analysis were as follows:

- To provide a better understanding of the nature of goods movement in the Gardiner/Lake Shore corridor/Transportation Study Area;
- To provide a comparative assessment and explanation of the opportunities and constraints for goods movement between the Remove (Boulevard) and the Elevated Expressway alternatives being considered in the EA; and
- To recommend high-level mitigation measures for any constraints identified that may be applied to goods movement.

The Goods Movement Study Report is available in **Appendix B**. The following provides a summary of the study and the results.

The study involved the review of City traffic count and cordon count data, future modelled travel times, and other available data including:

- **Municipal Property Assessment Corporation zoning data** and Canadian Business Patterns data (from December 2013) used to identify the location of goods movement industries.
- **Ontario Ministry of Transportation (MTO) Global Positioning System (GPS) data** to identify major truck traffic generators. MTO provided GPS-based data on truck stops, which indicate key goods movement origins and destinations (due to confidentiality constraints, this is only available at the county/regional level for this study).
- **MTO iCorridor data**. MTO's iCorridor web application provided data on average speeds of commercial vehicles on roads, including the Gardiner, as well as commercial vehicle counts for 400 series highways.

Furthermore, a large part of this assignment was informed through stakeholder consultations. The purpose of the consultations was to gather information on supply chains and stakeholders' current use

of the Gardiner Expressway, likely impacts of the alternatives, and any relevant issues raised by stakeholders. Some issues discussed include the differing impacts of the alternatives by: time of day (peak vs. off-peak movement), local vs. through movements, estimates of the reliability of the road network, and perceived challenges to travel time reliability.

A list of stakeholders was identified through an analysis of Canadian Business Patterns data as well as truck stop data in order to identify areas where larger generators of goods movement flows are located. Several participants had deputed at the Public Works and Infrastructure Committee meeting in 2014. Additionally, industry associations were contacted in order to gain a better understanding of the perspective of stakeholders that may not be located in the Study Area but would be impacted by the Remove (Boulevard) alternative. In some cases, industry organizations recommended particular additional stakeholders that may be significantly impacted by the alternatives.

Stakeholders consulted include key goods movement companies in the Industrial/Manufacturing, Retail and Courier/Logistics industries that could be affected by the implementation of the Remove (Boulevard) alternative.

Key findings of the study are as follows:

Traffic Patterns

- The Gardiner Expressway facilitates some of the largest flows of commercial vehicles in Toronto outside of the 400 series highways; it has been identified by stakeholders as the preferred route for most commercial vehicle trips starting or ending within the EA Study Area.
- The Gardiner Expressway has approximately 40% of the flow of trucks on Highway 401 at Yonge Street during the peak 8:00-9:00am hour and approximately 28% of the flow of trucks at Highway 427 at Dundas St. at the peak 8:00am-9:00am hour.
- For longer distance trips, including those passing through the City of Toronto or those that are not originating in or destined to the Gardiner EA Transportation Study Area (Spadina, Dundas, and Woodbine), the 400 series highways are the preferred routes for commercial vehicle traffic.
- On a wider scale, the Gardiner Expressway/Lake Shore Boulevard Corridor, along with the Don Valley Parkway (DVP), 401 and 427 form a higher speed and higher capacity network around the City that allows for the transportation of goods around the City of Toronto.
- Local traffic is a significant component of all commercial traffic on the Gardiner in the Study Area (80% of truck traffic on the Gardiner either begins or ends in the local study area).
- A large number of truck trip ends currently occur in the southeast corner of the EA Study Area (i.e. Port Lands).

Truck trip patterns by 2031 (EA time horizon) will be affected greatly by development, growth, and changing land use in the Study Area.

Transportation Decisions by Goods Movement Stakeholders

- Transportation decisions of goods movement stakeholders in the Study Area are generally dictated by downstream customer requirements.
- Key factors that goods movement stakeholders consider in transportation decisions are (A) Travel Time, (B) Reliability, and (C) Cost. Goods movement stakeholders value all three factors, but weigh each factor differently depending on the nature of the supply chain in which they operate.
- The main types of goods movement generators using the Gardiner in the study area are categorized into three principal groups (1) Industrial and Manufacturing, (2) Retail, and (3) Courier and Logistics stakeholders.
- Industrial and Manufacturing stakeholders tend to move larger volumes of goods and have a strong focus on cost of transportation. Retail stakeholders often focus on reliability for restocking shelves, and courier services tend to focus on both travel time and reliability in order to meet customer expectations.

Alternatives Assessment

Metrics to compare the alternatives considered under the EA were developed based on the supply chain analysis of impacted firms and key concerns raised by stakeholders during consultations. In order to better understand stakeholder feedback received, a framework was developed to convert comments into objective and measurable concerns. These measures were used to evaluate the potential impact of the Remove (Boulevard) and alternatives that included the elevated Gardiner (e.g. the Hybrid).

Considering the above information, an assessment of the alternatives was undertaken on the basis of the following criteria: Travel Time, Travel Reliability, and Cost. The results of this alternatives evaluation are described below and presented in **Table 3** (in Section 6.0).

As previously described in this report, modelled vehicle travel times for the representative OD pairs indicate that the Remove (Boulevard) results in additional travel times of 2-3 minutes over the Hybrid alternative. Further, other major City roads in the Downtown area may have higher traffic volumes due to traffic diversion under the Remove (Boulevard) during peak period travel hours. Commentary of the impact on goods movement is provided further below.

Also, to assess reliability of the alternatives, a traffic incident/accident scenario was modelled for both alternatives. The reliability measure is concerned with the resilience of the alternatives to accommodate traffic incidences (e.g. accidents, road maintenance). Some of the goods movement stakeholders expressed opinion that a system with two roadways (Gardiner and Lake Shore Blvd.) should be more resilient as it provides more roadway options versus a system that includes just one roadway (Lake Shore Boulevard) through the corridor. The modelling work included the simulated closure of one west-bound lane east of Jarvis St. for one-half hour in the peak hour. Considering the change in average vehicle speed in the corridor, for the Remove (Boulevard), a west-bound lane closure on Lake

Shore Boulevard during the AM peak hour results in a 2 km/hr average speed reduction. In comparison, the Hybrid resulted in a 0.5 km/hr speed reduction for an incident on Lake Shore Blvd and a 4.5 km/hr speed reduction for an incident on the Gardiner. Considering change in traffic volume during an incident, for the Remove (Boulevard), there was a reduced volume of 1,685 vehicles. In comparison, for the Hybrid, there was a reduction of 368 vehicles from an incident on Lake Shore Boulevard and a reduction of 2,211 vehicles from an incident on the Gardiner. Based on these results, it was determined that there is not a significant difference between the alternatives for this measure. It is noted that these modelled results are collaborated from observations by the City's Traffic Operations Monitoring group, which noted that incidences in the corridor are more impactful to traffic flow if on the Gardiner than on Lake Shore Boulevard. It was also noted that there is higher frequency of incidents west of Yonge Street than in the East Gardiner.

Many stakeholders within the Study Area are involved in industrial and manufacturing operations. Examples of major goods produced include sugar, cement, concrete, cooling systems, roofing, and other manufacturing goods. While supply chains of these stakeholders may not be as sensitive to changes in average travel time and reliability as some others consulted, based on the stakeholder consultations, above 90% of all their goods movement traffic could be impacted by the removal of the East Gardiner (i.e., the trip would take longer and/or increase shipping costs). Their businesses currently rely significantly on the Gardiner Expressway/Lake Shore Boulevard corridor and for this reason may be particularly sensitive to proposed changes that may impact travel times or reliability.

For other stakeholders in retail and courier sectors, while reliance on the Gardiner Expressway for movements in Toronto may still be quite significant, a lower proportion of their total trips would be impacted by East Gardiner removal since these stakeholders operate in more diverse locations as opposed to an industrial stakeholders with a factory located in the Study Area. While the proportion of trips impacted for these stakeholders may be lower, these stakeholders may be more sensitive to changes in reliability and average travel times due to the nature of their supply chains and their businesses. For example, a courier company may need to allocate additional resources (additional delivery vehicles and additional labour) to carry out the same number of deliveries on routes that utilize the GE/LSB corridor or impacted alternate routes with the same level of reliability and delivery times compared to the elevated expressway remaining (e.g. Hybrid). What this can mean is that for some stakeholders, reduced corridor capacity may equate to an increase in goods movement vehicles on the road for the same number of trips in order to maintain service standards.

Considering the assessment results of the two alternatives from the perspective of Goods Movement, a toolbox of proposed potential mitigation measures that could be employed have been proposed to either reduce overall traffic congestion in the study area that would improve goods movement flows, or measures specifically targeted to improve the movement of goods in particular. The mitigation measures should be targeted both to the Gardiner/LSB corridor as well as alternate routes to the corridor as appropriate. The measures are listed below and presented in the CPCS Report contained in **Appendix B**:

- Application and expansion of existing tools in City of Toronto's Congestion Management Plan to Corridor and Key Alternate Routes
- Off-peak delivery periods
- Truck only lanes
- Peak Shoulder Lanes
- High occupancy vehicle (HOV) lanes
- High occupancy toll (HOT) lanes
- Congestion pricing
- Increase alternative road capacity
- Increase public transit
- Roadway operational improvements
- Improved way finding for trucks for alternative routes

5.2. Economic Competitiveness Study

To further explore the potential for the Remove (Boulevard) and Hybrid alternatives to impact the City's economic competiveness, additional study was undertaken by HR&A Advisors. HR&A conducted research and stakeholder consultation beginning in September 2014. HR&A first undertook an evaluation of the importance of Downtown Toronto to the regional economy, recent economic trends in Downtown, and the competitiveness of Toronto when compared to other global cities. HR&A presented this information to stakeholders in December 2014 to confirm its understanding of Downtown's and Toronto's competitive positioning, factors that drive that competitiveness, and risks to Downtown Toronto. Stakeholders included leading representatives from Toronto's real estate, economic development, and business communities. To fully articulate how the alternatives may affect Downtown's competitive positioning, HR&A synthesized stakeholder feedback and conducted additional industry research on the factors that drive business location decisions. HR&A then isolated those factors that may be affected by the EA alternatives and evaluated the alternatives, using available data. HR&A reviewed its findings with stakeholders in March 2015.

HR&A relied on a combination of third-party research and stakeholder consultation to describe Toronto's relative competitiveness, the importance of Downtown to that position, Downtown's strengths and weaknesses, and more globally the factors that drive business location decisions. The research and findings from the stakeholder consultations represent widely accepted perspectives in the business, real estate, and economic development communities. However, there were varied opinions among stakeholders about the risks to Downtown and what considerations draw businesses to locate and invest in Downtown.

An assessment of potential impacts of each alternative was developed on the basis of the following criteria groups:

1. **Global & Regional Economic Impacts**. These criteria identify the role of the eastern portion of the Gardiner Expressway in the competitive positioning of Downtown Toronto, the economic

hub and driver of the City and regional economy, and how the alternatives may affect that competitive positioning. These criteria respond most directly to the additional analysis requested by PWIC to articulate how the alternatives affect the City's economic competitiveness.

2. **Local Economic Impacts.** These criteria identify how the alternatives would impact the Study Area in terms of the potential to create jobs and the marketability of those lands.

3. **Fiscal Net Benefits.** These criteria account for how the alternatives would impact the City's fiscal position by updating HR&A's prior cost-benefit analysis to reflect the latest alternatives and to reflect adjustments in the area.

The full details of this study are included in the Economic Competitiveness Study Report that is included in **Appendix C** to this report. The economic assessment results of the two alternatives are summarized below and also presented in **Table 3** (in Section 6.0) which presents the assessment results of the alternatives for all the criteria groups.

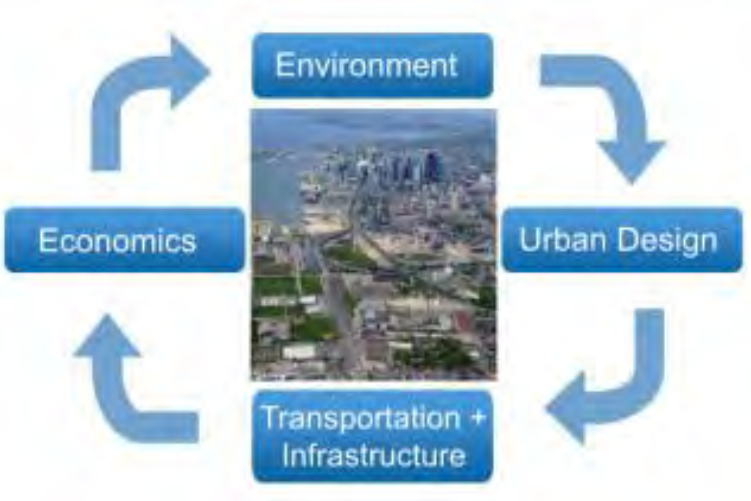
Category	Description	Conclusion
Regional Economics	Impact of alternatives on Toronto's global competitiveness	The alternatives are unlikely to affect global competitiveness, which is driven by a range of factors, the vast majority of which are unrelated to the alternatives. The alternatives are equally preferred
	Impact of alternatives on the marketability and competitiveness of Downtown to business.	Remove entails 2-3 minutes higher travel times in AM peak hour and entails a longer construction period which could impact business decisions to locate Downtown. The Hybrid alternative is preferred.
Local Economics	Potential for job creation in the areas adjacent to the alternative alignments, and impact to the marketability of the areas to development	Both alternatives support the potential for job creation, but the Remove alternative makes more land directly available for development and job creation. The Remove alternative makes available parcels west of Cherry Street; and both alternatives make land available between Cherry Street and the Don River. Both alternatives improve the marketability of the local area, the Remove by enhancing public realm and visibility, and the Hybrid by maintaining convenient and direct highway access. The Remove alternative is preferred.
Fiscal Net Benefits	Potential revenues from the sale of public land and projected lifecycle costs of the alternatives.	The Remove entails lower lifecycle costs and results in more land revenues than the Hybrid alternative. The Remove alternative is preferred.

6. REMOVE (BOULEVARD) and HYBRID COMPARISON

The evaluation was focussed on the optimized Remove (Boulevard) and Hybrid alternatives. In the original evaluation of the four alternatives presented in Dillon's February 2014 Evaluation Report, the Remove (Boulevard) was recommended as preferred. In its referral, PWIC requested further development and the assessment of the Remove (Boulevard) and Hybrid alternatives. The following presents the alternatives evaluation approach and the results of the evaluation.

6.1. Evaluation Criteria

The assessment and evaluation of the optimized Remove (Boulevard) and Hybrid alternatives was based on a set of evaluation criteria and measures. The draft criteria were previously presented to the Stakeholder Advisory Committee (SAC) and the public in October 2013 in conjunction with the draft alternative solutions. Comments received on the criteria were considered in their finalization. For each of the criteria, one or more measures were developed. The measures specify the data to be collected and/or the effects to be assessed for each criterion. The criteria and measures considered in the evaluation are organized on the basis of the four study lenses (see below) and 16 criteria groups. The four study lenses, as outlined in the EA Terms of Reference are Transportation and Infrastructure, Urban Design, Economics and Environment.



Some minor revisions were made to the criteria/measures that were used in the original alternatives evaluation. Revisions were done to better clarify what is being measured and to accommodate the new information collected through the Goods Movement and Economic Competiveness studies that were completed. (see **Table 1** below – criteria/measure changes are highlighted in *italicized* font).

Table 1: Evaluation Criteria Groups and Criteria (Updated)
(italicized font indicate revisions to the criteria)

Study Lens/ Criteria Group	Criteria	Definition
TRANSPORTATION and INFRASTRUCTURE		
Automobiles	Commuter Travel Time (Average travel time for AM peak hour)	Average in-bound peak hour travel time using EMME and PARAMICS model outputs between selected Origin-Destination (O-D) pairs.
	Impact on Average Auto Travel Time (AM peak hour.) within Downtown/ Primary Transportation Study Area	Change in average peak hour travel times (all directions) in PARAMICS model for local traffic trips within Spadina Avenue and Woodbine Avenue and south of Dundas Street.
	Road Network Flexibility/ Choice	Number of available road network connections that provide drivers with the ability to alter their routes.
Transit	Transit Impact	Change in average travel times in PARAMICS model for street cars on Dundas Street, Queen Street and King Street and impact on subway service. Ability to accommodate planned future transit service.
Pedestrians	North-South Sidewalks	Extent, quantity and condition of pedestrian connections crossing Lake Shore Boulevard. Walking distance across Lake Shore Boulevard at major north-south streets (e.g. Jarvis Street).
	East-West Sidewalks	Extent, quantity and condition of pedestrian connections along Lake Shore Boulevard
Cycling	East-West Movement	Extent and quantity of east-west cycling facilities and opportunities to connect with existing and planned north-south cycling facilities.
Movement of Goods	*Travel Time*	*Potential for changes in travel times for the movement of goods. Considers the modelled peak hour travel time results.*
	Reliability	*Additional time expected to be required to ensure that the goods arrive on the scheduled time (buffer index). The importance of reliability depends on the types of goods being delivered.*
	Transport and Shipper Cost	*Transportation costs can be impacted by a number of factors including mode of transport choice, service standards required, regulations, etc. Increase in travel time increases costs to carriers and transporters (increased fuel consumption, driver time, need for more trucks on the road).*
Safety	*Pedestrians conflict points*	Traffic exposure risk for pedestrians at intersections and crossing Lake Shore Boulevard considering width/distance of roadway to cross, intersection configuration and sightlines.
	Cyclists conflict points	Extent to which cyclists are exposed to free

Study Lens/ Criteria Group	Criteria	Definition
		flowing/uncontrolled auto traffic flow. This includes free flowing access ramps to and from the Gardiner Expressway where automobile traffic has the right of way.
	Motorists conflict points	Extent to which there are road safety concerns for motorists. Includes poor sightlines and intersection configuration.
	Safety Risk for Motorists on the Gardiner East	Extent of expressway road geometry that poses safety risk for drivers, particularly lack of shoulders.
Construction Impact	Duration	Number of years required to complete construction, with an emphasis on the number of years that will result in traffic impacts.
	Transportation Management	Extent of pedestrian and cycling facilities to be affected during construction. Level of traffic disruption during construction and potential for disruption to other roadways from traffic diversion.
	Private Property	Extent of private property to be used during construction and potential for access to private properties (e.g. driveways) to be impacted.
URBAN DESIGN		
Planning	Consistency with Official Plans	Extent to which the principles and recommendations of the City's Official Plan and the Central Waterfront Secondary Plan are accommodated and supported.
	Consistency with Precinct Plans and other Initiatives	*Extent to which the goals, objectives and recommendations of the East Bayfront and Keating Precinct Plans are accommodated and supported as well the Don Mouth Naturalization Project EA and the Port Lands and South of Eastern TSMP EA Study.*
Public Realm	Streetscape	Quality and consistency of a cohesive street design and character along Lake Shore Boulevard. Considers the balance between hardscape (e.g. paved road surface) and softscape (e.g., landscape, open space, etc.).
	View Corridors	Visual sightlines within and across the corridor to destinations and landmarks in and surrounding the study area (e.g. views of the water and downtown skyline).
	Amount of public realm	Public space that is created for passive and active recreation and leisure including parks, plazas, trails, streetscapes, etc.
	New Park Land	Surplus right-of-way that could be dedicated as City of Toronto park land that would be usable and programmable above existing baseline.
	Rail Corridor and Berm	Opportunity to minimize the visual and noise impacts of the rail corridor for pedestrians on Lake Shore Boulevard.
Built Form	Street Frontage	Relationship between development and Lake Shore Boulevard at the pedestrian scale. This includes the

Study Lens/ Criteria Group	Criteria	Definition
		active at-grade uses in buildings fronting onto Lake Shore Boulevard that may contribute to street character and vibrancy. Also includes the average number of podium floors with obstructed views and limited access to light and air that may limit programming/leasing those floors.
ENVIRONMENT		
Social & Health	Air Quality	Air quality conditions at the local and regional level, including changes in NOx, VOCs, PM2.5, as well as the level of greenhouse gas emissions.
	Noise	Noise level change at various receptors locations in the study area.
Natural Environment	Terrestrial Environment	Opportunity for new and/or enhanced land-based natural habitat, species and features.
	Aquatic Environment	Opportunity for new and/or enhanced aquatic-based habitat, species and features.
	Storm Water Quality	On-site capability to treat stormwater and manage the conditions/quality of water run-off and impact receiving water bodies.
	Storm Water Quantity	Difference in amount of stormwater run-off potentially generated.
	Microclimate/Heat Island Effect	*Local atmospheric conditions related to sunlight, temperature and amount of trees that could grow in the corridor.*
Cultural Resources	Built Heritage	Potential for impact on historic physical architecture and cultural property that is inherited and maintained within the corridor.
	Cultural Landscape	Potential for impact on the existence of a built or natural landscape that is valued by people for its religious, artistic or cultural associations within the corridor.
	Archaeology	Potential for impact on known buried resources or artifacts within the corridor.
	First Nation People and Activities	Potential for impact on the use of the study area by First Nations for traditional purposes.
ECONOMICS		
Global & Regional Economics	*Toronto's Global Competitiveness*	*Influence on change in the global attractiveness of the City of Toronto.*
	Regional Labour Force Access	*Potential for change in level of access to/from the downtown core.*
	Mobility within Downtown	*Potential for change in worker mobility in the downtown core/CBD.*
	Entertainment Venues	*Potential for change in access to major entertainment venues in the downtown (e.g. ACC, Rogers Centre, etc.) and change in their ability to draw visitors.*
Local Economics	Business Activity	Number of jobs created in the study area.
Direct Cost & Benefit	Capital Cost & Funding	Capital cost to construct the alternatives including the cost to acquire private property (if required) versus the

Study Lens/ Criteria Group	Criteria	Definition
		funding currently available in the City budget for rehabilitation.
	Lifecycle Cost	Net present value of construction cost and 100-year operations and maintenance costs of the alternative.
	Public Land Value Creation	Amount of money that could be generated through the creation and sale of new land for the City.
	Total Net Benefit	The net cost or net benefit of the alternative considering the capital and O&M lifecycle cost and public land value creation benefit.

6.2. Effects Assessment & Evaluation Approach

Data for each of the alternatives was collected on the basis of the evaluation criteria as presented in **Table 1** above and in **Table 3** presented further below. To compare the advantages and disadvantages of the alternatives, both construction effects and long-term operations effects were identified and assessed based on the criteria and measures. Considering this data, alternative preference rankings were then determined for each measure and these rankings were then considered to generate alternative preference rankings by criteria group. It is not unusual in EA studies to not have an alternative that is preferred for all the evaluation criteria. As such, when comparing among alternatives, there are often trade-offs that need to be made to select the technically preferred alternative. As both quantitative and qualitative data was collected, the evaluation of the two alternatives was undertaken using a "reasoned argument" approach.

6.3. Consideration of Public Input

Consultation activities associated with the development and evaluation of the optimized Remove (Boulevard) and Hybrid alternatives were focused on the engagement of the SAC, the holding of two public meetings (April 15th and 20th) with a live web cast of the April 15 event, the release of the presentation package on the project web site, and an open comment period following the public meetings. Including web site visits, close to 8,500 people were in some way engaged in the provided consultation activities in this fourth round. The details of the consultation activities are documented in the Round Four Consultation Report, prepared by Lura Consultants appended to the City Staff Report (2015) on the Gardiner East EA. The key questions asked at the consultation events were:

Public Works and Infrastructure Committee and Toronto City Council will soon consider what to do with the Gardiner East. Thinking about the results of the additional work and updated evaluation…

- *What are the most important considerations in making this decision?*
- *What other advice do you have on making a decision that involves finding a balance among diverse priorities?*
- *Other comments?*

Public commentary on the alternatives is presented below:

Remove (Boulevard) Alternative

- Participants who indicated support for the Remove (Boulevard) alternative typically provided the following reasons:
  - Contributes to broader city building goals
  - Improves the public realm for a variety of users
  - Presents the most cost-effective solution
  - Improves urban design in the study area
  - Reconnects the City to the waterfront
  - Frees land for future development
  - Integrates transit and active forms of transportation
  - Replaces outdated infrastructure
  - Increases traffic time marginally

Hybrid Alternative

- Participants who indicated support for the Hybrid alternative generally provided the following reasons:
  - Does not decrease road capacity
  - Does not significantly increase travel time or add to congestion
  - Maintains a continuous expressway connection between the east and west ends of the City and into the downtown core
  - Supports the movement of goods and the transportation needs of local businesses
  - Enhances safety better than the Remove (Boulevard) alternative

Concerns about projected increases in travel times, safety, impacts from construction, assumptions about public transit and the potential for future development were expressed by participants about both alternatives.

6.4. Comparative Evaluation of Alternatives

Table 3 presents the collected data and the alternatives preference rankings by evaluation criterion for the 16 criteria groups. For each criteria group, the alternatives have been relatively compared and assigned a preference level of: Preferred or Less Preferred or Equally Preferred. The assigned preference levels are relative, not measures of acceptability/unacceptability. As such, an assignment of Less Preferred does not necessarily mean that the alternative is considered to be unacceptable for a particular measure, criterion, or criteria group, just less preferred than the other alternative. The alternatives preference levels by criteria group were considered in the overall evaluation to identify a preferred alternative.

6.4.1. Criteria Group Discussion

The following provides a description of the differences between the two alternatives by each of the four evaluation lenses. Differences between the criteria with respect to Goods Movement and City Economic Competiveness are discussed in the previous report sections 5.1 and 5.2 and are not repeated here. Data for all the criteria groups are available in **Table 3**. The process to generate the data and its interpretation of the data is similar to that previously outlined in the 2014 Alternatives Solution Evaluation Report and is not repeated in this addendum report.

Transportation and Infrastructure Lens

The following provides commentary on two criteria groups within this lens: Automobiles and Constructability as these two issues received much attention by stakeholders and are key considerations within this evaluation lens. Data and trade-offs for the other criteria groups in this lens are presented in **Table 3**.

Automobiles Criteria Group

This criteria group considered three criteria: 1) Commuter Travel Time based on average AM peak hour auto in-bound travel times for select origin-destination (OD) pairs; 2) Impact on Average Auto Travel Time based on average AM peak hour auto travel times within the transportation study area (roughly bounded by Spadina, Dundas, Woodbine and Lake Ontario); and 3) Road Network Flexibility/Choice represented by the number of turning prohibitions.

Traffic forecasting for the Gardiner Expressway EA was undertaken for a 2031 horizon year for AM commuter peak hour conditions. The transportation modelling process used an integrated application of City of Toronto's regional planning model (in EMME/2 software) and a detailed operations model (in Paramics software) developed specifically for the project.

The EMME model provided the regional perspective on travel demand forecasting. It was used to forecast demands in the primary travel modes for existing and 2031 conditions for the two alternative solutions (Remove (Boulevard) and Hybrid). The EMME model accounts for the impacts of major road and transit infrastructure projects; growth in population and employment levels; and changes in travel patterns due to the new residential and employment areas expected to develop across the City (e.g., development of Lower Yonge, Keating, Don Lands, Port Lands will increase percentage of downtown employees who live downtown).

The PARAMICS model (a micro-simulation model) was used to develop the local assignment of auto volumes to study area roads. The transportation study area extends from Dundas Street to Lake Ontario and from Spadina Avenue to Woodbine Avenue. While the EMME model projected auto demands on all major roads in the study area, it is a planning tool that does not account for fine operational details (e.g., delay at traffic signals, interaction with streetcars, etc.) and can be unreliable when used to project demands within a specific corridor or on a specific segment. The PARAMICS model took the

aggregate auto demand and travel patterns for the study area from EMME and generated a more robust estimate of future auto demands.

Travel times for the OD pairs were determined using a combination of travel times from the City-wide EMME transportation model (for portions of the OD pairs travel outside the study area) and use of the PARAMICS transportation model for travel within the study area. The OD pairs were selected as representative trips into the Downtown to show travel time differences among the alternatives. The OD pairs represent travel from zones in the City that have particularly high usage of the Gardiner/Lake Shore Blvd East corridor. The AM peak hour was chosen to be assessed as it provides the most consistent commuter travel patterns and the highest volume of users. It serves as the "worst-case" auto travel condition. Afternoon (PM) travel often varies for commuters depending on the day.

The models represent travel times for 2031 which assume the full build out of lands in the study area and future population and employment projections. In addition, it was also assumed that new transit projects and other road network changes would be in place in the Study Area, as was done in the 2014 modelling, including the following:

- Go Transit service improvements;
- Relief Line (transit);
- Queens Quay East (Bay to Parliament). Transit in its own ROW and re-configuration of Queens Quay from Bay to Parliament;
- Queens Quay East (Parliament to Cherry) Extension of Queen Quay from Parliament to Cherry's new alignment and transit in its own ROW;
- Cherry Street reconfiguration (King to Railway Tracks) and transit in its own ROW. As part of the WDL Plan;
- Cherry Street reconfiguration (Railway Tracks to Ship Channel/ Commissioners) and new alignment;
- Port Lands transit lines (Cherry, Villers/Commissioners/Don Roadway, Leslie, and Unwin) Transit in its own ROW to serve the Keating, Lower Don Lands, and Port Lands areas. Transit service on the new Cherry St, Villers St/Commissioners, and Don Roadway;
- New Public Roads in the West Don Lands (Bayview, River, Front) as part of the WDL Plan; Extension of Bayview, River and Front to the WDL area;
- Broadview Extension contemplated in the Central Waterfront Secondary Plan: The actual alignment would be subject to the ongoing Environmental Assessment Study;
- York-Bay-Yonge Ramps;
- Gardiner ramps reconfiguration;
- Queens Quay West Transit in its own ROW; Re-configuration of Queens Quay from Bay to Spadina;
- Front Street Re-configuration of Front Street (outside Union Station);
- John Street public realm improvements and some lane reconfiguration;
- Bremner/Fort York Blvd (construction of Fort York Blvd, between Bathurst and Spadina is underway); and

- Simcoe Street underpass (completed).

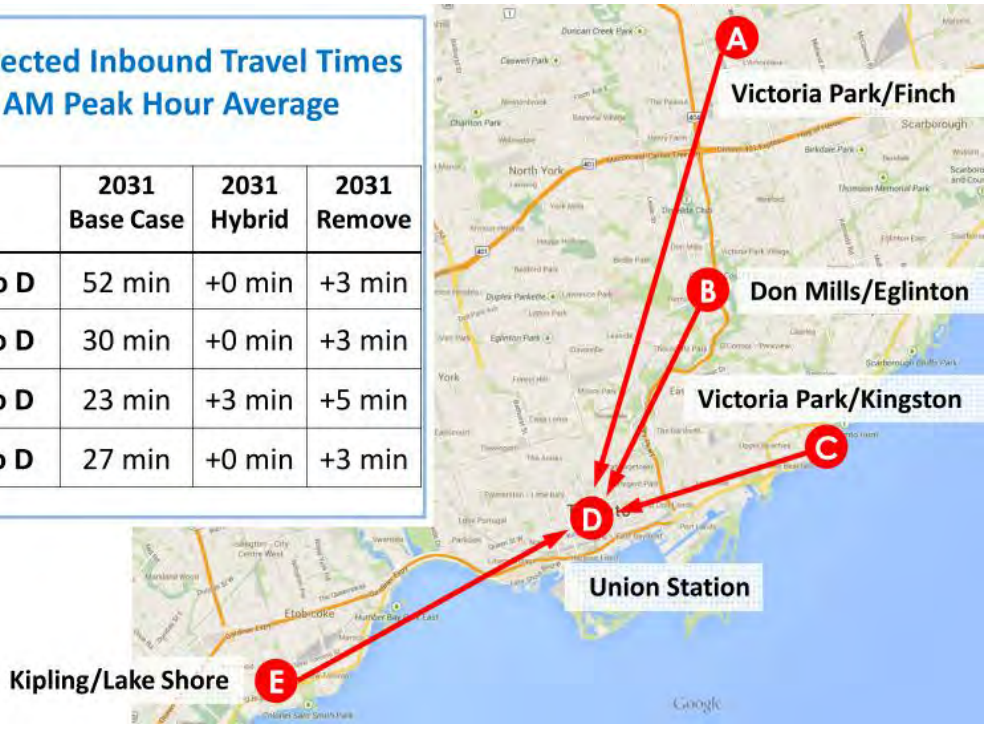
Prior to running the PARAMICS model, additional Travel Demand Management (TDM) measures were added to reflect anticipated changes in future travel behaviour as supported by trends and industry research (see **Appendix D** of the 2014 Alternatives Solution Evaluation Report). Both the Hybrid and optimized Remove (Boulevard) were assigned a 15% demand reduction. Note that the former Remove alternative was previously assigned a 25% demand reduction. As a result of the Remove (Boulevard) optimization efforts, the Remove (Boulevard) alternative can now process a higher volume of vehicles and reduced travel times.

The travel time modelling results are presented below (**Figure 9**) and indicate that for the select OD pairs, the optimized Remove (Boulevard) alternative reduces the additional travel time (over the future base case) to 3-5 minutes from the previously presented 5-10 minutes (AM peak hour). Despite these reductions, the Remove (Boulevard) still results in an additional travel time of 2-3 minutes over the Hybrid.

Figure 9: Auto Travel Times for Select OD Pairs

Projected Inbound Travel Times
AM Peak Hour Average

	2031 Base Case	2031 Hybrid	2031 Remove
A to D	52 min	+0 min	+3 min
B to D	30 min	+0 min	+3 min
C to D	23 min	+3 min	+5 min
E to D	27 min	+0 min	+3 min



Note: 2031 Base case travel times are approximately five minutes higher than current travel times due to expected growth in background traffic volumes.

It is noted that travel times were previously modelled as a sensitivity test for the original alternatives without the planned new transit projects noted above (expanded GO service was left in). The result of this "no new transit" sensitivity test indicates that Auto travel times for the selected OD pairs would increase by approximately an additional 2-3 minutes for these alternatives (over the travel times modelled for the original alternatives in 2031 with the planned transit projects in place). While not

modelled, it is assumed that the Hybrid alternative would react similarly without new transit projects. This illustrates that new transit projects in addition to Go Transit improvements, while necessary to accommodate future travel demand, does not have a large impact on Auto Travel Times for the selected OD pairs.

Travel Times were also examined for travel in the AM peak hour (both directions) within the Transportation Study Area (Downtown). While the rankings of the alternatives for this criterion generally mimic those for the OD pairs (City-wide), this analysis provides information on the volume of automobiles affected. As presented in **Table 3**, for the Hybrid, 90% of the trips in the AM peak hour will have delays of less than 2 minutes while for the Optimized Remove (Boulevard), 75% of the trips will have delays of less than 2 minutes. Related to this, the total vehicle hours in the AM peak for all trips in the Transportation Study Area were modelled. As show in **Table 2**, Vehicle Hours Travelled (VHT) values are provided for:

- Total hours travelled in the peak hour for each alternative
- Additional hours travelled for trips that have less than 2 minute increases over the Maintain
- Additional hours travelled for trips that have greater than 2 minute increase over the Maintain

Table 2: Modelled Vehicle Hours Travelled (AM Peak Hour)

Alternative	Total VHT	Additional Total hrs.	Additional hrs. for Trips < 2min	Additional hrs. for Trips > 2min
Maintain	5,649	--	--	--
Hybrid	6,272	624	367	256
Remove	7,289	1,640	694	947

The Remove (Boulevard) results in 1016 more total hours traveled in the AM peak hour than the Hybrid. To put this in context, there are 70,500 vehicle trips in the peak hour in the transportation system. As such, the Remove (Boulevard) results in an average approximate increase of approximately 52 seconds per vehicle trip over the Hybrid in the AM peak hour. It also needs to be highlighted that the presented increases in time are for auto trips only and if we were to distribute the increase across all modes of commuter travel then the impact of the travel time increase would be perceived as even less significant.

A breakdown of additional travel hours in categories of <2 minutes and >2 minutes are provided as there is rationale to suggest that that trip length increases per commuter of less than 2 minutes are of less importance than trips length increases that are greater than 2 minutes because:

- Additional trip lengths that are <2 minutes are within the average variability of the model outputs (on non-incident days); and

- Research on the value of time suggests small increments of time savings are less valuable as it is not possible for people to reschedule their activities to make use of the extra time in a meaningful way.

As such, if only additional trip lengths that are >2 minutes are considered, the travel time increase per trip would decrease to about 36 seconds.

Considering the rankings for the three criteria in this criteria group, the Hybrid alternative was identified as preferred due to its 2-3 minute lower travel times in the AM peak hour for the selected OD pairs over the optimized Remove (Boulevard). The Hybrid also results in lower total vehicle hours than the optimized Remove (Boulevard) for all vehicle trips in the transportation study area.

Constructability Criteria Group

Stakeholders have expressed concerns regarding the constructability of the alternatives, thus a description of how the construction of each alternative would be phased is provided here.

Remove (Boulevard) Construction Staging

- **Stage 1-Pre-works (1 year)**
  - Prepare/extend detour roads including Queens Quay, Commissioners Street and Don Roadway, Cherry Street etc. Coordinate with planned development in this area
  - Complete detour road connections to LSB (east of Don River)
  - Construct new LSB alignment through Keating
  - Install temporary Gardiner bents to support demolition activities

- **Stage 2 – WB Gardiner/LSB Works (2 years)**
  - Detour WB traffic and demolish DVP off-ramp and WB Gardiner lanes
  - Construct new WB boulevard lanes, intersections and DVP off-ramp
  - Reroute traffic to new WB lanes

- **Stage 3 – EB Gardiner/LSB Works (2 years)**
  - Detour EB traffic and demolish DVP on-ramp and WB Gardiner lanes
  - Construct new EB boulevard lanes, intersections and DVP off-ramp
  - Reroute traffic to new EB lanes

- **Stage 4 – Final configuration (1 year)**
  - Complete boulevard including public realm features
  - Remove detour roads

Hybrid Construction Staging

- **Stage 1- Keating Works (2.5 years)**
  - Build new WB on-ramp and LSB realignment through Keating Precinct

- Redirect traffic to new LSB alignment
- Build new EB off-ramp and approach roads

- **Stage 2 –Logan Ramp Demolition/Boulevard Construction (2.0 years)**
  - Prepare/extend temporary detour roads including Don Roadway, Commissioners St. and Cherry St.
  - Detour LSB traffic east of Don River to temporary detour roads (traffic west of Cherry St. is unchanged)
  - Demolish Logan Ramps and build new LSB boulevard

- **Stage 3 – Final configuration (1 year)**
  - Reroute traffic back to LSB
  - Complete boulevard including public realm features
  - Remove detour roads

Considering the above, while both alternatives are expected to involve a 6-year construction period, the Remove (Boulevard) alternative is expected to result in greater construction impacts and delays to traffic with 3-4 years of roads detours as compared to the Hybrid alternative which will require 1 to 1.5 years of road detours.

Urban Design Lens

The Urban Design lens considers three criteria groups: Planning, Public Realm and Built Form.

In regards to the Planning criteria group, the Hybrid is less preferred when considering consistency with Precinct Plans, as it would result in impacts to the Keating Precinct as the new Gardiner on/off ramps would result in the loss of public space and limit pedestrian access between the Keating Channel and the realigned Lake Shore Blvd. Both alternatives support the recommendations in the Don Mouth Naturalization Project EA and provide opportunity for the extension of Broadview Ave/LRT which is being studied in the Port Lands and South of Eastern TSMP EA.

Considering the Public Realm criteria group, both alternatives provide equal benefit east of the Don River. Within the Keating Precinct, the Hybrid is less preferred due to the loss of public lands from the ramps/approach roads. West of Cherry St, the Remove is clearly preferred as it provides new public realm space while with the Hybrid, current conditions essentially remain.

Finally, with respect to Built Form, again both alternatives facilitate redevelopment plans east of the Don River. The key differences lie west of Cherry St, where the Remove (Boulevard) will allow building fronts to have active uses at-grade oriented towards Lake Shore Blvd. Under the Hybrid, the majority of space along Lake Shore Blvd west of Cherry St. will be back-facing and will not provide active uses at-grade.

Considering the above, the Remove (Boulevard) is preferred over the Hybrid for the Urban Design lens.

Environment Lens

The Environment Lens is concerned with noise and air effects and the potential for natural habitat enhancement within the corridor. Recognizing the baseline conditions of the corridor, first many of the noise/air receptor locations represent future residential development locations as lands along much of the corridor are either vacant or are to be redeveloped. Regarding the natural environment, the corridor is highly degraded due to historical development and land use activities; the only natural feature of note in the corridor is the mouth of the Don River/Keating Channel which is proposed to be realigned and re-naturalized.

Regarding potential noise effects, based on previous modelling results (see 2014 Alternatives Evaluation Report) the Remove (Boulevard) is expected to have slightly lower noise levels in the Gardiner-LSB corridor as a result of lower volumes of traffic (and slower speeds) in the corridor but there is potential for minor increased noise levels on other City streets due to expected traffic diversion to these streets. The previous model results showed that the relative change in noise levels is greater in the Gardiner-LSB corridor than on other City streets. It also needs to be recognized that most of the receptors potentially affected in the corridor are future receptors. As such, the difference between the alternatives with respect to noise is considered to be minimal.

Considering local air emissions in the Gardiner-LSB corridor, based on previous modelling results, it is anticipated that the Remove (Boulevard) would have slightly lower levels than the Hybrid due to lower vehicle volumes in the corridor. As noted above, many of the receptors in the corridor will be future receptors pending the completion of development plans in the area. The difference between the alternatives with respect to regional scale air emissions is considered to be of more relevance in comparing the alternatives given the ability of auto users to freely choose what routes they take to their Downtown destinations. Regarding regional air shed emissions, based on the completed modelling results, there is a minor difference between the alternatives. The alternatives are therefore considered to be similar. Thus, from a community health point of view, the alternatives are considered similar.

However, regarding regional greenhouse gas emissions, based on the model results, the Remove (Boulevard) has 12% less emissions which is reflective of the lower vehicle kilometers travelled in the transportation system for the Remove (Boulevard).

Opportunities for tree plantings and other habitat enhancements are similar for both alternatives east of the Don River but, to the west, Remove (Boulevard) results in better sunlight conditions that offer significantly greater “greening’ opportunities. Considering aquatic habitat, with the removal of all road infrastructure along the north side of the Keating Channel, the Remove (Boulevard) is expected to provide greater opportunity for the enhancement of aquatic habitat in the channel. Neither alternative result in significantly different impacts on built heritage and cultural landscape features or the activities of First Nation Peoples. However, Remove (Boulevard), which involves the expansion and realignment of Lake Shore Boulevard, results in a greater disturbance of known archaeological features.

Considering the above, for the Environment Lens, there is modest preference for the Remove (Boulevard).

Economics Lens

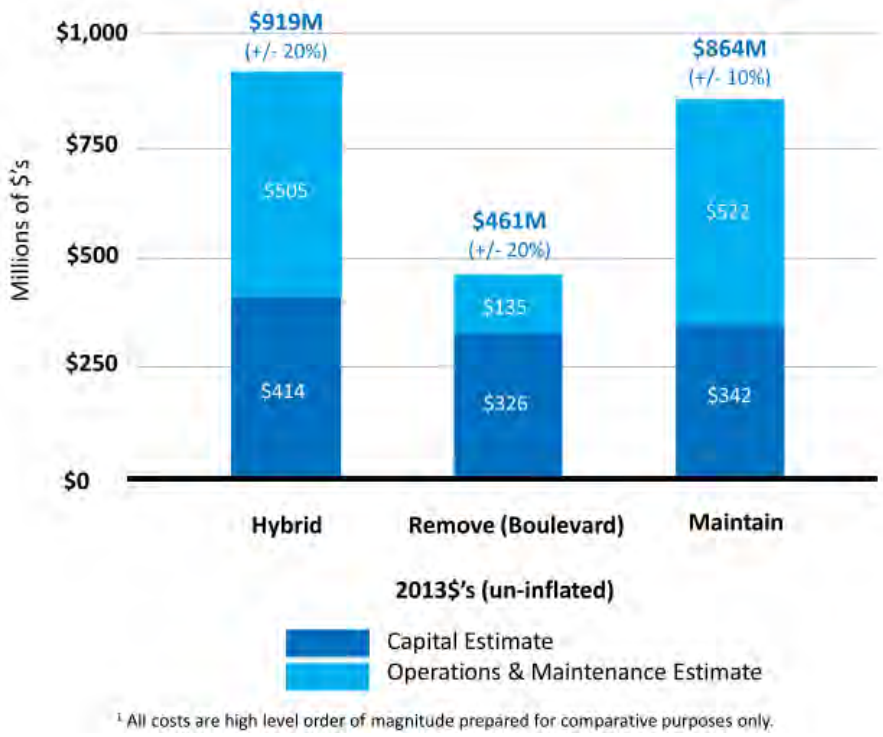
For this lens, the following describes the differences between the alternatives for the Direct Costs and Benefits criteria group. Differences between the alternatives for the other criteria groups within the Economics lens were previously discussed in Section 5.2.

Three criteria were considered under this criteria group, Capital Cost and Funding, Lifecycle Cost and Land Value Creation. Other than costs referencing the City's approved Capital Budget and Plan for the Maintain base case, costs for the Remove (Boulevard) and Hybrid alternatives outlined in this report represent high order-of-magnitude costs for comparative purposes only. These costs were based on conceptual designs only and may have a significant margin of error. Current cost estimates have not taken into consideration conflicts and constraints with respect to environmental and utility issues. More refined cost estimates will be derived from the next stage of EA work in which the preferred EA alternative solution is designed in greater detail. Costs for the Maintain option only have been advanced to the 30% design stage and reflect a conventional construction approach.

In regards to Capital Cost and Funding, **Figure 11** and **Table 3** in this report presents the estimated capital costs for the alternatives. **Appendix D** provides the assumptions regarding how the capital costs were generated. The estimated costs that were developed are high-level estimates that were developed on the bases of the concept plans for each alternative. These costs are intended for comparative purposes. The Remove (Boulevard) alternative has the lowest estimated lifecycle capital cost at $326 M (2013$) ($221 NPV) while the Hybrid has a cost of $414 M (2013$) ($260 NPV). Also considered under this criterion was the measure Property Acquisition. None of the alternatives are expected to require significant private property. There is potential for minimal private property acquisition along the Don Roadway (to the east of the right-of-way) for the Remove (Boulevard) alternative to accommodate new ramps that are required to connect the Don Valley Parkway with the new at-grade boulevard. The Funding Availability measure was provided as information but was not considered as an appropriate measure to rank the alternatives.

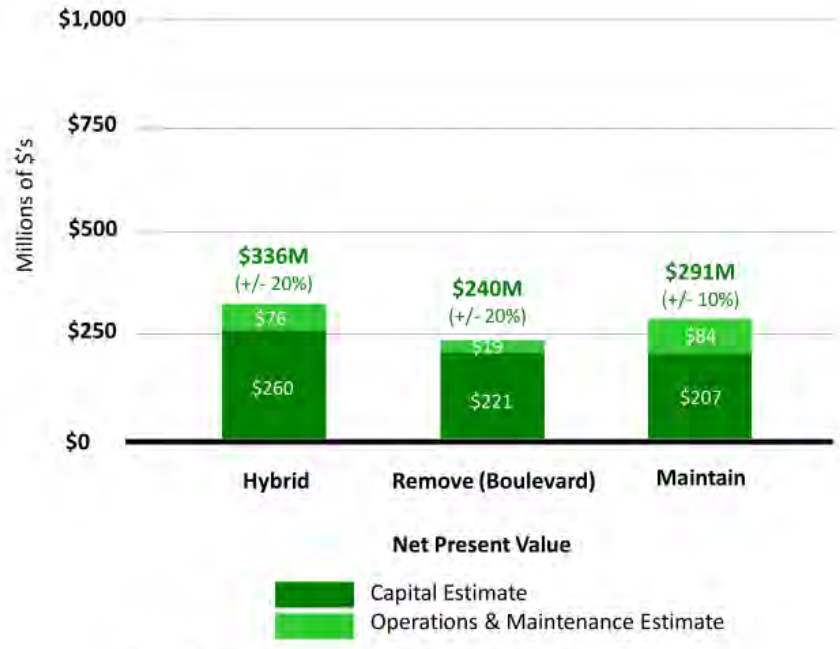
Lifecycle Costs as a net present value (NPV) were determined and include the total capital cost and the 100-year operations and maintenance costs for each alternative. The Remove (Boulevard) alternative was ranked *preferred* with the lowest NPV lifecycle cost ($240 M). The 100-year NPV lifecycle cost for the Hybrid is $336 M. **Figures 10 & 11** provide a breakdown of the 100-year lifecycle costs in 2013$ and NPV.

Figure 10: Alternatives Lifecycle Cost 2013$



[1] All costs are high level order of magnitude prepared for comparative purposes only.

Figure 11: Alternatives Lifecycle Cost NPV



[1] All costs are high level order of magnitude prepared for comparative purposes only.

Land Value Creation and Net Cost

An analysis of potential revenues from the sale of City land under the two alternatives was undertaken by HR&A Advisors. Development opportunities on publicly owned land in two distinct areas were examined: west of Cherry Street, and the area between Cherry Street and the Don River. Also described are development opportunities along LSB on publicly owned land east of the Don River.

Remove (Boulevard) would create 4.6 acres of redevelopment land west of Cherry Street, north of the realigned Lake Shore Boulevard between Yonge Street and Bonnycastle Street. This land is currently occupied by Gardiner/Lake Shore infrastructure and there would be no change under Hybrid. Between Cherry Street and the Don River, Remove (Boulevard) would create 12.9 acres of redevelopment land while Hybrid would create only 5.5 acres. The difference is because of the additional on/off ramps and connecting road infrastructure for Hybrid, as well as the existing elevated Gardiner East deck that would remain.

In sum, between Yonge Street and the Don River, Remove (Boulevard) would create an additional 12 acres of redevelopment land. Potential revenues from the sale of these City-owned lands have been valued at approximately $137 M in 2013 dollars – the equivalent of approximately $100 M in net present value.

The public land value benefit on the east side of the Don River is expected to well exceed $100 M (2013$). The full benefit is pending final development plans within the area. HR&A estimates that the 14 acre TPLC development block to the south-east of Lake Shore Boulevard and Don Roadway could generate land sale revenues of $64 M (2013). Also, there are additional City and TPLC lands further east in the Port Lands and South of Eastern area that cannot be valued until zoning is finalized through the various land use planning exercises that are currently underway. According to First Gulf, 20 acres of City and TPLC owned land could generate $100 M (2014$) in land sales. Both alternatives support the marketability of those lands because both alternatives feature a landscaped boulevard east of the Don River that will improve the accessibility and visibility of those lands.

If we consider the public land value creation benefits as a result of each alternative (31 acres available from the Remove (Boulevard) and 19 acres available from the Hybrid between Jarvis and Don River), the net costs of the Remove (Boulevard) are $285 million (2013$)/$112 million (NPV) and the net costs for Hybrid are $880 million (2013$)/$337 million (NPV). If the potential land value east of the Don River is also considered, as discussed above, then these net costs would be equally further reduced.

It should be noted that HR&A's analysis of potential land sale revenues did not include the costs of soil and groundwater remediation because they are unknown at this time

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
A. Transportation & Infrastructure	**A.1 Automobiles**	**A 1.1 Commuter Travel Time** (Modeled average travel time for AM Peak Hour) Note: Transportation demand based on regional projections for growth expected by 2031 in addition to full build-out of East Bayfront, Keating, Port Lands expected to occur over a 40-50 year timeline.	Average travel times between representative Origins and Destinations	**Less Preferred** - Generates higher peak hour modeled auto travel times.	**Preferred** - Generates lower peak hour modeled auto travel times.
			Don Mills to CBD - Don Mills/ Eglinton to Front/ Bay [B-D]	33 minutes	30 minutes
			Scarborough to CBD - Victoria Park/ Kingston to Front/ Bay [C-D]	28 minutes	26 minutes
			Etobicoke to CBD - Kipling/Lake Shore to Front/Bay [E-D]	49 minutes	46 minutes
			North York to CBD - Victoria Park/ Finch to Front/ Bay [A-D]	55 minutes	52 minutes
			Auto travel time sensitivity to future transit scenarios	**Equally Preferred** - Similar increases in travel times without planned transit projects.	**Equally Preferred** - Similar increases in travel times without planned transit projects.
		A 1.2 Impact on Average Auto Travel Time (AM peak hr.) Within Downtown/ Transportation Study Area	Total Volume Assigned (reflects available road capacity)	**Equally Preferred** - 70,500 vph	**Equally Preferred** - 70,500 vph
			Percentage of vehicles experiencing increases in travel time over the future Base Case/Maintain.	**Less Preferred** - More vehicles per hour impacted for more than 2 minutes	**Preferred** - Less vehicles per hour impacted for more than 2 minutes
			<2 min	75% (46,000 vph)	90% (64,500 vph)
			>2 min	25% (17,000 vph)	10% (7,000 vph)
			Trip Reduction/Diversion	**Equally Preferred** - Approx. 15%	**Equally Preferred** - Approx. 15%
			Overall impact on auto travel in Downtown	**Less Preferred** - Generates the higher modeled peak hour auto travel times.	**Preferred** - Generates lower modeled peak hour auto travel times.
		A 1.3 Road Network Flexibility/ Choice	Turning prohibitions at key intersections	**Equally Preferred -** Both options are significantly better than existing.	**Equally Preferred -** Both options are significantly better than existing.
			Existing		
			Jarvis Street: 4 prohibitions	Cherry Street: 2 prohibitions (SB left & NB right prohibited)	Jarvis Street: 1 prohibition (WB left prohibited)
			Sherbourne Street: 2 prohibitions		
			Parliament Street: 1 prohibition		
			Cherry Street: 2 prohibitions		
			Don Roadway: 3 prohibitions		
Automobiles Summary Ranking				**Less Preferred**	**Preferred**
A.2 Transit	**A 2.1 Transit Impact**		Impact on surface transit service	**Less Preferred –** Minor travel time impacts on surface transit when compared to the base case	**Preferred –** Essentially same as the base case
			Impact on subway service	**Equally Preferred -** No impact to subway transit	**Equally Preferred -** No impact to subway transit
			Ability to accommodate planned transit service	**Equally Preferred –** Accommodates same planned transit projects and provides similar flexibility in transit planning east of the Don River (e.g. Broadview Extension).	**Equally Preferred –** Accommodates same planned transit projects and provides similar flexibility in transit planning east of the Don River (e.g. Broadview Extension).
Transit Summary Ranking				**Equally Preferred**	**Equally Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	A.3 Pedestrians	**A 3.1 North-South Sidewalks**	Ability to physically implement City standard north-south sidewalks for use by the local community and travelers.	**Preferred** – Reconstruction of the corridor allows for sidewalks to be built to City standards for all intersections along the entire length of Lake Shore Boulevard.	**Less Preferred** – Improvements not possible at all north-south crossings.
				Preferred – Reconstruction of the corridor allows for city standard crosswalks to be built on both the east and west side of the street .	**Less Preferred –** Improvements and standardization possible at some intersections. However, existing constraints do not allow standardization of crosswalks on both the east and west side of the street for all intersections.
			North-South Crosswalk Locations at Lake Shore Blvd.		
			Jarvis Street	East and West	East and West (non-standardized)
			Sherbourne Street	East and West	East and West (non-standardized)
			Parliament Street	East and West	East and West
			Cherry Street	East and West	East and West
			Don Roadway	East	East
			Broadview Avenue	East and West	East and West
			Bouchette Street	East and West	East and West
			Logan Avenue	East and West	East and West
			Carlaw Avenue	East and West	East and West
			North-south crosswalk crossing distance at Lake Shore Boulevard (W = westside crossing, E = eastside crossing)	**Preferred** - crossing distance ranges from 25 - 39 metres	**Less Preferred** - crossing distance ranges from 25 - 55 metres.
			Jarvis Street	37.7m W, 37.4m E	44.6m W, 44.6m E
			Lower Sherbourne Street	37.5m W and E	46.9.8m W, 55.1m E
			Parliament Street	38.5m W, 38.9m E	37.05m W, 31.5m E
			Cherry Street	39m W, 36.2m E	38.1m W, 33.7m E
			Don Road	Not available W, 29.6m E	Not available W, 29.6m E
			Broadview Avenue/ Saulter Street	25.8m W and E	25.8m W and E
			Bouchette Street	25.8m W and E	25.8m W and E
			Logan Avenue	26.9m W, 27.8m E	26.9m W, 27.8m E
			Carlaw Avenue	28.8m W, 31.3m E	29.9m W, 31.3m E
		A 3.2 East-West Sidewalks	Ability to physically implement City standard east-west sidewalks as measured by length along the corridor for use by the local community and travelers (Yonge to Logan).	**Preferred -** Reconstruction of the corridor allows for sidewalks to be built to City standards along the entire length of Lake Shore Boulevard for use on the north and south sides of Lake Shore Boulevard. 5,600 total linear metres of city-standard sidewalk.	**Less Preferred –** Sidewalks on the north side of Lake Shore Boulevard are not possible between Yonge and Parliament St due to physical limitations of on/off ramps. 2,700 total linear metres of city-standard sidewalk.
Pedestrians Summary Ranking				**Preferred**	**Less Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	A.4 Cycling	**A 4.1 East-West Movement**	Length of facility	**Equally Preferred –** Total length of cycling facility is 4,200 m in length between Leslie Street to Yonge Street.	**Equally Preferred –** Total length of cycling facility is 4,200 m in length between Leslie Street to Yonge Street. While it is assumed that the cycling facility can be extended west of Jarvis in the Hybrid, this is being confirmed through a separate study by the City.
			Connectivity with other planned and existing bikeway facilities <u>Existing cycling facilities</u> · Yonge Street · Sherbourne Street · Martin Goodman Trail (east of Parliament) <u>Planned cycling facilities</u> · Trinity Street · Cherry Street	**Equally Preferred –** New facility can connect with all existing and planned facilities.	**Equally Preferred –** New facility can connect with all existing and planned facilities. While it is assumed in the Hybrid that the cycling facility can be extended west of Jarvis, this is being confirmed through a separate study.
	Cycling Summary Ranking			**Equally Preferred**	**Equally Preferred**
	A.5 Movement of Goods	**A 5.1 Travel Time**	Modelled Average Travel Time (impact to Truck Movements)	**Less Preferred –** Vehicle travels times expected to be 2-3 minutes greater than the Hybrid for the AM peak hour period which has potential for delay to truck traffic during peak period travel.	**Preferred –** Vehicle travels times expected to be 2-3 minutes less than the Remove for the AM peak hour period which has potential for delay to truck traffic during peak period travel.
			Impact of Construction	**See Construction Impact**	**See Construction Impact**
		A 5.2 Reliability	Change in overall travel speeds in corridor due to incident	**Equally Preferred**: Reduction of 2 km/hr. for incident modelled on LSB (between Jarvis and Sherbourne).	**Equally Preferred: R**eduction of 0.5 km/hr. for incident on LSB and reduction of 4.5 km/hr. for modelled incident on the Gardiner (between Jarvis and Sherbourne).
			Change in traffic volumes through corridor due to incident	**Equally Preferred:** Reduced volume of 1,685 vehicles for modelled incident on LSB.	**Equally Preferred:** Reduced volume of 368 vehicles for modelled incident on LSB and 2,211 vehicles for an incident on the Gardiner.
		A 5.3 Transport & Shipper Cost	Transport & Shipper Cost	**Less Preferred:** Longer vehicle travel times may result in higher transport and shipper costs than the Hybrid.	**Preferred:** Shorter vehicle travel times may result in lower transport and shipper costs than the Remove.
	Movement of Goods Summary Ranking			**Less Preferred**	**Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	A.6 Safety	**A 6.1 Pedestrian Conflict Points**	Risk Exposure for pedestrians at intersections: - road crossing length - presence of free turns - presence of poor sight lines	**Preferred** – Shorter crossing length, normalized intersections and removal of Gardiner columns that improves sight lines. Greater volume of traffic will be on an at-grade street, design speed will be lower and road can be designed to accommodate expected volume to meet safety standards.	**Less Preferred –** Longer crossing lengths, greater number of free turns and poor sight line conditions remain.
		A 6.2 Cyclist Conflict Points	Potential for conflict points (e.g. crossing of free flow turns/ ramps)	**Preferred** – Eliminates all free flow right turns and removal of Gardiner columns improves sight lines.	**Less Preferred–** Number of free turns is expected to be reduced compare to Base Case, however sight line issues still exist at certain intersections.
		A 6.3 Motorist Conflict Points	Potential conflict points/safety concerns at Lake Shore Blvd. intersections <u>Existing</u> Lake Shore Blvd./Jarvis – short merge for E/B on-ramp Lake Shore Blvd./Jarvis – short diverge for W/B on-ramp Lake Shore Blvd./Jarvis – poor sightlines for Gardiner Expressway W/B on-ramp Lake Shore Blvd./Sherbourne – poor sightlines for S/B RT Lake Shore Blvd./ Don Roadway – speed differential for merge between E/B and N/B RT Lake Shore Blvd./ Don Roadway – unexpected conflict between S/B and Martin Goodman Trail	**Preferred** – Eliminates existing road safety concerns at Jarvis Street, Sherbourne Street, and the Don Roadway.	**Less Preferred –** A number of intersections and road segments along Lake Shore Blvd. have been identified on the City's top 20% list of roadways in need of improvement based on collisions from 2007 to 2011. The existing Gardiner columns result in poor sight line conditions that potentially contribute to higher rates of incidents on this roadway. Hybrid maintains these columns.
		A 6.4 Safety Risk for Motorists on Gardiner Expressway	Gardiner expressway geometry	**Not Applicable**	**Less Preferred –** Gardiner Expressway shoulders not to standard
	Safety Summary Ranking			**Preferred**	**Less Preferred**
	A.7 Construction Impact	**A 7.1 Duration**	Length of construction period Note: Opportunity to reduce construction periods can be studied, the feasibility and costs of which need to be assessed during the Alternative Design phase of the Environmental Assessment.	**Less Preferred** – It is expected that a 5 to 6 year construction period will be required. Approximately 3 years of direct impact on expressway lanes. 1.5 years per direction. Rolling Lake Shore Blvd. lane closures will be required. Removal of the Expressway and the rebuild of LSB will at times require the temporary detouring of traffic away from the corridor (one direction at a time). The period requiring detour roads is greater than for Hybrid.	**Preferred –** This alternative includes the City's program to re-deck this section of Gardiner resulting in approximately 6 years of direct impact on expressway lanes. Rolling Lake Shore Blvd. lane closures are also expected for deck replacement. Given reduction of capacity, traffic delay is anticipated throughout this period. It is expected that the new on/off ramps in Keating area can be built while maintaining traffic flow. Removal of the Logan ramps will require the temporary detouring of EB and WB traffic away from LSB. The length of period requiring detour roads is much less than for Remove.

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
		A 7.2 Transportation Management	Potential impact to pedestrian/ cycling infrastructure during construction	**Equally Preferred –** It is assumed that all pedestrian/cycling infrastructure can be largely maintained during construction.	**Equally Preferred –** It is assumed that all pedestrian/cycling infrastructure can be largely maintained during construction.
			Capacity to accommodate traffic flows through corridor during construction	**Less Preferred** – Will be periods that the corridor is not available for traffic and will require the use of detour roads based on the proposed staging scheme. It is expected that detouring of traffic may be required for up to 3-4 years. East of Don River both options will require diversion when Logan ramps are removed.	**Preferred –** It is expected that traffic flows can largely be accommodated through corridor during construction. East of Don River both options will require traffic diversion when Logan ramps are removed.
			Potential off-site traffic disruption during construction	**Less Preferred** – Off-site disruption is expected to be greater than Hybrid as greater amount of traffic diversion to other roadways is expected to be required.	**Preferred** – Off-site disruption is expected to be less than Remove as less amount of traffic diversion to other roadways is expected to be required.
		A 7.3 Private Property	Potential need for private property for construction staging/ detours	**Less Preferred** – Potential private property needs during construction. To be confirmed subject to the development of more detailed design.	**Preferred** – None expected
			Potential property/ access disruption during construction	**Less Preferred** – Greater potential to impact private property, depending on final road detour plan.	**Preferred** – None expected
	Construction Impact Summary Ranking			**Less Preferred**	**Preferred**
OVERALL RATING: TRANSPORTATION & INFRASTRUCTURE				**LESS PREFERRED**	**PREFERRED**
B. Urban Design	**B.1 Planning**	**B 1.1 Consistency with Official Plans**	Consistency with approved Central Waterfront Secondary Plan principles: 1) Removing Barriers; 2) Building a Network of Spectacular Waterfront Parks and Public Spaces; 3) Promoting a Clean and Green Environment; and 4) Creating Dynamic and Diverse New Communities to support residential and employment growth along the Gardiner/ Lake Shore Blvd corridor.	**Preferred** – Fully achieves the Central Waterfront Secondary Plan principles improving north-south crossings, implementation of continuous trail, adding park space, creating a tree-lined urban boulevard, creating right-of-way infrastructure to support transportation, community and neighbourhood objectives.	**Less Preferred –**Minimally achieves the Central Waterfront Secondary Plan principles given existing physical constraints and opportunities for improvements.
		B 1.2 Consistency with Precinct Plans and Other Initiatives	Consistency with approved East Bayfront, Keating, Port Lands, Don Mouth Naturalization, South of Eastern and other plans and land use goals which define standards for high quality and high value urban development.	**Preferred** – Fully realizes all approved Precinct Plans.	**Less Preferred** – There are negative effects on the Keating Precinct Plan due to the new ramps and new access road between Cherry and Lake Shore Blvd.
	Planning Summary Ranking			**Preferred**	**Less Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	B.2 Public Realm	**B 2.1 Streetscape**	Quality of place along Lake Shore Boulevard	**Preferred** - Urban boulevard design, familiar road geometries, human-scale fixtures, standard city finishes, full sun exposure, no noise amplification, unobstructed views and clear sight lines to destinations create a comfortable and easily navigable environment	**Less Preferred** - Minimal improvements to intersections with free turns, irregular road geometries, scale of fixtures, and quality of finishes create an only slightly less unattractive and disorienting environment than at present. Removal of Logan on/off ramp east of the Don River allows for the creation of a new 6-lane Lake Shore Blvd. with the same benefits of the Remove option for this segment.
			Consistent and cohesive character from east to west on Lake Shore Boulevard	**Preferred** - Consistent conditions and only minor variations in width enable a consistent character to be achieved along the length of the corridor	**Less Preferred** – Varying conditions and widths across the length of the corridor make cohesive character impossible to achieve. Creation of a new Lake Shore Blvd. east of the Don River improves part of the corridor but not its entire length.
			Ratio of hardscape to softscape surfaces in the corridor	**Preferred** - 83% hardscape, 17% softscape	**Less Preferred** - 88% hardscape, 12% softscape
		B 2.2 View Corridors	Quality of north-south visual connections between downtown and the waterfront	**Preferred** - Removes all visual barriers	**Less Preferred** - No opportunity to mitigate the visual barrier of the Gardiner columns and elevated deck except at Don River.
			Quality of east-west visual connections between the east end and the financial core on Lake Shore Boulevard	**Preferred** - Fully opens up all the skyline views from Lake Shore Blvd.	**Less Preferred** - No opportunity for skyline views from Lake Shore Blvd. Gardiner structure remains except at Don River.
		B 2.3 Amount of Public Realm	Usable public realm area in the Lake Shore Blvd corridor, including pedestrian areas, patios, passive recreation, multi-use trails and streetscaping. (Yonge to Logan).	**Preferred –** Reconstruction of the corridor allows for most public realm area to be created. Approximately 18 acres.	**Less Preferred –** New public realm space limited to east of Don River along Lake Shore Boulevard. Approximately 14 acres.
		B 2.4 New Park Land	Surplus right-of-way that could be dedicated as City of Toronto park land that would be usable and programmable above existing baseline.	**Equally Preferred –** There is not a meaningful difference of parkland creation between the two options in the Keating Precinct within the current Gardiner right-of-way.	**Equally Preferred –** There is not a meaningful difference of parkland creation between the two options in the Keating Precinct within the current Gardiner right-of-way.
		B 2.5 Rail Corridor and Berm	Length of the CN rail corridor exposed to the public sidewalk and open space along Lake Shore Boulevard	**Preferred** – Proposed north side buildings provide a buffer to LSB (330 metres buffer Jarvis to east of Sherbourne).	**Less Preferred** – No additional buffering of rail corridor from Lake Shore Blvd.
Public Realm Summary Ranking				**Preferred**	**Less Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	B.3 Built Form	**B 3.1 Street Frontage**	Length of leasable, active, at-grade space supported by the design of the corridor on Lakeshore Boulevard (North & South frontage)	**Preferred** – Removal of elevated structure will allow for entire corridor to be developed for retail and active uses. Total 3,812 linear metres of frontage (approximately 80% of corridor length).	**Less Preferred –** Presence of elevated structure along most of the corridor will limit retail and active uses. Total 896 linear metres of frontage (approximately 15% of corridor length).
			Number of podium floors with obstructed views, limited access to light and air and expressway impacts due to proximity of elevated structure	**Preferred** - Removal of Gardiner would result in no obstructed views to podiums floors and allows access to light and air.	**Less Preferred** - Existing Gardiner height of approximately 10 metres (west of Cherry) and 15 metres (east of Cherry) will negatively impact the lower 4–7 building storeys. Removal of the elevated Logan on/ off ramp resulting in an improved Lake Shore Blvd. east of the Don River.
	Built Form Summary Ranking			**Preferred**	**Less Preferred**
OVERALL RATING: URBAN DESIGN				**PREFERRED**	**LESS PREFERRED**
C. Environment	**C.1 Social & Health**	**C 1.1 Air Quality**	Extent of change in regional air quality (NOx, VOC, & PM2.5)	**Equally Preferred** – Modeling results indicate similar regional emissions relative to the Hybrid. Regional burden of 0.0038%.	**Equally Preferred –** Modeling results indicate similar regional emissions relative to the Remove. Regional burden of about 0.0037%.
			Extent of change in local air quality (NOx, VOC, & PM2.5)	**Preferred** – Previous modeling results indicate that a lower concentration of local emissions (NOx) would exist due to lower volumes of vehicles in the corridor.	**Less Preferred**- Based on previous modeling results, a higher concentration of local emissions (NOx) is expected for the Hybrid due to higher volumes of vehicles in the corridor.
			Level of Greenhouse Gas Emissions	**Preferred** – Modeling results indicate similar levels in GHG emissions. Regional burden of 0.28%	**Less Preferred** – Modeling results indicate similar levels in GHG emissions. Regional burden of 0.31%.
		C 1.2 Noise	Extent of change in noise levels Note: noticeable differences in the predicted noise levels are mainly for the receptors in close proximity to the Gardiner Expressway/Lake Shore Blvd. corridor.	**Equally Preferred** – Alternative is expected to have slightly lower noise levels in the Gardiner corridor as a result of lower volume of traffic in corridor but there is potential for increased noise levels on other City streets due to traffic diversion on other streets. While the relative increase in noise is higher in the corridor, most of the receptors potentially affected are future receptors and would relocate to the corridor with knowledge of the roadway/traffic conditions.	**Equally Preferred –** Alternative is expected to have higher noise levels in the Gardiner corridor but lower noise levels on other City streets as traffic diversion is less. The greatest change is expected to be along the corridor. Changes on other City streets are expected to be minor to moderate.
	Social & Health Summary Ranking			**Preferred**	**Less Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	C.2 Natural Environment	**C 2.1 Terrestrial Environment**	Potential to create new terrestrial/ habitat/ natural features	**Equally Preferred –** Neither alternative has potential for creation of meaningful new terrestrial habitat.	**Equally Preferred –** Neither alternative has potential for creation of meaningful new terrestrial habitat.
		C 2.2 Aquatic Environment	Potential to create new aquatic habitat	**Preferred** - Relocation of all road infrastructure along the Keating Channel will allow for improved runoff control into the Keating Channel. This may provide for some improvement of aquatic habitat in the Keating Channel. Both solutions facilitate the Don Mouth Naturalization Project.	**Less Preferred -** Although relocation of Lake Shore Blvd. through Keating Precinct will allow for improved runoff control into the Keating Channel, the Hybrid maintains the existing Gardiner and introduces on/off ramps and the approach road near the Keating Channel which could affect the potential to improve aquatic habitat through increased road run-off. Both solutions facilitate the Don Mouth Naturalization Project.
		C 2.3 Storm Water Quality	Ability to treat stormwater on-site/at source	**Preferred –** redesigning the entire roadway at grade allows for the potential to integrate stormwater management and water quality features that are not available unless the road is reconstructed.	**Less Preferred –** The new Lake Shore Blvd. alignment in Keating Precinct could be designed to improve treatment of stormwater and water quality. East of Don River redesign of LSB has potential to integrate stormwater management and water quality features that are not available unless road is reconstructed.
		C 2.4 Storm Water Quantity	Area of paved surface (higher number equates to more surface water run-off)	**Preferred –** 84,575 sq. m. of paved surface.	**Less Preferred –** 125,074 sq. m. of paved surface.
		C 2.5 Microclimate/Heat Island Effect	Access to natural sunlight in the corridor and tree canopy coverage (which can encourages active transportation. reduces urban heat island effect, improve air quality, increase evapotranspiration)	**Preferred –** With no elevated structure through the corridor there is full access to sunlight and opportunities for tree planting are greatly increased due to increased sunlight which will result in the greatest tree canopy. (1,237 new trees estimated providing 52% coverage in corridor).	**Less Preferred –** Elevated structure west of Don River remains. Removal of Logan ramps east of Don River provides full access to sunlight through this section. Some improved opportunity for new trees west of Cherry Street and east of Cherry along new Lake Shore Blvd. alignment and east of Don River due to Logan ramp removal. (326 new trees estimated – 12% coverage in corridor)
	Natural Environment Summary Ranking			**Preferred**	**Less Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	C.3 Cultural Resources	**C 3.1 Built Heritage**	Direct impact on built heritage features	**Equally Preferred:** Based on available documentation, no built heritage features within existing or proposed right-of-way.	**Equally Preferred:** Based on available documentation, no built heritage features within existing or proposed right-of-way.
		C 3.2 Cultural Landscape	Direct impact on cultural landscapes	**Equally Preferred:** Based on available documentation, no cultural landscapes within or adjacent to the existing or proposed right-of-way.	**Equally Preferred:** Based on available documentation, no cultural landscapes within or adjacent to the existing or proposed right-of-way.
		C 3.3 Archaeology	Potential for impact on archaeological resources *Note all alternatives result in impact from New Lake Shore Blvd. alignment east of Cherry. Potential effects on three archaeological features:* *Toronto Dry Dock* *Toronto Iron Works* *British American Oil*	**Less Preferred**: Greater amount of excavation results in increased potential for disturbance to known features. Potential effects on 9 archaeological wharf related features: • circa 1893-1925 Yonge Street Wharf • circa 1893-1925 City Wharf • circa 1893-1925 Toronto Electric Light Co. wharf • circa 1870 Don Breakwater • circa 1900 Don Mouth Fill Limit • circa 1910-1926 Polson Iron Works Wharf • circa 1910-1926 City Corp. Wharf • Knapp's Roller Boat • National Iron Works	**Preferred:** minor disturbances possible from widen westbound Gardiner off Ramp (Relocate Piers) East of Sherbourne - Potential effects on one archaeological feature: • circa 1910-1926 City Corporation Wharf
		C 3.4 First Nation People and Activities	Potential impact on lands used for traditional purposes	**Equally Preferred:** No impact anticipated.	**Equally Preferred:** No impact anticipated.
	Cultural Resources Summary Ranking			**Less Preferred**	**Preferred**
OVERALL RATING: ENVIRONMENT				**PREFERRED**	**LESS PREFERRED**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
D. Economics	**D.1 Global & Regional Economics**	**D 1.1 Toronto's Global Competitiveness**	Potential for change in Toronto's Global Competitiveness	**Equally Preferred –** Based on the City's high global ranking, the anticipated increase in travel times and the relative small proportion of commuters expected to be affected by the increase, and the fact that accessibility is only one of many considerations factored into assessing competiveness, neither option is expected to have an impact on the City's global economic competitiveness.	**Equally Preferred –** Based on the City's high global ranking, the anticipated increase in travel times and the relative small proportion of commuters expected to be affected by the increase, and that accessibility is only one of many considerations factored into assessing competiveness, neither option is expected to have an impact on the City's global economic competitiveness.
		D 1.2 Regional Labour Force Access	Potential for change in Regional Labour Force Access to downtown	**Less Preferred –** While 95% of new commuter trips to the downtown will be on transit, the additional auto travel times could impact employers and employees decisions to locate/work downtown as compared to other regional employment centres.	**Preferred – C**hange to the regional attractiveness of downtown Toronto is not expected to change.
		D 1.3 Mobility within Downtown	Potential for change in mobility within Downtown	**Equally Preferred –** With an increased reliance on transit, walking and cycling in the downtown, neither option is expected to have a meaningful impact on downtown mobility.	**Equally Preferred** – With an increased reliance on transit, walking and cycling in the downtown, neither option is expected to have a meaningful impact on downtown mobility.
			Disruption During Construction	**Less Preferred –** While the total period of construction is similar, the Remove will result in more traffic delay during construction that could result in greater economic impacts.	**Preferred –** While the total period of construction is similar, the Hybrid will result in less traffic delay during construction and thus has less potential economic impacts.
		D 1.4 Entertainment Venues	Potential for change in access and attractiveness to downtown entertainment venues.	**Equally Preferred -** The City's downtown venues are highly accessible by public transit. Further, there is typically minimal overlap with peak commuter travel times and travel to the entertainment venues. It is unknown if patrons that use the Gardiner Expressway to visit Downtown's venues will face higher travel times in one EA alternative versus the other. Regardless, information on the sensitivity of a customer's willingness to attend an event due to changes in travel time is unavailable.	**Equally Preferred -** The City's downtown venues are highly accessible by public transit. Further, there is typically minimal overlap with peak commuter travel times and travel to the entertainment venues. It is unknown if patrons that use the Gardiner Expressway to visit Downtown's venues will face higher travel times in one EA alternative versus the other. Regardless, information on the sensitivity of a customer's willingness to attend an event due to changes in travel time is unavailable.
Global and Regional Economics Summary Ranking				**Less Preferred**	**Preferred**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
	D.2 Local Economics	**D 2.1 Business Activity**	Number of potential new jobs in corridor and/or study area	**Preferred –** as about 2,000 more jobs expected to be generated in the corridor over the Hybrid. But both options support the First Gulf development that is projected to generate in excess of 25,000 new jobs	**Less Preferred –** less new local jobs than the Remove. But both options support the First Gulf development that is projected to generate in excess of 25,000 new jobs
	Local Economics Summary Ranking			**Preferred**	**Less Preferred**
	D.3 Fiscal Net Benefits	**D 3.1 Capital Cost and Funding**	Total capital cost (in 2013$)	**Preferred** $326 million (2013$) Includes demolition and removal of the existing Gardiner Expressway and 8-lane Lake Shore Blvd. construction and major urban design and landscaping throughout and construction of new bridge structures across Don River to connect to Lake Shore Blvd. and Don Valley Parkway.	**Less Preferred** $414 million (2013$) Includes demolition and removal of the Gardiner Logan ramps and rebuild of a new at-grade 6-lane boulevard. Building of new on and off ramps and connecting roads in the Keating areas and modifications to the Gardiner to accommodate these ramps and Construction of new bridge structures across Don River to connect to Lake Shore Blvd. and Don Valley Parkway.
			Property acquisition	**Equally Preferred** Minimal property requirements around the Don Roadway/DVP connection.	**Equally Preferred** Minimal property requirements around the Don Roadway/DVP connection.
			Funding Availability	**Preferred** $342 ($2013) Capital is availble (Yonge to Logan Ramps). Less additional Capital funding required over budget.	**Less Preferred** $342M ($2013) Capital is available (Yonge to Logan Ramps). More additional Capital funding required over budget.
		D 3.2 Lifecycle Cost	100 year life cycle cost (includes total capital cost + 100yr operations and maintenance cost) *Figures are +/- 20%	**Preferred** - $461M 2013$ ($326M Capital + $135M Operations and Maintenance) $240M NPV ($221M Capital + 19M Operations and Maintenance)	**Less Preferred** - $919M 2013$ ($414M Capital + $505M Operations and Maintenance) $336M NPV (260M Capital + $76 M Operations and Maintenance)
		D 3.3 Public Land Value Creation	Public Land disposition proceeds. All figures +/- 10%	**Preferred** $176 million (2013$) $128 million (NPV) (31 acres of public land) These values are for land west of Don River only. East of Don River, both alternatives would have equal benefit. The amount of this benefit is subject to development plans but is expected to be in excess of $100M.	**Less Preferred** $39 million (2013$) $29 million (NPV) (19 acres of public land) These values are for lands west of Don River only. East of Don River, both alternatives would have equal benefit. The amount of this benefit is subject to development plans but is expected to be in excess of $100M.
		D 3.4 Total Net Benefit	Net 100 Year Life Cycle Cost after land revenues.	**Preferred** $285 million (2013$) Net Cost $112 million (NPV) Net Cost	**Less Preferred** $880 million (2013$) Net Cost $307 million (NPV) Net Cost
	Direct Cost and Benefit Summary Ranking			**Preferred**	**Less Preferred**
OVERALL RATING: ECONOMICS				**PREFERRED**	**LESS PREFERRED**

Table 3: Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Criteria	Measures	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid
Study Goals Achievement	Revitalize the Waterfront			Preferred	Less Preferred
	Reconnect the City with the Lake			Preferred	Less Preferred
	Balance Modes of Travel			Preferred	Less Preferred
	Achieve Sustainability			Preferred	Less Preferred
	Create Value			Preferred	Less Preferred
Summary				This transformative option yields substantial benefits to the eastern waterfront in terms of environmental quality, city-building, and development compatibility. Local benefits are considerably greater than under any other alternative, while lifecycle costs are also less. Negative impacts are primarily related to slightly longer auto travel times for those continuing to choose this form of transportation to access the downtown.	Partially addresses some of the negative impacts of the existing infrastructure while largely maintaining auto capacity and expressway functionality. Does not lead to transformation of the corridor west of Cherry St. and commits the City to live with an elevated waterfront expressway for decades to come. Allows for small additional advancement of the CWSP objectives over the base condition.

6.4.2. Alternatives Comparison Summary

Table 4 presents a summary of the alternatives rankings by the four study lenses. As presented in this table, the Hybrid alternative is preferred on the basis of the Transportation and Infrastructure lens while the Remove (Boulevard) is preferred on the basis of the Urban Design, Economics and the Environment lenses.

Both alternatives facilitate:

- Revitalization of the Don River Mouth and Flood Protection project
- Development of the First Gulf site
- Implementation of new public transit projects

However, there are differences in the benefits between the two alternatives, including:

- **Remove (Boulevard)** has a lower cost, higher revenue to the City from public land redevelopment, creates a lively Lake Shore Boulevard, facilitates better connections to the waterfront and is to result in less greenhouse gas emissions.
- **Hybrid** maintains an expressway connection function and level of service between the Gardiner and Don Valley Parkway, has lower auto travel and goods movement times, and less construction disruption.

Further, to this trade-off statement and the comparative data presented in this report, the following provides contextual information that should be considered in making a preference choice between these two alternatives:

- About 28% of current commuter trips to the downtown are by auto, of which about 12% of all commuter auto trips use the Gardiner East;
- Road volumes to the City core have largely been constant over the last 20 years due to the capacity constraints in the road network; the increase in commuter volumes to the Central Business District (CBD) has been accommodated largely through public transit;
- Further, 95% of future commuter demand is to be satisfied by transit resulting in a proportional decrease of auto commuters; Both alternatives require the same amount of new transit projects to support this future commuter demand;
- New development and new transit needs to be developed in parallel. Without new transit, this City will be challenged to grow to the projected levels. And while it is possible that not all the assumed new transit projects will be in place by 2031, achieving full new development build out may also take longer than the 2031 horizon year;
- Many of today's users of the Gardiner East/commuters will not be using the facility by 2031. Currently about 30% of the City's workforce are of the "baby boomer" generation. By 2031 this will decrease to about 5%. As such, in making the decision, we need to consider the future residents, employees and visitors of the City as much as those who currently live, work, or visit our city.

Considering the benefit trade-offs of these two alternatives, the decision as to which of these two alternatives should be recommended as preferred is difficult. Selecting the alternative based only on the number of evaluation lens/criteria groups preferences may not be appropriate as this approach would not consider the variation in the magnitude of the effect/benefit, the period of the effect/benefit, the scale of users affected, the certainty of the forecast, and measures available to mitigate the effect. Further, a decision made on this basis would not consider how stakeholders and decision makers might weigh the relative importance of the criteria.

Opinions on the alternatives are highly divisive with some feeling that the Gardiner infrastructure is integral to the City's transportation system while others noting that the East Gardiner is antiquated infrastructure that largely only serves as a DVP ramp to the downtown core and beyond.

This decision requires a trade-off between two very important (and related) City priority issues: traffic congestion and City building/prosperity (understanding that traffic congestion is a product of City growth and prosperity). There is not a strong technical case to select one alternative over the other. With or without the Gardiner, the waterfront/downtown core will grow just as it has in the recent past, and traffic congestion in the City will increase – even with new transit projects being developed. Both alternatives are technically viable although offer different advantages and disadvantages. Rationalizing a defensible preference for either alternative on the basis of the available facts, effects forecasts and received stakeholder input has proven to be extremely difficult. In making the decision, what needs to be taken into account are the values, goals and priorities of those who represent the affected public.

As such, under these circumstances, it is our view that the decision regarding the preferred alternative should rest with Toronto City Council who can consider the facts and apply their value judgements on the trade-offs presented in this Report.

Table 4: Summary of Remove (Boulevard) and Hybrid Evaluation Matrix

Study Lens	Criteria Group	Alternative 1: Optimized Remove (Boulevard)	Alternative 2: Hybrid	Summary
A. Transportation and Infrastructure	**A.1 Automobiles**	**Less Preferred** - As average AM peak hour auto travel times for select OD pairs are slightly longer – typically by about 2-3 min on average. More auto travellers in study area to experience a greater than 2 min increase in travel time (25%).	**Preferred –** As average AM peak hour auto travel times for select OD pairs are slightly shorter – typically by about 2-3 min on average. Less volume of auto travellers to experience a greater than 2 min increase in travel times (10%).	
	A.2 Transit	**Equally Preferred:** Both alternatives to result in similar travel times on east-west routes serving transit in the Central Area, such as Dundas, Queen, and King Street Streetcars. Both alternatives facilitate new transit projects.	**Equally Preferred:** Both alternatives to result in similar travel times on east-west routes serving transit in the Central Area, such as Dundas, Queen, and King Street Streetcars. Both alternatives facilitate new transit projects.	
	A.3 Pedestrians	**Preferred: S**horter crossing distances on Lake Shore Blvd. and more City standard sidewalk configurations	**Less Preferred:** Less normalized intersections and longer crossing distances on Lake Shore Blvd.	**Hybrid is preferred for the Transportation and Infrastructure Evaluation Lens due to the lower auto travel time.**
	A.4 Cycling	**Equally Preferred** - 4200 metre cycling facility between Yonge and Leslie Streets	**Equally Preferred** - 4200 metre cycling facility between Yonge and Leslie Streets	
	A.5 Movement of Goods	**Less Preferred –** Less road capacity/higher travel times may have an impact on the movement of goods through the area.	**Preferred –** Due to greater road capacity and reduced vehicle travel times	
	A.6 Safety	**Preferred** - due to elimination of free flow right turns and sight line issues resulting from Gardiner columns.	**Less Preferred** - due to sight light issues resulting from Gardiner columns.	
	A.7Construction Impacts	**Less Preferred –** Similar overall construction period (6 years), but with more complex traffic management requirements and greater period of traffic detours required (3-4 years) and greater potential for traffic delays	**Preferred -** Similar overall construction period (6 years), but less period of traffic detours required (1.5 years).	
B. Urban Design	**B.1 Planning**	**Preferred** - Accommodates development proposals east of the Don River and opens up the mouth of the Don River with removal of Logan Ramps. More flexibility to accommodate additional growth. Accommodates precinct plans in study area.	**Less Preferred -** Accommodates development proposals east of the Don River and opens up the mouth of the Don River with removal of Logan Ramps. Less flexibility to accommodate additional growth. Results in negative impact to Keating Precinct Plan.	**The Remove is preferred for Urban Design. The take-down of the elevated FGE creates an opportunity for dramatic improvement in the urban design fabric of the corridor. This action transforms the corridor and allows the full development of a urban district introduced by a tree canopied urban boulevard.**
	B.2 Public Realm	**Preferred -** Opportunity for significant streetscaping improvements. Significant increase in public realm area within corridor. Corridor will be open to sun and sky.	**Less Preferred -** Minor to moderate improvement in streetscaping – minor increase in public realm. Some opportunity for more trees.	
	B.3 Built Form	**Preferred -** Same benefits east of the Don River from removal of Logan Ramps. West of Cherry St., will allow building fronts to have active uses at-grade oriented towards Lake Shore Blvd.	**Less preferred –** Same benefits east of the Don River from removal of Logan Ramps. Majority of space along Lake Shore Blvd west of Cherry St. will consist of service uses and will not provide active uses at-grade.	
C. Environment	**C.1 Social and Health**	**Preferred** - Considering potential effects on community health, the alternatives are considered to be similar. However, due to 12% less Green House Gas emmissions, the Remove is considerd preferred (.	**Less Preferred** - Considering potential effects on community health, the alternatives are considered to be similar. However, due to 12% greater Green House Gas emmissions the Hybrid is less preferred.	
	C.2 Natural Environment	**Preferred** - Neither alternative will result in impact to existing natural features. Better facilitates ehancement of aquatic habitat in Keating Channel, less area of impervious surface (reduced stormwater generation), and improved micro-climate in corridor.	**Less Preferred –** Neither alternative will result in impact to existing natural features. Less opportunity for new/enhanced habitat and trees. Greater area of impervious surface.	**The alternatives are similar with respect to community health effects. Remove is however, considered to be preferred due to lower green house gas emissions and greater opportunity to create new natural habitat.**
	C.3 Cultural Resources	**Less Preferred –** Potential for greater impact on known archaeological features as a result of excavation.	**Preferred –** Less area of disturbances and less potential for impact on known archaeological features	
D. Economics	**D.1 Global and Regional Economics**	**Less Preferred –** Higher vehicle travel times could impact employers and employee decisions to locate/work downtown as compared to other regional employment centres.	**Preferred –** change to the regional attractiveness of the downtown is not expected to change.	
	D.2 Local Economics	**Preferred –** Both facilitate job growth opportunities east of the Don River. More new job opportunities west of the Don River (about 2,000 more).	**Less Preferred –** Both facilitate job growth opportunities east of the Don River. Less new jobs generated west of the Don River.	**The Remove alternative is preferred from an economics perspective as it has lower net 100 year lifecycle cost.**
	D.3 Direct Cost & Benefits	**Preferred** - Less $595 M (2013$)/$195 M (NPV) net revenue lifecycle cost.	**Less Preferred –** Additional $595 M (2013$)/$195 M (NPV) net revenue lifecycle cost.	

7. CONCLUSION

This EA has completed a considerable amount of work to present the facts, forecast the future conditions, present stakeholder opinions on the issue, and present the trade-offs. Rationalizing a defensible preference for either alternative on the basis of the available facts, effects forecasts and received stakeholder input has proven to be extremely difficult. As such, under these circumstances, it is our view that the decision regarding the preferred alternative should rest with Toronto City Council who can consider the facts and apply their value judgements on the trade-offs presented in this Report.

APPENDICES

Appendix A – Remove (Boulevard) Optimization Road Design Changes

Appendix B – Goods Movement Study

Appendix C – Economic Competiveness Study

Appendix D – Capital Cost and Net Present Value Estimate Approach

Appendix A
Remove (Boulevard) Optimization Road Design Changes

Appendix A: Remove (Boulevard) Optimization Road Design Changes

Item	Original Boulevard Model	Optimized Boulevard Model
Gardiner cross-section		
Eastbound lanes	- 2 eastbound lanes between York–Bay–Yonge off-ramp and base of ramp to Lake Shore Boulevard (not including merging lane from Rees on-ramp) - Eastbound left turn lane at Jarvis Street is added to the left of the 2 Gardiner lanes	- 3 eastbound lanes between Rees on-ramp and base of ramp to Lake Shore Boulevard - Leftmost (inside) of the 3 Gardiner lanes becomes the eastbound left turn lane at Jarvis Street
Westbound lanes	- 2 westbound lanes at base of ramp from Lake Shore Boulevard; widens to 3 westbound lanes at the top of the ramp - Lake Shore / Gardiner split occurs one block west of Jarvis Street (2 lanes to Lake Shore; 2 lanes to Gardiner)	- 3 westbound lanes at base of ramp from Lake Shore Boulevard - Lake Shore / Gardiner split occurs on west side of Jarvis Street intersection (2 lanes to Gardiner; 1 lane to Lake Shore; 1 shared lane to both)
Lake Shore / Simcoe		
Signal phasing	- Eastbound Lake Shore and Gardiner off-ramp traffic proceeds on same green signal; requires weaving within short block between Simcoe and York	- Eastbound Lake Shore and Gardiner off-ramp traffic given separate green signals to minimize the need for weaving east of Simcoe
Harbour / York		
Eastbound approach lane configuration	- L – T – T – TR	- L – L – T – TR - Dual left turn lane created by converting one of the through lanes - Dedicated eastbound left turn phase required
Harbour / Bay		
Eastbound approach lane configuration	- L – T – TR - Two through lanes on west side of intersection; 3 lanes east of intersection	- L – T – T – TR - Matches pavement width identified in York–Bay–Yonge Interchange ESR - 3 through lanes on west and east sides of intersection
Lake Shore / Jarvis		
Signal operations	- Eastbound and westbound proceed independently (split phasing)	- Eastbound and westbound proceed concurrently, with separate left turn phases
Southbound approach lane configuration	- L – TR (right turns from through lane)	- L – T – R - Curb lane through rail underpass becomes right turn lane - Short left turn lane developed south of rail underpass
Westbound approach lane configuration	- 4 through lanes plus left turn lane	- Added westbound right turn lane

Lake Shore / Sherbourne		
Southbound approach lane configuration	- L – TR (right turns from through lane)	- L – T – R (short left and right turn lanes developed south of rail underpass)
Lake Shore / Parliament		
Southbound approach lane configuration	- L – TR - Inside lane through rail underpass becomes left turn lane - Right turns made from through lane	- L – T – R - Curb lane through rail underpass becomes right turn lane - Short left turn lane developed south of rail underpass
Southbound approach lane configuration	- L – TR (right turns from through lane)	- L – T – R (add dedicated right turn lane)
Lake Shore / Cherry		
Streetcar signal operations	- Short dedicated transit phase after end of east-west green	- Streetcars proceed during main north-south green signal - Dedicated transit phase eliminated - Northbound right turns and southbound left turns prohibited to eliminate conflict with streetcars
Queens Quay East		
Easterly extension	- Queens Quay extended from Parliament Street to Cherry Street	- Queens Quay extended further from Cherry Street to Lake Shore Boulevard - New east leg at Cherry Street intersection - New signalized intersection at Lake Shore Boulevard between DVP ramps and Don Roadway
Lake Shore / Don Roadway		
Eastbound lane configuration	- 2 through lanes	- Third through lane added; begins at west end of Don River bridge
Northbound and southbound lane configuration	- L – TR - Right turns made from through lane	- L – T – R - Added exclusive right turn lanes)
Left turn phases	- Eastbound and westbound left turn phases	- Eastbound and northbound left turn phases
Port Lands		
Intersections between Don Roadway and Carlaw	- One signalized intersection (Bouchette)	- Two signalized intersections (Saulter; Logan)

Appendix B
Goods Movement Study Report

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Final Report

Gardiner Expressway and Lake Shore Boulevard East Reconfiguration EA and Integrated Urban Design Study

Goods Movement Analysis

Prepared for:

Dillon Consulting

Prepared by:

CPCS

Solutions for growing economies

CPCS Ref: 14238
May 1, 2015

Ackowledgments

CPCS acknowledges the input of all of those consulted in the preparation of this Report. We also thank the City of Toronto and Waterfront Toronto as well as the Ontario Ministry of Transportation for providing data in support of this project.

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Table of Contents

Acronyms / Abbreviations

AADT	Annual Average Daily Traffic
AADTT	Annual Average Daily Truck Traffic
ATMS	Advanced Traffic Management System
B/C	Benefit/Cost
BIA	Business Improvement Area
CCTV	Closed-Circuit Television
DC	Distribution Centre
DfT	Department for Transport (UK)
DOT	Department of Transportation
DVP	Don Valley Parkway
EA	Environmental Assessment
GE	Gardiner Expressway
GE/LSB	Gardiner Expressway and Lake Shore Boulevard
GGHA	Greater Golden Horseshoe Area
GIS	Geographic Information System
GM	Goods Movement
GTA	Greater Toronto Area
GTHA	Greater Toronto and Hamilton Area
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HST	Harmonized Sales Tax
ITS	Intelligent Transportation System
LSB	Lake Shore Boulevard
MTO	Ontario Ministry of Transportation
NYC DOT	New York City Department of Transportation
O/D	Origin/Destination
OPD	Off-Peak Delivery
QEW	Queen Elizabeth Way
RESCU	City of Toronto's Road Emergency Services Communication Unit
SCOOT	Split, Cycle, and Offset Optimization Technique
T&L	Transportation and Logistics
TfL	Transport for London (UK)
TOC	Traffic Operations Centre
TTI	Texas Transportation Institute
VEH	Vehicle(s)
VMS	Variable-Message Sign

Executive Summary

Introduction

In support of the Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study, CPCS has been retained by Dillon Consulting to carry out an analysis of goods movement in the Transportation Study Area being considered under the ongoing EA.

The objectives of the goods movement analysis are as follows:

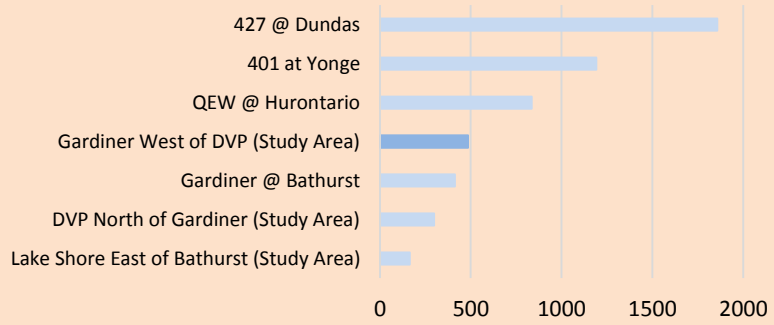
- To provide a better understanding of the nature of goods movement in the Gardiner/Lake Shore corridor, Transportation Study Area considered in the EA, and the Greater Toronto Area.
- To provide a comparative assessment and explanation of the opportunities and constraints for goods movement between the Remove (Boulevard) and the Elevated Expressway alternatives being considered in the EA; and
- To recommend high-level mitigation measures for any constraints identified that may be placed on goods movement under the Remove Alternative.

Nature of Goods Movement in the Study Area

Traffic Patterns

- The flow of trucks on Highway 401 at Yonge Street between the peak 8:00-9:00am hour is approximately 2.5 times the flow of trucks on the Gardiner Expressway in the Study Area at the same time.[1]

Figure ES-1-1: Peak Hour Truck Traffic on Select Highways



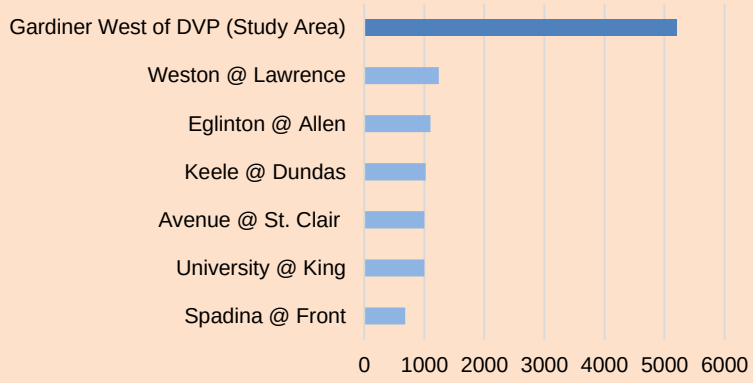
Source: Ministry of Transportation iCorridor Data (2008 data) and City of Toronto Cordon Count data (year indicated)

[1] Ontario Ministry of Transportation iCorridor data for 2008 annual average daily truck traffic (AADTT) and City of Toronto Cordon Counts for the Gardiner Expressway in the Study Area for 2011. Toronto Cordon Count Data includes Commercial Vehicles classified as "Medium" or above

- For longer distance trips, including those passing through the City of Toronto or those that are not originating in or destined to the Gardiner EA Transportation Study Area (defined between Woodbine and Spadina and Dundas and Lake Ontario), the 400 series highways are the preferred routes for commercial vehicle traffic.

- The Gardiner Expressway facilitates some of the largest flows of commercial vehicles in Toronto outside of the 400 series highways; it has been identified by stakeholders as the preferred route for most commercial vehicle trips starting or ending within the Study Area considered in the EA.

Figure ES-1-2: Daily Truck Trips in Toronto Surface Routees



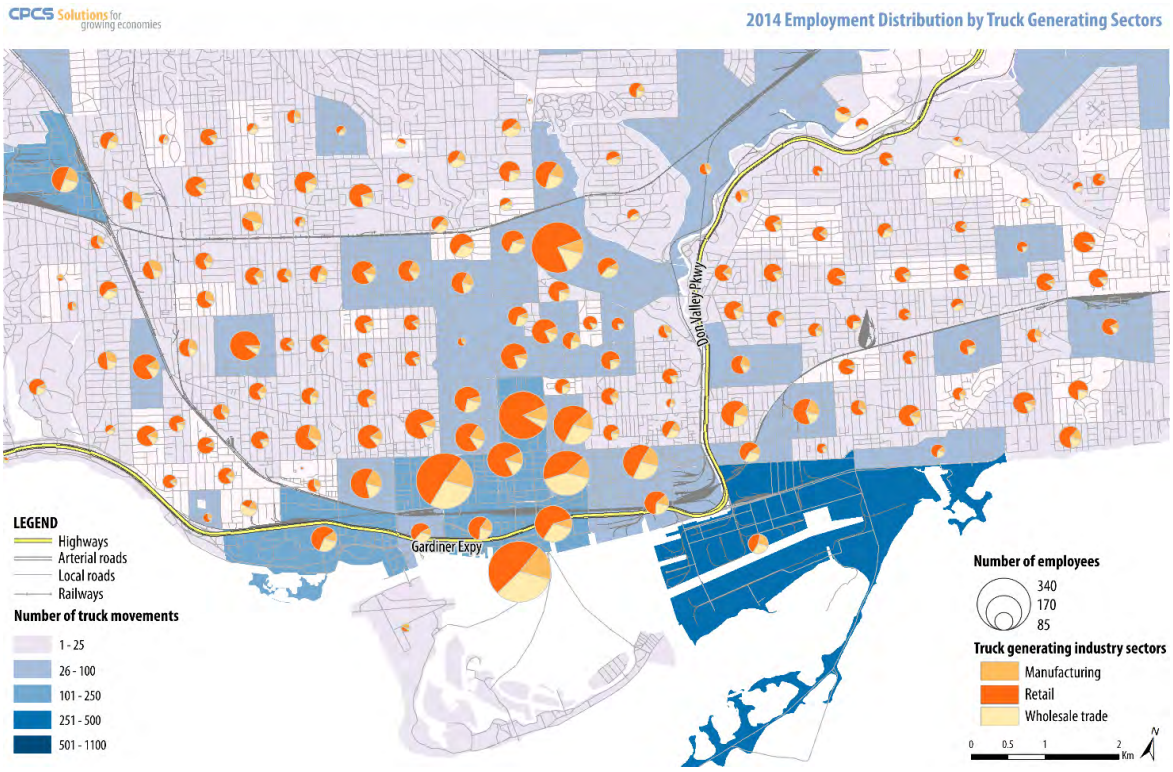
Source: Ministry of Transportation iCorridor Data (2006 data)

- On a wider scale, the Gardiner Expressway/Lake Shore Boulevard Corridor, along with the Don Valley Parkway (DVP), 401 and 427 form a higher speed and higher capacity network around the City that allows for the transportation of goods around the City of Toronto.

- Local traffic is a significant component of all commercial traffic on the expressway in the Study Area.

- A large number of truck stops currently occur in the southeast corner of the Study Area being considered under the Environmental Assessment. Truck stop patterns for 2031 (EA time horizon) will be affected greatly by development, growth, and changing land use in the Study Area over this time horizon.

Figure ES-1-3: Goods Movement Sector Employment and Truck Trips



Source: CPCS Statistics Canada Data on Canadian Business Patterns and Ontario Ministry of Transportation Truck GPS Data

Transportation Decisions

- Transportation decisions of goods movement stakeholders in the Study Area are generally dictated by downstream customer requirements.
- Key factors that goods movement stakeholders consider in transportation decisions are **(A) Travel Time, (B) Reliability, and (C) Cost**. Goods movement stakeholders value all three factors, but weigh each factor differently depending on the nature of the supply chain in which they operate.
- The main types of goods movement generators using the expressway in the study area are categorized into three principal groups (1) Industrial and Manufacturing, (2) Retail, and (3) Courier and Logistics stakeholders.
- Industrial and Manufacturing stakeholders tend to move larger volumes of goods and have a strong focus on cost of transportation. Retail stakeholders often focus on reliability for restocking shelves, and courier services tend to focus on both travel time and reliability in order to meet customer expectations.

Impact of Remove Alternative

Proposed metrics to compare the alternatives considered under the EA were developed based on the supply chain analysis of impacted firms and key concerns raised by stakeholders during consultations. In order to better understand stakeholder feedback received, a framework was developed to convert comments into objective and measurable concerns in order to better understand the potential impact of the Remove Alternative as compared to the Elevated Expressway alternatives.

Concerns identified are examined through the lens of the impact they may have on goods movement stakeholders in terms of travel time, travel reliability, and cost. Evaluation metrics prepared to compare the Remove Alternative to the Elevated Expressway alternatives are also based on these three considerations. Recommended evaluation metrics include:

Figure ES-1-4: Evaluation Measures for Impact of Remove Alternative on Goods Movement

Key Concern	Measurement Indicator
Travel Time	Change in travel time for recommended O/D Pairs
	Change in distance to nearest on/off ramp
	Impact of construction period
Reliability	Estimated change in travel time for trips in the top 95th percentile of travel times (longest trip in a month)
	Network redundancy in case of incident
	Congestion on alternate routes
Cost	Estimated change in transportation costs (based on change in travel time)

Cases Studies

On a macro scale, main congestion indicators for major US cities that have removed or do not have elevated urban freeways are comparable to those that have maintained elevated urban freeways. In other words, the maintenance or removal of urban expressways alone does not seem to be a significant factor in predicting the traffic outcomes in major cities. Macro studies examining the removal of roadway capacity have shown that traffic demand tends to respond to roadway capacity, partially offsetting the impacts of adding or removing highway capacity.

Seoul, New York, San Francisco, and Seattle have all removed urban expressways. All except Seattle elected to replace elevated expressways with surface boulevards. While there were often fears of traffic “chaos” following removal of elevated expressways in the case studies analyzed, traffic generally adjusted to the new reality without very significant disruption using the best alternate route available, adjusting trip time, or in some cases changing mode or avoiding trips all together.

Mitigations

Ongoing modelling work being carried out under the wider EA suggests that the Remove Alternative may result in marginally increased congestion in the Study Area and the Gardiner Expressway/Lake Shore Boulevard (GE/LSB) corridor than under an Elevated Expressway alternative. A proposed toolbox of potential mitigation measures that could be employed by the City of Toronto and Waterfront Toronto are proposed in this report to either reduce overall congestion in the corridor that will improve goods movement flows, or measures specifically targeted to improve the movement of goods in particular. Mitigation measures should be targeted both to the GE/LSB corridor as well as alternate routes to the corridor as appropriate; both will mitigate the impact on the movement of goods.

Figure ES-1-5: Potential Mitigation Measures to Address Constraints of Remove Alternative on Goods Movement

Mitigation Approach	Improves Overall Traffic	Targets Goods Movement Specific	Barriers to Implementation in Toronto
Application and expansion of existing tools in City of Toronto's Congestion Management Plan to Corridor and Key Alternate Routes	✓		**Low**
Off-Peak Delivery Programs	✓	✓	**Low**
Preferential Lane Treatments	✓	✓	**-**
Truck-Only Lanes		✓*	**Medium**
Peak Shoulder Lanes	✓		**Medium**
HOV Lanes	✓	✓	**Medium**
HOT Lanes	✓	✓	**Medium**
Congestion Pricing	✓		**Medium/High**
Increase Alternate Road Capacity	✓		**High**
Increase Public Transit	✓		**Medium/High**
Operational Improvements	✓		**Low**
Improve Wayfinding for Trucks for Alternate Routes		✓	**Low**
Creation of Goods Movement Stakeholder Committee		✓	**Low**

*Depending on whether or not goods movement vehicles will be allowed to utilize preferential lanes.

1 Introduction

Key Messages

Under an Environmental Assessment and Urban Design Study (EA) carried out for the City of Toronto and Waterfront Toronto, four options were considered for the section of the elevated Gardiner Expressway approximately east of Jarvis Street:

1. Maintain
2. Improve
3. Replace
4. Remove

Following analysis carried out under the EA, the Remove alternative was recommended to the Public Works and Infrastructure Committee. Following directive from the PWIC to carry out further analysis on goods movement, CPCS has been retained by Dillon Consulting to support Waterfront Toronto and the City of Toronto with additional analysis focused on the movement of goods on the Gardiner Expressway and in the Study Area of the EA as well as proposing approaches to measure the impact of the Remove alternative on goods movement.

An additional fifth option, the Hybrid option, is now being considered as a part of a revised terms of reference for the EA.

1.1 Context for Assignment

1.1.1 EA Terms of Reference

In 2009, the Terms of Reference for an Environmental Assessment (EA) on the eastern portion of the Gardiner Expressway and Lake Shore Boulevard were approved by City Council and the Ontario Minister of the Environment.

Purpose

> *The purpose of the study was to determine the future of the eastern portion of the elevated Gardiner Expressway and Lake Shore Boulevard from approximately Lower Jarvis Street to just east of the Don Valley Parkway at Logan Avenue.*[2]

Key problems and opportunities that were identified in the EA as reasoning for the study were:

Figure 1-1: Problems and Opportunities Considered in EA Terms of Reference

Problems	Opportunities
Deteriorated Structure	Revitalize Waterfront
Disconnected Waterfront	Create a Sustainable Waterfront
	Generate and Capture Economic Value
	Rebalance Transportation Modes

Source: Gardiner Expressway and Lake Shore Boulevard Reconfiguration EA Terms of Reference, September 2009

Proposed Options

Four options were considered under the EA for the elevated portion of the Gardiner Expressway in the Study Area.

Figure 1-2: Four Alternatives Considered Under EA

Source: Presentation made at Public Information Centre #3, February 6, 2014.

[2] Gardiner Expressway and Lake Shore Boulevard Reconfiguration EA Terms of Reference, September 2009. p.7

Maintain: Maintain the elevated expressway includes completing the Gardiner East rehabilitation program with complete reconstruction of the deck of the expressway. Maintain also includes implementation of the precinct plans as they are approved today. This includes the realignment of Lake Shore Boulevard through the Keating Precinct between Cherry Street and the Don Roadway. The realignment of Lake Shore Boulevard would position Lake Shore further north through this area of Keating and allow the Keating Channel edge to be reclaimed for a pedestrian promenade, recreation, and public space. The Keating Precinct Plan was approved by Council in 2010.

Improve: Improve the urban fabric while maintaining the existing infrastructure involves the following elements:

- Rebuilding the expressway deck with four lanes. The four lanes would be on the north side of the deck. The space where the southern two lanes currently exist would be opened up to light and air that would improve the pedestrian experience at grade.
- Lake Shore Boulevard would largely stay where it is between Jarvis and Cherry Streets. Modest improvements would be made at intersections to improve crossings for pedestrians and limit auto conflicts with pedestrians and cyclists.
- The Jarvis Street on- and off-ramps to and from the Gardiner would be shortened to open up more space at grade.
- Dedicated turning lanes for Gardiner on- and off-ramps would be reduced to connect directly with Lake Shore Boulevard. This would reduce the number of access ramps that pedestrians have to cross at intersections.

Replace: Replace with a new elevated structure includes:

- Construction of a new four-lane elevated expressway between Jarvis Street and the DVP. Design of the structure would include a single, centre column to support the structure that would be more widely spaced than the distance between columns today.
- New ramp connections would be built to connect to the DVP.
- The new elevated expressway would be aligned through the north section of the Keating Precinct between Cherry Street and the DVP ramps. This would open up land along the Keating Channel for redevelopment.
- The new structure would be 5 m higher than the existing Gardiner structure. This opens up access to light and air at grade and allows for landscaping and tree planting along Lake Shore Boulevard.
- New ramp connections would be built to provide the Jarvis/Sherbourne connections.

- Lake Shore Boulevard would be rebuilt as a four-lane boulevard situated underneath the new elevated expressway.
- Development parcels along the south edge of Lake Shore Blvd would be expanded and opportunities for new parks and public spaces would be created between the rail corridor and the north side of Lake Shore Blvd.
- A new east-west continuous bicycle path would be developed on the north side of Lake Shore Boulevard.

Remove (Boulevard): The Remove (Boulevard) alternative solution involves the demolition of the existing Gardiner Expressway east of Jarvis Street and the construction of a new eight-lane boulevard with potential for new development on both the north and south sides of the street. This alternative would open up the corridor to light and air and would allow for a boulevard planted with continuous rows of trees. The transition from the boulevard back up to the existing elevated expressway in the west end of the Study Area would occur between Yonge Street and Jarvis Street.

Opportunities for new development parcels on the north side of the new green boulevard would allow for a buffer between the rail corridor and Lake Shore Boulevard. Dedicated left-turn lanes would exist at the intersections and the potential for off-peak parking would exist in the southern eastbound lane. A new continuous bicycle path would be developed on the north edge of Lake Shore Boulevard.

Rationale

These options were to be considered within the context of:

1. Waterfront Toronto's Guiding Principles
   - Sustainable development;
   - Public accessibility;
   - Economic prosperity;
   - Design excellence; and
   - Fiscal sustainability

2. Themes from The Toronto Official Plan
   - Promoting growth that is less reliant on the private automobile;
   - Developing transit-based growth strategies that support development in areas with good transit and improve transit in major growth areas;
   - Emphasizing environmentally sustainable development;
   - Having design policies to guide the physical form of development and public realm improvements; and,

- Ensuring the social and environmental infrastructure is in place to serve Toronto's present and future residents.

3. The City's Central Waterfront Secondary Plan
   - Removing barriers and making connections;
   - Building a network of spectacular waterfront parks and public spaces;
   - Promoting a clean and green environment; and,
   - Creating a dynamic and diverse community.

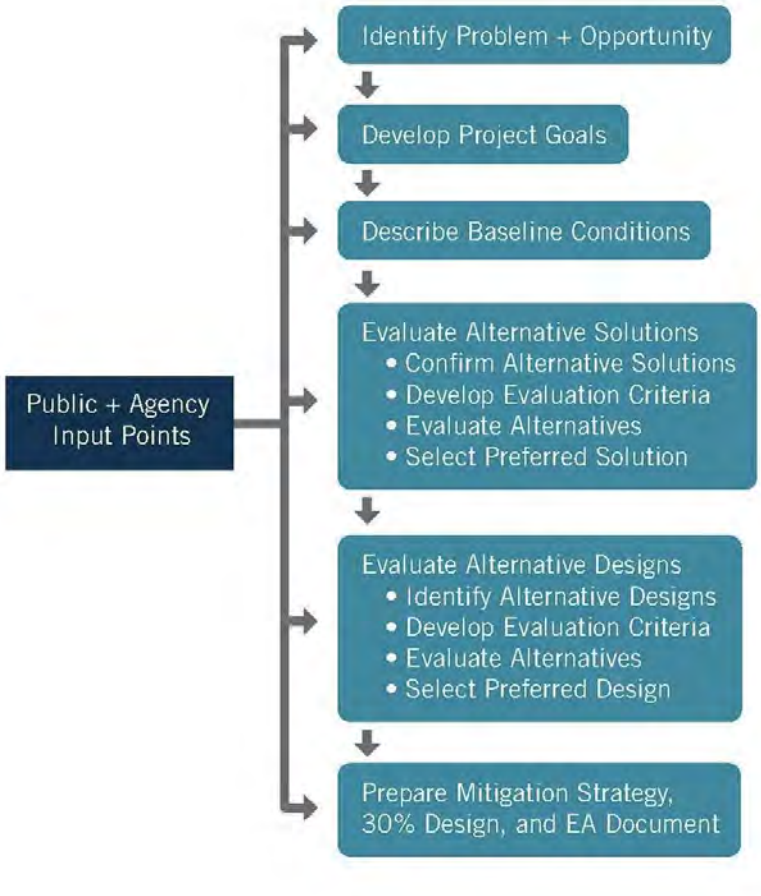
4. Study Goals of the Environmental Assessment

   - Revitalize the Waterfront
   - Reconnect the City with the Lake
   - Balance Modes of Travel
   - Achieve Sustainability
   - Create Value

Study Process

The process to carry out the Environmental Assessment and identification of the preferred option is outlined in the figure below.

Figure 1-3: EA Study Process

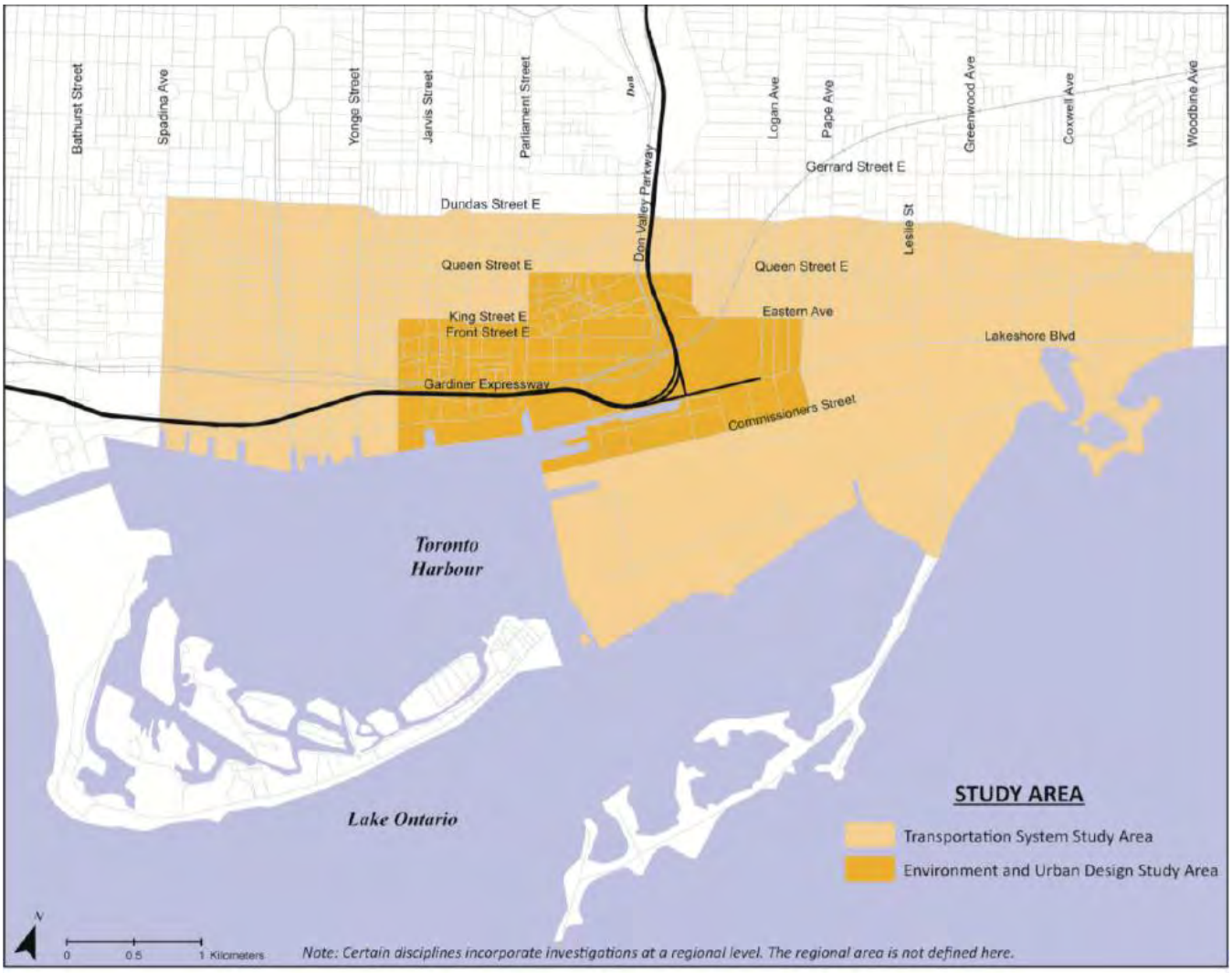


Source: Gardiner Expressway and Lake Shore Boulevard Reconfiguration EA Terms of Reference, September 2009

1.1.2 Environmental Assessment and Urban Design Study Area

The Environmental Assessment and Urban Design Study Area (immediate Study Area) as well as the wider Transportation System Study Area that were considered as a part of the EA are depicted in the dark and light orange areas respectively in the figure below. The GE/LSB corridor is the corridor through the Study Area comprised of the combined Lake Shore Boulevard surface route and elevated Gardiner Expressway system and is shown in black moving west-east and east-west through the Study Area.

Figure 1-4: Study Area



Source: Alternative Solutions Evaluation Interim Report, February 2014. Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment and Urban Design Study

1.1.3 Remove Alternative and Past Recommendations to the PWIC

Comparative Evaluation

The four alternatives were compared (relatively) under the four lenses of:

- Transportation and Infrastructure
- Urban Design
- Environment
- Economics

Each lens had a set of criteria under which each option was evaluated. The summary of this evaluation is shown below as it was reported to the PWIC in 2014.

Figure 1-5: Preliminary Evaluation Results

	Study Lens/ Criteria Group Summary	MAINTAIN	IMPROVE	REPLACE	REMOVE
TRANSPORTATION & INFRASTRUCTURE	Automobiles				
	Transit				
	Pedestrians				
	Cycling				
	Movement of Goods				
	Safety				
	Constructability				
URBAN DESIGN	Planning				
	Public Realm				
	Built Form				
ENVIRONMENT	Social & Health				
	Natural Environment				
	Cultural Resources				
ECONOMICS	Regional Economics				
	Local Economics				
	Direct Cost and Benefit				

Preferred | Moderately Preferred | Least Preferred

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Source: Presentation made at Public Information Centre #3, February 6, 2014.

Key Findings and Recommendations

Based on the evaluation summarized in Figure 1-5 above, John Livey, Deputy City Manager, Cluster B, submitted the recommendation to the Public Works and Infrastructure Committee on February 21, 2014 to proceed with the Remove Alternative as the preferred solution for the Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment and Integrated Urban Design Study.

1.1.4 Public Works and Infrastructure Committee Decision

As part of the EA process, some goods movement stakeholders raised concerns that reflect a variety of perspectives, but all relate to concerns that the removal of the eastern portion of the Gardiner will result in increased traffic congestion, which in turn will reduce the speed and reliability, and increase the cost, of transportation into and out of the downtown core. In regard to goods movement specifically, these concerns affect shipper industries (those that ship and

receive goods), service-movement industries (those that undertake service movements, such as repair persons and others who provide services at client sites), and carrier industries (those who physically transport goods, in this case, by truck). Collectively, we refer to these industries as goods movement industries. Each of these industries has specific requirements and circumstances that affect their use of the City's transportation system.

A number of deputations were made at the City of Toronto Public Works and Infrastructure Committee meeting, including the request that new options be studied. The following are a summary of the concerns related to goods movement:

- Relying too heavily on the assumption that transit will be in place
- Lack of focus on movement of goods in EA
- Impacts on access to goods, services, and businesses
- Increase in travel time is too high in Remove Alternative
- Removing the Gardiner will limit access to downtown core
- Capacity must be maintained during construction

The Public Infrastructure Committee referred the item back to the Deputy City Manager, Cluster B and requested that he undertake to:

1. Work with Waterfront Toronto and community stakeholders to review the recommended option under the EA process to mitigate congestion concerns;

2. Prepare an additional option that combines the Maintain and Replace components to preserve expressway linkage and functionality between the Gardiner Expressway and the Don Valley Parkway, and evaluates it against the EA criteria and the following:

    - Transportation functionality;
    - Impacts on key economic sectors;
    - Cost benefit;
    - Future land use considerations;
    - Public transit components;
    - Environmental impact; and
    - Neighbourhood growth and compatibility.

3. Report back to City Council in 2015, through the Public Works and Infrastructure Committee.

Waterfront Toronto and the City of Toronto then undertook to carry out further study on goods movement in response to direction from the committee. CPCS has been retained, through a sub-contract to Dillon Consulting, to carry out the goods movement study in support of the EA process. This report forms part of the overall 2015 report back to PWIC.

1.2 Objectives

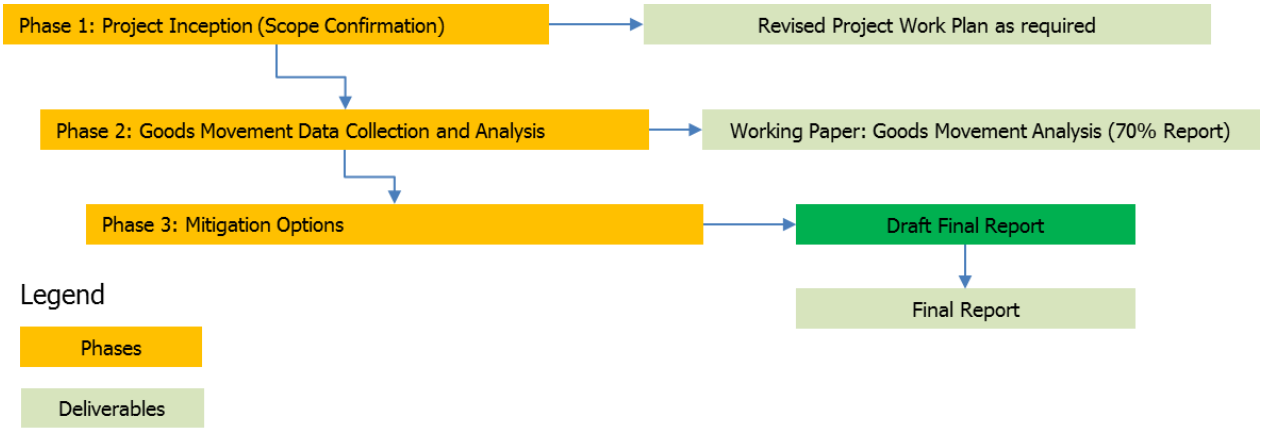
The objectives for this project are

- To provide a better understanding of the nature of goods movement in the Gardiner/Lake Shore corridor, Transportation Study Area (downtown) and Greater Toronto Area.
- To provide a comparative assessment and explanation of the opportunities and constraints for goods movement between the Remove and the Elevated Expressway alternatives being considered in the EA; and
- To recommend high-level mitigation measures.

1.3 Project Structure

The project has been developed in three broad phases, as set out in Figure 1-6. This final report is the output of all three phases. It incorporates comments provided on the Working Paper, which was the output of Phase 2.

Figure 1-6: Phased Approach to the Study



1.4 Key Questions

This report seeks to answer or address several key questions.

What is the nature of goods movement within the Study Area?

- What geographical areas would be affected by the implementation of the Remove Alternative?

- What type of businesses, located within the Study Area and GTA, are the key goods movement companies (shippers, carriers, and service-movement) that may be affected by the implementation of the Remove Alternative?
- What are the relevant characteristics of the supply chains in which these companies operate (e.g. just-in-time, 24-hour operations, peak/off-peak, modes used, origins and destinations of shipments, on-site storage and loading/delivery considerations, key drivers and seasonality of shipment volumes, etc.)?
- How are businesses currently responding to the rehabilitation construction of the Gardiner Expressway?

What comparative measures can be used to evaluate the potential impacts of the Remove Alternative relative to other Elevated Expressway alternatives?

- What are the specific (local) concerns of the key goods movement companies associated with the Remove Alternative?
- What would be the key issues with the implementation of the Remove Alternative for key goods movement companies?
- What are the potential general (regional) impacts of the implementation of the Remove Alternative on goods movement within the Greater Toronto Area including through movement on the Gardiner and Don Valley Parkway?

What steps could be undertaken to mitigate the negative impacts on goods movement of the Remove (Boulevard) alternative relative to the Elevated Expressway alternatives?

- Based on work already undertaken, how have other jurisdictions addressed the negative implications of initiatives similar to the Remove (Boulevard) alternative in their jurisdictions?
- What steps could be taken, including in terms of design, to mitigate the negative implications of the Remove Alternative?

1.5 Methodology

This report has been prepared through a combination of review and analysis of background data and literature and stakeholder consultations.

1.5.1 Background Data

In Toronto, comprehensive sources of local goods movement data are scarce, so it is necessary to use multiple data sources to “triangulate” a picture of goods movement in the impact area.

The starting point for this assignment is City traffic count and cordon count data and other data already incorporated into the EA.

Additional data sources include:

- **Municipal Property Assessment Corporation zoning data and Canadian Business Patterns data** (from December 2013) used to identify the location of goods movement industries.
- **Ontario Ministry of Transportation (MTO) Global Positioning System (GPS) data** to identify major truck traffic generators. MTO provided GPS-based data on truck stops, which indicate key goods movement origins and destinations (due to confidentiality constraints, this is only available at the county level for this study).
- **MTO iCorridor data.** MTO's iCorridor web application provided data on average speeds of commercial vehicles on roads, including the Gardiner, as well as commercial vehicle counts for 400 series highways.

In many cases, data from more than one source were combined in order to gain a better understanding of the movement of goods. For example, iCorridor data from MTO for 400 series highways is combined with City cordon count data.

Beyond the data sources mentioned above, other micro-data required for this assignment were largely gathered through interviews.

In the longer term, better data can be available to the City of Toronto through cooperation with the Ontario Ministry of Transportation (MTO). MTO could provide the City performance metrics for goods movement, a truck origin/destination matrix based on data available to MTO (GPS tracking data) using MTO algorithms (they estimate they are currently capturing 30-40% of trucking activity). MTO is interested in collaborating with the City to receive data on hourly commercial vehicle volumes (total, medium, and heavy) for every link in the City's road system to be incorporated into the iCorridor program. Similar data has been provided to MTO by Peel Region.

Limitations of Data

Much of the analysis included in this report is dependent on third-party data. CPCS cannot warrant the accuracy of the data from third parties, but has attempted to verify information or make note of limitations of the data available in this assignment. No single data source provides a complete picture of the movement of goods in the GTA or on the Gardiner Expressway. MTO iCorridor data are based on a sub-sample of all movements from GPS sources, surveys, traffic counts, and other sources that have been put together to create the best possible understanding of traffic. At times, information has been modelled or assumptions have been made by MTO when not all data were available. Cordon count data provided by the City of Toronto are limited to counts on a single day of the year and may not be representative of overall traffic patterns for that year. In the absence of other data, the cordon count information

is used as indicative of traffic volumes on the Gardiner Expressway and Lake Shore Boulevard. No single data source provides a complete and true picture of the movement of goods, but all the points of data in conjunction allow us to make useful inferences and gain more understanding about the magnitude and pattern of the movement of goods.

Feedback provided by stakeholders represents their views and not necessarily the views of CPCS. We have provided feedback as per the views of these stakeholders as well as examined considerations to take into account in the evaluation of the impact of goods movement.

1.5.2 Stakeholder Consultations

A large part of this assignment was informed through stakeholder consultations. The purpose of consultations was to gather information on supply chains and stakeholders' current use of the Gardiner Expressway, likely impacts of the Remove Alternative, and discuss any relevant issues raised by stakeholders. Some supply chain issues discussed as appropriate include the differing impacts of the Remove Alternative by time of day (peak vs. off-peak movement), by local vs. through movement, estimates of the reliability of the network, and perceived challenges to reliability.

A list of stakeholders was identified through an analysis of Canadian Business Patterns data as well as truck stop data in order to identify areas where larger generators of goods movement flows are located. Several of these were the same as those who deputed at the Public Infrastructure and Works Committee. Additionally, industry associations were contacted in order to gain a better understanding of the perspective of stakeholders that may not be located in the Study Area but would be impacted by the Remove Alternative. In some cases, industry organizations recommended particular additional stakeholders that may be significantly impacted by the Remove Alternative.

Stakeholders consulted include key goods movement companies (shippers and receivers of significant volumes of freight; carriers, particularly truckers and couriers; and service-trip generating businesses, those travelling on the road network to provide on-site service) that could be affected by the implementation of the Remove Alternative.

A consultation package was put together for distribution to the identified stakeholders providing some background information on the project as well as a template questionnaire intended to be indicative of the topics that would be discussed during consultations. This is provided in Appendix A.

2 Nature of Goods Movement Affected by Remove Alternative

Key Messages

The 400 series highway system is the preferred option for the movement of goods around the GTHA. During peak hour, the section of the Gardiner Expressway in the Study Area is estimated to handle 40% as many trucks as the 401 at Yonge Street during the 8:00-9:00am peak hour. A large portion of these trucks travelling through the Gardiner Expressway in the EA Study Area originate in or are destined for locations in the Study Area.

The Gardiner Expressway and Lake Shore Boulevard corridor is an important piece of infrastructure for the movement of goods in the City of Toronto. When compared to arterial roads, the Gardiner Expressway and Don Valley Parkway often represent a faster way to move goods in Toronto and exhibit some of the heaviest volumes of commercial vehicle traffic in the City outside of the 400 series highways.

2.1 Geographical Areas Affected

Approximately 30% of Canada's economic activity and over 400 million tonnes of goods pass through, originate in, or are destined for the GTHA annually.[3] Goods move into, out of, and through the GTA by road, air, rail, and water. The 400 series highways, Toronto International Airport and Hamilton Airport, railways, as well as the ports in Toronto and Hamilton comprise key goods movement infrastructure serving the City. Still, the majority of freight movements in the GTHA are by road. Road congestion creates real economic costs for the movement of people and goods. In 2008, it was estimated that the economic burden of congestion was $3.3 billion on commuters and $2.7 billion in lost opportunities for economic expansion in the GTHA.[4] The City of Toronto experiences the most congestion and highest cost due to congestion of all the areas in the GTHA. The City has developed a Congestion Management Plan in order to help it manage congestion using innovative best practice techniques combining increasing availability of information to travellers and planners, real-time adjustments to traffic management, and demand management among other factors.

In Toronto, the Don Valley Parkway and Gardiner Expressway/Lake Shore Boulevard system is a limited-access, high-speed highway system that provides access to downtown Toronto for both passenger and commercial vehicles. Goods movement stakeholders consulted indicate that for traffic passing through the GTA or for interregional trips, the Gardiner Expressway is *not* a preferred route for travel. For example, for a trip between Durham Region and Peel Region, stakeholders prefer to use Highway 401 or potentially Highway 407 for east to west travel. The Gardiner Expressway is used primarily for trips originating in or destined to somewhere in the Study Area shown in Section 1.1.2.

As shown in Figure 2-1, some of the areas showing the largest truck traffic south of the 401 in Toronto include areas along the Gardiner Expressway, with particular emphasis on the Port Lands in the southeastern end of the Study Area. Mississauga and Etobicoke are also seen as major hubs for truck traffic.

[3] Metrolinx, *Moving Goods and Delivering Services: Development of a Regional Transportation Plan for the Greater Toronto and Hamilton Area (Green Paper No. 5)*, February 2008

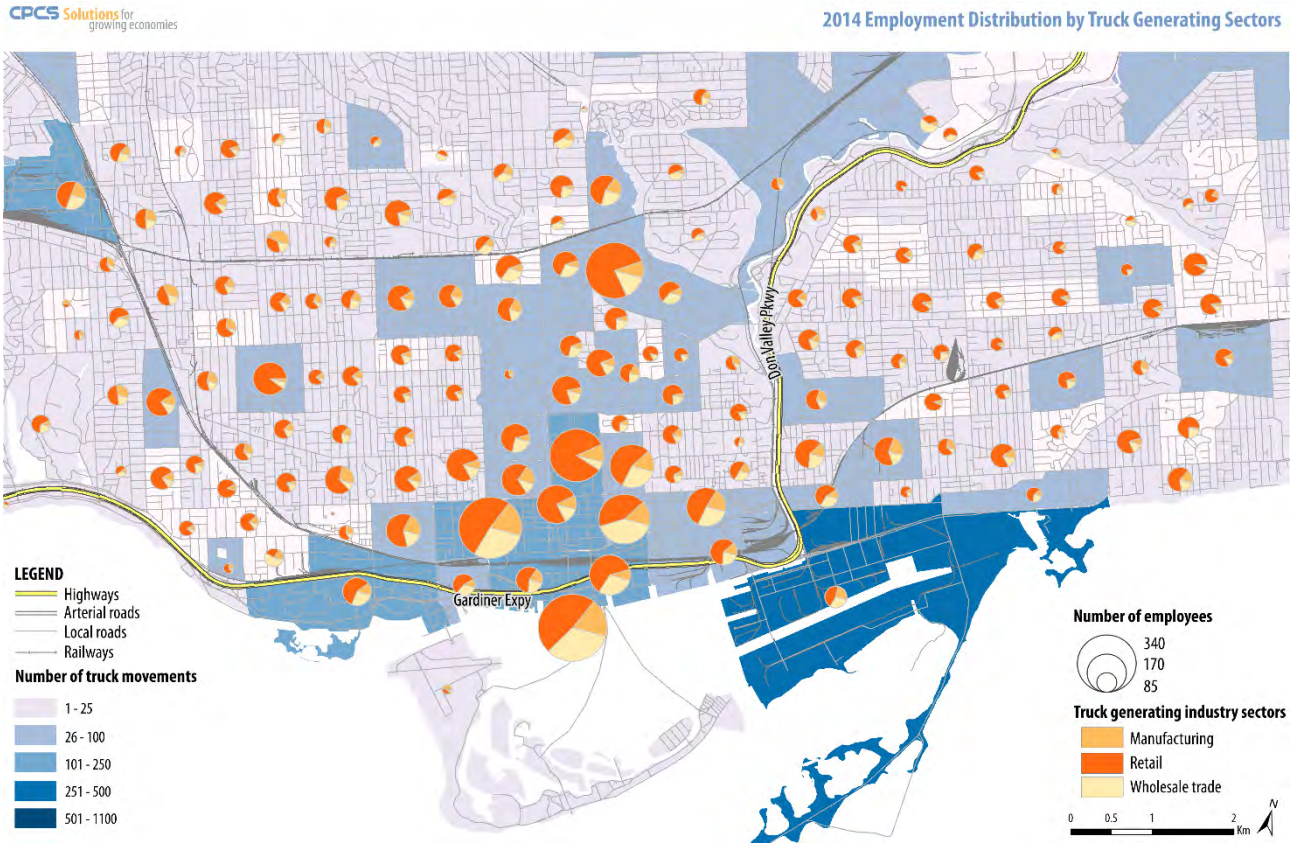
[4] HRD, Costs of Road Congestion in the Greater Toronto and Hamilton Area: Impact and Cost Benefit Analysis of the Metrolinx Draft Regional Transportation Plan. December 1, 2008. p.1

Figure 2-1: Truck Trip Ends in Toronto

Source: Ontario Ministry of Transportation GPS data for Truck Trips in October 2011

The map below provides an overview of the location and breakdown of employment in goods-producing industries within Toronto compared to the number truck trips ending in each location (from the sample data provided by MTO for October 2011 of a sub-sample of all truck trips).

Figure 2-2: Goods Movement Sector Employment and Truck Trips



Source: CPCS, Statistics Canada Data on Canadian Business Patterns, and Ontario Ministry of Transportation Truck GPS Data

Employment in goods movement generating sectors such as retail, manufacturing, and wholesale trade is centralized within the densest areas of downtown Toronto. Truck trips are much more heavily clustered around the 400 series highways in Peel Region as well as in the industrial areas on the Waterfront in Downtown Toronto close to the Study Area being contemplated as a part of the EA.

The clusters of employment[5] in goods movement industries shown do not seem to be reflective of the areas of the highest truck stop activity based on the MTO truck data sample. While this may partially be a by-product of the non-random nature of the sample of trucks included in the data, likely this is also an indication that the intensity of the number of goods movement trips, even among goods movement jobs and goods movement economic activity, can vary greatly depending on the unique business and supply chains of each individual firm and sector.

[5] Sourced from Statistics Canada Canadian Business Patterns Data

2.1.1 Trends

It is important when analyzing current goods movement traffic information in Toronto and in the Study Area to recognize that goods movement patterns are expected to change as a result of changing land use patterns in the city.

As part of the Central Waterfront Plan a number of redevelopment plans for mixed-use communities are being completed. Over the next two decades these districts will transform the waterfront into new communities and will directly influence the urban design and public realm characteristics of the area. These include: East Bayfront (approved plan), West Don Lands (approved plan), and the Keating Channel-Lower Don Lands (plan in progress). Included in the plans for Keating Channel-Lower Don Lands are plans for improving Keating Channel as a recreational waterway, improving flood protection plans, and naturalizing the mouth of the Don River. Flood protection and naturalization plans for the Don River mouth have been completed through a separate EA. A major development has been planned on the Unilever site by developer First Gulf that will also be expected to dramatically impact the landscape of the region.

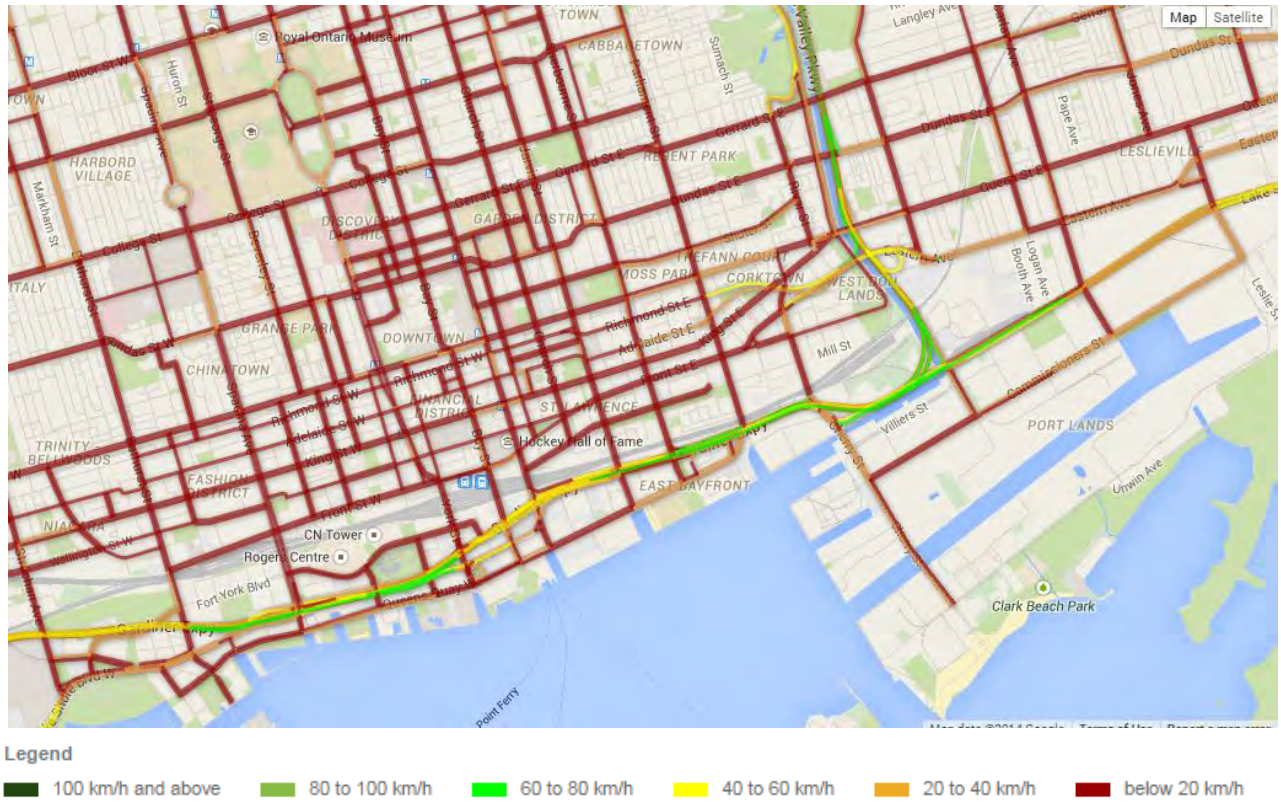
As Toronto develops, changes in land use and population and employment density have impacts on the goods movement networks in the City and the GTHA. Most goods movement industries have experienced employment growth in the last few years. While growth has been somewhat geographically diverse, the areas with close access to the Don Valley Parkway and Gardiner Expressway have seen some of the largest employment growth in the goods movement generating sectors including: manufacturing, retail, courier, wholesale trade, and distribution support, according to Statistics Canada employment data. Appendix B shows maps for each of these sectors showing the geographical location of changes in employment in these sectors.

Going forward, changes are expected in both employment and residential population that may have an effect on the goods movement network. The expansion of road and highway infrastructure in downtown Toronto in order to accommodate increased population and employment in the region is difficult and unlikely due to constraints imposed on expansion by the existing development of the area. The City of Toronto, in its Official Plan, is focused on strategies to reduce the reliance on road networks in transportation through demand management strategies, encouraging the use of other transport modes, and other wider developmental initiatives. These strategies are highly effective in managing the reliance on automotive transportation for passengers, but may not be able to as effectively respond to the movement of goods that are still predominantly reliant on roads for transportation and may require some additional strategies.

2.2 Traffic Volumes, Origins, and Destinations

The Gardiner Expressway is a key connection for the movement of goods to, from, and through the downtown area. The figure below displays the average traffic speeds for commercial vehicles as reported by MTO for 2011 on key roads in the downtown region around and outside the Study Area. The Gardiner Expressway and Lakeshore Boulevard corridor currently provides for the quickest flow of commercial vehicles and goods through the area identified.

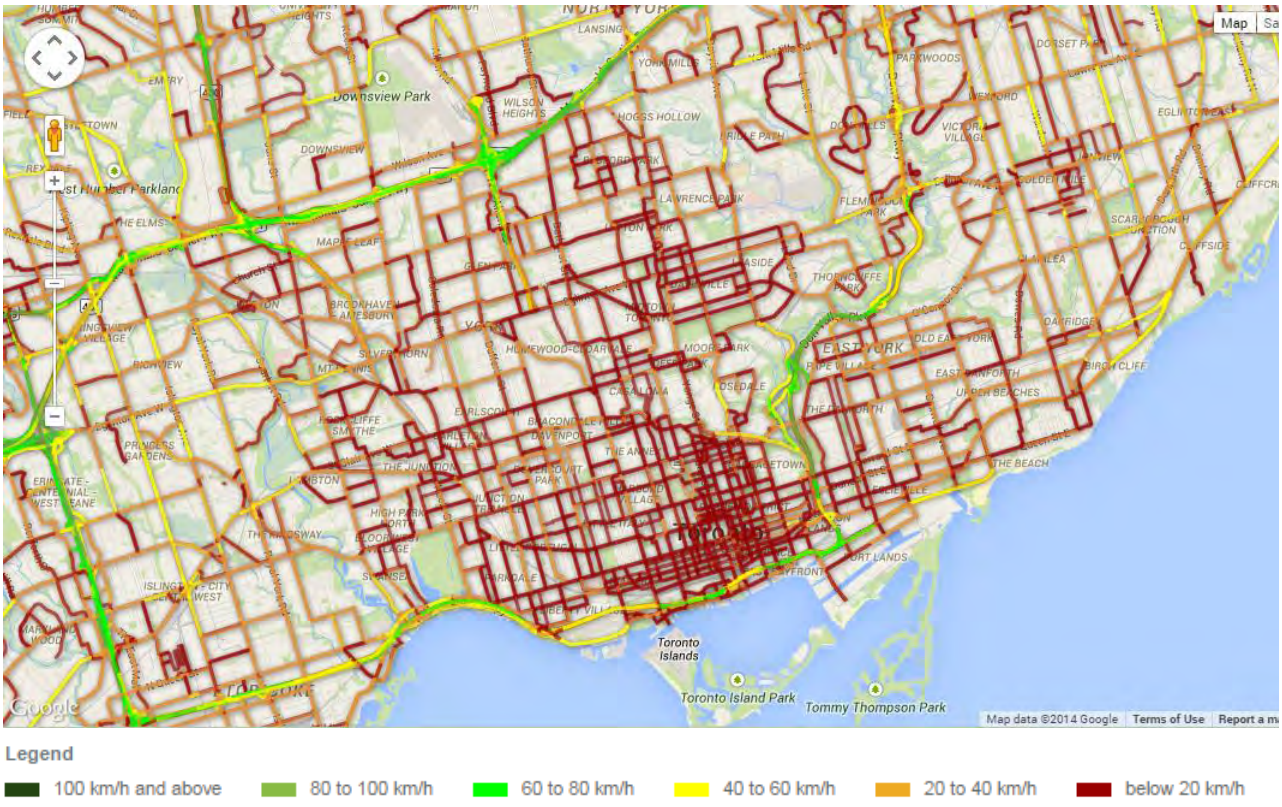
Figure 2-3: Average AM Peak Commercial Vehicle Traffic Speeds around Study Area (2011)



Source: Ontario Ministry of Transportation iCorridor system

When examined on a slightly wider scale, it can be noted that the Gardiner Expressway/Lakeshore Boulevard corridor forms part of a higher capacity and higher speed freeway network encircling the downtown area that allows for a relatively efficient movement of goods compared to other arterial roads. This ring is formed by the Don Valley Parkway to the east, Highway 401 to the north, Highway 427 to the west, and the Gardiner Expressway/Lake Shore Boulevard to the south.

Figure 2-4: Average AM Peak Commercial Vehicle Traffic Speeds in Toronto (2011)



Source: Ontario Ministry of Transportation iCorridor system

This network allows for a relatively efficient and reliable movement of goods as well as people encompassing the city. Growth will likely lead to increased demand on all of these existing routes. It is expected that travel times would increase as vehicle use increases on the existing roadways. The EA will take into account this change in demand when carrying out analysis on the relative impact of the Remove Alternative as compared to the Elevated Expressway options (travel time through the GE/LSB corridor will be expected to increase under all options).

2.2.1 Traffic Volumes

As shown above, Gardiner Expressway/Lakeshore Boulevard provides higher average speeds than most other routes through the Study Area. It also receives a comparatively large amount of traffic through the downtown Toronto and has been identified as the preferred route by most stakeholders to get into and out of the Study Area. The figure below shows traffic volumes on the major routes into and around downtown Toronto, including the Study Area.

Figure 2-5: AADTT Commercial Vehicle Traffic Volume (2006)

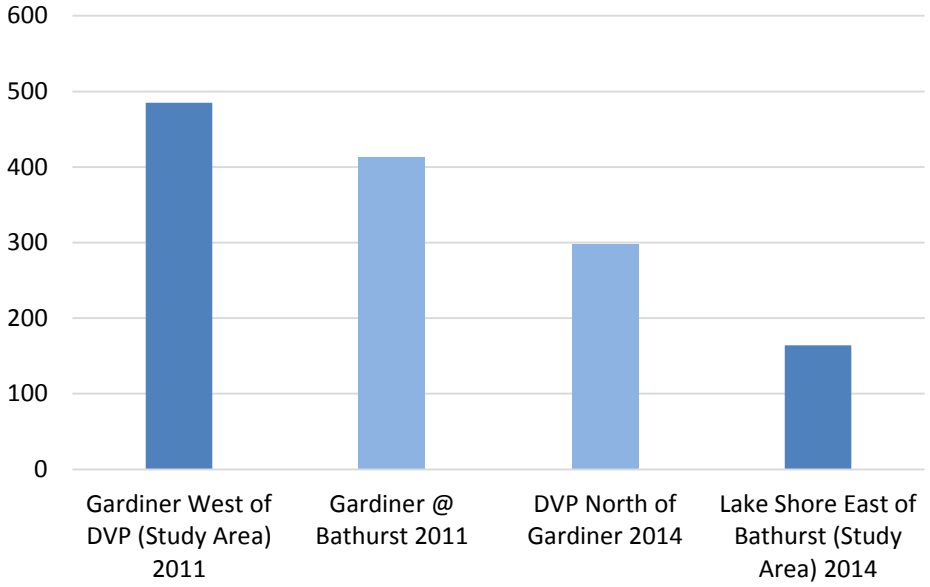
Source: Ontario Ministry of Transportation iCorridor program

According to 2011 City of Toronto cordon count data for the Gardiner Expressway in the Study Area and 2014 City of Toronto cordon count data for the Lake Shore Boulevard in the Study Area, the LSB handled 22% of the sum of the reported Gardiner Expressway and Lake Shore Boulevard traffic.[6]

Figure 2-6 compares commercial vehicle traffic on the elevated Gardiner Expressway through the Study Area (2011) with the Gardiner just east of Bathurst (2011) and the LSB (2014).

[6] Note: City of Toronto cordon counts are data of traffic for a single day only. Available data for commercial vehicle traffic on the Gardiner was for 2011 while data for the Lake Shore was for 2014. These results are not directly comparable but may be indicative of the true split of commercial vehicles between the LSB and elevated Gardiner Expressway.

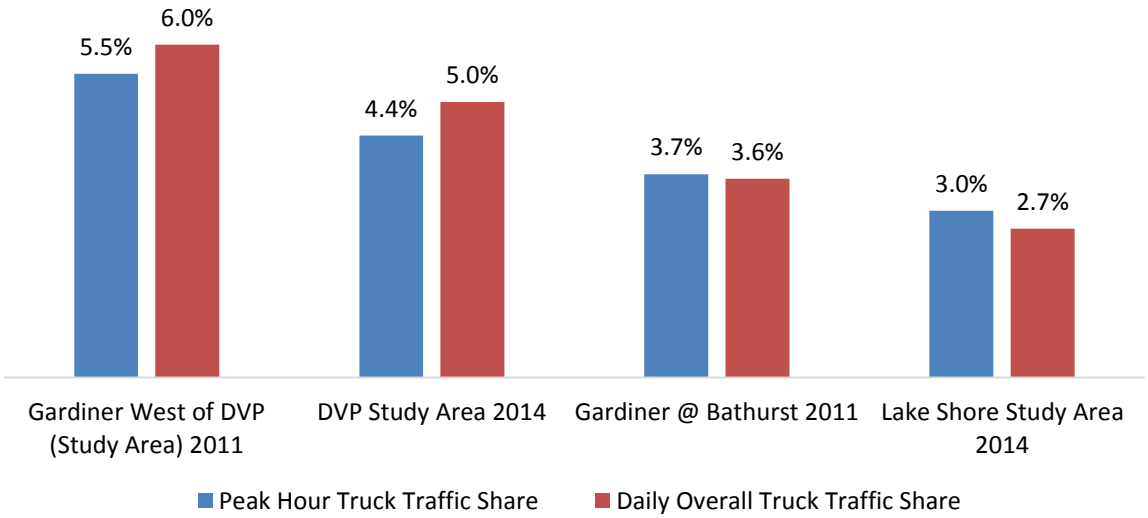
Figure 2-6: Peak Hour Truck Traffic in GE/LSB Corridor (# of trucks at 8-9am)



Source: City of Toronto Cordon Count Data

This analysis supports general comments made by stakeholders during consultation that the elevated expressway is currently the preferred method of travel for commercial vehicle traffic through the GE/LSB corridor.

Figure 2-7L GE/LSB Corridor Truck Traffic Share (as % of total number of vehicles)

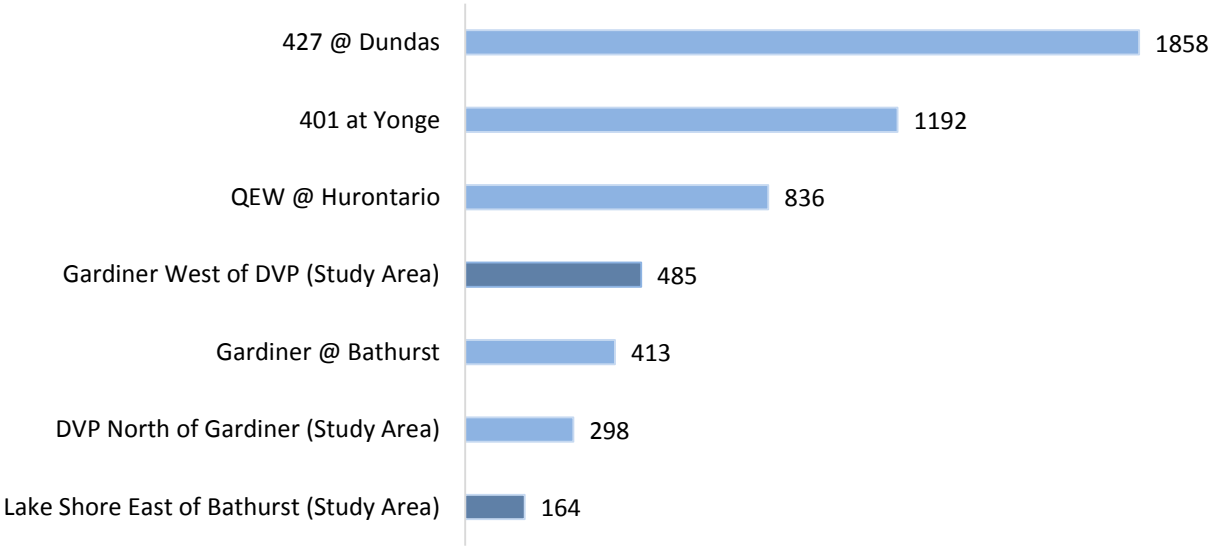


Source: City of Toronto Cordon Count Data

Truck traffic also tends to make up a larger percentage of total vehicles during off peak as compared to peak hour. This is mostly due to a relatively larger reduction in passenger vehicles as seen in commercial vehicles during off-peak daytime hours.

When compared on a larger scale to some major highways in the GTA, the Gardiner Expressway moves a relatively small amount of commercial vehicles. In general, it was noted through stakeholder consultation that goods movement stakeholders use higher capacity highways such as the 400 series highways for longer distance travel whenever possible. Inter-regional trips or trips bypassing the downtown core tend to use routes such as the 401, 407, and 427 as opposed to the Don Valley Parkway or GE/LSB corridor whenever possible. Figure 2-8 shows the comparative daily truck trips on many of the major highways and the Gardiner Expressway within the Study Area in the year 2006 (the last year for which comparable data is reported for the Gardiner and the 400 series highways).

Figure 2-8: Peak Hour Truck Traffic on Comparative Highways (# of trucks 8-9am)



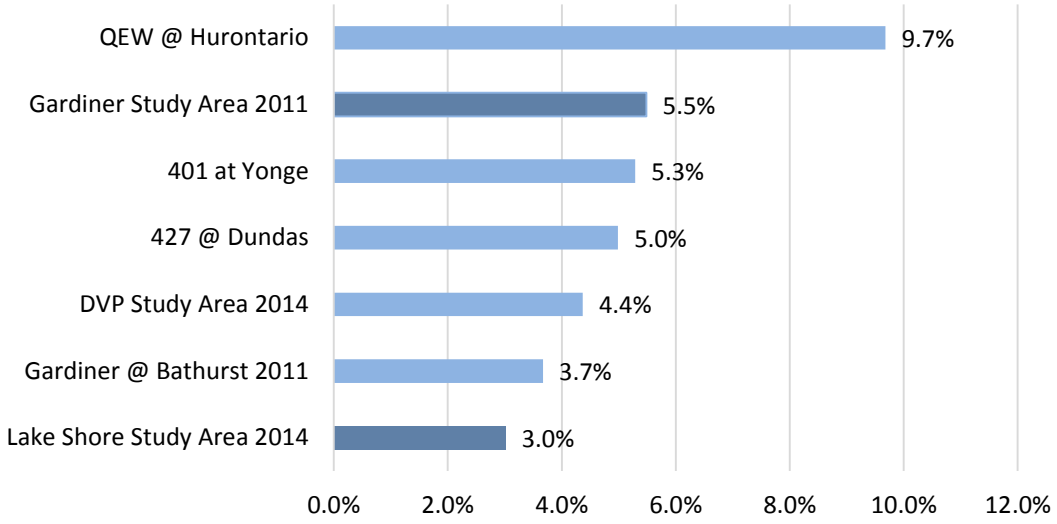
Source: Ministry of Transportation iCorridor Data, City of Toronto Cordon Count Data

Comparatively, the Gardiner Expressway in the Study Area handles 40% as many trucks in a day as the 401 at Yonge Street and 26% as many trucks as the 427 at Dundas during the 8:00-9:00am peak hour.[7]

In terms of intensity of truck traffic, trucks make up a larger share of total traffic on the Gardiner Expressway in the Study Area than most other highways analyzed.

[7] Ontario Ministry of Transportation iCorridor program, 2008 AADTT data, and City of Toronto Cordon Count data

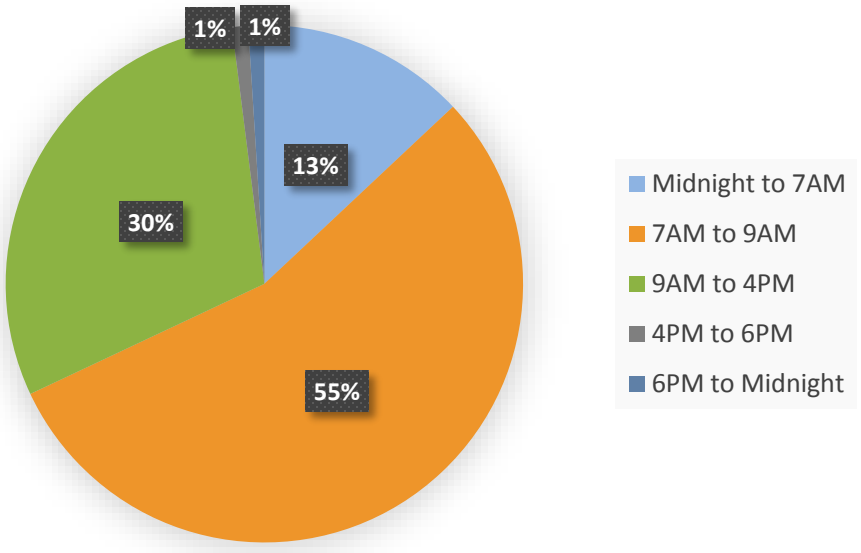
Figure 2-9: Truck Traffic as a Percentage of Number of Vehicles During Peak Hour



Source: Ministry of Transportation iCorridor Data, City of Toronto Cordon Count Data

Most outbound trips generated by goods movement stakeholders are dependent on customer schedules. Many customers expect to receive goods prior to the start of the business day or at some point during the business day (depending on the type of good and business involved). For this reason, most trips occur prior to the morning peak, during the morning peak period or during daytime business hours.

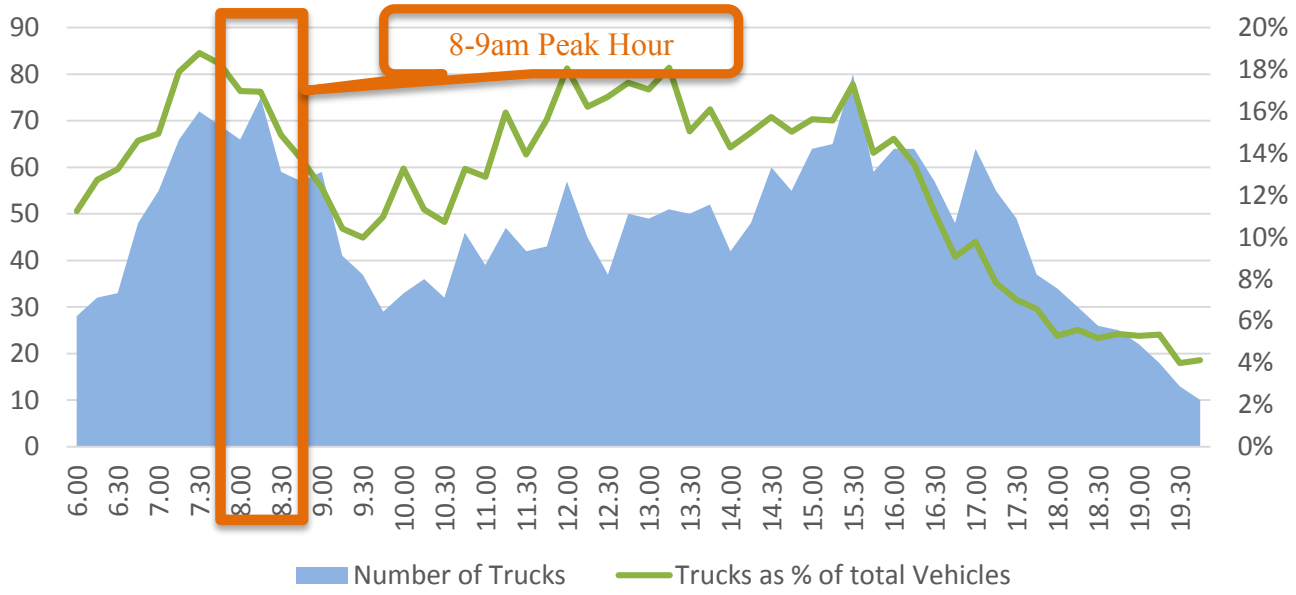
Figure 2-10: Estimated Commercial Vehicle Trip Start Times in the GTHA



Source: McMaster Institute for Transportation and Logistics. Estimating Urban Commercial Vehicle Movements in the Greater Toronto-Hamilton Area. July 2010

While transportation costs may be cheaper for carriers during off-peak hours due to lower road congestion, trips are made based on the supply chains and demands of goods movement producers and consumers. Section 3.1.5 mentioned some trends towards off-peak delivery programs trips for the movement of goods. In particular, progress in off-peak delivery has been made in the densest cities such as London and New York, where strains are highest on transportation systems for competing uses of the network. Often, it is necessary for government action through incentives or other programs to encourage off-peak deliveries as a desirable alternative for trips during peak hours (or through regulation that encourages or compels off-peak delivery).

Figure 2-11: Truck Traffic Patterns in the Study Area



Source: City of Toronto Cordon Count Data

In general, passenger vehicle trips tend to experience larger peaks and valleys in terms of utilization of the expressway in the Study Area than commercial vehicles. Many stakeholders consulted indicated that many of their trips commenced early in the morning and ended prior to the afternoon peak period. This corresponds well with the pie chart above in Figure 2-10, which shows that estimated commercial vehicle trip start times occur primarily in the morning, with few trips commencing in the afternoon or evening periods. This is often as a consequence of downstream customers' needs, where deliveries are destined for receivers that are only capable of receiving deliveries during their business hours. Many require deliveries prior to or at the start of opening hours (such as many retailers).

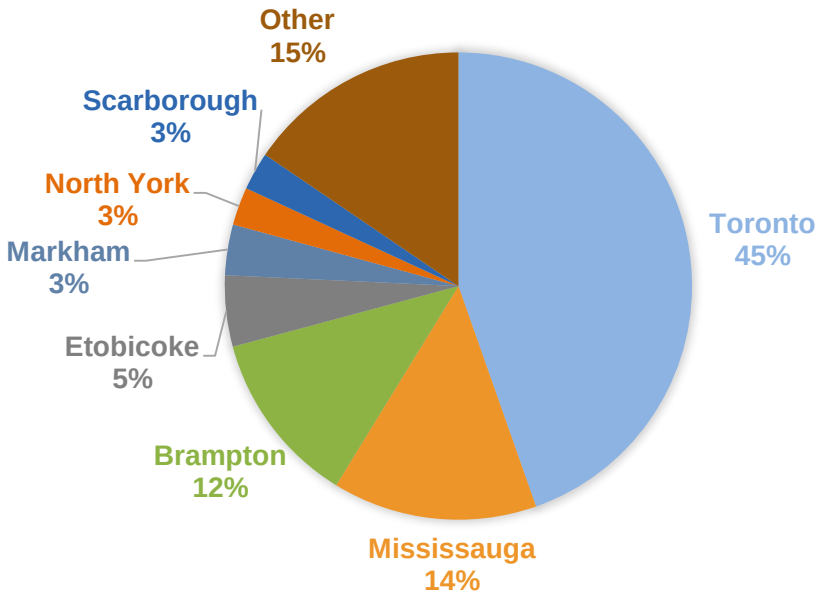
2.2.2 Origins and Destinations

The value of goods moving through Southern Ontario is particularly large in the corridor between the border crossings into the United States and along the 401 through to the Quebec

border. The GTA is at a critical juncture in the middle of the corridor, with many goods destined to or originating in the GTA as well as many goods passing through the region.

During consultations, goods movement stakeholders indicated that the preferred route for through traffic, in particular traffic that is not originating or destined for the City of Toronto, is the 400 series highways. Goods movement traffic that is destined for Toronto, particularly downtown Toronto, often uses the Gardiner Expressway and/or Don Valley Parkway as its preferred route to travel through the Study Area. The major origins of trucks travelling on the Gardiner in the Study Area include the Toronto and Peel Region with smaller portions coming from other regions in the GTA.

Figure 2-12: Origins of Trucks Travelling on the Gardiner Expressway in Study Area



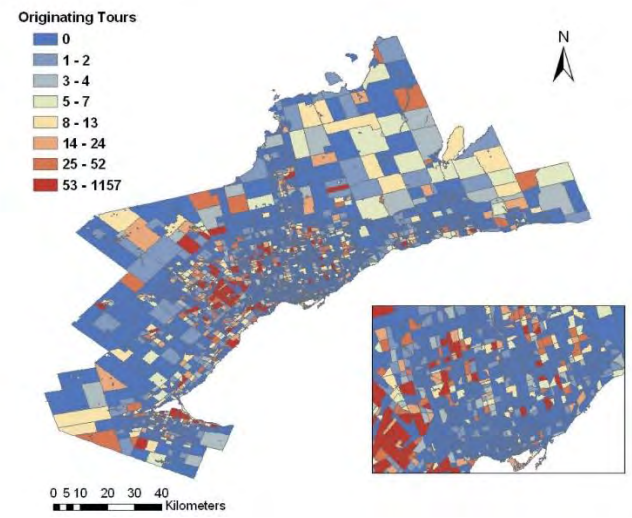
Source: CPCS Analysis of Ontario Ministry of Transportation GPS data.

Note: Scarborough, North York and Etobicoke are separated out form the original City of Toronto boundaries in this data

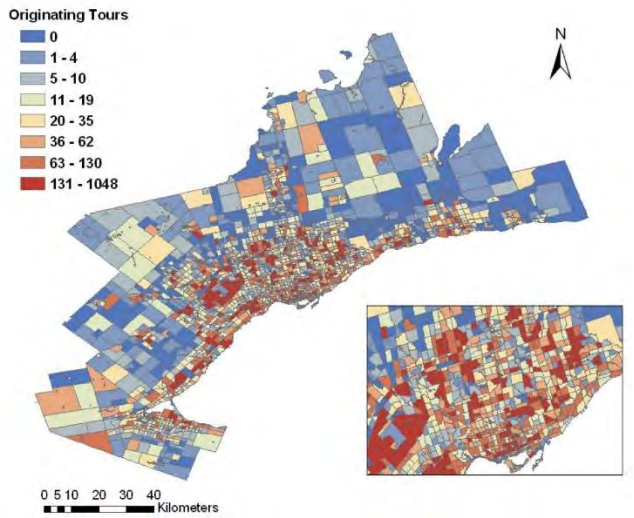
Heavy vehicle trips tend to occur in regions close to 400 series highways. Heavy vehicles that use these highways to travel tend to make longer trips. Additionally, land necessary to support heavy vehicle trips (distribution, warehousing, etc.) is often adjacent to these highways, with a particularly heavy cluster in Peel Region. Conversely, lighter vehicles, which tend to make shorter trips and can manoeuvre in smaller streets more easily, tend to make many more trips in the downtown and midtown areas of Toronto. Few heavy vehicles travel through downtown Toronto or the Study Area.

Figure 2-13: Heavy Versus Light Vehicle Trip Tour Origins in the GTHA

Heavy Commercial Vehicles



Light Commercial Vehicles



Source: McMaster Institute for Transportation and Logistics. Estimating Urban Commercial Vehicle Movements in the Greater Toronto-Hamilton Area. July 2010

MTO purchases GPS data for a sample of trucks travelling in Ontario. It is estimated that this represents less than 20% of all trucks on the road. Given the non-random nature of the sample of trucks (dependent on whether they have signed up for a GPS service from which MTO collects data) the information provided from this analysis can only be indicative of potential true origin/destination patterns. Based on GPS data provided from MTO, 48% of all trips on the Gardiner within the area of the Expressway east of York Street travelled through without stopping or exiting in this section of the highway. Just over half of all the trips in the sample travelling on the Gardiner Expressway through this same section either entered or exited the Gardiner within this area.

3 Supply Chain Analysis

Key Messages

Goods movement stakeholders' transportation and supply chain decisions are driven primarily by the needs and demands of their downstream customers. Goods movement trips often occur in the early hours of morning prior to business hours, and throughout business hours, with volumes starting to reduce by the afternoon peak and through to the night.

Supply chain and transportation decisions are made by goods movement stakeholders in relation to three key considerations:

1. Travel time for the delivery of goods
2. Reliability in the delivery of goods
3. Cost of the transport of goods

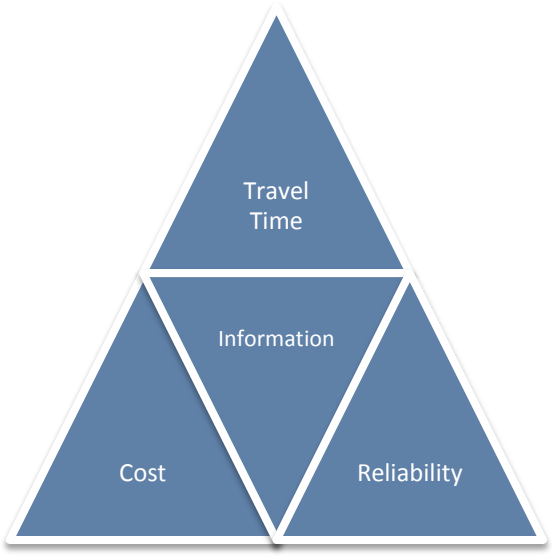
Different stakeholders make different trade-offs between these three items based on the needs of their unique value chains.

3.1 Key Transportation and Supply Chain Considerations and Trends

3.1.1 Transportation Considerations

For shippers and their customers, travel time, cost, reliability, and information are key decision factors. For a shipper the decision to locate in a particular region will be driven in part by how the location improves its position in terms of travel time, cost, and reliability in serving markets, sourcing inputs, and related information.

Figure 3-1: Supply Chain Decision Factors

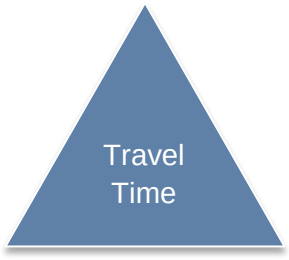


Source: CPCS

Figure 3-1 summarizes the overall key factors that affect the decision-making of shippers of goods. To the extent that locating in a particular area can allow a business to receive and/or deliver goods faster, at a lower cost, more reliably subject to less risk or better information, a location will be more desirable.

Different businesses value each of the elements in the triangle differently. For example, a shipper of coal, which is a relatively heavier, bulkier, and lower value product, will likely put the largest emphasis on cost of the transport. A shipper of very high value goods, such as the sending of an urgent document needed to complete a large transaction prior to a deadline, may put almost no weight on cost while valuing travel time and reliability highest, and be willing to pay much more for transporting the document to ensure it arrives quickly and in time. Each supply chain of each goods movement stakeholder dictates their relative weighting of the elements shown in the above pyramid. Stakeholders operating under a just-in-time supply chain will put the largest emphasis on reliability.

3.1.2 Travel Time

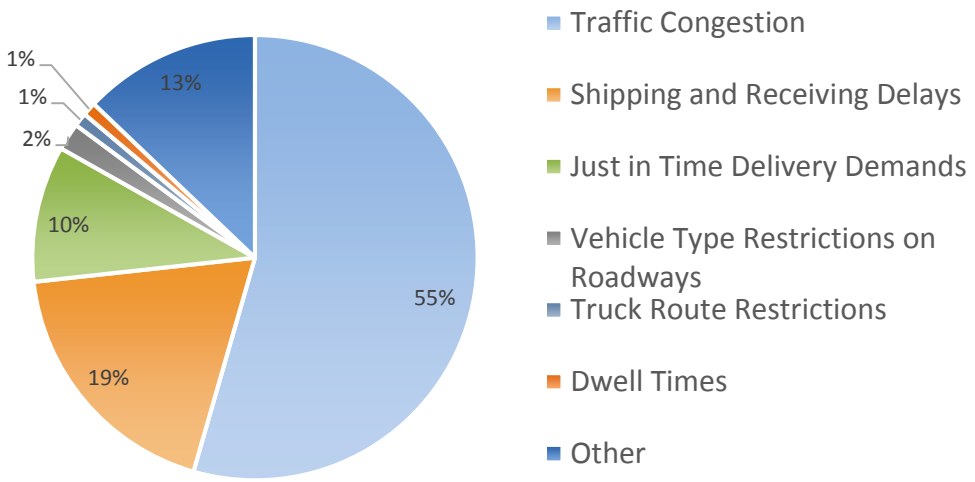


Average travel time is an important consideration for stakeholders. In the example above, a shipper of an important document is highly concerned about the expected time that the document will arrive in order to complete an important contract. This customer places the highest value on the expected travel time. While he places some value on reliability of the delivery, travel time most directly influences how he estimates the expected arrival time of the document he is shipping.

As part of its *Developing Urban Goods Movement Data in the GTHA: Framework and Preliminary Implementation Draft Final Report,* prepared for Metrolinx by the University of Toronto, a

survey was carried out asking goods movement stakeholders to identify the largest demands on their business. Traffic congestions proved the largest factor.

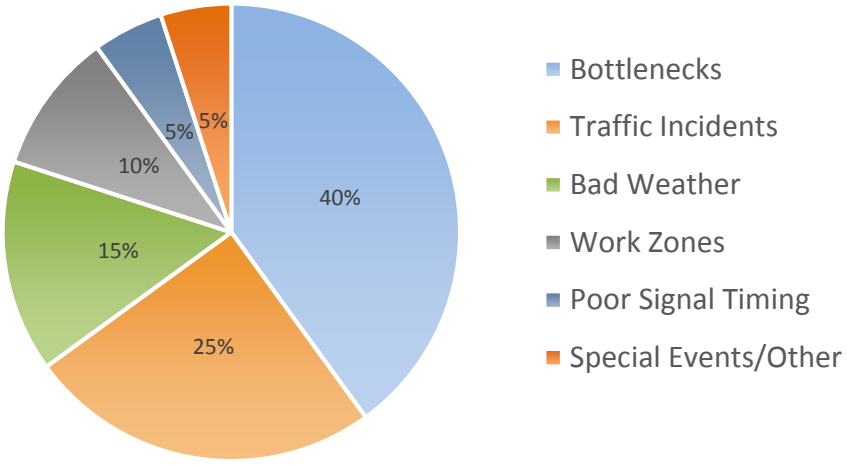
Figure 3-2: Issues Impacting Goods Movement Businesses in the GTHA



Source: Developing Urban Goods Movement Data in the GTHA: Framework and Preliminary Implementation Draft Final Report, Prepared for Metrolinx by the University of Toronto. 2013

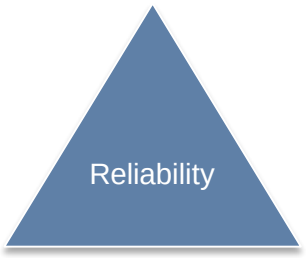
Average travel time can be influenced by overall volumes of traffic, road capacity, highway speeds, number of access points (highways), traffic signalling, and a host of other factors. The figure below summarizes the key estimated factors that contribute to congestion in the United States.

Figure 3-3: Estimated Sources of Congestion on National Highways in the United States



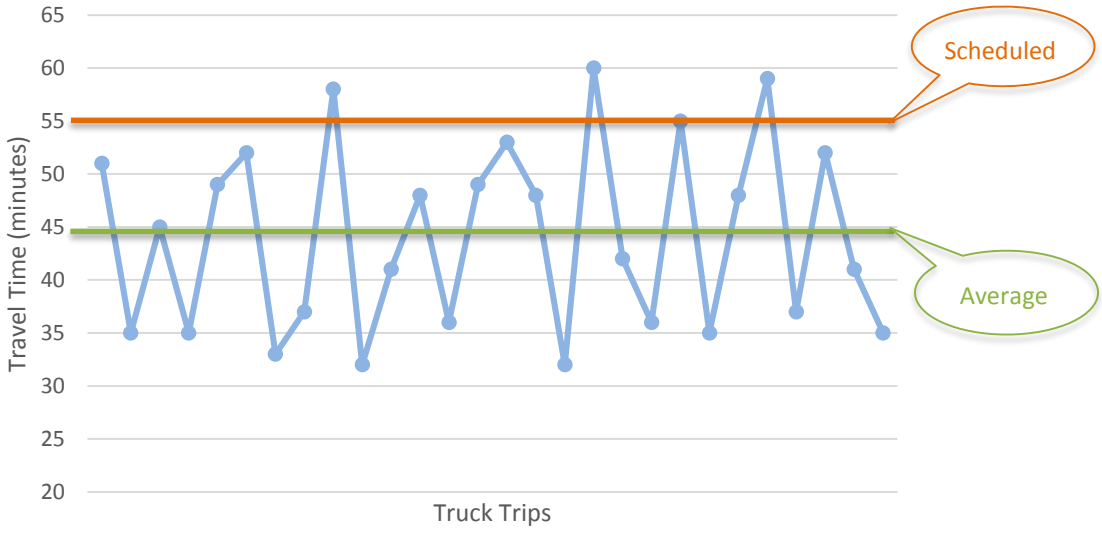
Source: Cambridge Systematics, Final Report prepared for the Federal Highway Administration. Traffic Congestion and Reliability: Linking Solutions to Problems

3.1.3 Reliability



Previous work has indicated that commuters as well as shippers value the variable component of their travel time up to six times more than average travel time.[8] A stakeholder operating a just-in-time supply chain, such as a retail store located downtown that does not have any space to store inventory, may place particularly high emphasis on the reliability of deliveries. If a delivery does not arrive when it is expected to arrive, this can translate into lost sales for this retailer. While average travel time is of some consideration, under most circumstances this stakeholder can plan ahead to allow sufficient time for goods to arrive. This stakeholder will also allow for a buffer in case of delays.

Figure 3-4: Average and Scheduled Delivery Times



In order to ensure the predictability of the arrival of goods, goods movement stakeholders often schedule travel time for trips above the average travel time in order to ensure goods arrive when they are needed. In the above example, average travel time was approximately 45 minutes while scheduled travel time was 55 minutes in order to account for the variance in actual travel times. This ensures goods arrive on time for almost all trips[9].

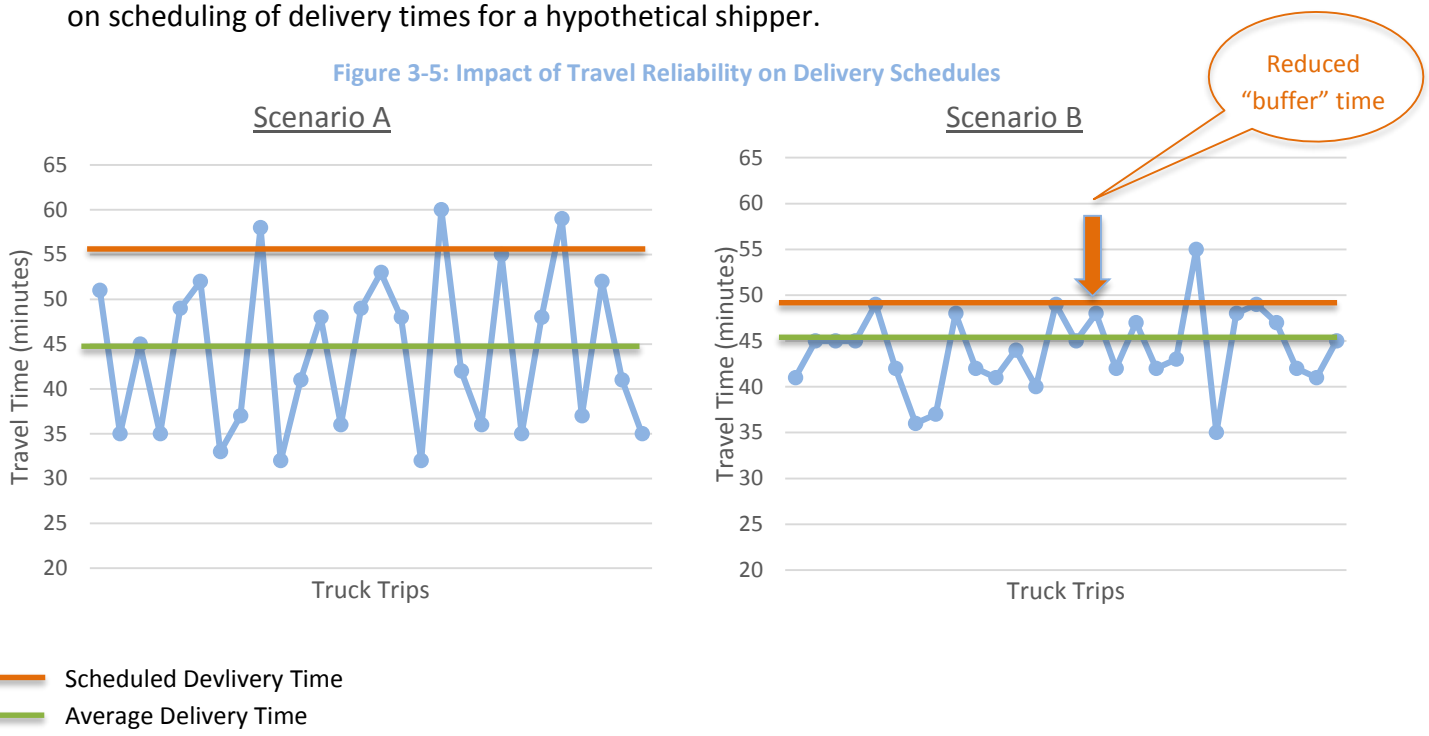
As reliability increases (or variance in trips decreases), the "buffer" a stakeholder may need to schedule between the average delivery times and scheduled delivery time reduces. The figure

[8] Cambridge Systematics, Final Report prepared for the Federal Highway Administration. Traffic Congestion and Reliability: Linking Solutions to Problems

[9] For example, a travel time buffer index is often calculated at the difference between average travel time and the time in which 90% or 95% of all trips take. In practice, scheduled times will depend on the needs of an individual goods movement stakeholder.

below shows the impact of increasing travel reliability (moving from Scenario A to Scenario B) on scheduling of delivery times for a hypothetical shipper.

Figure 3-5: Impact of Travel Reliability on Delivery Schedules



Source: CPCS

In both scenarios above, the average travel time is 45 minutes. In Scenario A, where reliability is lower, a buffer time of 10 minutes above average travel time is scheduled to meet their targeted arrival time. In Scenario B, the shipper only needs to schedule a buffer time of 4 minutes to achieve the same standard for the same number of trips. Although the green (average time) line is at the same point in the left and right charts, the shipper is only concerned about the orange line, or the amount of time it needs to schedule in order to ensure its goods arrive predictably.

Reliability can be impacted by weather, number and severity of incidents on a roadway, response time to incidents, congestion (increased congestion has been shown to reduce traffic reliability), as well as a host of other factors.

The Texas Transportation Institute provides estimates of the 2011 Planning Time Index (PTI) for major cities in the United States. The PTI is measured as the ratio of the travel time for a route on the worst day of each month[10] compared to travel speeds under free flow conditions. For example, if the Planning Index is 2, a trip that takes 20 minutes in light traffic should be planned for 40 minutes during peak conditions in order to reliably arrive on time.

[10] I.e. travel time for trips in the top 95th percentile of trip durations experienced, divided by the free flow travel time

Figure 3-6: Planning time Indices for Major Cities in the United States

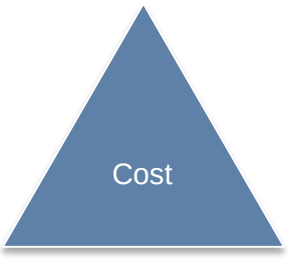
Urban Area	Planning Time Index (95th percentile)
Washington DC-VA-MD	5.72
Los Angeles-Long Beach-Santa Ana CA	4.95
New York-Newark NY-NJ-CT	4.44
Boston MA-NH-RI	4.25
Dallas-Fort Worth-Arlington TX	4
Seattle WA	3.99
Chicago IL-IN	3.95
San Francisco-Oakland CA	3.74
Atlanta GA	3.71
Houston TX	3.67
Miami FL	3.6
Philadelphia PA-NJ-DE-MD	3.46
Detroit MI	3.22
Phoenix-Mesa AZ	3.19
San Diego CA	2.9

Source: Texas Transportation Institute 2012 Urban Mobility Report

This means that in New York, in order to ensure a trip arrives on time 19 times out of 20, a goods movement stakeholder will need to schedule on average almost six times the amount of time that the trip would take in free flow conditions. Comparatively, estimates provided by the City of Toronto Traffic Data for 2012 report a Planning Time Index on the Gardener Expressway Eastbound of 4.35 and Westbound of 3.87.

In reality, stakeholders may have very different expectations and needs in terms of delivery of goods (schedules are made within a "window" or time, allow for delays by maintaining buffer inventory at location, etc.) and 95% may be a very high threshold for some stakeholders. Actual planning of trip times will depend on each stakeholder's balance between the costs of planning additional buffer time in trips and the costs to their business of late deliveries due to unreliability. In some cases, carriers have agreements with larger goods movement stakeholders that specify penalties in case of late arrival. Penalties can be costly to carriers, requiring them to plan to ensure timely arrival.

3.1.4 Cost



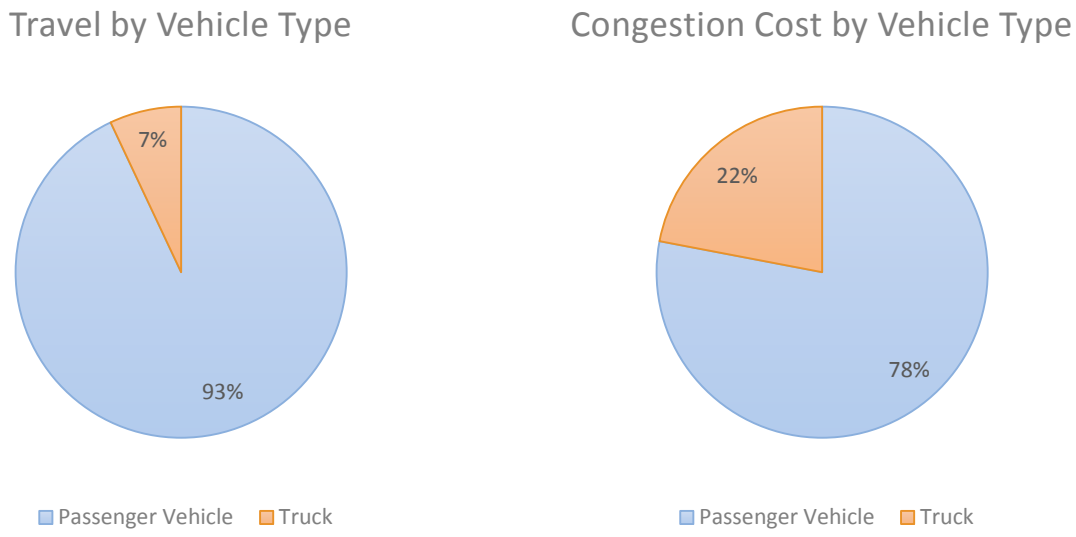
Transportation cost is the third critical factor considered by stakeholders. As mentioned in Section 3.1, cost often becomes an increasingly important factor to shippers as the average value per volume/weight of the goods being shipped decreases.

Cost can be impacted both by internal factors such as travel time and reliability as well as external factors. Transporters incur more costs when goods take longer to

transport or more buffer times are needed to transport a good due to unreliability (increased labour, fuel costs, etc. due to increased times).

The American Transportation Research Institute has carried out a study to get an understanding of the cost of time for carriers. In 2013, they found that the average marginal costs per hour of truck operations were US$67. In many analyses of the cost of congestion, the value of time is used to estimate the impact of changes in travel times. The most straightforward approach is to multiply the expected change in travel time by the value of that time and the number of vehicles expected to be impacted. Whether this increase in cost is borne by carriers or passed on directly to shippers (or likely some combination of the two) is a more difficult question to answer. Goods movement vehicles bear a disproportionately high percentage of the costs of congestion in a roadway.

Figure 3-7: Estimates of the Impact of the Cost of Congestion in the United States



Source: Texas A&M Transportation Institute, 2012 Urban Mobility Report

In this way, changes in travel time can have direct implications on changes in travel costs for the movement of goods.

Non-Transportation Cost Considerations

A whole host of non-transportation factors can also impact the cost of business for goods movement stakeholders. It is not expected that these costs would be significantly impacted by the Remove Alternative, but may be impacted by wider development and growth in the Study Area.

Almost all jobs in goods movement sectors require specific skills. As such, the availability of skilled labour can be an important factor in locating a business. Most of these factors impact the “Cost”.

There is a strong network effect associated with having a large pool of skilled labour. With many employers and a large labour pool, workers can move quickly from one job to another, and there are always workers available. A larger pool of skilled labour also improves the viability of third-party training programs, such as those offered by colleges, since the market for such programs is larger. With these network effects, the more goods movement industries in a region (manufacturing, industrial, retail, transportation, and warehousing), the easier it is for new companies to set up shop, since similar labour will be readily available.

Of particular relevance for many goods movement stakeholders is the availability of labour that is accustomed to shift work.

Labour Cost

Closely related to the availability of skilled labour is the cost of using that labour. Beyond supply and demand issues, factors including unionization and local labour laws can have an impact on labour cost.

Labour also places value on the cost of transportation to and from their place of employment. Travel time and reliability also impact the labour pool available to industry.

From the employer perspective, labour cost includes wages, salaries, and benefits as well as the employer shares of payroll taxes (Employment Insurance, Canada Pension Plan, employer health premiums).

Availability and Price of Serviced Industrial Land

Ready availability of serviced industrial land has been one of the most crucial non-transportation factors in attracting manufacturing and transportation/warehousing to a particular area. Land cost is another major factor in goods movement businesses' locational decisions. Generally, land close to major urban areas and major transportation infrastructure such as a 400 series highway, tends to be more expensive than land that is more remote.

The development and growth patterns in the City of Toronto have led to less availability over time of industrial lands available to goods movement stakeholders. The availability and price of such lands will continually be evaluated by goods movement stakeholders and impact their locational decisions.

Business Taxes and Fees

Taxes that affect business can also be an important factor in locational decisions. Taxes such as development charges, property taxes, and business taxes vary at the regional and municipal level in Ontario. Value-added taxes (i.e. HST) vary from province to province and province to US state, as do business income taxes.

Energy Costs

Energy costs including electricity can be important in attracting businesses. This is particularly true for warehousing, where lighting and temperature control consume a significant amount of energy and thus represent a significant cost.

Availability and Price of Appropriate Support Services and Clustering

Having a competitive pool of relevant support services is also a key factor in a goods movement business' locational decision. What constitutes a support service will depend on the type of business being undertaken. Having a cluster of suppliers will make a region more attractive to a business.

3.1.5 Key Trends

A strong commonality among all supply chains is the incorporation of service sensitivity in their design. In general, the goal in supply chain management is to fulfill users'/customers' needs with as little investment in inventory as possible (inventory has costs). Companies adjust their supply chains based on their reliability and performance experiences. Often there is larger flexibility in trips that are scheduled for larger distances, with the shortest trips being more sensitive to changes in delivery time or reliability. Congestion is one of the top challenges to supply chain performance.[11] In addition to impacting performance, congestion can impact the number of deliveries that can be made by a single vehicle. As delivery time increases, more delivery vehicles are required to be on the road to make the same number of deliveries.

Supply chains are constantly evolving in response to technological, commercial, and regulatory developments. This section reviews some ongoing trends in supply chains that are likely of relevance to the Study Area.

Off-Peak Delivery

Off-peak delivery (OPD) is the delivery of goods outside of normal business hours, usually during the night. OPD is often suggested as a means of delivering goods more quickly and reliably than is possible during the day, given traffic congestion. The result should be cost savings for carriers and shippers as well as reduced congestion and pollution. However, it is argued that there is a market failure that prevents the expansion of OPD: receivers are unwilling to accept deliveries off peak.[12] The solution in New York City (a leader in this area) was to facilitate OPD that does not require receiver staff to be available to receive deliveries. In some cases, local noise bylaws may also curtail or prevent OPD. The results of OPD in New York City have been highly favourable with carriers, drivers, and receivers.

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[11] National Cooperative Freight Research Program, Transportation Research Board. *Report 14, Guidebook for Understanding Urban Goods Movement.* 2012

[12] http://www.civil.engineering.utoronto.ca/Assets/Civil+Engineering+Digital+Assets/aUTTRI/2.2+Jose+Holguin-Veras+Off-Hour+Deliveries+in+NYC+Lessons+Learned.pdf

MTO has commenced a pilot project in Toronto associated with the Pan-Am Games. If successful, this pilot could open the door to broader application of OPD throughout Ontario.

Some further analysis of off-peak delivery is discussed in Appendix D of this Report.

E-Commerce

The rapid growth of E-commerce, i.e. shopping online and direct product delivery to the customer, has important implications for urban goods movement. E-commerce in Canada is significantly less developed than in the United States or the United Kingdom. In Canada 6% of retail sales are online, while in the United States it is 9% and in the United Kingdom 15%.[13] Many predict Canada will close the gap in the years ahead.

The impact of the expansion of E-commerce on urban goods movement in Toronto is multifaceted. At a high level, traditional patterns of deliveries from distribution centre (DC) to retail store will be affected. There will be more DC pick-up by carriers for direct delivery to customers, probably using smaller vehicles than are typically used for store deliveries. But there will also be more shoppers who order products for pick-up at stores, likely affecting the frequency of deliveries to stores. Finally, customers may cut down their own shopping trips. The net result of all of these sometimes offsetting factors means that the impact of E-commerce is not knowable, at least in the aggregate.

3.2 Supply Chain and Goods Movement

Supply chain refers to the interconnected processes and systems that are involved in producing, distributing, and supplying goods. This starts from the earliest stage of raw materials, through refining, manufacturing, or other value-added measures, through to distribution for use or consumption. Each of these stages can generate varying levels of trips to move goods from one point to another in a supply chain.

Supply chains impact goods movement choices and demands on goods movement networks. For example, Section 3.1.3 described how reliability impacts a supply chain and what goods movement stakeholders may do to address reliability issues. Different stakeholders will make different transportation and supply chain choices depending on the nature of their business.

3.2.1 Last Mile

One of the main distinguishing features of the movement of goods in urban centres from other regions is the “last mile” of trips, which is generally highly concentrated within urban regions. The last mile may mean the local distribution from a distribution centre to end retailer or end

[13] http://www.cbc.ca/news/business/e-commerce-explosion-coming-for-2014-holiday-shopping-dianne-buckner-1.2818640

consumer. For a door-to-door delivery it can mean navigating local and arterial streets to arrive at a destination after exiting higher capacity and higher speed freeways. Often, last mile trips may be made with smaller vehicles to more dense urban areas where it is difficult for larger trucks to travel. Chapter 2 reviewed some of the patterns of commercial vehicle use in the GTHA, and estimated vehicle size of commercial vehicle traffic in downtown Toronto was notably smaller than that of other regions, such as Peel.

Challenges in last mile deliveries include parking restrictions and lack of curbside space, narrow streets and turning radii, lower clearance levels, increased "stop and go" traffic and more shared space with other modes such as cyclists and pedestrians, among other concerns.[14] From a planning perspective, it is useful to attempt to understand and quantify last mile inefficiencies in order to better understand the implications of these and potentially address them where necessary.

3.3 Characteristics of Supply Chains Affected by Remove Alternative

Currently most freight movements in the GTHA are local, and 89% of all movements are by truck.[15] Stakeholders consulted as a part of this assignment identified one key message in regards to the management of their supply chains: **the supply chains of goods movement stakeholders are in a large part dictated by the needs of their downstream customers**.

Industry stakeholders consulted for this assignment are diverse, each with its own unique business, customer base, and characteristics that drive their unique supply chains. For this reason, providing an overview of how supply chains may be affected by the Remove Alternative will necessarily require some simplification of the unique needs and challenges each stakeholder faces. In order to provide some understanding of this, we have categorized stakeholders consulted into three categories of goods movement stakeholders[16]:

1. Industrial and Manufacturing
2. Retail
3. Courier and Logistics

[14] National Cooperative Freight Research Program, Transportation Research Board. *Report 14, Guidebook for Understanding Urban Goods Movement.* 2012

[15] http://www.metrolinx.com/thebigmove/en/strategies/strategy9.aspx

[16] Types of stakeholders contacted include trucking carriers, general (sugar, salt, concrete) and high end industrial and manufacturers, film industry, general retailers, grocery and food retailers, courier companies, messenger companies, third party logistics providers, among others.

Figure 3-8 below provides an overview of high-level feedback from goods movement stakeholders as to their key priorities in managing their supply chains. We have broken these priorities down into the three key supply chain metrics identified in Section 3.1.1.

Figure 3-8: Supply Chain Priorities of GM Stakeholders[17]

	Travel Time	Reliability	Cost
Industrial and Manufacturing			
Retail			
Courier and Logistics			

Legend

Top Priority

Secondary Priority

Industrial and Manufacturing

Many stakeholders involved in the industrial and manufacturing sector create heavy, high-volume goods. Transportation of these goods can be expensive. Most stakeholders are able to store some inventory on site and rely less on just-in-time delivery for inputs into their production processes. For stakeholders who are generally producing goods of higher value and weight, transportation costs as a percentage of the total value of final goods can be significant. The cost of transportation is a key concern to such stakeholders. While often these goods still move by truck, as often as possible stakeholders look to manage their inputs and outputs to minimize transportation costs. For example, an express rush door-to-door delivery service of a small quantity of product will not often make sense.

When asked about the response to ongoing maintenance activities on the Gardiner Expressway, stakeholders have generally indicated that the same trips are taking longer than before. There haven't been many significant operational changes as a result of this maintenance; sometimes carriers are allocating more time for these customers, and sometimes customers are attempting to manage travel times increasing by ensuring they have sufficient inventory to prevent any shutdowns from a delay in the arrival of inputs.

An example of a supply chain that may be impacted by the Remove Alternative is the concrete sector. Cement is made with concrete and aggregates, which are normally shipped in bulk to a plant. Concrete is a very time sensitive product and transportation time to final destination needs to be less than one hour for road construction and less than two hours for residential and

[17] Note: this is a generalization of the true nature of supply chain considerations for goods movement stakeholders, and not all stakeholders in every category will value each factor in the same way.

commercial construction.[18] Given the time sensitive nature of the product, supply chain performance is significantly degraded by local and regional freight bottlenecks, maintenance activities, and general congestion on roadways.[19] Increasingly, approvals for new concrete facilities have become more difficult for cities throughout North America, mostly due to increasing requirements and regulation to reduce noise levels and control dust and pollution.

Retail

In the retail sector, the key goods movement generation is on the input side – deliveries of products to restock shelves for example. The locations affected by the Remove Alternative are mostly downtown or in mid-town where an alternative preferred route, such as the 400 series highways, is not available. Land values are at a premium at these locations and, as such, dedicating space to inventory is often too costly for these stakeholders. The retail sector in downtown Toronto relies much more heavily on just-in-time shipments of products in order to restock shelves. For these stakeholders, reliability is the single most important factor in most circumstances. An increase in average travel time can be adjusted by scheduling longer deliveries, but deliveries need to arrive on time and as expected in order for these businesses to be able to sell their products to consumers.

In response to the ongoing maintenance on the Gardiner Expressway, it appears that thus far the impacts have not been significant enough to have a major impact on business. Many trips occur in off-peak hours (i.e. restocking overnight or early morning prior to business hours), where impacts have not been as strong, and in other cases it appears that carriers or distribution arms of companies are responding by ensuring deliveries still arrive in time.

In a survey carried out for the National Cooperative Freight Research Program (NCFRP), it was estimated by one of America's top grocery store chains that produce and frozen foods are kept on the shelves for one to three days on average, eggs and dairy for two days on average and dry goods for up to seven days.[20] For an urban grocer, if deliveries are disrupted, this can impact the availability of goods within one to two days.

Courier and Logistics

In the courier and logistics sector, customers have very high expectations about the reliability and timing of the arrival of products. Many customers use these services for products where the speed and reliability of the delivery of a product is critical. This can range from several business days to a rush door-to-door delivery service where a product is expected to arrive in

[18] National Cooperative Freight Research Program, Transportation Research Board. *Report 14, Guidebook for Understanding Urban Goods Movement.* 2012
[19] Ibid
[20] National Cooperative Freight Research Program, Transportation Research Board. *Report 14, Guidebook for Understanding Urban Goods Movement.* 2012

two to three hours from when it leaves the destination of origin. Small changes in reliability and average travel time can have large impacts on the courier and logistics business. If either reliability or speed of the road network decreases, these services generally respond by allocating additional vehicles and labour for the same number of units of shipments in order to ensure everything arrives on time.

When consulted on the issue of current maintenance on the expressway, these stakeholders have indicated that the impacts have been felt. In some cases they have had to allocate additional vehicles and labour in order to ensure the same goods arrive on time to meet customers' expectations.

4 Stakeholder Consultation

Key Messages

A key element of this goods movement study is stakeholder consultations. As a part of the process, CPCS developed a list of goods movement stakeholders and then circulated a consultation package to all stakeholders with some background information on the EA process and key questions.

Key themes of importance identified by stakeholders regarding the EA include: road capacity, travel times, reliability, network redundancy, long-term investment in road networks, and the impact of the construction period under various EA options.

4.1 Consultation Methodology

Beginning on November 10, 2014, stakeholders were contacted by email or by phone when email was unavailable or email addresses unknown. Stakeholders were sent a "consultation package" that consisted of three elements (contained in Appendix A):

1. An introductory letter from Waterfront Toronto introducing CPCS and the assignment to be carried out.
2. A "background materials" document outlining the proposed alternatives with a focus on the proposed Remove Alternative.
3. A "template questionnaire" document that was provided to stakeholders in advance of consultation in order to provide stakeholders with a broad idea of the topics intended to be discussed during consultations. This questionnaire was provided while recognizing that the unique situation of various stakeholders would drive overall talks, and questions would be adapted depending on the stakeholder consulted.

Times were then arranged to speak with stakeholders, either in person or over the phone if more convenient to them. While talks were structured around the template questionnaire sent to stakeholders in advance of the meeting, stakeholders were encouraged to speak to issues important to them or that they deemed would provide a greater understanding of the movement of goods within the Gardiner Expressway/Lake Shore Boulevard corridor.

Questions centred on (1) stakeholders' current use of the Gardiner Expressway and their businesses' supply chains and (2) stakeholders' views of the impact of the Remove Alternative on their businesses. Most questions were designed to obtain objective and measurable information that would inform an objective analysis of the impact of goods movement, but efforts were made to gain deeper understanding of any concerns that stakeholders held.

4.2 Summary of Feedback

Some of the key issues identified in supply chains of stakeholders consulted have been discussed in Section 3.3 of this report. Aside from supply chain issues, stakeholders expressed many wider views on the impact of the Remove Alternative based on their unique business and reliance on the Gardiner Expressway/Lake Shore Boulevard corridor for the movement of goods. Several key themes identified throughout consultations are discussed further below. All discussion in Chapter 2 is based on viewpoints of various stakeholders consulted, and has not been adjusted based on any CPCS analysis or verification.

The figure below summarizes the key comments received from stakeholders and represents them as objective concerns using the framework described in Chapter 3 of this report.

Figure 4-1: Key Stakeholder Comments and Underlying Concerns Regarding the Remove Alternative

Main Comments Received	Understanding and Measuring Key Stakeholder Concerns	Objective/Measurable Concern
This will reduce the capacity of the corridor Stakeholders indicated that congestion is already impacting their businesses and the city, and removing capacity will only make this worse.		• Will lead to increased **travel times.** • Will reduce **reliability** of travel. • Will increase **cost** of transportation.
Travel will take longer Stakeholders were concerned that trips would take longer under the Boulevard alternative than if the elevated expressway was maintained.		• Will lead to increased **travel times.**
Arrival times of trips will be less predictable Stakeholders were also concerned that increased congestion may reduce the reliability of travel time in the corridor (i.e. more unexpected delays).		• Will reduce **reliability** of travel.
Alternate routes will also become busier Stakeholders indicated that they felt that congestion would also increase on alternate routes as a result of some traffic being diverted from the existing corridor.		• Will lead to increased **travel times** on alternate routes. • Will reduce **reliability** of travel on alternate routes. • Will increase **cost** of transportation on alternate routes.
Construction will be "chaotic" Stakeholders indicated that were concerned that the removal of the elevated expressway would cause larger traffic disruptions than the rehabilitation under the Maintain scenario.		• Will lead to increased **travel times** during construction. • Will reduce **reliability** of travel during construction. • Will increase **cost** of transportation during construction period.
Will be less safe Stakeholders indicated that the removal of the limited-access expressway would require further interaction between trucks and other modes such as pedestrians and cyclists.		• Will result in more traffic incidents with trucks or other commercial vehicles.
Once capacity is removed, we will never get it back Stakeholders were concerned that if the elevated expressway was removed, land freed up would be developed and the elevated expressway couldn't be replaced later.		• In the future, road travel demand will be greater than in the present. • Will lead to even greater increases in **travel times** in the future. • Will lead to even greater reductions in **reliability** in the future • Will lead to even greater increases in **cost** of transportation in the future

1. **Road Capacity.** Most stakeholders consulted indicated that maintaining existing road capacity was their top concern and felt that this should be the top concern of planning the road networks.

    - Stakeholders indicted they felt the Gardiner Expressway was already at capacity at peak periods and reducing this capacity would only put further strain on the highway and road network.

    - Goods movement supports economic activity in the city and reducing capacity when roads are already operating at full capacity would mean:

        i. Some truck trips would still occur but use an alternate route to the Gardiner, increasing traffic on these routes, or

        ii. Traffic to the origins and destinations using the Gardiner Expressway would reduce, which could have negative economic implications

    - At least one major stakeholder in the area indicated they would likely leave the area for somewhere else in the GTA if the Remove Alternative were to proceed.

Measure: Change in travel time, reliability of travel time, and transportation costs.

2. **Travel Time.** Many stakeholders opined that the Remove Alternative would lead to decreased average traffic speeds compared to the Elevated Expressway alternatives and that this would have real cost and competitiveness implications for them compared to existing conditions.

    - For just-in-time supply chains, increased travel times may, under circumstances where shippers cannot adjust schedules to allow more time for delivery, lead to increased time delay costs for shippers of goods.

    - Many stakeholders noted that congestion on roads in Toronto and the GTA has been increasing as the city grows and develops and that this has led to real cost increases to their business, as well as operational constraints that impact their ability to serve customers' expectations of timely deliveries or their need for timely arrival of inputs for their businesses. Increased travel times impact their profitability, pricing of their products, and choice of location.

Measure: Change in travel time.

3. **Reliability.** The reliability and predictability of the travel time of goods was identified as being as important as or more important than the average travel time of goods.

    - Many stakeholders felt that the existence of the Gardiner Expressway and Lake Shore Boulevard allowed for a level of redundancy in the corridor giving them further choice

in routing in the event of an incident in the road network. For example, if an incident occurs on the Gardiner Expressway, stakeholders have the option of using the Lake Shore Boulevard where there is not an incident.

- Many businesses do not have significant space for inventory for inputs into their businesses, often due to space constraints that can be higher in Toronto where land values are more costly than in other regions in the GTA. In many cases, businesses rely on the timely arrival of inputs to their business.
- In the retail sector, unexpected delays in the arrival of goods to a store location can mean loss of sales. If a product isn't in stock or on the shelf, a customer may elect to purchase it somewhere else.
- In the industrial sector, lack of inputs can, under more extreme circumstances, mean the stoppage of production until inputs arrive.
- For carriers, late arrivals can mean large penalties being paid to customers for the delay in the arrival of goods. One carrier reported that the late arrival of a shipment to a customer resulted in a penalty on the carrier of $75,000 to compensate for the stoppage of operations.
- Carriers and shippers address reliability concerns by adding in a "buffer time" to account for potential delays. As reliability of travel speeds decrease, carriers and shippers need to increase the amount of time they allocate for a given trip to ensure goods arrive on time.

Measure: Reliability of travel time.

4. **Alternate Routes.** Many stakeholders expressed concern that the Remove Alternative would lead to more traffic being diverted from the corridor and to other routes. They fear that this would result in alternate routes, such as Richmond, Adelaide, and Queens Quay among others, becoming more congested than if an elevated expressway link were maintained.

Measure: Impact on Alternate Routes.

5. **Impact of Construction Period.** Stakeholders have indicated that they believe the Remove Alternative will lead to significant impacts on the movement of goods during construction and that construction will take several years to carry out. Some stakeholders indicated that they expected both the Gardiner Expressway and Lake Shore Boulevard to be closed for much of the construction period. They believe that these impacts would be very significant on business.
    - Some stakeholders did not fully appreciate that all options, including maintaining an elevated expressway, would require road closures to implement.

- Stakeholders have indicated they would like to understand more about the duration and severity of road closures in all scenarios, and believe that some analysis should be done on the impact of the construction periods as opposed to focusing only on the steady state once the options have been fully implemented.

Measure: Impact of Construction

6. **Safety.** Some stakeholders have indicated they felt that the removal of the elevated expressway would be less safe. They cite that there will be more commercial vehicles at street level that will interact with other travel modes than under the Remove alternative and this will lead to more potential for incidents.

Measure: Safety.

7. **Long-Term Investment in Infrastructure.** Several stakeholders indicated that they felt the removal of the eastern portion of the Gardiner Expressway and capacity in the Gardiner Expressway/Lake Shore Boulevard corridor was a form of "divestment" in the City's road transportation network at a time when the network requires further investment.

    - Stakeholders indicated that the Gardiner Expressway cannot be considered in isolation from the other major road networks in the city and GTA.
    - Many identified the GE/LSB, 427, 401, and Don Valley Parkway system as a crucial "ring road network" functioning as a critical piece of road infrastructure for the city that facilitates the flow of goods in the city.
    - Many also indicated they felt Toronto was fortunate to have such a network and this positively impacted the competitiveness of the city.
    - Stakeholders indicated that the loss of a limited-access expressway link from the Gardiner through to the DVP would be a loss of critical infrastructure that we would never be able to regain due to subsequent development in the corridor under the Remove Alternative.
    - Stakeholders felt reduced capacity to move goods may also affect the future growth of the goods movement industry in the region.

Objective/Measurable Concern: Travel time, reliability and costs (in the future).

Additional Topics

Some additional issues were brought up that were deemed significant concerns by stakeholders.

- The ability to attract labour may be impacted by increased automobile travel times. Many stakeholders are already identifying this as an issue and feel any increase in travel times or perceived increase in travel times may impact their ability to attract skilled labour.

This is to be addressed through the economic competitiveness study being carried out in support of the EA.

- Many stakeholders have said that parking bylaws have a strong impact on their ability to move goods. Stakeholders' customers in downtown Toronto require deliveries of products, but stakeholders feel that it is "almost impossible" in many circumstances to stop a delivery vehicle to make a delivery to these customers. They feel this makes Toronto a less desirable location to serve. If any of the Remove Alternative could have an impact on parking in Toronto (changes to side streets, etc.) this may be of relevance to the assignment.
    - Stakeholders also indicated they felt travel times would be impacted on many alternate routes such as Richmond, Adelaide, Dundas, Bloor, and Queens Quay.
    - Transportation costs themselves may increase as a result of the Remove Alternative. Increased travel times equal increased labour costs for drivers for the same trip, increased fuel costs as well as increased wear and tear for vehicles spending more time on the road and more stop and go in traffic. These may lead to higher transportation costs or shipping costs for goods.

Parking/unloading space availability in the Study Area is not expected to be different under the four options. Parking strategies are included as a part of Toronto's Congestion Management Plan for 2014-2018 and include developing dedicated delivery zones in the city.

5 Potential Comparative Measures to Evaluate Options

Key Messages

While there is not a standard list of performance measures for goods movement, some common measures include measures of travel time, reliability, level of service, and safety of roads for goods movement. Performance measures are often based on policy or goals of a particular jurisdiction with respect to goods movement. The development of a goods movement strategy by the City of Toronto could allow for the establishment of specific performance measurement indicators for the movement of goods in Toronto.

For the purposes of this study, some proposed comparative measures to evaluate the impact of the Remove alternative compared to the Elevated Expressway alternatives are based on the key considerations of stakeholders identified in Chapter 3. These include standard indicators to measure travel time and reliability, measures based on the particular concerns of stakeholders in the corridor, plus the availability of data through the transportation modelling being carried out to support the EA. Evaluation of the Remove alternative as compared to the Elevated Expressway alternatives is being carried out as a part of the wider EA process using proposed metrics from this Report.

5.1 Introduction

A comprehensive report by the National Cooperative Freight Research Program in the United States entitled "Performance Measures for Freight Transportation" reviews the existing use of performance measures for the transportation of freight in the United States. The report notes that:

> *Although the research literature identified hundreds of potential freight performance measures, in practice the minority of states that have freight performance measures use only a handful. Mature performance measurement states such as Washington, Missouri, and Minnesota use between five and 10 measures. It was noticeable that no two states had the same measures, and in most cases there were wide differences in the metrics.*[21]

While performance measurement of freight transportation is not standardized across jurisdictions, some common metrics have arisen including level of service (LOS), traffic volume, vehicle miles travelled, average speed and reliability or delay measures.

One of the key challenges in measuring the performance of goods movement is the availability of data to carry out performance measurement. Some discussion on the availability of data on the movement of goods on the Gardiner Expressway is included in Section 1.5.1. In comparing the options considered in the EA (Maintain, Improve, Replace, Remove and the new Hybrid Option), this task becomes more difficult as it is dependent on the ability to predict the future state of the Gardiner Expressway/Lake Shore Boulevard corridor under these scenarios. Some data may be available through existing modelling that has been carried out as part of the EA process, whereas other data may not be easily predicted in a quantitative manner.

Another consideration in the measurement of performance is the overall policy goals that are used to define what is measured. Often a goods movement policy is developed or is included as part of a wider transportation plan document. For example, Peel Region has a Goods Movement Strategic Plan document for 2012-2016 that lays out the Region's vision, objectives, and specific actions to achieve the objectives for goods movement identified in its plan. In Toronto's Official Plan, there is some mention of goods movement, with one of the goals of shaping the transportation system listed as "developing an enhanced and comprehensive system of policies and practices for moving goods that boosts the economic competitiveness of the City and the Region".[22] The development of a goods movement strategy for the City of Toronto would allow for the establishment of specific performance mechanisms that could monitor performance in line with the particular policy goals of the City.

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[21] Transportation Research Board of the National Academies, *NCFRP Report 10 Performance Measures for Freight Transportation.* 2011

[22] City of Toronto Official Plan, Consolidated December 2010. p. 2-26

One of the strategies identified in the *Big Move* by Metrolinx is to "Improve the movement of goods within the GTHA and with adjacent regions". The key goal of this will be the development of a comprehensive strategy for goods movement. Developing a strategy along with other data-gathering initiatives on the movement of goods will allow for better measurement of the performance of goods movement networks in the GTHA in the future. Coordination and engagement with Metrolinx and MTO may allow for efficiencies and exchange of information that can support the City in fostering an environment for the efficient movement of goods within the City's wider policies and plans for development and growth.

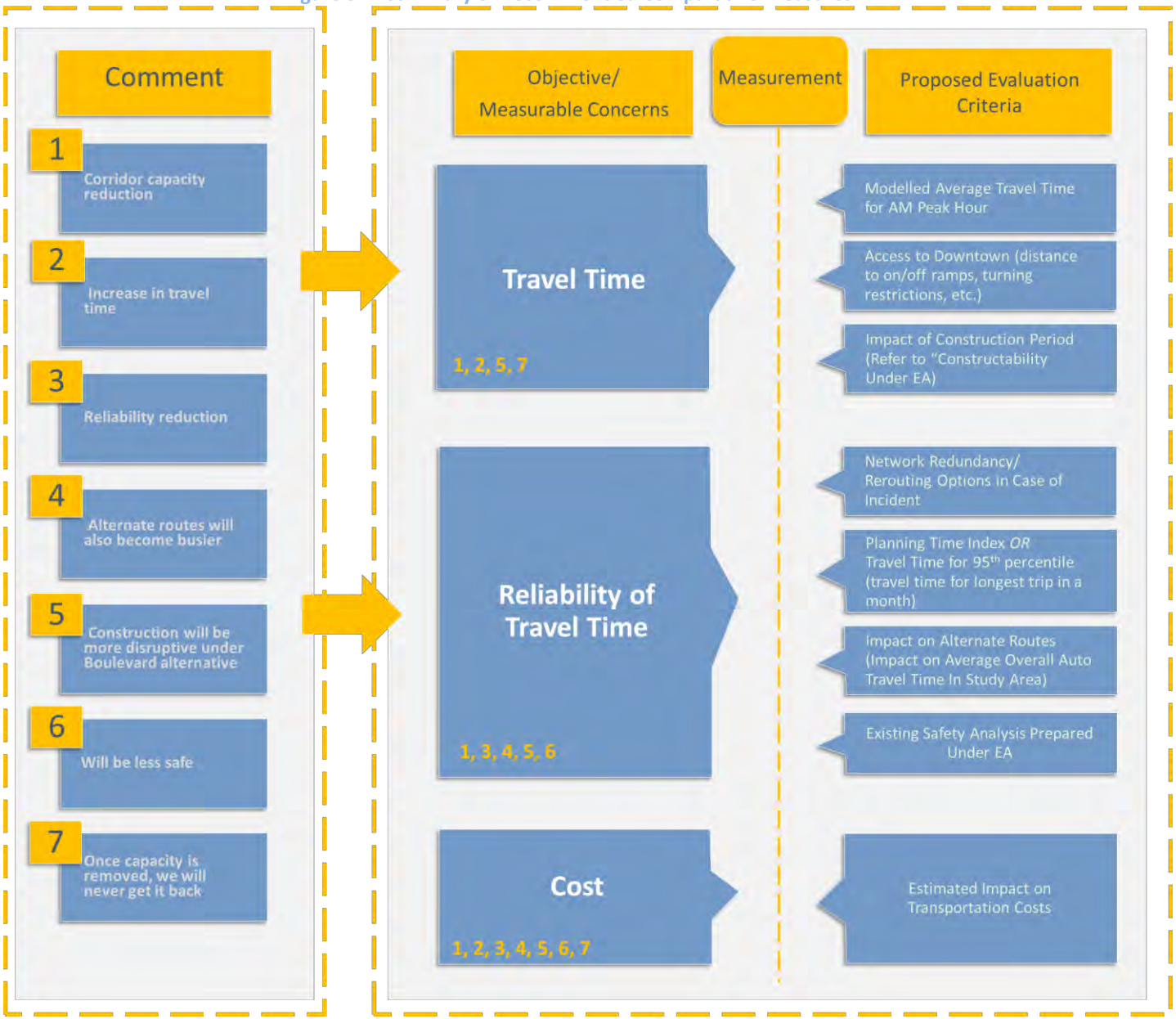
Specific potential performance measures that can be used to evaluate the movement of goods on the Gardiner Expressway/Lake Shore Boulevard corridor for the purpose of the EA are discussed below. Potential metrics are considered within the context of the availability of data to compare the Remove and Elevated Expressway alternatives. Since these alternatives are potential future options, evaluation of the options is based on forecasted data contained in transportation modelling developed for the EA.

5.2 Recommended Measures

Since the alternatives considered under the EA are not observable today (time horizon is 2031), data is not available to evaluate these scenarios. The comparison of the EA alternatives will depend on forecasts from modelling as well as qualitative evaluation based on an understanding of the changes in infrastructure and their impacts on key metrics. Some potential measures comparing the impact of the four alternatives on goods movement are shown in the table below. Recommended key measures are highlighted in blue and potential additional measurements are included in white cells. The use of measures will depend on the availability of sufficient information for analyzing the impacts of the EA alternatives on a particular metric. Comment is also made on the availability of information for evaluating the metrics. Additional information may be available as part of the ongoing evaluation process under the EA.

Measures were established based on the key factors considered under supply chain analysis in Chapter 3 and additional key stakeholder concerns discussed in Chapter 4, as well as some additional considerations on the change in design. In the figure below, we attempt to isolate the key concerns received from stakeholders, understand this feedback, and interpret it as specific, measurable concerns that can be evaluated, and then propose evaluation criteria to measure the comparative impact of the Remove Alternative compared to an elevated expressway.

Figure 5-1: Summary of Recommended Comparative Measures



5.3 Travel Time

Some discussion of expected travel time is already contained in Chapter 3 on supply chain analysis. Average travel time has been identified as a top issue to stakeholders for the movement of goods. Longer travel times create greater costs for firms in their supply chains and production processes and can lead to increases in transportation costs due to increased fuel consumption and longer driver hours for a route driven. Modelling work is carried out separately from this report to measure the impact on travel times for selected origin/destination pairs in the corridor.

Change in Average Travel Time (Remove versus Expressway)

Use existing model to estimate the difference in travel time between the Remove and Expressway alternatives. Currently some Origin/Destination pairs provide for fairly representative flows of overall traffic, and do provide insight on commercial vehicle traffic. In order to provide further insight on commercial vehicle traffic in particular, representative goods movement Origin/Destination (O/D) pairs through the Study Area could be targeted. Proposed O/D pairs include:

- Bay and Adelaide (financial district) to Gardiner and Spadina
- Leslie and Commissioners (Port Lands) to DVP and Dundas
- DVP and Dundas to the Gardiner and Spadina (through movements)

Access to Downtown

In order for stakeholders to better understand the change in access to the expressway system, it is proposed to graphically show the change in distance to the nearest on- and off-ramps on a "heat map" where areas are coloured based on the change in distance in access to the nearest ramp in the Remove Alternative compared to maintaining the elevated expressway. Stakeholders will be provided with a better representation to allow them to understand the change in distance to the nearest freeway access point in the Study Area. This should be contextualized with any information on the number of through trips versus local trips in order to better understand the nature of the trips using the elevated expressway in the study area.

Impact of Construction Period

Compare the impact on goods movement flows of construction of the Remove Alternative to the impact of construction associated with maintaining the existing elevated expressway. This analysis is already being done under the EA and it is proposed that this evaluation metric can simply reference the existing "Constructability" analysis on the impact of construction periods on traffic under the different alternatives.

5.4 Travel Time Reliability

Reliability was also discussed as a part of the supply chain analysis contained in Chapter 3. Recognition of the importance of travel time reliability in the movement of goods has been growing steadily and many consider this metric may be more important than average travel time alone. When travel times are unreliable, shippers or carriers often schedule additional "buffer" times to ensure that goods arrive when they are needed. Trends towards the increase in just-in-time supply chain management have also made reliability an even more pressing issue in the movement of goods.

Reliability of travel time is impacted by a number of factors including weather, traffic incidents, work zones, etc. Another factor that has been found to affect reliability is congestion itself.[23]

Reliability of the future EA scenarios is not presently observable. Still, some estimation may be able to be made based on the existing work carried out under the EA process. Factors that may be considered under each scenario should include:

Travel Time for Trips in the Top 95th Percentile of Travel Forecasted

The US Department of Transportation Federal Highway Administration identifies the 90th or 95th percentile travel times as the "simplest method to measure travel time reliability".[24] Intuitively, measuring the travel time of trips at the 95th percentile can be compared to the expected travel time for the "worst trip in a month". This provides an understanding of the variability in travel times compared to average travel times that will be estimated under Section 5.3. It is recommended that the travel time for the 95th percentile be calculated for the same O/D pairs identified under Section 5.3 for comparability to average travel time.

Network Redundancy/Rerouting Options

It is hard to objectively quantify the ability of road users to respond to incidents under different road designs. For example, will a truck better be able to find a new route or get to a new route in the event of an incident under the Remove versus Elevated Expressway alternatives? A possible solution is to use the EA model and simulate the shutdown of a lane due to construction or an incident and model the ability of the network to respond to the incident. These modelled results can be compared to understand the ability of the network to respond to an incident under the various EA options.

[23] U.S. Department of Transportation, *Traffic Congestion and Reliability: Linking Solutions to Problems*. July 19, 2004.
[24] United States Department of Transportation Federal Highway Administration. *Travel Time Reliability Brochure-Making it There on Time.*

Congestion on Alternate Routes

Alternate routes (arterial streets, local roads, etc.) provide for options in the event of a collision that impacts a preferred route of travel. For example, in the event that the GE/LSB corridor were closed due to an incident, stakeholders may use Queens Quay as an alternate route. In addition to impacting travel reliability, congestion on alternate routes also impacts average travel times for the "last mile" for any goods movement routes where the destination requires use of an alternate route or arterial street located near the Study Area.

An analysis of the comparative congestion anticipated on alternate routes under the Remove Alternative versus if the expressway were maintained should allow for an understanding of the impact of the Remove Alternative on traffic and congestion as compared to congestion on alternate routes under the Elevated Expressway alternatives. The use of the average estimated auto travel times in the study area should allow for a comparison between alternatives.

Safety and Incident Management

Incident management is another key concern for stakeholders. The existing EA has already carried out an analysis of the safety implications of the Remove Alternative versus the elevated expressway and this section can be referenced to understand the impact on safety from a goods movement perspective.

5.5 Increase in Transportation Costs

One of the main differentiators in transportation costs is the mode used. It is not anticipated that goods currently moving by truck will change modes as a result of the Remove Alternative. The main drivers of change in transportation costs for the purposes of this EA are estimated to be driven through differences in travel time and reliability between the Remove Alternative and the Elevated Expressway alternatives.

The American Transportation Research Institute (ATRI) has surveyed carriers for information to understand the operational costs of trucking on both a distance and time basis. They found that the breakdown of the marginal cost of an hour of transport time was:

Figure 5-2: Estimated Marginal Trucking Cost per Hour

Motor Carrier Costs	2013 Costs per Hour ($US)
Vehicle-based	
Fuel Costs	$25.78
Truck/trailer lease of purchase payments	$6.52
Repair and Maintenance	$5.92
Truck Insurance Premiums	$2.57

Permits and Licences	$1.04
Tires	$1.65
Tolls	$0.77
Driver-based	
Driver Wages	$17.60
Driver Benefits	$5.16
TOTAL	**$67.00**

Source: American Transportation Research Institute. An Analysis of the Operational Costs of Trucking: A 2014 Update.

In benefit-cost analyses, the impact of change in travel times is normally calculated as the change in travel time multiplied by the value of that time. The value of time of a passenger vehicle is significantly lower than that of a truck.

Understanding the changes in cost of transportation to goods movement stakeholders can be approximated by multiplying any change in travel time by the number of trucks impacted and by the estimated hourly operational costs of a truck.

In order to develop an estimate of the cost of additional delays of the Remove Alternative compared to the Elevated Expressway alternatives, the difference in forecasted travel times between these alternatives can be multiplied by the estimated cost of time of a truck.

Additional costs would also be imposed on goods movement stakeholders above the increased costs of trucking to the extent that delivery times also become less predictable for goods movement stakeholders.[25] This can impact supply chain management decisions; for example, a stakeholder may elect to increase inventory capacity in order to mitigate the impact of reduced delivery reliability. This depends on the extent to which carriers adjust.

5.6 Evaluation of Impacts

Based on information available as a part of the EA as well as feedback from stakeholders, the impact of the Remove Alternative compared to the Elevated Expressway alternative is carried out for the proposed measures below.

Many stakeholders located close to the Study Area are involved in industrial and manufacturing operations. Examples of major goods produced include sugar, cement, concrete, cooling systems, roofing, and other manufacturing goods. While supply chains of these stakeholders may not be as sensitive to changes in average time and reliability as some others consulted, in

[25] In many cases, carriers may respond by adding additional "buffer times" into delivery schedules in the event that delivery times become less reliable. Whether carriers fully adjust schedules to allow for the exact same level of reliability of delivery as prior to the implementation of the Remove alternative or whether they pass some of the unreliability on to their customers is difficult to estimate. Likely, costs of unreliability will be borne by both carriers and other goods movement stakeholders.

many cases stakeholders indicated above 90% of all their goods movement traffic would be impacted by the Remove Alternative. Their businesses currently rely significantly on the Gardiner Expressway/Lake Shore Boulevard corridor and for this reason may be particularly sensitive to proposed changes that may impact travel times of reliability.

For other stakeholders in retail and courier sectors, while reliance on the Gardiner Expressway for movements in Toronto may still be quite significant, a lower proportion of their total trips would be impacted by the Remove Alternative since these stakeholders operate in more diverse locations as opposed to an industrial stakeholder with a factory located in the Study Area. While the proportion of trips impacted for these stakeholders may be lower, these stakeholders may be more sensitive to changes in reliability and average travel times due to the nature of their supply chains and their businesses. For example, a courier company may need to allocate additional resources (additional delivery vehicles and additional labour) to carry out the same number of deliveries on routes that utilize the GE/LSB corridor or impacted alternate routes with the same level of reliability and delivery times compared to the Elevated Expressway alternatives. What this can mean is that for some stakeholders, reduced corridor capacity may equate to an *increase* in goods movement vehicles on the road for the same number of trips in order to maintain service standards.

6 Review of Comparable Jurisdictions

Key Messages

Seoul, New York, San Francisco, and Seattle have all faced similar debates as Toronto regarding elevated urban expressways. All except Seattle elected to replace elevated expressways with surface boulevards. While often there were fears of traffic "chaos" following removal of elevated expressways in the case studies analyzed, traffic generally adjusted to the new reality without very significant disruption, using the best alternate route available, adjusting trip time, or in some cases changing mode or avoiding trips all together.

On a macro scale, main congestion indicators for major US cities that have removed or do not have urban freeways are comparable to those that have urban freeways.

6.1 Macro Analysis of Urban Congestion and Urban Freeways

In support of the 2014 draft Environmental Assessment commissioned by Waterfront Toronto and the City of Toronto, an economic competitiveness comparison was carried out on key cities comparing the competitiveness of cities with and without expressway access. Here we provide a similar comparison of cities that have either removed or maintained elevated expressways and their current estimated Total Peak Period Travel Time and Planning Time Index (measure of reliability). The figure below summarizes the peak travel time and planning index for key cities that either (1) Removed, (2) Replaced or (3) Maintained urban expressways. The three groups appear relatively similar on all measures, with cities under the Maintain category reporting a somewhat higher (i.e. less reliable) Planning Time Index on average. While there are innumerable other differing factors between these cities that make any cause or effect difficult to isolate, there is no clear difference in congestion indices between the Remove versus Maintain or Replace groups. When examining population and population density, denser cities appear to be much more likely to remove expressways than less dense cities where there are fewer competing demands for use of public space that freeways may occupy.

Figure 6-1: Comparison of Peak Travel Time and Planning Time Indices for Key American Cities

	City	Freeway Access	**Peak Travel Time (mins)**	**Planning Time Index (reliability)**	Population	Density (pop/square mile)
1	New York	Remove	50	4.44	8,405,837	27,012
	San Francisco	Remove	47	3.74	837,442	17,179
	Chicago	Never Built	44	3.95	2,718,782	11,842
2	Boston	Replace (tunnel)	48	4.25	645,966	12,793
	Seattle	Replace (tunnel)	44	3.99	652,405	7,251
3	Washington	Maintain	53	5.72	646,449	9,856
	Los Angeles	Maintain	48	4.95	3,884,307	8,092
	Houston	Maintain	44	3.67	2,195,914	3,501
	Dallas	Maintain	42	4	1,257,676	3,518
	Atlanta	Maintain	50	3.71	447,841	3,154
1	**Remove/Never Built (average)**		**47**	**4.04**	**3,987,354**	**18,678**
2	**Replace (average)**		**46**	**4.12**	**649,186**	**13,938**
3	**Maintain (average)**		**47.4**	**4.41**	**1,686,437**	**10,629**

Sources: (Congestion Indices) Texas Transportation Institute. *2012 Urban Mobility Report.* And HR&A *Gardiner Expressway Economic Evaluation of Proposed Alternatives.* February 12, 2014 and Wikipedia (population and population density).

6.2 Case Study Review of Comparable Jurisdictions

A review of comparable jurisdictions that faced similar debates of whether to remove, replace, improve, or "maintain" an urban expressway was carried out under the existing Environmental Assessment. In this report, some follow-up work has been done to build off that analysis and try to get a better understanding of the impacts from the perspective of the movement of goods. For the most part, little to no analysis has been done on the impacts of freeway removal specifically on goods movement, but an understanding on the impacts on overall traffic allows for a strong understanding of the likely impact on the movement of goods.

Case studies of comparable cities were identified where urban expressways were removed. Considerations made by these cities prior to their removal and the mitigation measures they implemented to support the expressway removal, as well as any results of relevance to traffic outcomes, are reviewed in order to identify lessons learned for Toronto. The analysis in this Chapter feeds into the mitigation measures recommended in Chapter 7. Figure 6-2 below summarizes the case studies analyzed.

Figure 6-2: Overview of Case Studies Examined

	Cheonggyecheon	West Side Highway	Embarcadero Freeway	Central Freeway	Alaskan Way Viaduct
Location	Seoul, South Korea	New York City	San Francisco	San Francisco	Seattle
Current City Population	10,117,909	8,405,837	837,442	837,442	652,205
Prior Vehicle Traffic per Day (total and freight only)	120,000	140,000	80,000	93,100	103,000
Length of Area Considered	6.1 km (3.75 mi)	8.2 km	2.5 km	1.5 km	3.2 km
Outcome	Removed	Removed	Removed	Removed	Replaced with Tunnel
Timeline	July 2003-October 2005	1973-1989 (surface route completed 2001)	1989-1991	1989-1992 (surface route completed by 2005)	2001-Ongoing
Age	24	37	32		50
Main Reason for Removal	Large repair costs, improve urban environment	Earthquake/ structural damage	Earthquake/ structural damage	Earthquake/ structural damage	Earthquake/ structural damage

6.2.1 Seoul- Cheonggyecheon

Seoul is the only case study examined where the main reason for freeway removal was not structural damage due to natural disaster. This required strong political will, and the mayor led this removal program that was a part of his election platform.

Traffic speeds were noted to decrease by 18% following the removal of the expressway, with some traffic shifting to other modes, such as transit.

Under a cost-benefit analysis, the costs of traffic congestion were found to be very high, but were less than estimated benefits from increases in land values as a result of the removal.

Most mitigation employed to support the freeway removal involved demand management strategies.

Specific consideration was made for goods movement in the removal project, retaining lanes in the corridor, with goods movement being one of the primary considerations for the maintenance of road capacity.

6.2.2 New York- West Side Highway

Before removal, it was found that most traffic was using the West Side Highway for access to the city as opposed to through movements.

Trucks were not allowed on the elevated West Side Highway in New York. The replacement of the elevated expressway with a surface boulevard therefore actually increased road capacity available for goods movement in Manhattan.

Currently West Side is a significantly used route for trucks in New York, though in relative percentage many other arterials in New York see higher percentages of trucks than the West Side Highway.

6.2.3 San Francisco – Embarcadero

Removal for the Embarcadero was previously recommended but was never able to achieve approval. Removal was eventually carried out when the highway was damaged during an earthquake and could not be repaired.

Much of the traffic “chaos” predicted did not materialize, traffic was mostly routed to other arterial streets.

Some have claimed that increased vehicle incidents observed after the 1989 quake may be a result of elevated freeway closures, but such an outcome is difficult to measure and isolate from many other factors impacting safety in the City.

6.2.4 San Francisco – Central Freeway

The Central Freeway was removed after the elevated expressway system was damaged during an earthquake.

Traffic on the surface route was 52% lower than on the elevated expressway. The San Francisco Department of Parking and Traffic estimated that almost all of the displaced traffic was found on alternate routes.

6.2.5 Seattle- Alaskan Way Viaduct

The elevated expressway was removed following structural damage that was deemed to leave the elevated expressway unsafe.

The City and State considered replacing the elevated structure, creating a tunnel, or surface Remove Alternatives. In order to maintain travel times and road capacity while still increasing the urban environment, it was decided that a new tunnel would be built to accommodate traffic. It was estimated that the tunnel would accommodate over 120,000 trips daily, compared to around 100,000 on the existing structure.

The project has faced engineering challenges that are delaying the project schedule and increasing the project scope and budget.

Tolling of the tunnel has been considered, not as a tool to improve traffic flow but to generate revenue to help fund the project. The main concern with tolls was the estimated additional traffic that would be displaced onto alternate city streets as a result of the toll cost.

6.3 Key Themes and Lessons Learned

Removal of elevated expressways in urban centres has been discussed in the past but it has often been difficult to garner support for optional removals. The impact on goods movement is often a key issue brought up by opponents to the removal of such expressways. In the case studies analyzed, the removal of a highway has almost always been after structural damage was significant enough that the highway could not be repaired. In the case of San Francisco, it was recommended years before to remove the Embarcadero but support was not gained for the measure until an earthquake damaged the structure and necessitated removal. Removal or replacement of expressways are often difficult decisions for communities. For example, in Seattle options were brought to ballot for a vote. When asked to vote on whether they supported surface-tunnel hybrid or an elevated structure they rejected both options. Eventually the Governor of the state of Washington announced that a tunnel option would go ahead.

In most cases, following the damage or removal of the expressway, traffic “chaos” was predicted by media and local residents. For the most part such chaos did not materialize. In part this has been attributed by some to an “overreaction” by commuters and road users to the

feared congestion by either using routes much further away as opposed to alternate routes, changing mode of transport, or avoiding trips for the initial period after removal. It is hard to assess the longer-term impacts of such projects as they are often mixed with many other changes occurring in the dynamic transportation system of the cities. San Francisco's Department of Parking and Traffic estimated that most diverted traffic from the removal of expressway ended up on main alternate routes or other further routes in the city. Modal shift was not noted to be a very significant factor in making up for lost trips, but did also occur. For the most part, travellers adjust by using the route they deemed to be the least disruptive alternative to their current route.

Most removals were accompanied by traffic management plans and mitigation measures implemented by cities to mitigate the impact on automobile and freight traffic. Common measures included:

- Improved wayfinding for trucks on alternate routes
- Increased public transit capacity or services to provide passenger vehicles with an alternate mode of transport
- Temporary/permanent adjustments on alternate routes (changing parking restrictions, optimizing signal timing, review of truck routes in the city, etc.)
- Use of smart work zones during removal (provide current information on construction delays, suggest alternate routes, etc.)
- Introduction of other measures to increase capacity of alternate routes (for example introducing one-way streets, reversible lanes, etc.)
- Other targeted, demand-side measures for passenger or freight movements (regulation to limit passenger car use, restrictions on hours or routes for freight movements)

6.4 Implications for Toronto

In many cases examined, the removal of elevated, limited-access freeways in major urban cities has been preceded by fears of chaotic traffic and substantial and prohibitive impacts on traffic flows. For the most part, such chaos has not materialized. Traffic for the most part shifts to optimal alternate available routes in the city and utilizes other capacity in the city.

Many mitigation measures considered in the case studies to be implemented in conjunction with the removal of freeways in other cities have already been considered in one context or another under the City of Toronto's *Congestion Management Plan 2014-2018.* Some additional measures, including in particular the expansion of public transit projects to reduce passenger automobile demand, may also be considered by the City of Toronto. The following Chapter will examine in more detail some of the mitigation options used in the case studies analyzed above as well as in general congestion management and freight transportation planning strategies.

7 Mitigation Options

Key Messages

A toolbox of potential measures is available to mitigate any constraints imposed by the Remove alternative on the movement of goods in the Study Area. Mitigation measures are proposed to either directly target goods movement traffic, or to improve overall congestion in the Study Area which will have a positive impact on goods movement traffic.

It is recommended that implementation of mitigation measures not be limited to the Study Area, but also be implemented on key alternate routes that can reduce traffic demand in the corridor. Additionally, mitigation measures can also be applied to major goods movement routes, such as the Don Valley Parkway and the Gardiner Expressway outside of the Study Area, which will impact overall trip times for goods movement trips passing through the Study Area.

7.1 Summary of Mitigation Measures

A wealth of potential mitigation measures exists to ensure the efficient flow of goods to counteract any potential constraints the Remove Alternative may impose on goods movement. All options have costs associated, either upon goods movement stakeholders, the City, or both parties. A comprehensive review of measures available to counteract any constraints on the flow goods movement is contained in Appendix D.

In order to be effective, mitigation measures should be targeted on the section of the GE/LSB corridor where the elevated expressway is proposed to be removed under the Remove Alternative and also on alternate streets that may alleviate congestion in the corridor as well as other areas in the corridor that will allow for a reduction in overall trip times. Improving the flow on alternate routes may be another method to reducing increased congestion in the corridor.

The City of Toronto's Congestion Management plan should be the primary toolbox used to mitigate impacts on goods movement of increased congestion. Some options represent particularly "low-hanging fruit" for the City such as traffic coordination studies that have thus far had an estimated **overall benefit/cost ratio of 66:1.**[26] For every dollar spent on such a study an estimated $66 dollars is saved through improved traffic flow. Where applicable, such studies should be prioritized for the Lake Shore Boulevard as well as key alternate routes around the corridor. Such a measure would be advisable whether or not the Remove Alternative is chosen given the potential benefits. Other measures from the Toronto's Congestion Management Plan should be prioritized for the GE/LSB and key alternate routes to the corridor as is appropriate and possible. Such measures together may have the potential to mitigate any constraints of the Remove Alternative on their own.

Off-peak deliveries are another option for the City to pursue in order to reduce freight traffic during peak periods as well as to improve travel times and reliability for freight movements. Key constraints to off-peak delivery programs include noise concerns as well as the constraints goods movement companies face from their customers who demand goods arrive at a certain time. The New York pilot program of providing incentives to receivers to install and implement unassisted deliveries has proven a resilient option to encouraging the shift of goods movement travel to off-peak hours. The City should study and pursue such a program whether or not the Remove Alternative is implemented.

Preferential lanes offer another solution to address the impact of increased congestion. In particular, High Occupancy Toll (HOT) lanes allow for the highest utilization of infrastructure (by allowing all those eligible under High Occupancy Vehicle (HOV) lanes plus also those willing to pay) and also allows for a self-selecting of impacted goods movement stakeholders. Since goods

[26] City of Toronto. *Congestion Management Plan.* 2014-2018

movement stakeholders are very heterogeneous, the impacts on the stakeholders will also vary. To some, congestion may not represent a significant increase in cost, while to others that same congestion may represent very substantial increases in cost. More impacted stakeholders will be more likely to pay for HOT lanes, since the improved reliability will be worth the increase in cost to them. Therefore HOT lanes will allow for a measure to target those stakeholders most impacted by any increased congestion associated with the Remove Alternative through self-selection. The City may wish to consider converting some HOV lanes to HOT lanes, and/or adding HOV/HOT lanes in the GE/LSB corridor, the Don Valley Parkway, or other key goods movement routes in the city to allow goods movement stakeholders more options to move goods more efficiently.

A host of other strategies, including additional wayfinding signage programs, developing a goods movement stakeholder committee, demanding management strategies, or increasing road capacity in other alternate routes are all additional options available to the City to reduce the impact of increased congestion on goods movement stakeholders.

Figure 7-1: Potential Mitigation Measures to Address Constraints of Remove Alternative on Goods Movement

Mitigation Approach	Improves Overall Traffic	Targets Goods Movement Specific	Barriers to Implementation
Application and expansion of existing tools in City of Toronto's Congestion Management Plan to Corridor and key Alternate Routes	✓		**Low**
Off-Peak Delivery Programs	✓	✓	**Low**
Preferential Lane Treatments	✓	✓	**-**
Truck-Only Lanes		✓*	**Medium**
Peak Shoulder Lanes	✓		**Medium**
HOV Lanes	✓	✓	**Medium**
HOT Lanes	✓	✓	**Medium**
Congestion Pricing	✓		**Medium/High**
Increase Alternate Road Capacity	✓		**High**
Increase Public Transit	✓		**Medium/High**
Operational Improvements	✓		**Low**
Improve Wayfinding for Trucks for Alternate Routes		✓	**Low**
Creation of Goods Movement Stakeholder Committee		✓	**Low**

*Depending on whether or not goods movement vehicles will be allowed to utilize preferential lanes.

Key strategies that target the flow of goods, have relatively low barriers to implementation and do not have implications for other traffic include off-peak delivery programs (described further in Appendix D), improving wayfinding for commercial vehicles on alternate routes throughout

the transportation study area, as well as the creation of a goods movement stakeholder committee in order to work effectively with industry on the issue of goods movement.

Appendix A: Consultation Package

WATERFRONTToronto

TORONTO

Dear Madam or Sir:

RE: Goods Movement Analysis: Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment and Integrated Design Study

Waterfront Toronto and the City of Toronto are undertaking the Gardiner Expressway and Lake Shore Boulevard Reconfiguration Environmental Assessment and Integrated Urban Design Study to help determine the future of the eastern section of the Gardiner Expressway running east of Jarvis Street to approximately Leslie Street. As a result of work completed thus far, the Deputy City Manager, Cluster B, has recommended to the Public Works and Infrastructure Committee (PWIC) that the elevated expressway be removed and that Lakeshore Boulevard east of Jarvis be widened by two lanes to a landscaped at-grade eight-lane boulevard. This option is known as the Remove Alternative.

PWIC directed staff to better understand the impacts of the Boulevard option including looking at opportunities to optimize the travel time. In addition, PWIC directed staff to look at a "Hybrid" option that maintains part of the existing expressway and combines it with a new expressway where it meets the Don Valley Parkway.

Waterfront Toronto and the City of Toronto have engaged Dillon Consulting, who have retained CPCS, a strategy consulting firm specializing in the transportation, to study the implications of the Remove Alternative on the movement of goods, and in particular:

- to provide a better understanding of the nature of goods movement in the study area;
- to provide an assessment of the consequences (both positive and negative) of the implementation of the Remove Alternative for goods movement in the Greater Toronto Area as compared to Maintain and or Hybrid; and
- to provide high level recommendations for mitigating impacts of the Remove Alternative for affected goods movement companies based on work already undertaken in the Environmental Assessment.

To gather and validate information required for the goods movement analysis, CPCS will be undertaking consultations with key goods movement stakeholders. We would appreciate your participation in these consultations. Your confidentiality is important to us. We will not attribute any quotations or specific information to you or your organization without your permission.

WATERFRONToronto

TORONTO

We thank you for your time and appreciate your participation in this important study. If you have any questions about this study or the related process, please contact Antonio Medeiros (Tel: 416.214.1344 x285, E-mail: amedeiros@waterfrontoronto.ca).

Sincerely,

Christopher Glaisek
Vice President, Planning and Design
Waterfront Toronto

John Mende
Director, Transportation Infrastructure Management
City of Toronto

72 Chamberlain Avenue
Ottawa, Ontario
Canada K1S 1V9
ottawa@cpcs.ca
www.cpcs.ca

Gardiner Expressway Goods Movement Study

Stakeholder Questionnaire

Consultations with goods movement stakeholders will be carried out in person or over the phone. This questionnaire is being provided in advance of the consultations to inform goods movement stakeholders as to the topics to be discussed with CPCS. It is not necessary to fill out this questionnaire in advance of the consultations, though stakeholders are welcome to do so if they feel this would help guide their responses.

The questions contained in this document are meant as a guide for discussion and not intended to be inclusive of all topics discussed during consultations.

Results of these consultations will be shared with the City of Toronto and Waterfront Toronto in order to inform analysis being carried out under the Gardiner Expressway/Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study.

Peter Harrison, Principal Consultant, CPCS
pharrison@cpcs.ca
Robert Graham, Senior Consultant, CPCS
rgraham@cpcs.ca

We thank you for your willingness to participate in this important study.

PART A – RESPONDENT IDENTIFICATION

Organization name:	
Representative(s) name(s) and title(s):	
Representative(s) contact details (telephone and email):	

PART B – Goods Movement and Goods Movement Impacts of the Remove Alternative

Nature of your business and use of Lakeshore Blvd./Gardiner Expressway corridor

- Please describe the nature of your business

Expand box as needed

- What are some of the key characteristics of your firm's supply chain (e.g. just-in-time, 24-hour operations, peak/off-peak, modes used, origins and destinations of shipments, on-site storage and loading/delivery considerations, key drivers and seasonality of shipment volumes, etc.)?

Expand box as needed

- Which of your business locations rely on use of the Gardiner Expressway?

Expand box as needed

- What aspects of your business operations rely on the Gardiner/Lake Shore Boulevard (LSB) corridor and how does your business rely on it (what times of day, how often, etc.)? Are there alternate routes that you use? How does your use of the Gardiner Expressway compare with your use of other routes in the area?

Expand box as needed

- Where are the primary origins and destinations of trips you generate on the Gardiner Expressway?

Expand box as needed

- Which parts of the Gardiner Expressway do you use? Which on/off ramps do you use? How much of your traffic on the Gardiner Expressway relies on on/off ramps located within the study zone east of Jarvis?

Expand box as needed

- What percentage of traffic you generate on the Gardiner Expressway is "through traffic" versus "local traffic" (for the purposes of this question, please consider through traffic as traffic which originates on the Gardiner east of Jarvis and either continues on Lake Shore Boulevard East of the Don Roadway or continues northbound on the Don Valley Parkway)?

Expand box as needed

- What percentage of traffic you generate on the Gardiner occurs during each of these four periods?
    1. Evening and Overnight (7:00pm - 6:00am)
    2. Morning Peak (6:00am - 9:00am)
    3. Daytime (9:00am - 3:00pm)
    4. Afternoon Peak (3:00pm - 7:00pm)

Expand box as needed

- How is your business currently responding to the maintenance activities on the Gardiner Expressway and the traffic congestion that has resulted from these activities (any changes in schedule, routing, etc.)? What implications have these changes had on your business?

Expand box as needed

- How has your business adjusted operations over the years in response to changing traffic conditions both in the GTHA and in other regions (changes in schedule, routing, etc.)? What implications have these changes had on your business?

Expand box as needed

Consequences of the Remove Alternative

- Where do you operate that you believe would be significantly affected by the implementation of the Remove alternative (business location(s), delivery points, etc.)?

Expand box as needed

- What are the specific (local) changes your business may experience with the Remove alternative?

Expand box as needed

- How would you adjust your operations in the event that the Remove Alternative is pursued?

Expand box as needed

- What do you see would be the more general (regional) impacts of the implementation of the Remove alternative on the movement of goods within the Greater Toronto Area including through movement on the Gardiner/LSB and Don Valley Parkway?

Expand box as needed

- What changes do you feel will need to be made to your business/operations (if any) as a result of the wider growth being planned in the waterfront area (regardless of any changes made to the Gardiner Expressway)?

Expand box as needed

- Do you expect your businesses will be operating out of its current location 10 years from now? Do you expect your operations to be larger or smaller than they currently are? What impact do you believe this change would have on goods movement trips you generate on the Gardiner?

Expand box as needed

- The space below is left for any additional comments/feedback.

Expand box as needed

Please advise us if you have any data you can make available on the amount of traffic you generate on the Gardiner Expressway, your use of the Gardiner Expressway, or any other information you believe may inform this goods movement analysis. Such data can be kept confidential if requested.

Gardiner Expressway Goods Movement Study

Project Background

The City of Toronto and Waterfront Toronto are jointly carrying out the *Gardiner Expressway/Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study*.

In 2008 Toronto City Council authorized a partnership between the City of Toronto and Waterfront Toronto to examine options for the future of the eastern portion of the Gardiner Expressway between approximately Jarvis Street and Logan Avenue. The *Gardiner East EA and Urban Design Study* was formally initiated following the approval of the study Terms of Reference by City Council and the Minister of the Environment in 2009.

The study Terms of Reference included four alternatives for the future of the eastern portion of the Gardiner Expressway:

On February 21, 2014, a City of Toronto Staff report was submitted to the Public Works and Infrastructure Committee (PWIC) seeking Council approval to proceed with Remove alternative as the preferred solution. The report was based on the results of stakeholder consultations and alternative solutions evaluated as part of the EA.

PWIC directed City staff to further study the impacts of the Remove alternative including looking at opportunities to optimize the travel time. In addition, PWIC directed City staff to look at a Hybrid option that maintains part of the existing expressway and combines it with a new expressway where it meets the Don Valley Parkway.

Waterfront Toronto and the City of Toronto have engaged Dillon Consulting, who have retained CPCS, a strategy consulting firm specializing in the transportation, to study the implications of the Remove alternative on the movement of goods, and in particular:

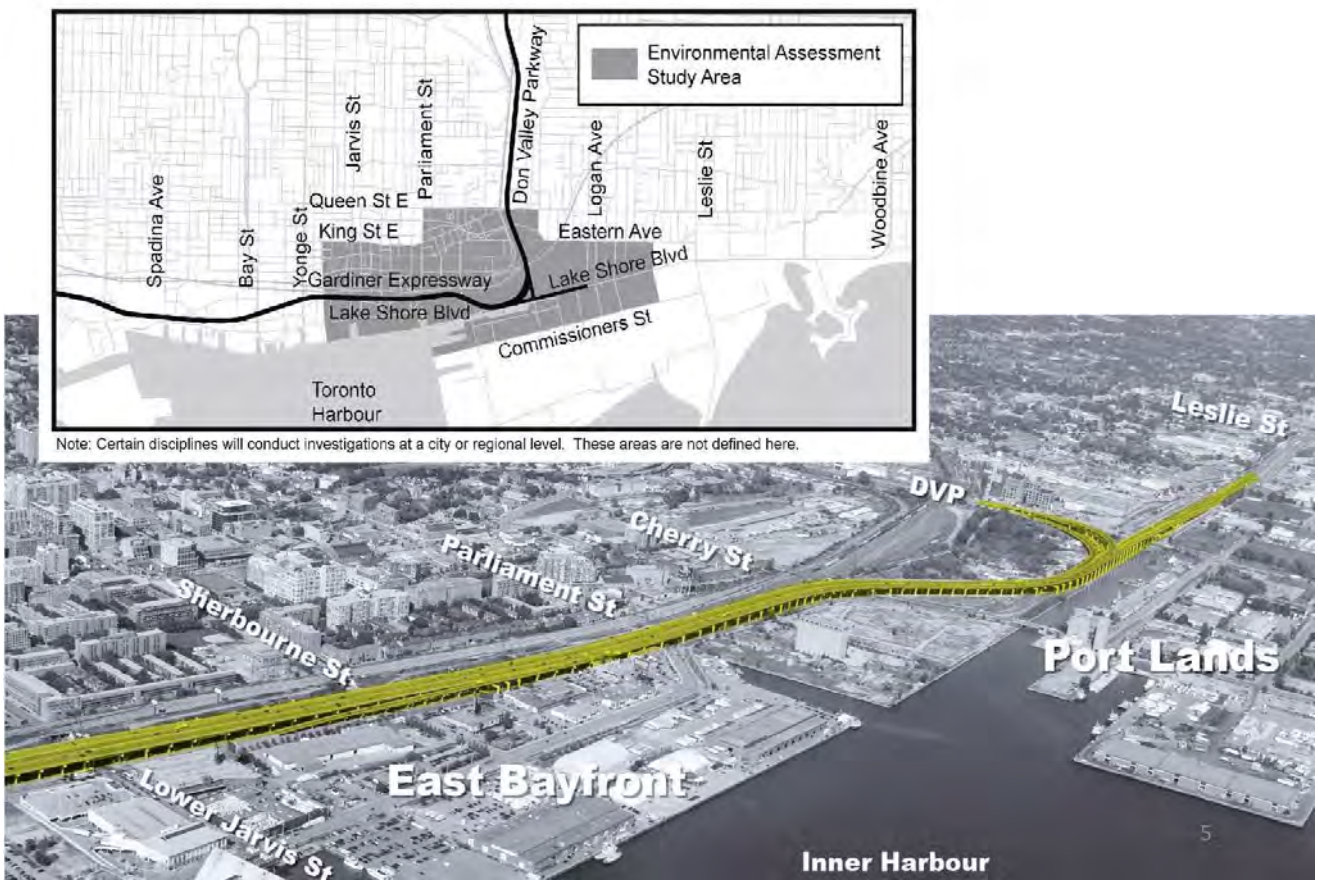
- To provide a better understanding of the nature of goods movement in the study area;
- To provide an assessment of the consequences (both positive and negative) of the implementation of the Remove alternative for goods movement in the Greater Toronto Area as compared to Maintain and or Hybrid; and
- To provide high level recommendations for mitigating impacts of the Remove Alternative for affected goods movement companies based on work already undertaken in the Environmental Assessment.

Consultations with goods movement stakeholders will allow us to better understand the implications of the Remove alternative on goods movement stakeholders, both located in the study area, as well as goods movement stakeholders located outside the study area that uses this section of the Gardiner Expressway.

Included on the following pages are some background materials from the Public Forum 3 Presentation[1] as part of the *Gardiner Expressway/Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study,* as well as some analysis as to what the Remove alternative in the area would look like. Further information on work completed to date can be found at http://gardinereast.ca/

[1] This presentation can be found at: http://gardinereast.ca/sites/default/files//documents/TRN%20-%20presentation%20-%20PIC%203%20-%202014%2002%2006.pdf

Study Area



Source: Public Forum #3 Presentation, slide 5

Remove Alternative Overview

Revised Plan with a Two Sided Street

- Improved cross section to allow for an 8 lane boulevard with potential development along 85% of the north and south side of the street
- North side development provides a buffer from rail corridor
- Opens up entire ground level to light and air
- Extensively treed boulevard

Source: Public Forum #3 Presentation, slide 22

Remove Option vs. Maintain

1. Lake Shore at Sherbourne

Source: Public Forum #3 Presentation, slide 42

2. Gardiner at Sherbourne

Source: Public Forum #3 Presentation, slide 43

3. Don Valley Mouth

Maintain

Remove

Source: Public Forum #3 Presentation, slide 46

Maintain Option

Remove Option

Preliminary Evaluation Results

	Study Lens/ Criteria Group Summary	MAINTAIN	IMPROVE	REPLACE	REMOVE
TRANSPORTATION & INFRASTRUCTURE	Automobiles				
	Transit				
	Pedestrians				
	Cycling				
	Movement of Goods				
	Safety				
	Constructability				
URBAN DESIGN	Planning				
	Public Realm				
	Built Form				
ENVIRONMENT	Social & Health				
	Natural Environment				
	Cultural Resources				
ECONOMICS	Regional Economics				
	Local Economics				
	Direct Cost and Benefit				

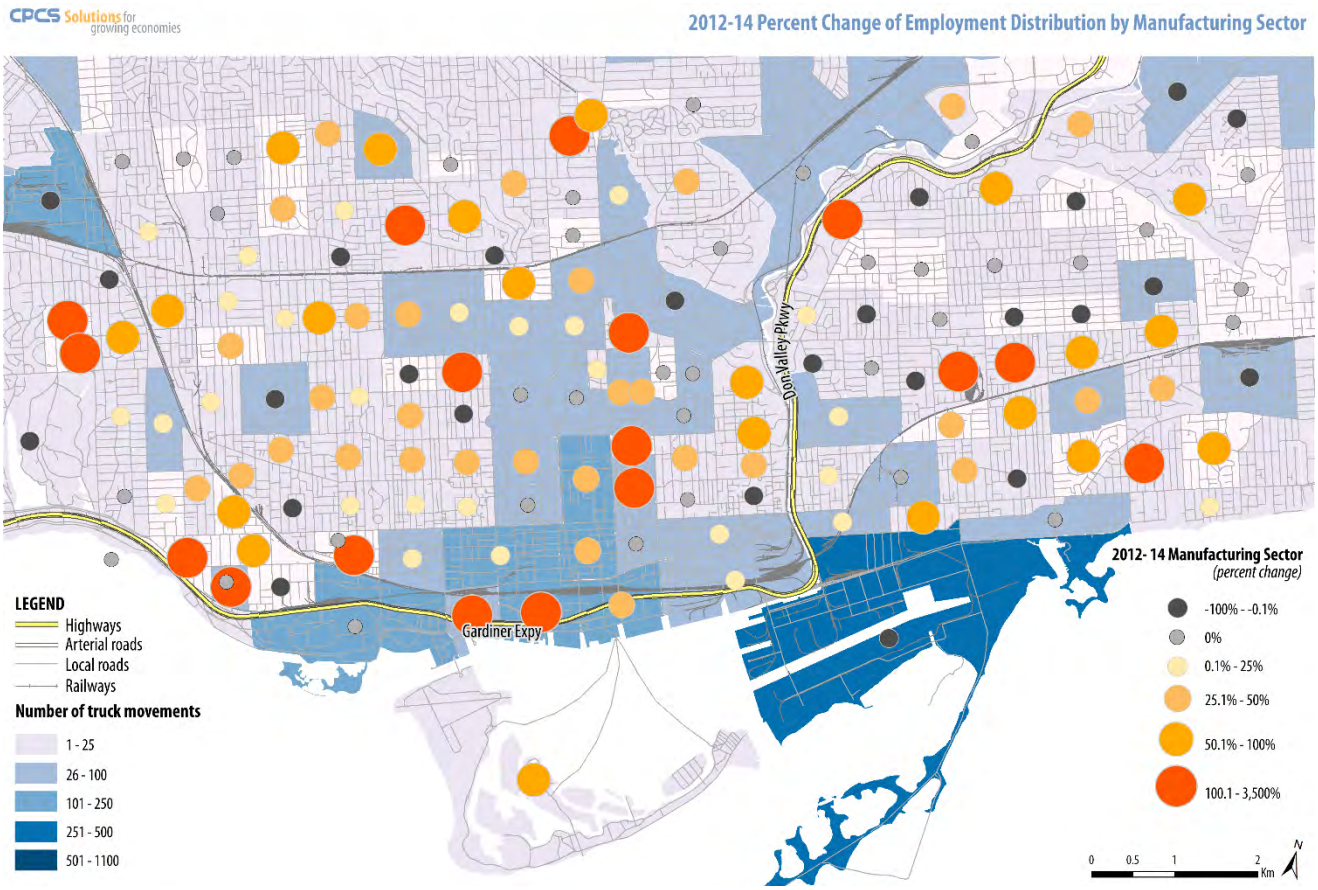
Preferred | Moderately Preferred | Least Preferred

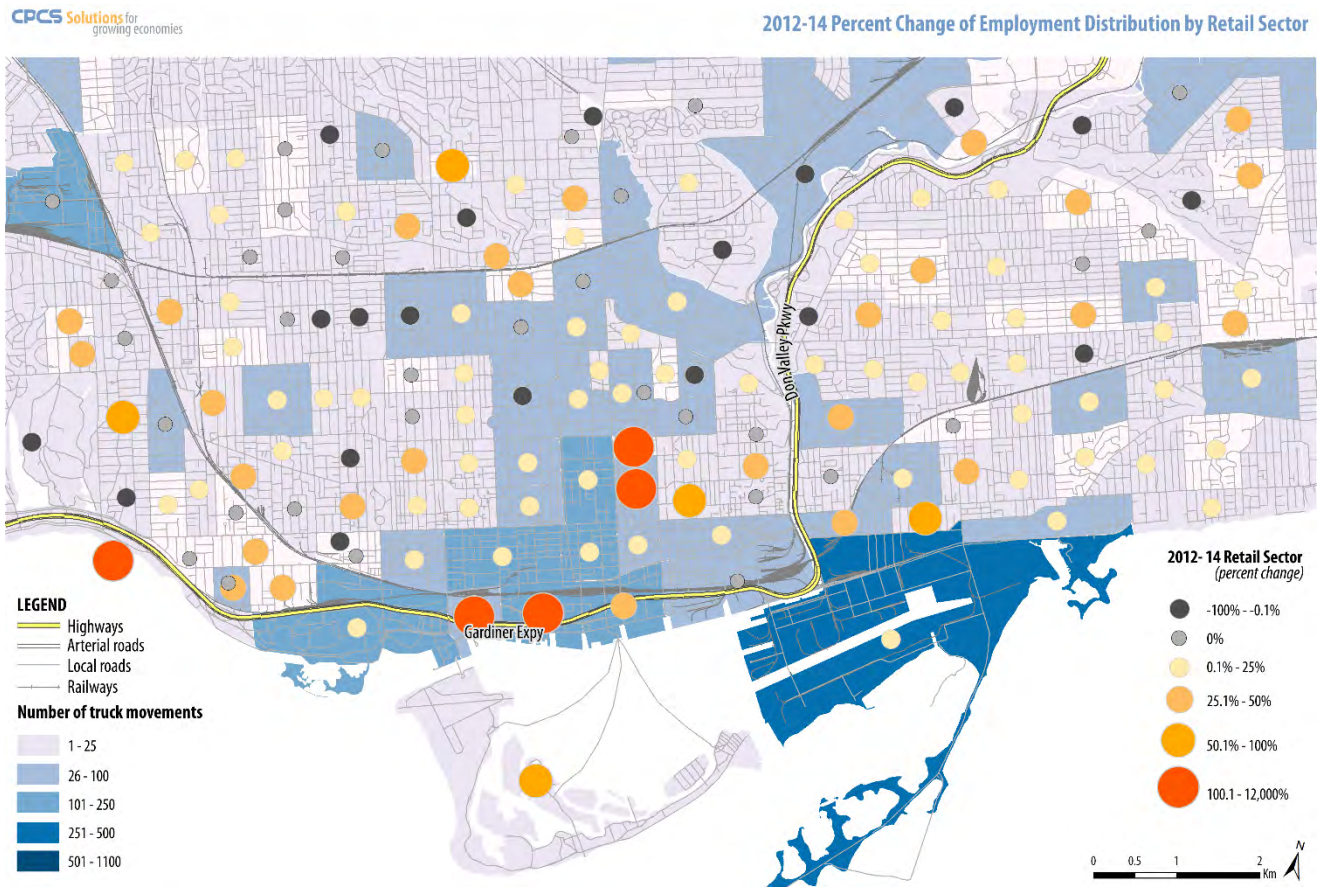
59

Source: Public Forum #3 Presentation, slide 59

Appendix B: Employment Change by Sector: GIS Analysis

This appendix contains a series of maps on GIS employment data for 2012 and 2014 from Statistics Canada overlayed with truck stop data provided by the Ontario Ministry of Transportation. Some sampling and sampling techniques employed by Statistics Canada have changed between 2012 and 2014 and the results may not be directly comparable. Still, the overall analysis in the maps below should provide some indication as to the changes in goods movement employment experienced in Toronto as well as the key locations. In some cases the percentage change is quite high. This may be due to sampling changes by Statistics Canada or to the establishment of a new business location in the area.




CPCS Solutions for growing economies
2012-14 Percent Change of Employment Distribution by Retail Sector
Don Valley Pkwy
Gardiner Expy
LEGEND
Highways
Arterial roads
Local roads
Railways
Number of truck movements
1 - 25
26 - 100
101 - 250
251 - 500
501 - 1100
2012- 14 Retail Sector
(percent change)
-100% - -0.1%
0%
0.1% - 25%
25.1% - 50%
50.1% - 100%
100.1 - 12,000%
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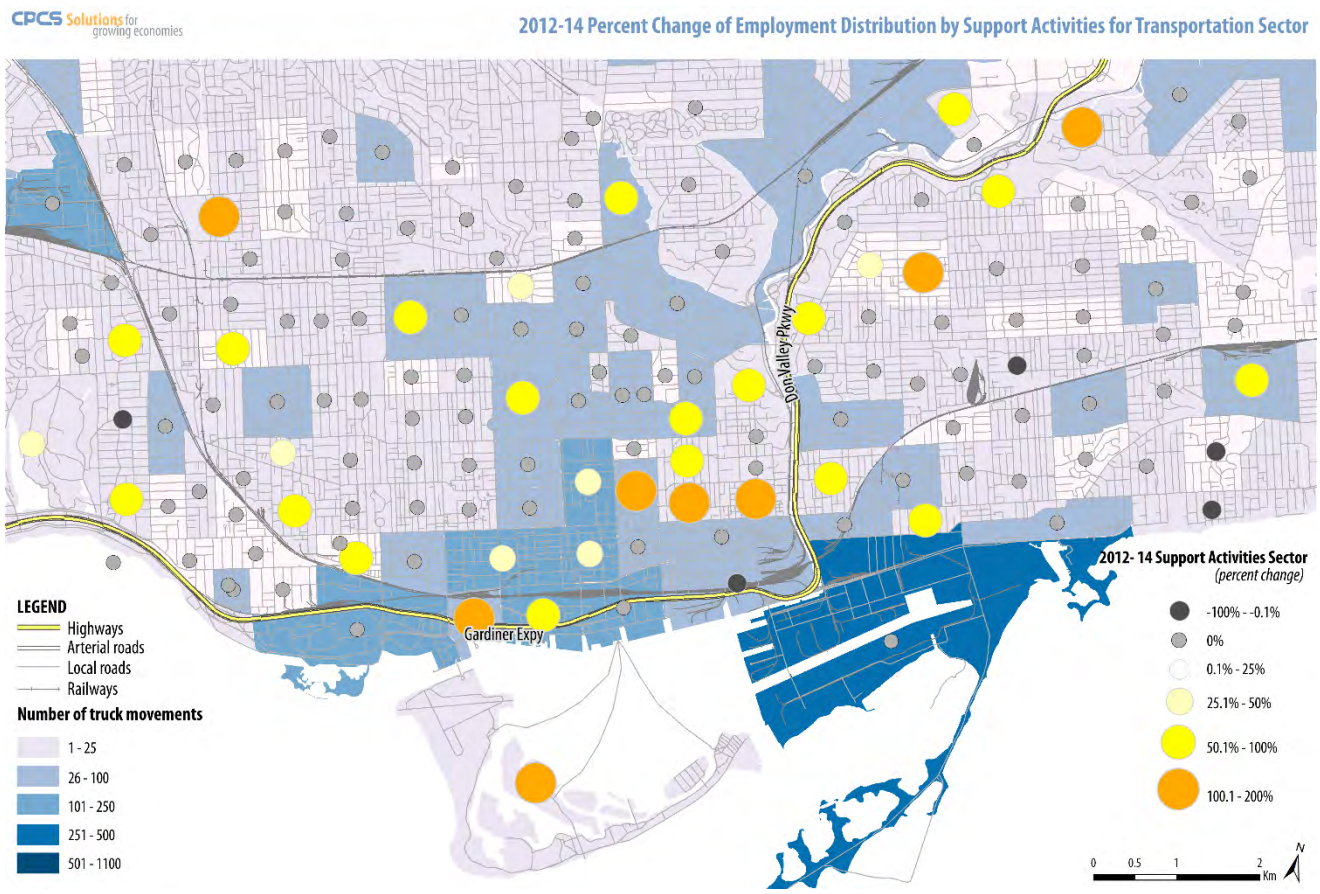
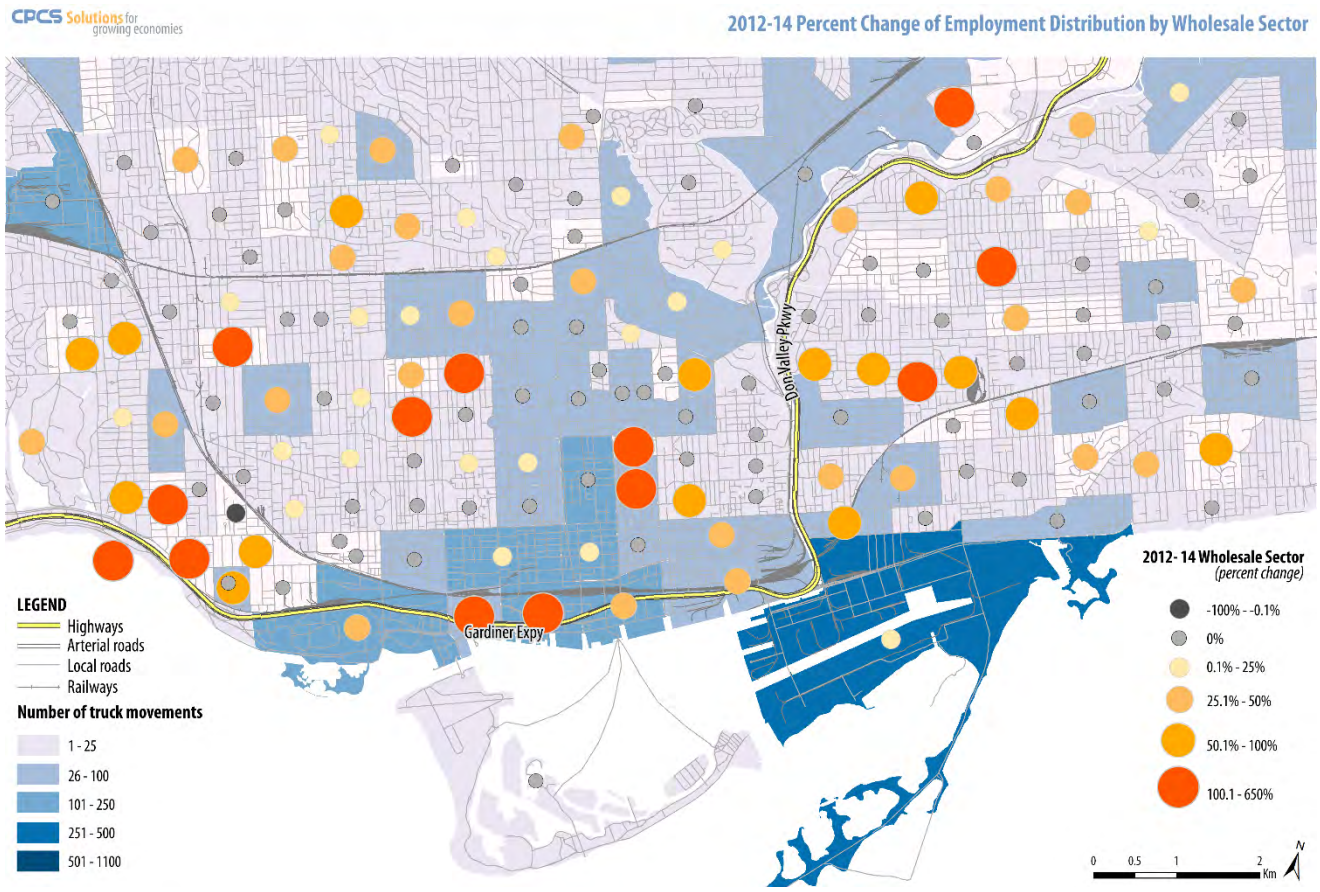
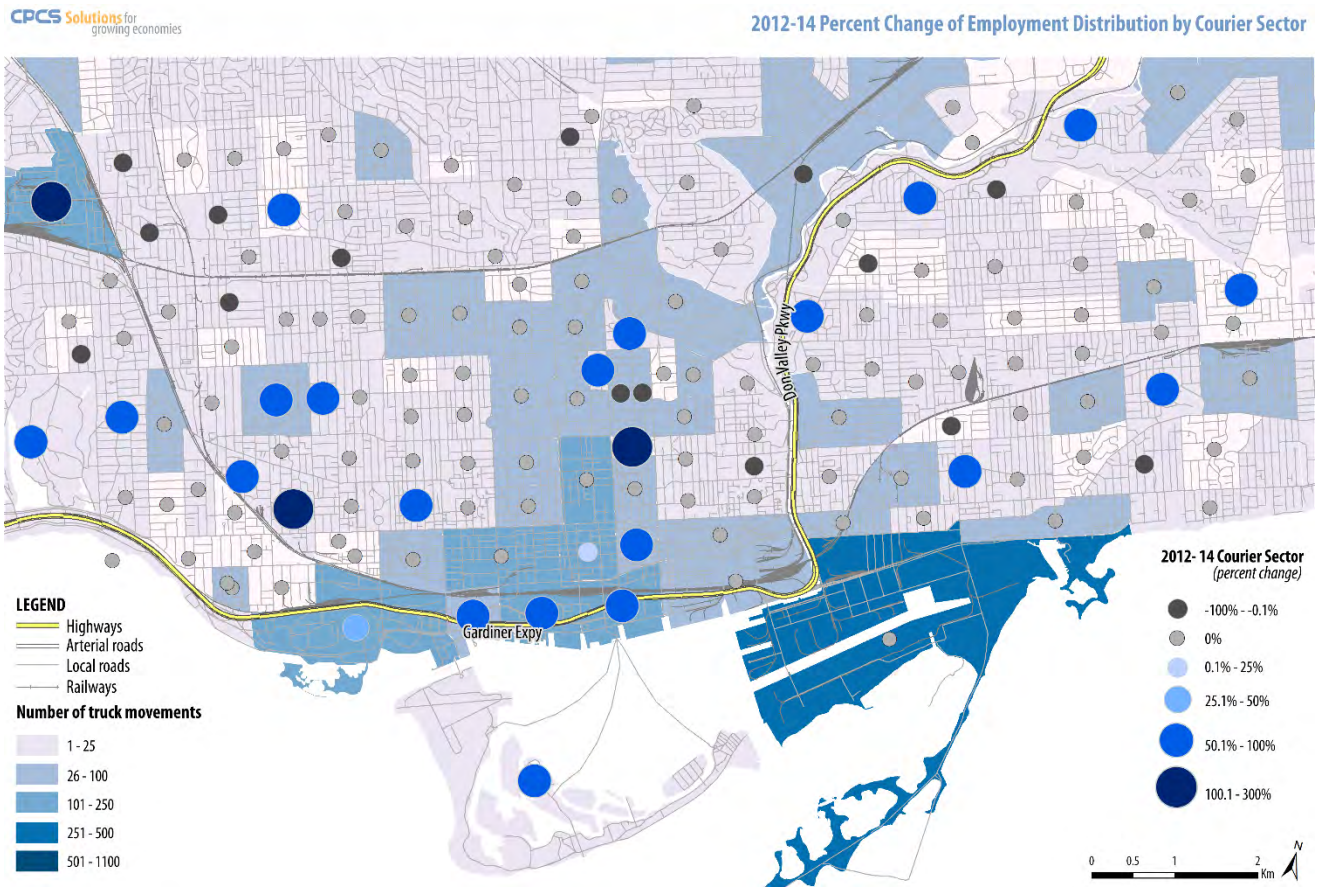
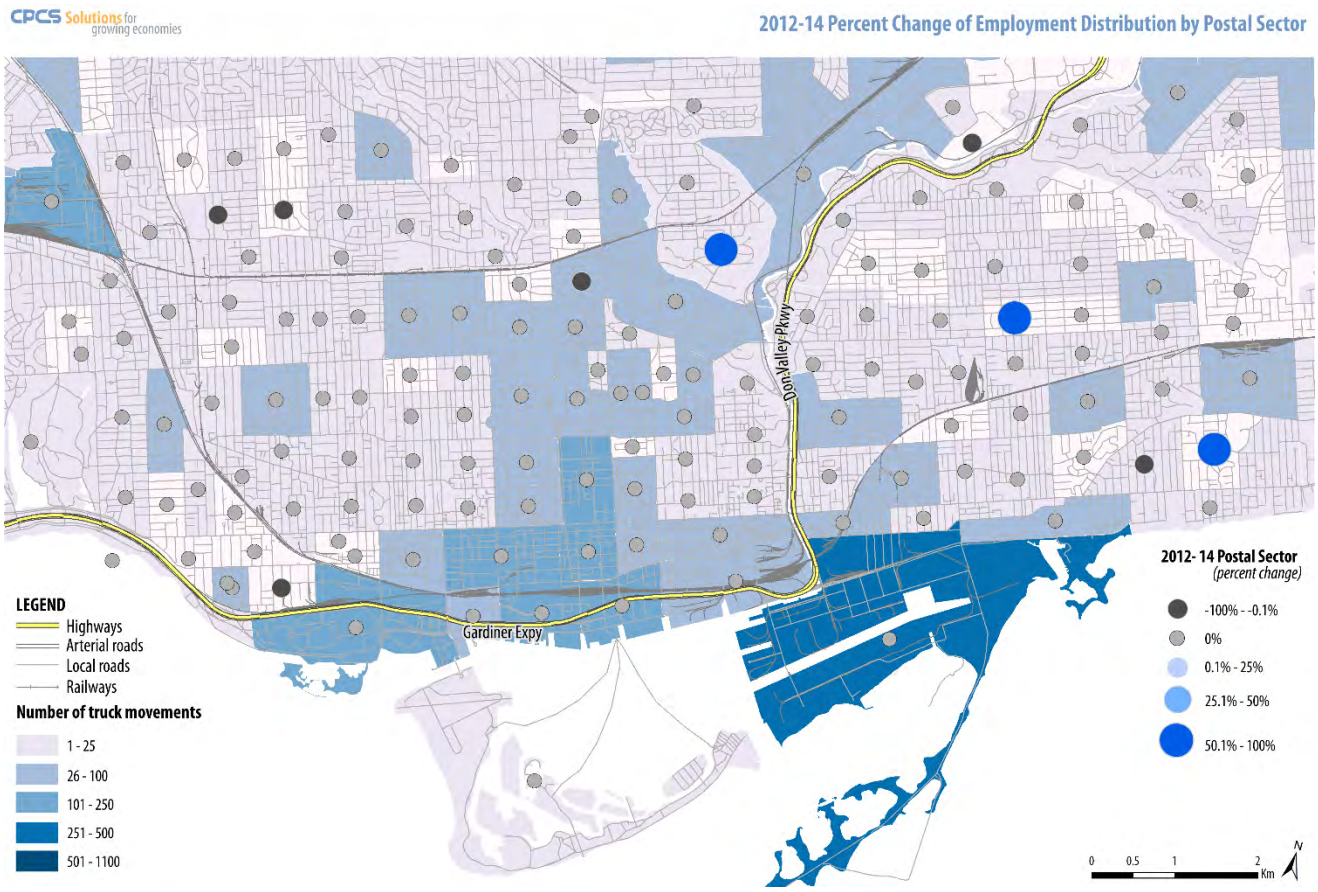
N


CPCS Solutions for growing economies
2012-14 Percent Change of Employment Distribution by Support Activities for Transportation Sector
Don Valley Pkwy
Gardiner Expy
LEGEND
Highways
Arterial roads
Local roads
Railways
Number of truck movements
1 - 25
26 - 100
101 - 250
251 - 500
501 - 1100
2012- 14 Support Activities Sector
(percent change)
-100% - -0.1%
0%
0.1% - 25%
25.1% - 50%
50.1% - 100%
100.1 - 200%
0 0.5 1 2 Km
N


CPCS Solutions for growing economies
2012-14 Percent Change of Employment Distribution by Wholesale Sector
Don Valley Pkwy
Gardiner Expy
LEGEND
Highways
Arterial roads
Local roads
Railways
Number of truck movements
1 - 25
26 - 100
101 - 250
251 - 500
501 - 1100
2012- 14 Wholesale Sector
(percent change)
-100% - -0.1%
0%
0.1% - 25%
25.1% - 50%
50.1% - 100%
100.1 - 650%
0 0.5 1 2 Km
N


CPCS Solutions for growing economies
2012-14 Percent Change of Employment Distribution by Courier Sector
Don Valley Pkwy
Gardiner Expy
LEGEND
Highways
Arterial roads
Local roads
Railways
Number of truck movements
1 - 25
26 - 100
101 - 250
251 - 500
501 - 1100
2012- 14 Courier Sector
(percent change)
-100% - -0.1%
0%
0.1% - 25%
25.1% - 50%
50.1% - 100%
100.1 - 300%
0 0.5 1 2 Km
N


CPCS Solutions for growing economies
2012-14 Percent Change of Employment Distribution by Postal Sector
Don Valley Pkwy
Gardiner Expy
LEGEND
Highways
Arterial roads
Local roads
Railways
Number of truck movements
1 - 25
26 - 100
101 - 250
251 - 500
501 - 1100
2012- 14 Postal Sector
(percent change)
-100% - -0.1%
0%
0.1% - 25%
25.1% - 50%
50.1% - 100%
0 0.5 1 2 Km
N

Appendix C: List of Stakeholders Consulted

Stakeholders Consulted

Stakeholder
United Messengers
Toronto Industry Network
Tim Horton's
St. Mary's Cement Group
St. Lawrence Market BIA
Sleep Country Canada
Siltech Corporation
Matt Roorda – Centre for Urban Freight Analysis
Redpath Sugar
Purolator
Ontario Trucking Association
Green For Life Environmental Corp.
First Gulf
Food and Consumer Products Canada
Courier and Logistics Association
Core Logistics International Inc.
CIMCO Refrigeration
Canadian Salt Company Ltd
Burnbrae Farms Inc.

Appendix D: Review of Potential Mitigation Options

Overview of Potential Goods Movement Constraints of the Remove Alternative

Key concerns regarding the Remove Alternative (as compared to the Elevated Expressway alternative) from goods movement stakeholders surround potential increases in travel time, reduction in reliability, and increases in transportation costs. This Chapter will discuss some potential mitigation measures that may be implemented to help reduce the impact on these three factors for goods movement stakeholders.

On a wider basis, the city is growing and experiencing ongoing development and change that will have impacts on goods movement no matter which option is chosen. These impacts are likely to be larger than the comparative impacts of the different options examined here for the Gardiner Expressway in the Study Area. No matter which option is chosen, strategies may need to be adopted to help goods movement stakeholders adapt to the ongoing changes in the City of Toronto and the anticipated increases in demand from passenger and commercial vehicles on roads and highways in the city. Mitigation measures identified in this section may also be applicable no matter which option is chosen under the EA process.

Identification of Mitigation Measures

Mitigation measures fall broadly into two categories: (1) Those that are targeted specifically at goods movement flows, and (2) Those that may reduce general congestion in the corridor and on alternate routes to the corridor, which will in turn improve the flows of goods moving in the corridor.

A key starting document in the management of congestion is the City of Toronto's Congestion Management Plan. This document highlights many key best practices in the management of congestion, Toronto's successes thus far in utilizing these strategies, and plans for wider scale implementation of programs to address congestion.

Key applicable congestion management strategies are mostly proposed to be implemented not only in the corridor but key alternate routes to the corridor. While stakeholders have provided some anecdotal examples of routes they would identify as key alternate routes, identification of a defined list of alternate routes should be constructed in consultation with stakeholders and the City of Toronto and Waterfront Toronto. Potential key alternate routes to be considered could include: Queen's Quay, Richmond, Adelaide, King, Front, Lake Shore Boulevard (in areas in the Study Area where the Gardiner Expressway remains), Dundas, and Bloor.

City of Toronto Congestion Management Plan

The City's Congestion Management Plan identifies congestion as costing $2.7 billion annually in lost economic output and accompanying job loss, in addition to the $3.3 billion it reports as the annual cost in terms of delay and increased vehicle operating costs. The plan identifies eight key strategies with several associated projects per strategy.

Figure 7-2: City of Toronto Congestion Management Plan

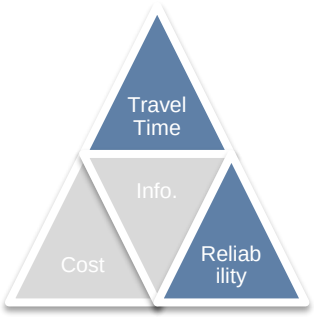
A. Intelligent Transportation Systems	B. Congestion and Engineering Studies	C. Incident and Event Response	D. Construction Coordination
A.1 Replacement of ATMS Software A.2 Enhanced Signal Control Modes A.3 Arterial CCTV Cameras A.4 Arterial Network Monitoring A.5 Update and Expand City Communications Networks A.6 Replacement of hardware	B.1 Auxiliary Signal Timing Plans B.2 Update Corridor Coordination Studies B.3 Active Traffic Management Feasibility Study B.4 Integrated Corridor Management Feasibility Study	C.1 Traffic Incident Management Team Procedures C.2 Service Patrols C.3 Steer It - Clear It Signage Program C.4 Universal Fire Station Pre-emption (Non-vehicle)	D.1 Smart Work Zones D.2 Lane Occupancy Permit Management D.3 Lane Occupancy Permit Review D.4 Work Zone Performance Management and Monitoring
E. Curbside Management	**F. Support of All Modes of Transportation**	**G. Traveller Information**	**H. Traffic Operations Centre (TOC)**
E.1 Parking Charge Review E.2 Develop Parking Strategies E.3 Smart Park	F.1 Transit Signal Priority F.2 HOV - Bus Lane Review F.3 Bicycle Facilities Expansion F.4 Corridor Renewal for Sustainable Transportation	G.1 Traveller Information Strategy G.2 VMSs including Display of Travel Times G.3 Event Database G.4 City Website Improvements G.5 Social Media G.6 Mobile Apps	H.1 Traffic Operations Centre Improvements H.2 Coordination with Emergency Services H.3 Coordination with Transit H.4 Coordination with External Agencies H.5 TOC Operations Coordination

Source: City of Toronto Congestion Management Plan. October 2013.

Mitigation measures proposed to reduce the impact on goods movement industries will build upon Toronto's existing congestion management plan as applicable, as well as propose some additional strategies based on case study reviews and reviews of trends and practices in freight transportation. The following sections review the eight congestion management strategies identified by the City of Toronto, and discuss how they can be best used to mitigate congestion in the GE/LSB corridor and wider Study Area. As relevant, they are also supplemented with additional discussion from review of other jurisdictions and best practice.

Some additional strategies not highlighted in the Congestion Management Plan that may be particularly applicable to goods movement are then also discussed.

Intelligent Transportation Systems



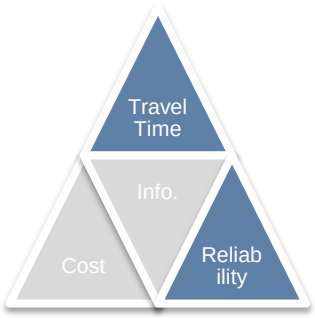
The City of Toronto has already been using Intelligent Transportation Systems (ITS) for years with the RESCU and SCOOT programs. Toronto's Congestion Management Plan notes that in Dallas-Fort Worth the implementation of ITS systems resulted in the equivalent of an estimated 30% increase in capacity.

A. Intelligent Transportation Systems
A.1 Replacement of ATMS Software
A.2 Enhanced Signal Control Modes
A.3 Arterial CCTV Cameras
A.4 Arterial Network Monitoring
A.5 Update and Expand City Communications Networks
A.6 Replacement of hardware

In terms of the initiatives identified by the City of Toronto a few may have particular applicability to support the reduction of congestion in the corridor and alternate routes, and speeding up the movement of goods in the corridor as a by-product of addressing overall congestion:

- Roll out enhanced signal control systems on intersections in the corridor as well as on key alternate routes
- Add additional CCTV cameras to corridor and key alternate routes
- Collect additional updated traffic flow data on key alternate routes to the corridor in order to prioritize actions on these routes

Congestion and Engineering Studies



One of the key initiatives identified by the City under this strategy is traffic signal coordination studies. The Congestion Management Plan predicts that traffic signal work completed in 2012 at 112 intersections along three corridors reduced traveller delays by 12%, number of vehicle stops by 12% and fuel consumption by 8%. The overall benefit/cost ratio of these activities was estimated at 66:1.[27] It is worth emphasizing the magnitude of the benefit/cost ratio estimated of this intervention. No infrastructure expansion plan or large capital intensive congestion management

B. Congestion and Engineering Studies
B.1 Auxiliary Signal Timing Plans
B.2 Update Corridor Coordination Studies
B.3 Active Traffic Management Feasibility Study
B.4 Integrated Corridor Management Feasibility Study

[27] City of Toronto. *Congestion Management Plan.* 2014-2018

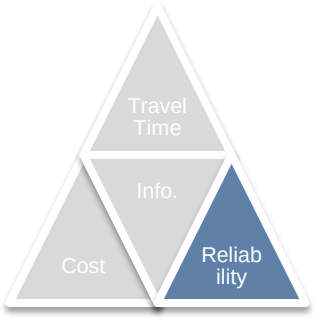
strategy would ever be expected to obtain benefit/cost ratios remotely approaching what has been estimated by the City under this program.

In 2014 such studies were carried out by the City on six corridors with 250 signals including: Sheppard Avenue East, Leslie Street, Islington Avenue, and Yonge Street. As a result of these studies total delay was reduced between 4-18% and reduced fuel consumption and associated emissions of between 1-7%.[28]

On the basis of the results achieved thus far, similar programs should be fast tracked for the corridor and alternate routes and other streets in the area where they have not already been carried out. Given such benefit/cost ratios it is recommended such programs be greatly expanded to aid congestion management in the corridor, alternate routes, and wider Study Area whether or not the Remove Alternative or an Elevated Expressway alternative is chosen under the EA process.

C. Incident and Event Response
C.1 Traffic Incident Management Team Procedures
C.2 Service Patrols
C.3 Steer It - Clear It Signage Program
C.4 Universal Fire Station Pre-emption (Non-vehicle)

Incident and Event Response



Traffic incidents are one of the key causes of delays and congestion on roadways. The efficient management and response to incidences can increase travel reliability and improve overall traffic flows on road and highway infrastructure. One of the key concerns identified by stakeholders under the Remove Alternative was the removal of an alternate routing (elevated expressway) in the event of an incident. For example, if there is an incident on the Gardiner, commercial vehicles can plan ahead and exit the Gardiner before the incident and use the Lake Shore Boulevard.

Conversely, the Remove Alternative may allow for design changes that could increase safety and reduce incidents in the corridor as well as increased accessibility for response vehicles that could allow for quicker response times to incidents than would be allowable comparably in the limited-access elevated expressway.

The City's RESCU system on the expressways currently represents a key asset in incident management. RESCU cameras currently exist on the Gardiner Expressway at several points in the Study Area. Under the Remove Alternative, RESCU cameras should be replaced at key points on the surface route to allow for real time information. Signage in support of the City's Steer It

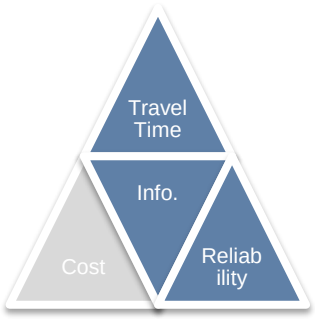
[28] City of Toronto. *Staff Report: Congestion Management Plan 2014-2018 – Update*. December 9, 2014.

- Clear It Program[29] should be prioritized in the corridor and key alternate routes if the Remove Option is elected.

Additionally, an ongoing feasibility study on exploring the potential for implementing roving service patrol vehicles along the Don Valley Parkway and Gardiner Expressway may result in additional options for more active incident management strategies for the corridor. Such strategies could lead to further reductions in incident response time and consequent reductions in the costs of delays caused by those incidents.

Construction Coordination

D. Construction Coordination
D.1 Smart Work Zones
D.2 Lane Occupancy Permit Management
D.3 Lane Occupancy Permit Review
D.4 Work Zone Performance Management and Monitoring



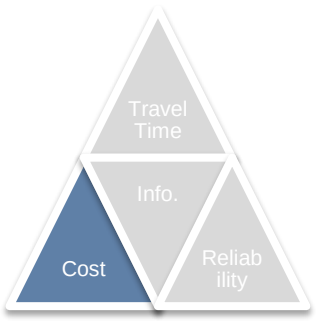
The impact of construction has been identified by stakeholders as one of the key concerns of the Remove Alternative. Stakeholders may presently not appreciate the impact of construction that the Elevated Expressway alternative would also represent on traffic flows. A coordinated campaign to educate goods movement stakeholders regarding the traffic disruptions from construction will allow stakeholders to plan ahead and allow for additional time for trips that need to be made or make other adjustments to their supply chains as applicable. In Los Angeles, an automated work zone information system was found to reduce vehicle hours of travel by 37% due to traffic diversion to alternate routes.[30]

Smart work zone systems including the use of cameras, vehicle detectors, and portable electronic messaging signs should be used as a part of the traffic management campaign during construction period under the Remove or perhaps also the Elevated Expressway alternatives. In Arizona, the smart work zone on SR-68 measured travel times on the work zone and reported the information to motorists to allow them to make real time route decisions; this was estimated to reduce traffic congestion from construction. The same system was used to monitor construction contractor performance, with financial incentives tied to traffic performance.

[29] Program encourages motorists involved in property damage only collisions on expressways to move their vehicles to a safe place if possible.
[30] City of Toronto. *Congestion Management Plan.* 2014-2018

E. Curbside Management
E.1 Parking Charge Review
E.2 Develop Parking Strategies
E.3 Smart Park

Curbside Management

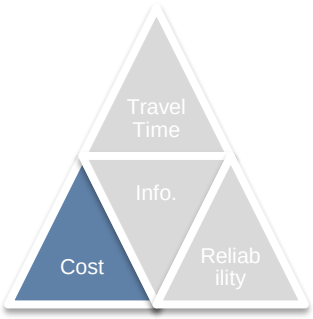


Though not directly related to the impacts of the Remove Alternative, many goods movement stakeholders mentioned parking availability for deliveries as a significant constraint to their operations in downtown Toronto. Time spent circling and looking for parking, or fines imposed when vehicles park illegally (stakeholders indicate sometimes they do not feel there are any options available) create real costs for goods movement stakeholders.

If the Remove Alternative results in increased travel times and/or reduced reliability, such costs may be partially offset for some stakeholders by an expansion of programs designed to increase the availability of parking and stopping areas for commercial vehicles making deliveries in the city. The City has recently implemented a courier zone pilot program in the downtown core to assist in the delivery of goods. Initial observations from the City were that these dedicated zones were being utilized during the defined times. The expansion of this program, especially within the transportation Study Area, would result in additional parking options available that would likely increase delivery costs for goods movement stakeholders.

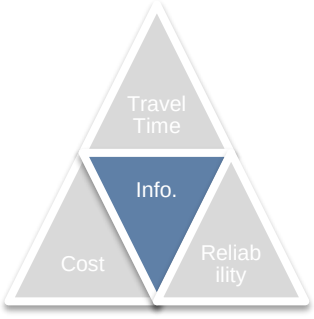
F. Support of All Modes of Transportation
F.1 Transit Signal Priority
F.2 HOV - Bus Lane Review
F.3 Bicycle Facilities Expansion
F.4 Corridor Renewal for Sustainable Transportation

Support all Modes of Transportation



While it is unlikely that goods movement stakeholders will change modes of transport used no matter whether the Remove or Elevated Expressway alternatives are proposed, supporting multimodal transportation can reduce passenger vehicle traffic, which in turn increases travel speeds for goods movement vehicles remaining. Separate discussion is included below regarding the use of HOV/HOT lanes, which has been mentioned as an initiative under this strategy.

Traveller Information



The availability of information allows stakeholders to make informed decisions regarding routing and transportation of goods. Some discussion is already contained above in obtaining additional real-

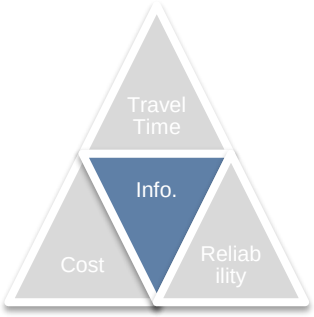
time traffic data and communicating real time traffic conditions, especially during construction periods when impacts on goods movement in the corridor may be highest. In Houston, Texas, real time travel information posted was shown to influence drivers' route choices: 85% of respondents stated they changed their route based on the information provided and 66% said that they saved travel time as a result. Variable-message signs (VMS) are one of the most direct ways to communicate with goods movement stakeholders regarding real-time traffic conditions. Information can also be shared with mobile applications or with carriers and fleets.

G. Traveller Information
G.1 Traveller Information Strategy
G.2 VMSs including Display of Travel Times
G.3 Event Database
G.4 City Website Improvements
G.5 Social Media
G.6 Mobile Apps

H. Traffic Operations Centre (TOC)
H.1 Traffic Operations Centre Improvements
H.2 Coordination with Emergency Services
H.3 Coordination with Transit
H.4 Coordination with External Agencies
H.5 TOC Operations Coordination

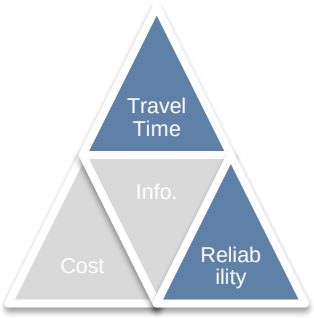
Traffic Information Centre

The City of Toronto has also identified several initiatives for the City's Traffic Operations Centre (TOC). This is the main centralized body to monitor and coordinate traffic conditions with other agencies such as public transit, government bodies, and emergency services, among others. While no specific initiatives have been identified under this category for goods movement, ongoing improvements planned will benefit the overall management of traffic and therefore the movement of goods throughout the City.



Off-Peak Deliveries

Off-peak delivery has been in use in a number of cities, most notably London and New York. Some businesses (e.g. those staffed 24 hours) have seen clear benefits, but for many off-peak delivery entails an additional cost. Thus, either the benefits in the form of passed-through savings and/or financial incentives must outweigh these costs, or new technologies and systems must bring down the cost of off-peak delivery.



Case Studies of Off-Peak Delivery Models

In London, the higher costs of freight transportation during the 2012 Olympic Games led many businesses to adjust their delivery schedules, including to the night-time. However, when the Games were over these businesses mostly reverted to their previous practices.

In New York, financial incentives were used to attract businesses to a night delivery trial. Receivers moving to unassisted night delivery largely retained these methods after the trial was over, due to the increased convenience and reliability.

London

Over 80% of freight in London moves by truck, with congestion being the biggest cost to the movement of goods in the city at £800 million per year and freight activity expected to increase by 15% by 2025.[31] In 2008, 33% of warden-issued penalty charges and 59% of camera PCNs (fines for parking/loading) were issued to commercial vehicles in 2008. In 2007, there were 419 incidents resulting in death or serious injury related to collisions involving commercial vehicles.

London has been a leader in off-peak deliveries, having implemented a number of off-peak trials. Much of the focus in London has been on making off-peak delivery quieter. In November 2014 the city hosted the Quiet Cities Global Summit for operators, customers, and policymakers, where Transport for London (TfL) released a guidance for fleet operators making off-peak deliveries[32] and where exhibitors showcased new urban freight products, such as DHL's bespoke 'city quiet' gas-powered truck. TfL's guidance was based on the experiences of the Re-timing Deliveries Consortium, a joint effort of freight industry representatives, retailers, and several London boroughs, which is conducting trials on quiet delivery technology and practices.

The UK's Department for Transport (DfT) spearheaded Quiet Delivery Demonstration Scheme (QDDS) trials in 2010 at six retailer premises, predominantly supermarkets, across England.[33] A larger trial was led by TfL during the 2012 Olympic Games. Building on these, the DfT has prepared a good practice guide for retailers, operators, and local authorities.[34] The Freight Transport Association, one of the partners of these studies, has also prepared a toolkit for implementing night-time delivery trials.[35]

Surveys found that 57% of businesses and 58% of freight operators made at least one change to their operations during the Olympic Games (1,000 of each were surveyed) – 41% of businesses changed delivery times; 5% retained these changes after the Games. Night-time deliveries were used by 15% of businesses. The biggest barriers to night-time delivery cited by businesses were cost increases (e.g. staffing costs), night-time delivery restrictions, and

[31] National Cooperative Freight Research Program. *Report 14: Guidebook for Understanding Goods Movement*. 2012
[32] Transport for London, Re-timing Deliveries Consortium, *Getting the timing right: Making the most of quieter times for deliveries.* 2014.
[33] Department for Transport, with the Freight Transport Association and the Noise Abatement Society. *Quiet Deliveries Demonstration Scheme: Case Studies.* 2011.
[34] Department for Transport, *Quiet Deliveries Good Practice Guidance* (several documents for various different stakeholders: see http://www.fta.co.uk/export/sites/fta/_galleries/downloads/delivery_improvement.pdf)
[35] Freight Transport Association, *Delivering the goods: a toolkit for improving night-time deliveries.*

unsupportive customers. TfL noted that other motivational factors would need to be in place to sustain shifts to night delivery.[36]

A smaller, separate trial in the borough of Wandsworth was carried out by Sainsbury's (third largest supermarket chain in the UK) working with a local organization called the Noise Abatement Society. Between October and December, the trial was found to have:

- Reduced the maximum recorded noise level by 8-10 decibels by using dock curtains
- Reduced average delivery vehicle journey times by 60 minutes over a round trip from the distribution centre
- Produced a savings in drivers' time of two hours per day
- Removed 700 vehicle journeys from the road annually
- Increased store sales by 5-6% because of product availability at opening time (as opposed to receiving throughout the day)

New York

A study for the New York City Department of Transportation (NYC DOT) found that increased truck tolls, for example those implemented on the Tappan Zee Bridge, were minimally effective at changing delivery schedules.[37] Financial incentives to receivers were found to be somewhat more effective. A 2007 study of Manhattan showed that every $2,000 in tax deductions to receivers would increase carriers' off-peak delivery market share by around 1-2 percentage points.[38] A combination of commercial vehicle tolls and tax deductions would have the largest effect.

New York carried out a 2010 pilot project to shift Manhattan deliveries to night hours with businesses including Sysco, Whole Foods, New Deal Logistics, and Foot Locker. Receivers gained improvements in reliability and higher staff productivity, while carriers saved time and money from faster speeds, shorter unloading times and fewer parking tickets.

The night delivery was of two kinds: staffed and unstaffed. The pilot project found that **all of the receivers trying staffed night delivery reverted back after the pilot project, whereas almost all receivers doing unassisted delivery retained night delivery.**

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[36] Transport for London. *Olympic legacy monitoring: Adaptations to deliveries by businesses and freight operators during the Games. Travel in London supplementary report.* 2013.

[37] Cambridge Systematics. Technical memorandum prepared for the New York City Department of Transportation and the New York City Economic Development Corporation. *Congestion Mitigation Commission Technical Analysis: Night Delivery Incentives.* 2007.

[38] Holguín-Veras et al, Journal of the Transportation Research Board, No. 1966. *Effectiveness of Financial Incentives for Off-Peak Deliveries to Restaurants in Manhattan, New York.* 2006.

The key findings relating to receivers were[39]:

- Superior reliability of off-peak delivery compared to regular-hour delivery
- Ability to rectify delivery errors earlier in the day, with less of an impact on business operations compared to regular delivery
- Off-peak delivery can be performed safely, with neither the driver nor the business at risk
- Off-peak delivery can have minimal impact on local communities (no noise or other complaints received during the pilot)
- Superior reliability, reduced inventories, and more efficiencies in staff usage resulting from unassisted delivery compared to staffed delivery
- Participants reported that fewer daytime deliveries allowed shops and restaurants to focus more on their customers and staff were more productive since they were not waiting for deliveries
- Time spent by carriers at the receiver's location was reduced from 1.8 hours to 0.5 hours
- Travel times from depot to the first stop in Manhattan improved by 75%

The attractiveness of unassisted delivery was affected by whether the business had a trusted vendor, and also the risks perceived by the business. It was noted that the optimal level of off-hours delivery for a single receiver was typically much less than 100%. Generally, the trade-off between staffed and unstaffed delivery is between cost and risk. Inclination to participate in unassisted delivery was highest for mid-sized companies with 16-20 employees.

In the Manhattan case study, the effects of various incentives on receiver participation in unassisted off-peak delivery were studied. A one-time financial incentive to receivers ranging from $1,000 to $9,000 was found to be effective up to $4,000, above which level financial incentives have little effect. An incentive of $4,000 increased participation by 16.4% (compared to no incentive), while carrier discounts of 50% increased participation by 20.6% (compared to no discount). Business support services and public recognition had a modest effect of under 5% apiece.[40]

Some of the systems and technologies that can facilitate unassisted delivery are:

- Giving the carrier access to a receiving area by key or keypad, where the receiving area may be separated by locked door from the rest of the premises
- A "virtual cage" using laser beams that activates an alarm if penetrated

[39] Holguín-Veras et al, Transportation Research Board, *Unassisted Off-Hour Deliveries and Their Potential Role in Freight Transportation Demand Management: Results From an Attitudinal Survey.* 2013.
[40] Holguín-Veras et al, 2013

- Giving the carrier a separate key providing access to a box that contains the key to the receiving area

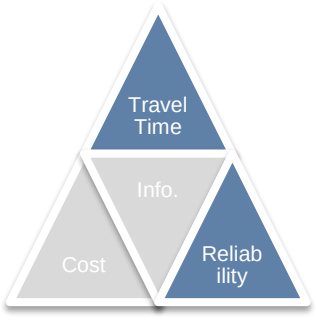
Key Lessons

Although Off-Peak Delivery programs may appear simple and straightforward solutions, both the supply chains of industries affected as well as existing laws and regulations can provide hurdles to program implementations. Challenges, for example, include increased noise pollution that may be caused by overnight deliveries (vehicles backing up, vehicles unloading, etc.) especially in mixed-use areas with residents close by.

While transportation costs for carriers are much less during off-peak hours, many receivers are not equipped to receive deliveries at night. Generally, receivers do not deem the cost of staffing for overnight deliveries to be worth the benefits of potentially increased transport costs or more reliability and reduced travel time in deliveries. In both London and New York, assisted deliveries (where the receiver paid staff overnight to receive the delivery) were not continued after trial periods were complete. In the New York case, where financial incentives were provided to encourage receivers to invest in technologies to allow for unassisted deliveries, most receivers elected to continue with off-peak deliveries once they had the systems in place to receive them unassisted.

Off-peak deliveries may be used as a strategy to address increased congestion as a result of the Remove Alternative or as a result of the general wider increase in congestion resulting from growth in the city, but likely these will require planning for noise reduction strategies on the carrier side and providing programs or incentives to encourage receivers to develop systems to allow them to receive deliveries unassisted.

Preferential Lane Treatments



Truck Only Lanes

While currently not widely used, truck lanes are an alternative that can facilitate reliable, efficient goods movement in an urban area. Truck lanes have typically been implemented or proposed on routes that are highly congested and either provide access to important ports or intermodal facilities or are on significant truck through routes. For example, the Clarence Henry Truckway in Louisiana provides access to the Port of New Orleans. In the Los Angeles area, dedicated truck lanes exist on I-5 and are being considered on I-710, which connects I-5 to the ports of Los Angeles and Long Beach. In Chicago, a two-lane “Mid-City Freightway” has been proposed as a grade-separated bypass road and intermodal connector.

A feasibility study in southern California suggests a minimum of 30% trucks with peak hour volumes greater than 1,800 veh/lane.[41] The cost of financing truck-only lanes is a complicated and controversial issue. Most proposals have assumed that new lanes should be paid through tolls, but there are various disagreements about whether non-users should contribute, either because of benefits related to congestion reduction or because of the equity truck operators may have in existing roads.[42]

Truck lanes have often been proposed as large-scale facilities, sometimes with their own on- and off-ramps, but there are also cases where simpler urban truck-only roads have been built. A good example is the South Boston Bypass Road in the growing Seaport District, which received federal funding as part of the Big Dig construction project and was intended to redirect truck traffic from I-93. This two-lane road, grade-separated at most intersections, is restricted to commercial vehicles, with simple signposts indicating its restricted use. However, there are increasing pressures to open up the road to all vehicles. In 2014, road usage nearly tripled when it was temporarily opened to regular traffic during the closure of the Callahan Tunnel. The Massachusetts DOT intends to launch a pilot project in 2015 allowing public use of the road in the northbound direction between 6:00 and 10:00am on weekdays.

Reversible Flow and Peak Shoulder

Reversible flow lanes use either signs or movable barriers to increase road capacity in the high-demand direction. Toronto has experience with these with the Jarvis Street fifth lane. Examples of roads that use movable barriers include the Tappan Zee Bridge in New York and the San Diego-Coronado Bridge in California. HOV restrictions can be combined with reversible flow lanes.

The state of Colorado is implementing peak period shoulder lanes on the I-70 toward Denver. This will allow the centre shoulder lane to serve as a third travel lane at peak hours, reducing congestion. In this case, the lane will also be priced. While there may not be the availability of a shoulder on the proposed Lake Shore Boulevard surface route, implementing peak shoulder lanes may be possible in other parts of the corridor where goods movement vehicles travel (for example further west on the Gardiner or on northern parts of the DVP where GO buses currently use shoulder lanes). While this may not change the travel time in the surface route east of Jarvis, this would reduce the overall travel time of a goods movement trip using that route and mitigate the impacts of any increase in travel time associated with the Remove Alternative.

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[41] Southern California Association of Governments, cited in US DOT Federal Highway Administration, Forkenbrock and March, *Issues in the Financing of Truck-Only Lanes.* 2005.
[42] FHWA, 2005

Use of shoulder lanes during peak travel times is also used internationally in countries like Germany and the UK. This strategy is often combined with speed harmonization, such that the lane becomes available for use when upstream congestion causes the traffic speed to drop. Emergency call boxes are provided at refuge areas to support safe operation in case of vehicle breakdown or accident.

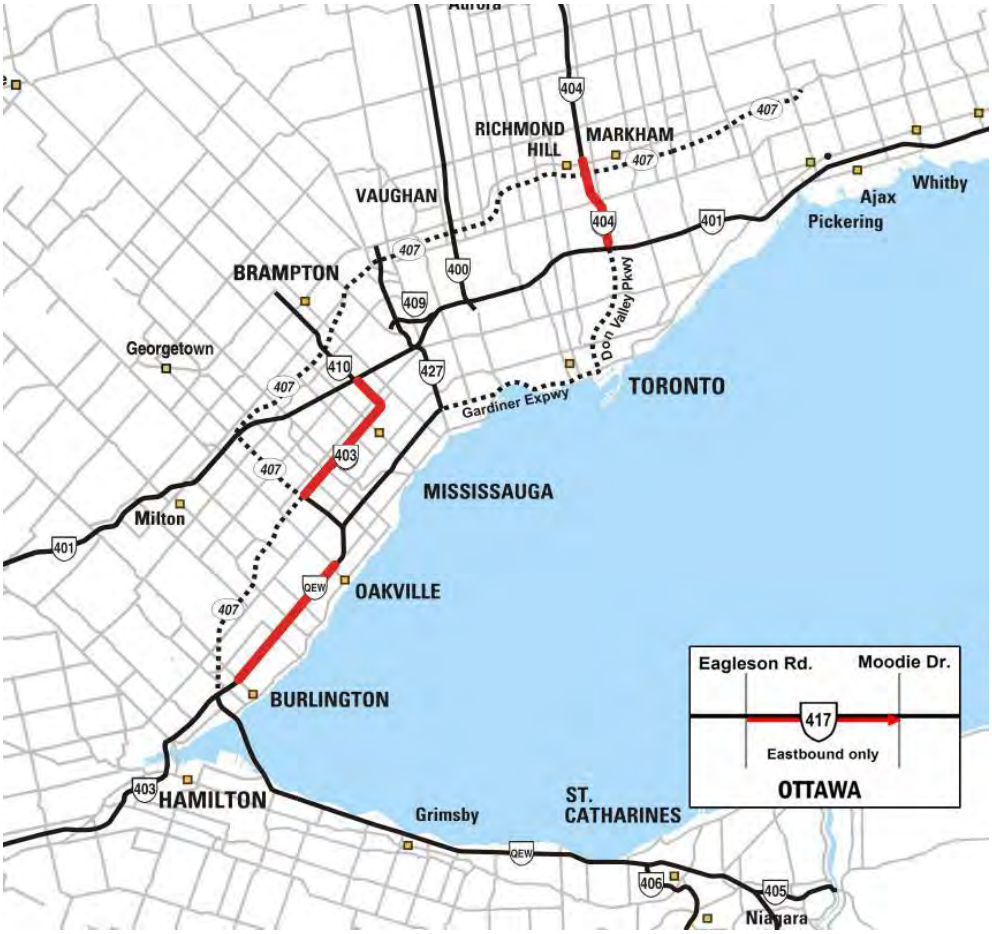
HOV Lanes

The simplest approaches in preferential lane treatments are most notably high occupancy vehicle (HOV) lanes. Such lanes have been in use since at least 1969, when they were introduced on the I-395 in Virginia between Washington D.C. and the Capital Beltway. HOV lanes have rapidly increased in popularity since the 1980s. HOV lanes are used on five arterial corridors in the City of Toronto and have been used on Toronto-area highways since 2004.

HOV lanes vary in their operating characteristics in a number of ways, including number (one lane or several), type (left or right), separation (stripes, buffers, or barriers), access (continuous, intermediate, or none), minimum number of patrons (typically two or three), hours of operation (all day or at peak periods), and alternative eligibility (e.g. buses, motorcycles, alternative fuel vehicles).

In the GTHA, there are several HOV lanes currently in place managed by the Ontario Ministry of Transportation. These lanes are accessible to passenger vehicles and commercial trucks less than 6.5 metres long carrying at least two passengers.

Figure 7-3: HOV Lanes Maintaned by the Ontario Ministry of Transportation



Source: Ontario Ministry of Transportation

HOV lanes are a part of the demand-side management of congestion that encourages passengers to carpool and allow for a more efficient utilization of the existing road infrastructure. MTO plans to expand the use of HOV lanes on the 400 series highways over the coming years to better manage congestion of the highways.

In order to lessen the impact of congestion from the Pan American Games, the Province of Ontario is planning on implementing a widely expanded network of “priority lanes” during the games; these lanes will be dedicated to high-occupancy vehicles (3+), transit, and Games Family. The lanes will be implemented in advance of the games to allow travellers to adjust to the lanes prior to large increases in traffic expected as a result of the games. Below is a proposed network of priority lanes in the downtown region, including through the Study Area.

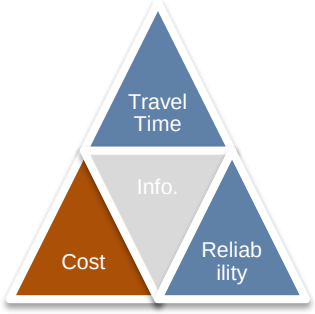
Figure 7-4: Proposed HOV/Priority Lanes to be Implemented for 2015 PanAm Games

Source: Let's Go: Toronto 2015 Pan Am/Parapan Am Games Strategic Framework for Transportation

The implementation of these lanes through the Study Area and the GE/LSB corridor will allow for a real test evaluation of the effectiveness of HOV lanes in managing congestion in the corridor. This should be monitored and evaluated as a part of the identification of preferred mitigation measures in the event the Remove Alternative is chosen as the preferred option.

The proposed priority lanes include access for transit vehicles and Games Family. A more guaranteed method of mitigating impacts on reliability and travel time for commercial vehicles under the Remove Alternative would be the inclusion of commercial vehicles in those vehicles permitted in proposed HOV lanes through the corridor. Such a proposal would need to be examined in the context of the effectiveness of the Pan Am Games program and the feasibility,

safety, and desirability of prioritizing commercial vehicles in addition to high occupancy vehicles through the corridor.



HOT Lanes

High Occupancy Toll (HOT) lanes are similar to HOV lanes, except they also permit single occupant vehicles provided such vehicles pay a toll. This allows those most willing to pay for preferential travel time and reliability to do so. Many argue that traditional HOV lanes are often under-utilized and therefore are not an efficient use of road infrastructure (i.e. actually reduce road throughput). HOT lanes allow for additional traffic to pay for the reduced travel time and increased reliability that HOT lanes provide.

The creation of an HOT lane in the GE/LSB corridor and potentially on the Don Valley Parkway (for example using existing GO Bus exclusive lanes) that is accessible to commercial vehicles willing to pay would provide a mitigation tool for goods movement stakeholders who deem the costs of the increased travel time to be greater than the costs of the HOT lane (i.e. they save money by using the HOT lane as this allows for quicker travel). Decisions on when to use HOT lanes may depend on goods being moved, delivery schedules and supply chains, and traffic conditions on a particular day, among other reasons. In this case, stakeholders using a HOT lane would be exchanging improvements in reliability and travel time for increased transport cost (cost of toll).

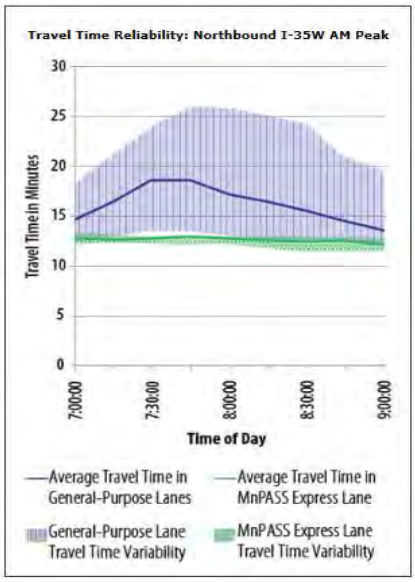
The table below summarizes some key HOT lanes in urban areas in the United States.

Figure 7-5: HOT Lanes in the United States

Corridor	Metropolitan Area	Free Travel	Maximum Price
I-15	San Diego	2+ person vehicles, low emission vehicles	$0.50 to $8
IH 45, US 59, US 290, I-10	Houston	2+ to 3+ person vehicles	$1 to $7
I-394, I-35	Minneapolis	2+ person vehicles	$0.25 to $8 for each of two segments
I-25	Denver	2+ person vehicles	$0.50 to $5
I-15	Salt Lake City	2+ person vehicles, C Decal clean vehicles	$0.25 to $1 for each of 6 payment zones
SR 167	Seattle	2+ person vehicles	$0.50 to $9
I-95	Miami	3+ person vehicles, hybrid vehicles	Was $0.50 to $10.50 – now Phase 2 to open spring 2015
I-680	San Jose (Alameda County)	2+ person vehicles, low-emission vehicles	$0.30 to $7.50

SR 91	Los Angeles (Orange County)	3+ person vehicles (free or 50% discounted)	$1.45 to $9.85
I-85	Atlanta	3+ person vehicles	$0.01 to $0.90 per mile
I-110 and I-10	Los Angeles	2+ to 3+ person vehicles, clean air vehicles	$0.25 to $1.40 per mile
I-95, I-495	Washington D.C. (Virginia)	3+ person vehicles	$0.20 to $1.50 per mile

Source: CPCS research (State agencies, websites accessed 2015)



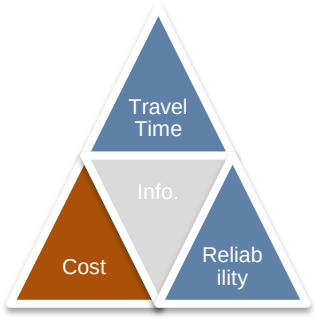
Minneapolis Case

Source: USDOT FHWA 2013

Minneapolis – HOT Lane Implementation

In Minneapolis, the conversion of HOV to HOT lanes has resulted in increased peak throughput. Corridor peak throughput increased by 5% on I-394, and by 6.5% and 9% in the am and pm peak periods, respectively. There was also evidence of increased travel speeds in the general lanes as traffic was spread out more evenly across the roadway: a 6% growth in the case of the I-394 (maintained from 2006 through at least 2012).[43]

Compared to general-purpose lanes, the major advantages of HOT (as well as HOV) lanes are travel time and reliability. The HOT lanes on the I-35 achieve time savings of up to 6 to 7 minutes compared to general-purpose lanes, and have substantially lower variability in travel time (see graphic).[44]



Other Pricing Strategies

In addition to these corridor-based measures, several cities in the world have adopted cordon-based congestion pricing schemes in the city centre.

[43] US Department of Transportation, *Post-hoc evaluation of a HOT lane implementation in Minneapolis-St. Paul*. 2013.

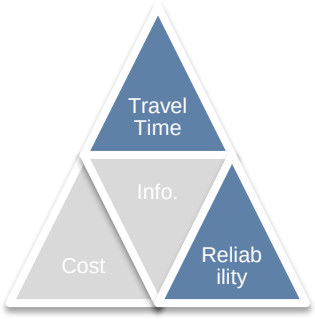
[44] US Department of Transportation, Federal Highway Administration, *2011 Urban Congestion Trends: Improving Travel Time Reliability with Operations.* 2013.

Figure 7-6: Major Cities with Congestion Charges

City	Year	Time of Day	Charge	Notes
London	2003	Weekdays 7:00 am-6:00pm	£11.50 ($22)	Cameras and licence plate readers. Charge is for full day's access; exemptions for accessible vehicles, taxis, buses, electric vehicles; discounts for residents. Modest discounts for business fleets
Milan ("Area C")	2012	Weekdays 7:30am-7:30pm (-6:00 pm on Thursdays)	€5 ($7)	Cameras and license plate readers. Charge is for full day's access; exemptions for various vehicles (including electric vehicles); discounts for residents and with multiple-day tickets
Singapore	1975	Weekdays & Saturday. All-day	Varies	Gantries and in-vehicle units. Functionally similar to express toll routes (e.g. 407 ETR near Toronto), but all roads into downtown area are tolled. Rate varies by route and time period and is revised quarterly, with the objective of optimizing speeds on arterial roads and expressways. Present system replaced an area-pricing scheme dating to 1975. Heavy trucks and buses pay a proportionally higher rate of 1.5-2 times the light vehicle rate
Stockholm	2007	Weekdays 6:30am-6:30pm	Varies; Max 60 SEK ($9)	Cameras and licence plate readers and transponders. Charge is for single passage and varies by time of day; there is a daily maximum. Exemptions for various vehicles, including electric vehicles

Source: CPCS (Government agencies, websites accessed 2015)

Increase Alternate Capacity



New Road Capacity

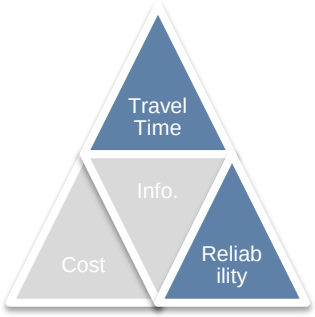
Another way to mitigate the impacts of increased travel time or reduction in reliability under the Remove Alternative would be to increase capacity in other alternate corridors or routes in order to relieve congestion through the GE/LSB corridor. For example, expanding capacity where feasible on alternate routes such as Front, Queens Quay, Richmond, Adelaide among others would relieve congestion on the surface Lake Shore Boulevard under the Remove Alternative by attracting traffic away from the corridor. Other strategies to increase capacity such as increasing the off-ramp capacity at interchanges leading up to the Study Area to allow for quicker entrance to the city from earlier off-ramps may also relieve congestion in the proposed surface route.

Increasing capacity is generally a more capital intensive mitigation strategy than some of the other mitigations proposed but allows for a higher total flow of vehicles and capacity to move goods and passenger vehicles. Increased highway capacity in other parts of the region may also draw trips away from the Study Area. Metrolinx has identified increased highway capacity, particularly for goods movement, as one of its key goals in *The Big Move.*[45]

Public Transit Improvements

Several public transit improvements are already considered in the 2031 projections in the Gardiner Expressway Environmental Assessment Report. Increased public transit is identified in most case studies as one of the main mitigation measures planned. For example, San Francisco increased ferry service when the Embarcadero Freeway was removed. While the movement of goods will not be expected to shift to public transit in any meaningful way, increased public transit may reduce congestion faced by commercial vehicles by removing demand from passenger vehicles.

Operational Improvements



In addition to the operational improvements proposed under the City's Congestion Management Strategy, identification of other operational improvements may allow for other tools to reduce congestion without significant capital expenditures. The Federal Highway Administration with the US Department of Transportation published a Congestion Reduction Toolbox[46] that outlines various measures to improve congestion including "Improving Service on Existing Roads". Topics on Arterial Management, Traffic Operations and Road Weather Management may be of use to supplement ongoing work from the City of Toronto's Congestion Management Report.

The Texas Transportation Institute analyzes the impact of operational treatments to improve congestion using existing infrastructure and summarizes the impact of operational improvements on urban congestion in the United States.

[45] http://www.metrolinx.com/thebigmove/en/lookingforward/5_4_longerTerm.aspx
[46] http://www.fhwa.dot.gov/congestion/toolbox/service.htm

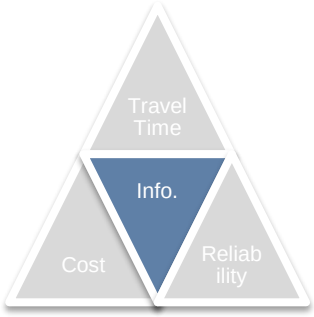
Figure 7-7: Estimated Delay Reduction From Operational Improvements

City Size and Number Analyzed	Estimated Reduction Due to Current Projects			Estimated Delay Reduction If in Place on All Roads (millions hours)
	Hours of Delay Saved (millions)	Gallons of Fuel Saved (millions)	Dollars Saved (USD$ millions)	
Very Large	250	151	5760	619
Large	71	30	1617	97
Medium	16	4	358	42
Small	4	1	89	9
Other	33	8	750	75
TOTAL	374	3	8484	842

Source: Texas Transportation Institute

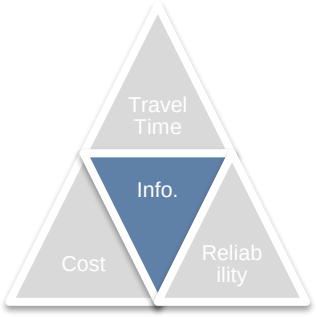
For example, ramp metering exists on the eastbound QEW in Mississauga, where the average waiting time between signals is between 5 and 6 seconds. Ramp metering has also been widely used elsewhere. The rate at which cars are allowed access to the freeway can depend on the demand on the on-ramp or on downstream traffic conditions. Currently, many on-ramps to the Gardiner Expressway experience strong congestion; ramp metering may help to speed the flow of vehicles entering the elevated expressway.

Improve Wayfinding



In the case studies analyzed in Chapter 6, several cases identified improving wayfinding signage on alternate routes as a mitigation measure to be implemented to reduce the impact of the removal/closure of an urban freeway. This is especially applicable to truck movements which may not be permitted on all streets or at all times. The clear communication to trucks of potential alternate routes allows for quicker adaption to new routings to be used, reducing the increases in travel times. For example, in 2008 the NYC DOT petitioned the Federal Highway Administration to conduct a pilot program for improved truck route signage in the city to make signs more identifiable to truck drivers. Identification of alternate routes during construction through distinctive and clear signage will also allow drivers to quickly adapt to new routes during construction periods.

Goods Movement Stakeholder Committee



Engaging goods movement stakeholders through a structured forum will allow for greater understanding between planning authorities and stakeholders on current issues faced by goods movement stakeholders and potential resolutions for these issues. On a larger scale, congestion management strategies can be developed with input from goods movement stakeholders. Stakeholders consulted in Toronto identified Goods Movement Stakeholder Committees, such as in Halton Region, as an effective tool in allowing them to engage directly with representatives from the Region in a structured format that facilitated cooperation and engagement on key issues.

Appendix C
Economic Competitiveness Study Report

Gardiner Expressway and Lake Shore Boulevard East Reconfiguration EA and Integrated Urban Design Study

Economic Evaluation

May 4, 2015

Prepared for:
Dillon Consulting
Waterfront Toronto
City of Toronto

Prepared by:
HR&A Advisors, Inc.

WATERFRONTToronto

TORONTO

HR&A Analyze. Advise. Act.

Contents

1. EXECUTIVE SUMMARY

In support of the Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study, Dillon Consulting retained HR&A Advisors, Inc. (HR&A) on behalf of Waterfront Toronto and the City of Toronto to carry out a comparative analysis of the economic impacts of each of the alternatives being considered in the EA:

- **Remove (Optimized Boulevard):** The Gardiner Expressway, east of Jarvis Street, would be converted into an at-grade boulevard, realigned as per the Keating Precinct Plan, with new access ramps to the Don Valley Parkway. The north-side of Lake Shore Boulevard would also be served by a new multi-use pathway. East of the Don River, the existing Logan on-off ramps would be removed and replaced with a new six-lane landscaped boulevard.

- **Hybrid:** The existing Gardiner Expressway structure/ramps would be maintained, new on-off ramps at Cherry Street with approach roads would be built, and the existing Don Valley Parkway ramps would be maintained. Lake Shore Boulevard would be realigned as per the Keating Precinct Plan with a new intersection featuring an extended Queens Quay underneath the Don Valley Parkway ramps and a new multi-use pathway along the north-side of Lake Shore Boulevard. East of the Don River, the existing Logan on-off ramps would be removed and replaced with a new six-lane landscaped boulevard.

In order to measure the economic impacts that would likely result from the EA alternatives, this report evaluates impacts in three ways, as summarized in Figure 1 below.

Figure 1: Summary of Findings

Category	Description	Conclusion
Regional Economics	Impact of alternatives on Toronto's global competitiveness	The alternatives are unlikely to affect global competitiveness, which is driven by a range of factors, the vast majority of which are unrelated to the alternatives. **The alternatives are equally preferred.**
	Impact of alternatives on the marketability and competitiveness of Downtown to businesses.	Both alternatives are projected to result in longer travel times to Downtown from origins around the city, but they are projected to be 2-3 minutes higher in the Remove (Optimized Boulevard). Also, the Remove (Optimized Boulevard) entails a longer construction period than the Hybrid alternative. **The Hybrid alternative is preferred.**
Local Economics	Potential for job creation in the areas adjacent to the alternative alignments, and impact to the marketability of the areas to development.	Both alternatives support the potential for job creation, but the Remove (Optimized Boulevard) alternative makes more land directly available for development and job creation. The Remove (Optimized Boulevard) alternative makes land available west of Cherry Street; and both alternatives make land available between Cherry Street and the Don River. Both alternatives improve the marketability of the local area, the Remove (Optimized Boulevard) by enhancing public realm and visibility, and the Hybrid alternative by maintaining convenient and direct highway access. **The Remove (Optimized Boulevard) alternative is preferred.**
Fiscal Net Benefits	Potential revenues from the sale of public land and projected lifecycle costs of the alternatives.	The Remove (Optimized Boulevard) entails lower lifecycle costs and results in more land revenues than the Hybrid alternative. **The Remove (Optimized Boulevard) alternative is preferred.**

- **Regional Economics Analysis:** This report identifies the factors that support Toronto's global competitiveness, and how the alternatives may impact Downtown Toronto's competitiveness given its importance to Toronto's economy. HR&A first reviews Toronto's current position in the global economy according to global rankings, the factors that underpin those rankings, and how those factors may be impacted by the alternatives. Separately for Downtown, HR&A identifies factors important to businesses in choosing where to locate, and how those factors may be impacted by the EA alternatives. Relevant factors include regional labour force access, ease of travel within Downtown, and level of traffic disruption during the construction period of each alternative.

  HR&A concludes that Toronto's global competitiveness is unlikely to be negatively impacted by either of the alternatives. Global rankings depend on a wide range of factors, including transport-related factors, but those transport-related factors primarily refer to transit, airport, and seaport connectivity rather than highway access.

  Similarly, Downtown's attractiveness depends on a range of factors, one of which is accessibility. The Remove (Optimized Boulevard) alternative presents

higher travel times than the Hybrid alternative from certain origins to Downtown, which some stakeholders noted may harm Downtown's ability to retain and attract business.

- **Local Economics Analysis:** This report also assesses how the alternatives will impact economic activity in the area around the Gardiner Expressway and Lake Shore Boulevard East. HR&A identifies the number of potential jobs in each alternative, and discusses how the alternatives may impact the attractiveness of the area to developers and users.

  The Remove (Optimized Boulevard) alternative will make more land (12 additional acres) available for new real estate development available and as a result, presents more potential for job creation than the Hybrid alternative. It should be noted that both alternatives improve the competitive positioning of the lands between Cherry Street and the Don River and East of the Don River through improved access and enhanced public realm.

- **Fiscal Net Benefits:** This report also evaluates the potential fiscal impacts of each alternative to the City of Toronto. This analysis identifies City revenues in the form of the sale of public land, as well as the capital and 100-year lifecycle costs for each alternative.

Figure 2: Summary of Estimated Benefits and Costs in Each Alternative

	2013$ (Uninflated)		Net Present Value	
	Remove (Optimized Boulevard)	Hybrid	Remove (Optimized Boulevard)	Hybrid
Benefits				
Potential Land Proceeds	$176,000,000	$39,000,000	$128,000,000	$29,000,000
Costs				
Capital Costs	$326,000,000	$414,000,000	$221,000,000	$260,000,000
Operations & Maintenance Costs, 100 years	$135,000,000	$505,000,000	$19,000,000	$76,000,000
Total (Lifecycle Costs)	$461,000,000	$919,000,000	$240,000,000	$336,000,000

The analysis finds that the Remove (Optimized Boulevard) alternative presents lower lifecycle (both capital and operations & maintenance) costs and the potential for higher public land sale revenues than the Hybrid alternative.

2. CONTEXT FOR ASSIGNMENT

2.1 EA Terms of Reference

In 2009, the Terms of Reference for an Environmental Assessment (EA) on the eastern portion of the Gardiner Expressway and Lake Shore Boulevard were approved by City Council and the Ontario Minister of the Environment. The Terms of Reference stated that the purpose of the study was "…to determine the future of the eastern portion of the elevated Gardiner Expressway and Lake Shore Boulevard from approximately Lower Jarvis Street to just east of the Don Valley Parkway at Logan Avenue." The EA identified key problems and opportunities for the study to address, as summarized in Figure 3.

Figure 3: Key Problems and Opportunities

Problems	Opportunities
Deteriorated Structure	Revitalize Waterfront
Disconnected Waterfront	Create a Sustainable Waterfront
	Generate and Capture Economic Value
	Rebalance Transportation Modes

The EA is currently evaluating two alternatives, described below. Maintain remains the base case.

Remove (Optimized Boulevard)

The Remove (Optimized Boulevard) alternative involves the demolition of the existing Gardiner Expressway east of Jarvis Street and the construction of a new six-lane boulevard, realigned as per the Keating Precinct Plan, with potential for new development on both the north and south sides of the street. This alternative would add new ramps directly connecting Lake Shore Boulevard to the Don Valley Parkway and provide a new multi-use path on the north-side of Lake Shore Boulevard. Along Lake Shore Boulevard, the removal of the Gardiner Expressway would bring light and air to the corridor, allow for continuous retail street frontage, and allow for a continuous rows of trees. The transition from Lake Shore Boulevard back up to the existing elevated expressway in the west end of the Study Area would occur between Yonge Street and Jarvis Street.

Opportunities for new development parcels on the north side of the new green boulevard would allow for a buffer between the rail corridor and Lake Shore Boulevard. Dedicated left turn lanes would exist at the intersections and the potential for off-peak parking would exist in the southern eastbound lane. A new continuous bicycle path would be developed on the north edge of Lake Shore Boulevard.

Hybrid

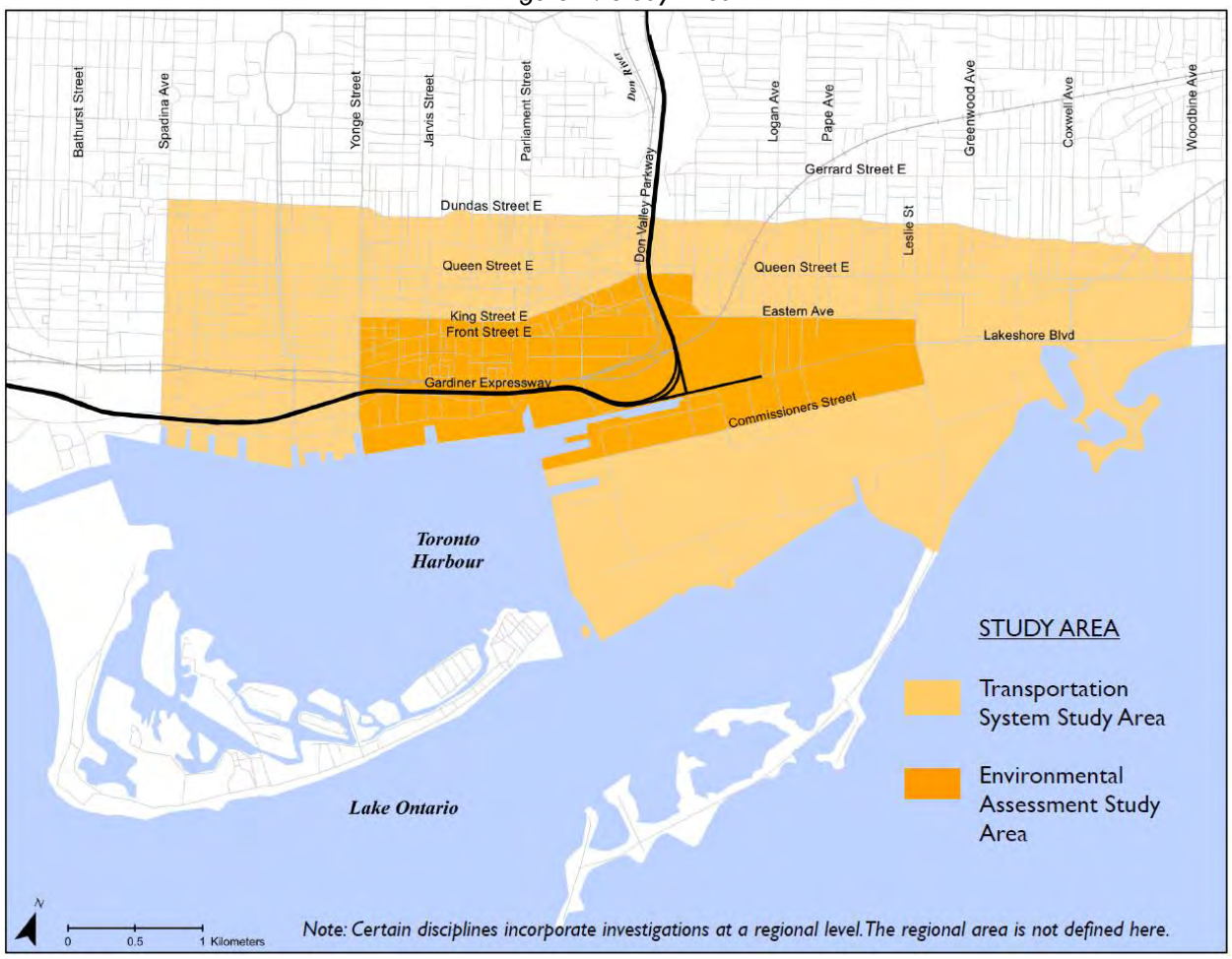
The Hybrid alternative involves the retention of a direct expressway connection between the Don Valley Parkway and the Gardiner Expressway. The alternative retains the existing Gardiner Expressway structure and ramps west of Cherry Street and the Don Valley Parkway on/off ramps. The alternative includes the removal of the Logan Avenue on/off ramps and rebuilding Lake Shore

Boulevard east of the Don River as a landscaped boulevard. The alternative also includes a new westbound on-ramp and a new eastbound off-ramp at Cherry Street, new approach roads to the new ramps, the extension of Queens Quay east of Cherry Street as an eastbound roadway, a new intersection between Lake Shore Boulevard and Queens Quay, and the realignment of Lake Shore Boulevard as per the Keating Precinct Plan. The alternative also includes improvements to existing intersections and includes a new multi-use pathway on the north side of Lake Shore Boulevard.

2.2 Environmental Assessment and Urban Design Study Area

The Environmental Assessment and Urban Design Study Area (immediate Study Area) as well as the wider Transportation System Study Area that were considered as a part of the EA are depicted in the dark and light orange areas respectively in Figure 4.

Figure 4: Study Area



2.4 Public Works and Infrastructure Committee Direction

Following an extensive program of technical analysis, public meetings, and stakeholder consultations examining four options for the Gardiner Expressway East (Maintain, Improve, Replace, and Remove), a City of Toronto staff report was submitted on March 4, 2014 to the Public Works and Infrastructure Committee (PWIC) seeking approval to proceed with a Remove (Boulevard)

alternative as the preferred solution. The report was based on the results of stakeholder consultations and alternative solutions evaluated as part of the EA.

PWIC deferred a decision on the preferred EA alternative and directed City staff to further study the impacts of the Remove (Boulevard) alternative including looking at opportunities to optimize the travel time. In addition, PWIC directed City staff to look at a Hybrid option that maintains existing expressway functionality between the Gardiner Expressway and the Don Valley Parkway.

Waterfront Toronto and the City of Toronto engaged Dillon Consulting, who retained HR&A to develop additional evaluation criteria and conduct further analysis of the economic impacts of the Remove (Optimized Boulevard) and Hybrid alternatives.

2.5 Work to Date

HR&A has completed a series of economic analyses as part of the EA to support evaluation of alternatives, including the evaluation described in this report. These analyses included:

- A fiscal net benefits analysis weighing project costs against revenues
- An estimation of potential job creation resulting from development in the area immediately surrounding the alternatives
- Case studies assessing the economic impact of similar infrastructure changes in other cities
- A literature review assessing Toronto's competitiveness relative to other major cities

2.6 Assignment Objectives

The objective for this report is to (a) respond to public and stakeholder comments received to date, (b) introduce additional criteria for further evaluation of each of the alternatives, and (c) to provide an analysis of the Remove (Optimized Boulevard) and Hybrid alternatives using these criteria. HR&A presents the following three overarching criteria for the economic evaluation:

1. **Regional Economic Impacts.** These criteria identify the role of the eastern portion of the Gardiner Expressway in the competitive positioning of Downtown Toronto, the economic hub and driver of the city and regional economy, and how the alternatives may affect that competitive positioning. These criteria respond most directly to the additional analysis requested by PWIC to articulate how the alternatives affect the City's economic competitiveness.

2. **Local Economic Impacts.** These criteria identify how the alternatives would impact the lands surrounding the proposed alternatives in terms of the potential to create jobs and the marketability of those lands.

3. **Fiscal Net Benefits.** These criteria account for how the alternatives would impact the City's fiscal position by updating HR&A's prior cost-benefit analysis to reflect the latest alternatives.

2.7 Methodology and Limitations

Regional Economic Impacts Analysis

To evaluate regional economic impacts, HR&A conducted research and consultation beginning in September 2014. HR&A first evaluated the importance of Downtown Toronto to the city and regional economy, recent economic trends in Downtown, and the competitiveness of Toronto when compared to other global cities. HR&A presented this information to stakeholders in December 2014 to confirm our understanding of Downtown's and Toronto's competitive positioning, factors that drive that competitiveness, and risks to Downtown Toronto. Stakeholders included leading representatives from Toronto's real estate, economic development, and business communities. To fully articulate how the alternatives may affect Downtown's competitive positioning, HR&A synthesized stakeholder feedback and conducted additional industry research on the factors that drive business location decisions. HR&A then isolated those factors that may be affected by the alternatives and evaluated the alternatives, using available data. HR&A reviewed its findings with stakeholders in March 2015 and collected feedback on the implications of the alternatives to economic competitiveness.

HR&A relies on a combination of third-party research and stakeholder consultation to describe Toronto's relative competitiveness, the importance of Downtown to that position, Downtown's strengths, Downtown's weaknesses, and more globally the factors that drive business location decisions. This research and findings from consultation represent widely accepted perspectives in the business, real estate, and economic development communities. However, as evidenced during stakeholder consultation, there are varied opinions about risks to Downtown and what matters to drawing businesses to locate and invest in Downtown.

Local Economic Impacts Analysis

This analysis provides an update of prior analyses regarding the amount of new development and associated job creation that would result from making new land available in each of the alternatives. It also considers how the alternatives will impact the marketability of the lands given the changes to both vehicular access and public realm in the alternatives.

The estimate of jobs relies on industry standard ratios of square feet per employee, by land use. The number of jobs, however, will depend on the end user/tenant of any new development. For example, the density of employees for an information technology industry tenant may differ from the density of employees for a law firm tenant.

Fiscal Net Benefits Analysis

HR&A updates its prior fiscal net benefits analysis to reflect the cost and revenue assumptions associated with the Remove (Optimized Boulevard) and Hybrid alternatives. In preparing the analysis for this report, HR&A updated a number of assumptions, primarily costs and the amount of land made available for new development, but did not update assumptions from its 2013 analysis related to land price, use mix, development intensity, and development pace. It should be noted that some sites may have environmental remediation requirements which would in turn, decrease the achievable land price.

3. STAKEHOLDER CONSULTATION

HR&A consulted with stakeholders on December 11, 2014 to understand their perspective on Toronto's competitiveness, the importance of Downtown to Toronto's economy, Downtown's strengths and weaknesses, and risks confronting Downtown Toronto. These stakeholder groups included think tanks and associations, employers, and real estate developers. Figure 5 presents the list of participating organizations.

Figure 5: Stakeholder Consultation Participants

Think Tanks	Real Estate	Employers
• Civic Action • Martin Prosperity Institute • Ryerson City Building Institute • Toronto Financial District BIA • Toronto Region Board of Trade • Urban Land Institute	• Brookfield Properties • Build Toronto • Cadillac Fairview • Colliers International • First Gulf • GWL Realty Advisors • Oxford Properties • Menkes Development Ltd. • RealPAC	• CBC • National Bank of Canada • Royal Bank of Canada • SunLife

HR&A presented background information on the EA, preliminary economic analysis findings, and an overview of trends in Toronto's economic competitiveness. HR&A then asked each group a series of questions to better understand what drives Downtown Toronto's regional and international competitiveness, and the risks faced by Downtown Toronto. The appendix of this report includes key takeaways from these stakeholder meetings.

The feedback provided by the stakeholder groups played an important role in helping to identify the relative importance of the Gardiner Expressway to Downtown's economic competitiveness, and in informing HR&A's evaluation of the alternatives. Key feedback received includes:

Downtown's Strengths

- Regional transit service converging at Union Station is one of the most important components of Downtown's value proposition to employers.
- Downtown has a high density of customers, competitors, and institutions that makes it an attractive ecosystem to businesses, including those in emerging industries.
- Downtown is highly walkable, in part due to the extensive PATH network, making it easy to reach work and non-work (e.g., retail, entertainment) activities.
- The waterfront is an occasional amenity for Downtown workers as a place for recreation and entertainment.

Downtown's Weaknesses

- The transit network is congested and requires substantial investment to reduce crowding and improve service.
- Routes from Downtown to the Gardiner Expressway are often congested and businesses experience unreliable travel time to/from Downtown when traveling to

places around the region (e.g., Pearson International Airport, other jobs centers in the region).

- Major roadway construction projects in Toronto are disruptive to businesses. The prospect of a major construction project affecting the Gardiner Expressway and Lake Shore Boulevard East concerns stakeholders.
- Rising occupancy costs have made it more difficult for arts and culture organizations to remain in and near Downtown. The organizations are important to the marketability of Downtown to some businesses and residents.

Other Trends

- Job centers in the 905 area, outside the City of Toronto (e.g., Mississauga, Markham), have excellent regional highway access, and are making investments to better compete with Downtown Toronto. In these competitive job centers, new rapid transit, multistory housing, retail, parks, and walkable streets, in combination with their excellent vehicular accessibility could threaten Downtown's attractiveness to businesses and residents.
- Stakeholders noted the rising attractiveness of Downtown to professionals and increasingly, families, but that cohort still represents a small share of the overall Downtown workforce.
- Stakeholders observed the increasing reliance of employees on transit, cycling, and walking as modes and decreasing reliance on the automobile for reaching Downtown. However, stakeholders noted that some companies continue to offer reserved parking spaces to executives, making them less likely to switch modes to reach Downtown.

HR&A then reviewed these findings, and findings gathered from its evaluation of regional economic impacts and local economic impacts with many of the same stakeholders on March 30, 2015.

4. REGIONAL ECONOMIC IMPACTS

4.1 Introduction

To evaluate regional economic impacts of the alternatives, HR&A considers two scales:

- Toronto's global competitiveness
- Downtown's competitiveness

Toronto is one of the world's most competitive metropolitan areas according to several publications, including those from PricewaterhouseCoopers and the Economist Intelligence Unit. HR&A reviews the findings of these studies, and considers whether the alternatives could impact the factors that make up those rankings.

Downtown Toronto plays a particularly important role in the city's economic performance and global competitiveness. Downtown comprises only three per cent of the total land area in the city, but is home to 33 per cent of the City's jobs, 25 per cent of the City's tax base, and generates 51 per cent of the city's total GDP.[1] HR&A reviews factors that drive business location decisions, drawn from the World Bank and industry publications such as Industry Week and Area Development. One of these factors, accessibility, may be impacted by the alternatives.

Figure 6: Downtown Toronto's Share of the City's Economy

Specifically, HR&A assesses how the alternatives may impact Downtown's accessibility in three ways:

- Regional labour force access
- Mobility within Downtown
- Disruption during project construction

HR&A utilizes findings from stakeholder consultations, outputs from the transportation analysis of the alternatives, and case studies to draw conclusions about impacts.

[1] *Comprehensive to the Core*. Toronto East York Community Council. May 2014. This report defines Toronto as the area bound by Dupont Street and Rosedale Valley Road to the north, Bathurst Street to the west, the Don River to the east, and Lake Ontario to the south.

In addition, this criteria considers how Toronto's major entertainment venues, which are located Downtown, may be impacted by the alternatives.

4.2 Toronto's Global Competitiveness

There are two well-known studies that rank metropolitan areas for competitiveness, the *Cities of Opportunity* study from PricewaterhouseCoopers (PwC) and the *Index of Indexes* from the Economist Intelligence Unit (EIU). These studies compare metropolitan areas across a range of economic drivers and factors to make these rankings. Toronto's ranking in these studies was generally very favorable, as shown in Figure 7 (below).

Among these studies, the alternatives are unlikely to have a substantial impact on Toronto's rankings. In each case, road networks play a marginal role in the evaluation of Toronto's competitiveness. Road networks are seen as subcomponents of broader factors that incorporate infrastructure and transportation issues. In these areas, issues like mass transit investment, quality housing, airports, and green space are much more impactful measures of a city's competitiveness.

Figure 7: Toronto's Rankings in International Comparisons

	PWC Cities of Opportunity	**EIU Index of Indexes**	**EIU Spatial Adjusted Livability Index**
Rank	4/30	1/140	8/70
Methodology	Ranked against 30 cities in ten categories	Average score from 6 different international studies on cities	Ranked against 70 cities using a standard livability index and an index adjusted for spatial qualities such as open space and access
Affected Categories	Transportation and Infrastructure	Livability Rankings	Green space, sprawl, pollution

PwC Cities of Opportunity[2]

Cities of Opportunity analyzes the finance, commerce, and culture drivers of 30 metropolitan areas. These drivers are organized into ten overarching categories, by which the cities are ranked.

1. **Intellectual capital and innovation**, which includes measures such as number of libraries with public access, literacy and education enrollment, world university rankings, and entrepreneurial environment;
2. **Technology readiness**, which includes measures such as internet access in schools, broadband quality, and software development and multimedia design;
3. **City gateway**, which includes measures such as the number of hotel rooms, the number of international tourists visiting the city, and the accessibility of airports from the CBD;

[2] *Cities of Opportunity 6* (PricewaterhouseCoopers, 2014)

4. **Transportation and infrastructure**, which includes measures such as quality, cost, and coverage of mass transit systems, quality and quantity of available housing, and major construction activity;
5. **Health, safety, and security**, which includes measures such as number and performance of hospitals, crime, and political environment;
6. **Sustainability and the natural environment**, which includes measures such as risk of natural disaster, thermal comfort, air pollution, and public park space;
7. **Demographics and livability**, which includes measures such as quality of living, cultural vibrancy, working age population, traffic congestion, and ease of commute;
8. **Economic clout**, which includes measures such as the number of "global 500 company" headquarters, financial and business services employment, productivity, and rate of real GDP growth;
9. **Ease of doing business**, which includes measures such as the ease of starting a business, ease of entry from international locations, number of foreign embassies or consulates, level of shareholder protection, operational risk climate, and workforce management risk; and
10. **Cost**, which includes measures such as total corporate tax rate, cost of business occupancy, cost of living, and purchasing power.

In its study, PwC ranked all 30 metropolitan areas in each of the above categories using a number of absolute measures. PwC then created a comprehensive ranking of the metropolitan areas based on their arithmetic total score in each of the categories.

Overall, Toronto ranked fourth among the 30 metropolitan areas, affirming that Toronto is an important global economic center. Toronto ranked very well in many categories, including 'Intellectual Capital and Innovation', 'Transportation and Infrastructure', 'Health, Safety, and Security', 'Ease of Doing Business', and 'Cost'.

The alternatives may have an impact on two categories considered by the PwC report: Transportation and Infrastructure, and Demographics and Livability. Within these categories PwC includes the following as potential assets for a competitive city:

Figure 8: PwC Categories of Interest

Category	Subcategories
Transportation and Infrastructure	• Mass transit • Cost of public transport • Licensed taxis • New construction • Housing
Demographics and Livability	• Cultural Vibrancy • Quality of Living • Working Age Population • **Traffic Congestion** • **Ease of Commute** • Relocation Attractiveness

Within Transportation and Infrastructure, the roadway network does not register as a direct concern. Rather, scores in this category relate to public transportation, the taxi system, and real estate development. Within Demographics and Livability, four of the six subcategories do not relate to the roadway network. Two of the six may be impacted by the EA alternatives by impacting congestion and ease of commute. Given the small contribution of the roadway network and congestion to PwC's overall analysis, it is unlikely that changes to the Gardiner Expressway would impact any of these measures.

EIU Index of Indexes[3]

HR&A also reviewed the EIU's Index of Indexes, a series of studies that examine metropolitan areas' livability, safety, cost of living, and business environment, among others.

In its Livability Index, the EIU ranked 140 metropolitan areas using two specific measures. The first measure, the standard EIU Livability Index, assesses each metropolitan area's level of stability, healthcare, culture, environment, education, and infrastructure.

In its Business Environment Rankings, the EIU examined national-level markets, policies, and opportunities. The study, which is conducted every four years, ranked Canada as the fourth best nation in the world, and the highest in North America, for business because of its strong GDP per capita, trade flows, and wealth of natural resources. The EIU also applauded Canada's regulation of the finance sector, noting that such regulation would help maintain soundness in the market.

Figure 9: EIU Index of Indexes Summary[4]

	City Level Index			Country Level Index			Best in Category / Best Overall
City	Safe Cities	Liveability Rankings	Worldwide Cost of Living	Business Environment	Democracy Index	Global Food Security	Average Index Rank
Tokyo	1	18	123	27	20	18	35
Singapore	2	52	131	1	80	16	47
Osaka	3	12	118	27	20	18	33
Stockholm	4	14	107	6	2	14	25
Amsterdam	5	26	86	16	11	5	25
Sydney	6	7	127	5	6	15	28
Zurich	7	11	128	2	7	5	27
Toronto	8	4	70	4	8	8	17
Melbourne	9	1	123	5	6	15	27
New York	10	56	104	7	19	1	33

Within the Livability Rankings index, the EIU considered a number of factors, among which only "infrastructure" is likely to be impacted by the Gardiner alternatives. The category includes the

[3] *The Safest Cities Index 2015* (The Economist Intelligence Unit, 2015)
[4] Ibid.

following issues: quality of the road network, quality of public transport, quality of international links, availability of good quality housing, quality of energy provision, quality of water provision, and quality of telecommunications. Road networks are one of seven total metrics within Infrastructure, and the category of Infrastructure accounts for only 20 per cent of the overall Livability Index. It is also noteworthy that the index was more influenced by issues at the national level, far beyond the potential impacts of the alternatives under consideration.

While changes to the Gardiner Expressway may have an impact on this index, the change will likely register marginally, and may be offset by the benefits of urban development opportunities made available by some of the EA alternatives.

Conclusion

The EA alternatives are unlikely to impact Toronto's global rankings in both the PwC and EIU Index of Indexes studies. From a transportation perspective, those studies do not focus on travel time or the size of the expressway system, but rather mass transit, airport, and roadway quality. In the EIU Index of Indexes and Spatial Adjusted Livability Index, both the Remove (Optimized Boulevard) and Hybrid alternatives may modestly support intensification of land use near transit and near Downtown. As a result, HR&A concludes that the alternatives are **equally preferred** in relation to Toronto's global competitiveness.

4.3 Downtown Toronto's Competitiveness

Downtown is the engine of Toronto's economy comprising more than half of the City's economic output. It is also a major and growing population hub. Between 1976 and 2011, the population of Downtown Toronto grew 95 per cent, nearly four times faster than the City overall during the same period. To understand how the alternatives may impact Downtown, HR&A lists 17 factors within four categories that businesses consider when determining where to locate or expand based on site selection literature publications.[5] These factors include:

Physical criteria:

1. *Adequate and quality space*: Spaces should meet quality standards and be large enough to meet company needs. Many early-stage businesses may also seek spaces that provide the ability to expand.
2. *Accessibility*: The office location should be convenient for employees and visitors to reach, and allow for employees and visitors to travel to other locations in the city or region.
3. *Local amenity*: The environment around the office should offer amenities that serve employees and visitors including hotels, restaurants, entertainment, shopping, open space, etc.
4. *Safety*: The office space and surrounding environment should be secure.

[5] Based on HR&A review of business site selection criteria as discussed in:
a) Multilateral Investment Guarantee Agency of the World Bank. *Site Selection Investment Criteria: How the Investment Decision is Made*. 2005.
b) Industry Week. *Corporate Site Selection: What's Changed?* Apr 13, 2013. <http://www.industryweek.com/expansion-management/corporate-site-selection-whats-changed>.
c) Area Development. *Corporate Survey Results: Site Selection Factors.* <http://www.areadevelopment.com/corpSurveyResults/>.

Economic and financial criteria:

5. *Occupancy cost*: The total cost of acquiring, constructing, renting, or relocating to a space.
6. *Cost of labour*: The cost of labour includes the salary and benefits requirements needed to attract talent.
7. *Tax regime*: Taxes under consideration for businesses typically include corporate tax, property tax, and payroll tax, among others.
8. *Tax incentives*: Provinces/states and municipal governments may provide incentives for locating a business in their jurisdiction in the form of corporate tax abatements or subsidies.

Human capital criteria:

9. *Workforce availability*: The regional labour market should offer a pool of qualified workers in terms of education and experience.
10. *Talent pipeline*: Nearby institutions should offer appropriate workforce training to ensure labour force quality.
11. *Livability*: The city and/or surrounding municipalities should be attractive to potential employees in terms of cost of housing, quality of housing, quality of educational system, and attractive recreational and entertainment amenities.

Industry-specific criteria:

12. *Competitor proximity*: Some industries (i.e., financial services, advertising) may benefit from proximity to competitors, while other industries may discourage or be indifferent about proximity.
13. *Consumer proximity*: Some industries may require proximity to customers (i.e., professional services), whether it be other business that purchase goods and services, or household consumers.
14. *Regulation*: The regulatory environment may encourage growth of certain industries affecting the ease of conducting business.
15. *International access*: A growing number of industries need to be in a region with an airport with sufficient international reach.
16. *Distribution infrastructure*: Some industries may require rail, port, or highway access in order to easily intake supplies or distribute products.
17. *Technology infrastructure*: Some industries need access to high-tech infrastructure such as broadband.

Of the 17 factors influencing business location decisions, the EA alternatives have the potential to impact one – accessibility. Other factors that may be impacted include competitor and consumer proximity for certain industries that require vehicular travel to access consumers or competitors. However, Downtown is well-known for its clustering of both competitors and consumers.

Based on stakeholder feedback, HR&A evaluates how three measures within the accessibility factor may be impacted by the alternatives. These measures include:

- Regional labour force access, which considers the ability for workers from around the region to reach downtown, a key factor for businesses in considering where to locate their office.
- Mobility within Downtown, which considers the ease of travel within Downtown for meetings or activities before, during, and after work.
- Disruption during construction, which considers both the length of the construction period and the extent of the construction.

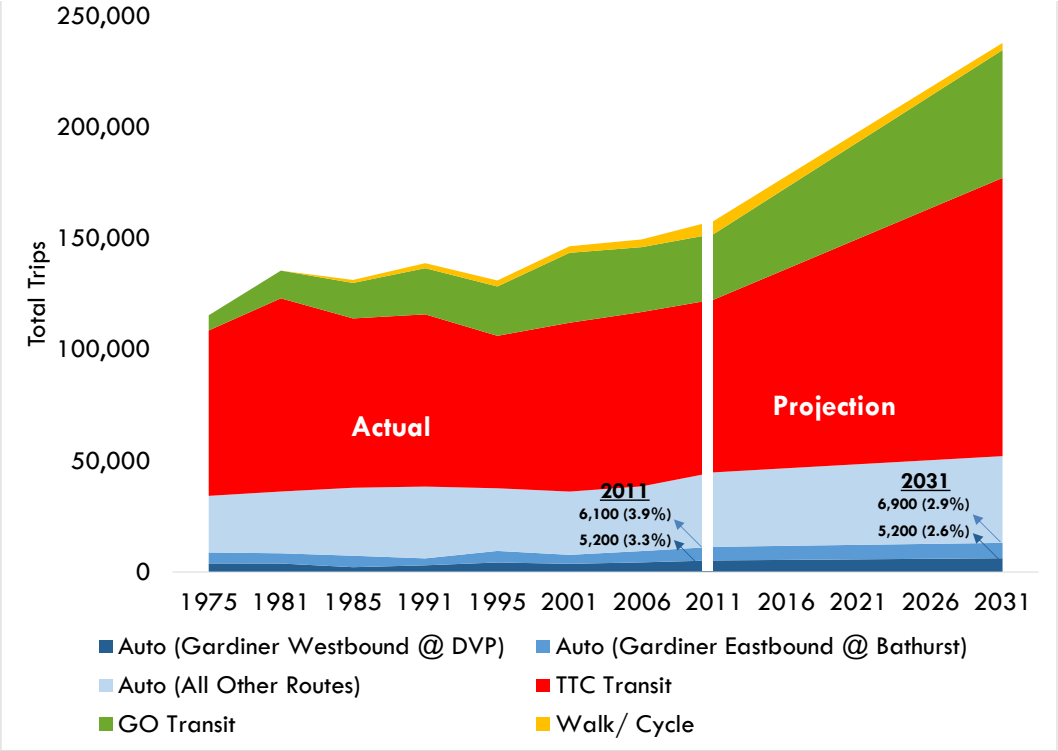
Regional Labour Force Access

The majority of Downtown workers will not be affected by the EA alternatives because they use alternate routes or means of transportation to reach Downtown. As of 2011, 49 per cent of morning commuters into Downtown use TTC, 19 per cent of commuters use GO, and 4 per cent walk or bike. Only 7 per cent drive on the Gardiner Expressway to reach their workplace in Downtown, of which only 3 per cent use the portion of the Gardiner Expressway under evaluation.[6] In addition to those who drive on the Gardiner Expressway to reach downtown during peak hours, surface transit users on routes closest to the Gardiner Expressway will be affected by slower travel to a degree.

The share of workers using non-automobile means of transportation is expected to increase over time. While the usage of the Gardiner Expressway during commute times is expected to grow very modestly between 2011 and 2031, the largest growth is expected to be in TTC transit use, and GO transit use, as shown in Figure 10. This shift towards non-automobile based travel to Downtown over the last few decades can be attributed in part to a lack of roadway capacity, and to the continued growth of Downtown's residential population. As a result, the workforce can rely on transit, walking, and biking to reach work in Downtown. Stakeholders noted this trend and its potential to extend further given employee preferences.

[6] Sources: 1) Transportation City Cordon Count (1975-2011); 2) Transportation Model EMME2 Forecast (2011-2031); 3) 2006 Transportation Tomorrow Survey (TTS) for Walk/Cycle Mode

Figure 10: Transportation Mode for Inbound Downtown Commuters during AM Peak Period[7]



Stakeholders strongly emphasized the importance of increased transit service, regardless of the selected alternative. The transportation modelling conducted for the EA assumed that transit service will be expanded in Toronto, allowing for growth in TTC usage. Specifically, the EA assumes the following investments:

- The **Relief Line** a proposed new rapid transit line. The RL would form a "U" and link east and west suburbs with Union Station and the Downtown Financial District. The RL would relieve crowding on the Yonge Subway line and the Bloor-Yonge interchange station. In addition, the RL may stitch together areas of Downtown that are growing in population and density, such as Liberty Village, CityPlace, the Entertainment District, the Distillery District, and the West Don Lands.
- The **Broadview Avenue LRT will be extended** to the First Gulf development site east of the Don River and south into the Port Lands.
- Investments in an **East Bayfront LRT extension** on Queens Quay to bring the line east of Yonge Street.
- A number of improvements will be made to the **GO Transit** system.

While not part of the EA modelling assumptions to date, additional transit project proposals described below could also enhance Downtown's regional labour force access.

- **SmartTrack** has been proposed as a new above-ground commuter rail system that would make use of existing GO transit infrastructure. The line would link existing major east-west lines with Downtown destinations. SmartTrack is conservatively

[7] Ibid.

estimated to have a daily ridership of 200,000, many of whom would be existing riders on the TTC system, but some of whom would be new riders who did not previously have convenient transit access.

- As part of the **Big Move**, three new light rail lines will provide access to areas not currently served by rapid transit north of Downtown. More broadly, the Big Move proposes 62 new transit lines, including express rail, regional rail, subway, and bus rapid transit across the GTA.

While the share of workers using the portion of the Gardiner Expressway under evaluation may decrease over time, those that continue to drive on the Gardiner Expressway will face increased travel times when compared to today's travel times under all alternatives, including Maintain, the base case. Stakeholders noted that increased travel time could negatively impact the marketability of Downtown to businesses.

Figure 11 presents projected travel times from various origins to Union Station in 2031 for the Remove (Optimized Boulevard) and Hybrid alternatives. The Remove (Optimized Boulevard) alternative results in higher travel times during the AM Peak hour than the Hybrid alternative by two to three minutes, depending on the point of origin.

Figure 11: Projected Inbound Travel Times to Union Station during the AM Peak Hour (Minutes)

		2031		
Departure Point	**2012**	**Base Case**	**Remove (Optimized Boulevard)**	**Hybrid**
North York Victoria Park/Finch	45	52	55	52
Don Mills Don Mills/Eglinton	25	30	33	30
Scarborough Victoria Park/Kingston	20	23	28	26
Etobicoke Kipling/Lake Shore	25	27	30	27

Downtown Mobility

Part of Downtown's value proposition is the ability for workers to easily travel for meetings, shopping, dining, or to their home within or near Downtown. Stakeholders noted that the PATH system allows for convenient travel by foot, while streetcar, taxi, and car travel can be challenging due to unpredictable travel time. Data is not available to illustrate how much of this travel occurs by foot, but stakeholders cited the frequency by which employees and visitors use the PATH system as a primary mode for intra-Downtown travel. Given that these trips typically occur in between the AM and PM peak travel times, they are unlikely to be impacted by the EA alternatives.

Disruption during Construction

Both alternatives will entail approximately six-year construction periods during which access to Downtown will be disrupted. The disruption will be more extensive under the Remove (Optimized

Boulevard) alternative, which entails three to four years of detours and road closures during the removal of the Gardiner Expressway, as opposed to 1.5 years of road detours under the Hybrid alternative. Stakeholders expressed strong concerns over the potential economic impact of this disruption, raising the possibility that businesses may not choose to locate Downtown in response to construction.

Conclusion

Downtown's competitiveness is driven by several factors that will not be negatively impacted by the EA alternatives. However, Downtown's accessibility – a key factor noted by stakeholders – will be impacted. Because transportation analyses project that the Remove (Optimized Boulevard) alternative will result in higher travel times for those that use the Gardiner Expressway during the AM Peak hour and a higher level of disruption during construction when compared to the Hybrid alternative, this analysis concludes the Hybrid alternative is preferred in relation to Toronto's downtown competitiveness.

4.4 Downtown Venues

Downtown Toronto and Toronto's waterfront are home to a number of important entertainment, arts, and cultural venues, such as the Air Canada Centre, the Rogers Centre, and the Harbourfront Centre, among others. The Rogers Centre is an enclosed, multi-use stadium built in 1989 as the home of Major League Baseball's Toronto Blue Jays. For baseball games, the Rogers Centre has a capacity of approximately 49,200 people. For other events, it has a capacity ranging from 10,000 to 55,000 people. The Air Canada Centre is an enclosed sports arena built in 1997 as the home of the National Basketball Association's Toronto Raptors and the National Hockey League's Toronto Maple Leafs. For most events, the Air Canada Centre has a capacity of approximately 20,000 people. The Harbourfront Centre is a multi-purpose arts and cultural center on Toronto's waterfront that includes event space and two marinas, among other uses, generating 12 million visits per year.

The EA alternatives may impact the accessibility of these venues to patrons. Patrons rely on a mix of modes to reach these venues, including the Gardiner Expressway. The vast majority of events at the Air Canada Centre begin between 7PM and 8PM, or on weekends. Most of the events at the Rogers Centre take place in the middle of the day or on weekends, outside peak travel times, or at 7PM. Visitors attending sporting events and concerts typically travel to these venues 30 to 60 minutes ahead of start times, which may overlap with PM peak travel times in some cases. However, travelers to these venues that use the Gardiner Expressway will be driving against the flow of traffic (i.e., evening events may generate in-bound traffic during peak periods, while departing workers will be moving in the opposite direction).

Conclusion

It is unknown if patrons that use the Gardiner Expressway to visit Downtown's venues will face higher travel times in one EA alternative versus the other. Regardless, information on the sensitivity of a customer's willingness to attend an event due to changes in travel time is unavailable.

5. LOCAL ECONOMICS

5.1 Introduction

In this section, HR&A evaluates the impacts of the EA alternatives on the economic activity of the area immediately surrounding the portion of the Gardiner Expressway under study, which includes a significant portion of Toronto's waterfront. This area has been an important place of growth in Toronto, and will be a significant future location for large-scale development creating places to live, work, study, and visit near Downtown. To understand the impact of the alternatives on the economic activity on the waterfront, HR&A evaluates the potential for job creation as a result of new development and the marketability of the area to development in terms of circulation and public realm benefits.

Each alternative offers distinct benefits to the surrounding areas. Under Remove (Optimized Boulevard), enhancements will be made to the public realm through the creation of green space and bringing air to lands currently encumbered by expressway infrastructure. Under the Remove (Optimized Boulevard) alternative, a new Lake Shore Boulevard-Don Valley Parkway link will be created, while under the Hybrid alternative, a continuous expressway linkage to the Don Valley Parkway will be maintained. Both alternatives will support development east of the Don River through the removal of ramp structure and replacement with a surface boulevard that improves the visibility and public realm of the lands east of the Don River, including the First Gulf site which is envisioned to have 50,000 employees at full build-out.

5.2 Business Activity

New development on the available parcels will create opportunities for new businesses to take root. The amount of new development will depend directly on the amount and location of land made available in each alternative. The analysis shows that the Remove (Optimized Boulevard) alternative makes approximately 17.5 acres of land available for development, where the Hybrid alternative opens 5.5 acres of land for development. Based on assumptions for usage and employment ratios developed in our analysis of business activity in 2013[8], the Remove (Optimized Boulevard) alternative is estimated to have the potential to accommodate approximately 2,800 new jobs and the Hybrid alternative is estimated to have the potential to accommodate approximately 770 new jobs.

Figure 12 details the number of new jobs created under each scenario in total and relative to potential job creation in the Maintain base case. Proposed new roads and on-off ramps at Cherry Street reduce the land made available for development under the Hybrid alternative when compared to the Maintain base case. The Fiscal Net Benefits section below details the geographies and development capacities of each.

[8] Analysis assumes 2.5 jobs per 1,000 square feet of retail, 1.7 jobs per 1,000 square feet of institutional space, and 3.1 jobs per 1,000 square feet of commercial space, and 0.06 jobs per 1,000 square feet of residential space.

Figure 12: Potential Job Creation

	Total		Relative to Base Case	
	Remove (Optimized Boulevard)	**Hybrid**	**Remove (Optimized Boulevard)**	**Hybrid**
West of Cherry Street	980	N/A	+ 980	N/A
Between Cherry Street and the Don River	1,820	770	+ 620	- 430
Total	**2,800**	**770**	**+ 1,600**	**- 430**

Conclusion

The Remove (Optimized Boulevard) alternative will support more potential for job creation, allowing for the possibility of 2,800 additional jobs. The Hybrid alternative will likely support the potential for 770 additional jobs. The difference between the two alternatives, approximately 1,600 jobs, is largely driven by the incremental development opportunities west of Cherry Street in the Remove (Optimized Boulevard) alternative. Since this land is closer to the Central Business District and permits for greater density, it will also support greater development.

Furthermore, the analysis shows that the Hybrid alternative generates 430 fewer potential jobs than would be made available if no changes were made to the Gardiner Expressway under the Maintain base case. This results from the impact of proposed new roads and on-off ramps at Cherry Street.

6. FISCAL NET BENEFITS

6.1 Introduction

For each of the alternatives, HR&A identifies capital costs, lifecycle costs, and revenues to the City of Toronto resulting from the sale of publicly owned property within the EA study area.

6.2 Capital Costs

The Remove (Optimized Boulevard) alternative has a lower capital cost ($326 million in 2013$, net present value (NPV)[9] of $221 million) than the Hybrid alternative ($414 million in 2013$, NPV of $260 million). The Remove (Optimized Boulevard) alternative includes the demolition and removal of the existing Gardiner Expressway East, construction of a six-lane Lake Shore Boulevard, and construction of new bridge structures across the Don River to connect Lake Shore Boulevard and the Don Valley Parkway. The Hybrid alternative includes the demolition and removal of the Gardiner Expressway's Logan Avenue on/off ramps, rebuilding of a six-lane boulevard in its place, construction of new on/off ramps and access roads in the Keating area, and modifications to the Gardiner Expressway to accommodate these new ramps.

6.3 Operations and Maintenance Costs

The Remove (Optimized Boulevard) alternative has lower operations and maintenance cost ($135 million in 2013$, NPV of $19 million) than the Hybrid alternative ($505 million in 2013$, NPV of $76 million). These numbers account for 100 years of operations and maintenance costs.

6.4 Public Land Revenue

HR&A analyzed development opportunities on publicly owned land in two distinct areas: west of Cherry Street, and the area between Cherry Street and the Don River. HR&A also describes development opportunities on publicly owned land east of the Don River.

West of Cherry Street in the Remove (Optimized Boulevard) Alternative Only

Several parcels of land west of Cherry Street that are currently unavailable for development would become available in the Remove (Optimized Boulevard) alternative. These parcels, labelled A through H in Figure 13, lie between Yonge and Cherry Streets north of the realigned Lake Shore Boulevard and south of the rail berm.

These parcels encompass nearly 4.6 acres. HR&A assumes they could be entitled to a floor area ratio (FAR) of ten and therefore would result in 184,000 square meters of buildable space.

Between Cherry Street and the Don River

Several undeveloped parcels around the Gardiner Expressway east of Cherry Street and west of the Don River may become available for development as a result of a reconfiguration of Lake Shore Boulevard in both alternatives.

[9] All net present value calculations assume a four per cent discount rate

In the Remove (Optimized Boulevard) alternative, nearly 12.9 acres of land would become available for new development. HR&A assumes they would be entitled to a FAR of 6.57, resulting in a total buildable area of approximately 343,000 square meters.

In the Hybrid alternative, the amount of land that would become available for new development decreases to 5.5 acres. Assuming a FAR of 6.57 this land would have a total buildable area of approximately 145,000 square meters.

East of the Don River

East of the Don River, there are 13.8 acres of publicly owned land available for redevelopment southeast of Lake Shore Boulevard and Don Roadway. HR&A estimates this land has a potential value of $64 million in 2013 dollars or $47 million in net present value terms using a four per cent discount rate. In addition, north of the proposed new boulevard, there is approximately 20.0 acres of publicly owned lands that could be redeveloped adjacent to the former Unilever site. According to First Gulf Don Valley Limited, the landowner of the former Unilever site, those publicly owned lands could have a value of $100 million. Both alternatives support the marketability of those lands because both alternatives feature a landscaped boulevard that will improve the accessibility and visibility of those lands.

Figure 13: Potential City-Owned Parcels in the Remove (Optimized Boulevard) Alternative

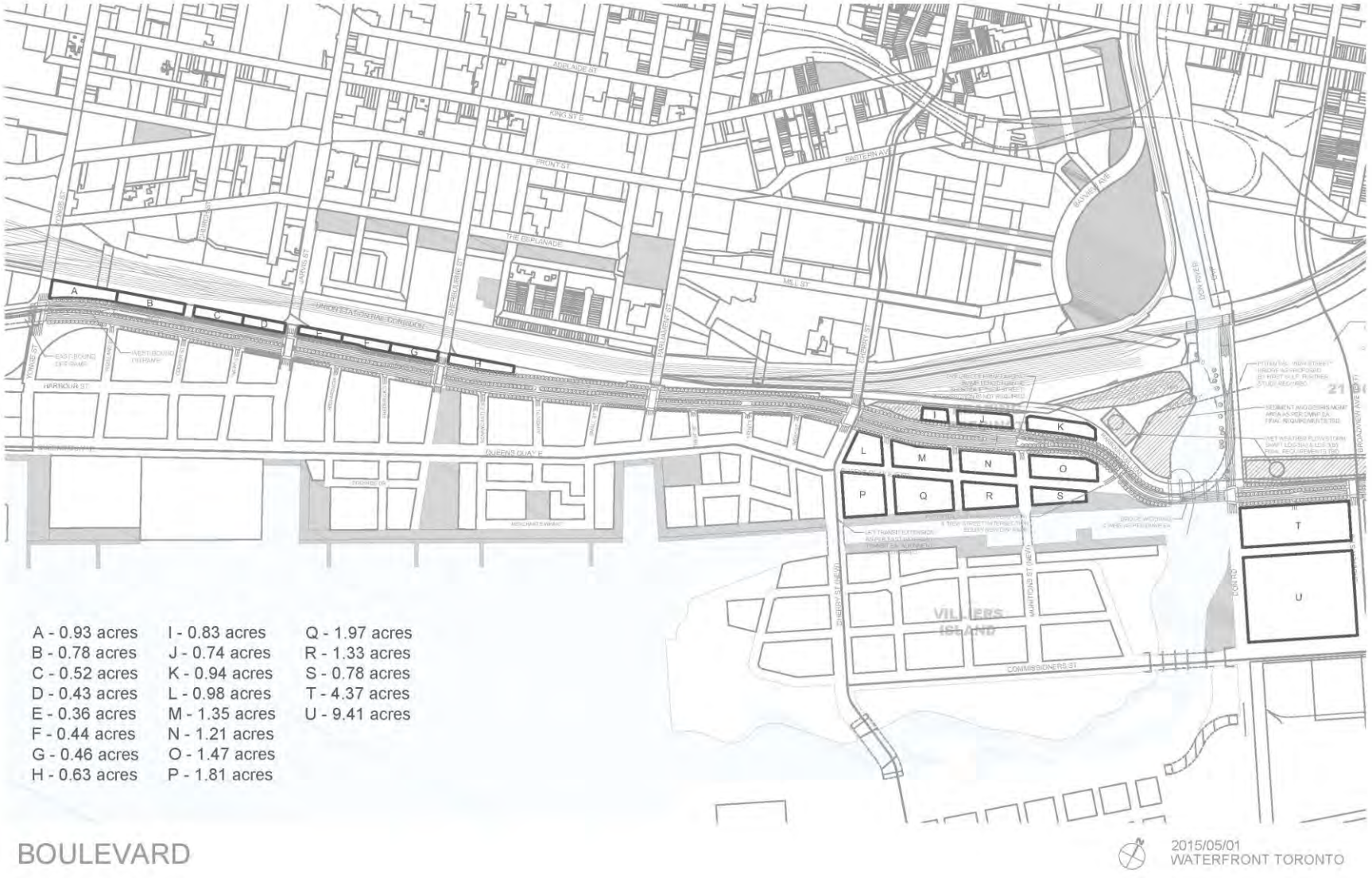
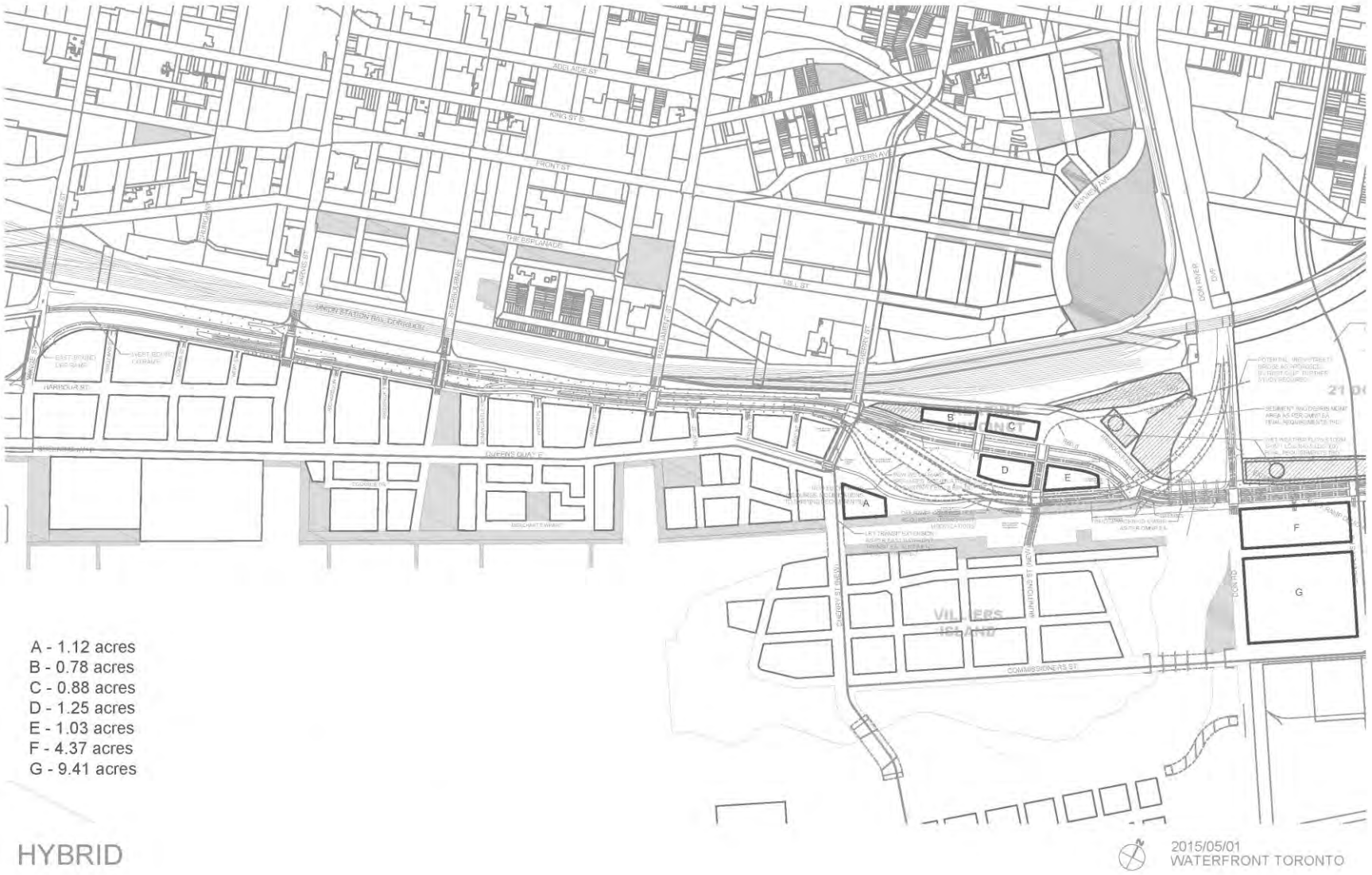


Figure 14: Potential City-Owned Parcels in the Hybrid Alternative



The Remove (Optimized Boulevard) alternative results in more land being made available for development than the Hybrid alternative, and as a result has the potential to generate more proceeds from the sale of publicly-owned land than the Hybrid alternative. The analysis considers two geographic areas:

- West of Cherry Street: The Remove (Optimized Boulevard) alternative entails the removal of the elevated Gardiner Expressway, making approximately 4.6 acres of currently encumbered land available for development. The Hybrid alternative retains the elevated expressway.
- Between Cherry Street and the Don River: Both alternatives will support the development of the "Keating" lands between Cherry Street and the Don River. The differences in configuration, however, result in more land being made available in the Remove (Optimized Boulevard) alternative (12.9 acres) than the Hybrid alternative (5.5 acres).

To estimate land value, the analysis assumes a volume of development in each area, using the same density assumptions in both alternatives:

- West of Cherry Street: The analysis assumes a floor area ratio of ten.
- Between Cherry Street and the Don River: The analysis assumes a floor area ratio of 6.57.

Figure 15: Floor Area Potential by Alternative

	Floor Area by Alternative (square meters)	
Area	**Remove (Optimized Boulevard)**	**Hybrid**
West of Cherry Street	184,000	0
Between Cherry Street & the Don River	343,000	145,000
Total	527,000	145,000

To estimate land value, HR&A assumes a development mix and value by land use. The analysis assumes 83 per cent will be residential, nine per cent will be commercial, three per cent will be retail, and six per cent will be institutional (numbers do not sum to 100 per cent due to rounding). Figure 16 below presents value assumptions by geographic area, as developed during the 2013 net benefits analysis. Because market demand is likely to be higher for parcels west of Cherry Street when compared to parcels between Cherry Street and the Don River, the analysis assumes a higher land value per buildable square meter for the parcels west of Cherry Street. It should be noted that site conditions could further decrease land value depending on the cost of remediating environmental conditions. For the Remove (Optimized Boulevard) alternative, values for parcels west of Cherry Street and between Cherry Street and the Don River have been increased four per cent because those properties will benefit from increased visibility, landscaping, and light/air resulting from the removal of the elevated expressway.

Figure 16: Land Price Assumptions

	Land Price (per buildable square meter)			
Area	**Residential**		**Other Uses**	
	Remove	Hybrid	Remove	Hybrid
West of Cherry Street	$459	N/A	$280	N/A
Between Cherry Street & the Don River	$306	$295	$168	$160

Figure 17 presents a summary of potential land proceeds by alternative, in both nominal and net present value terms using a four per cent discount rate. The analysis assumes all land sales occur over a 20-year timeframe. The Remove (Optimized Boulevard) presents more potential for land value proceeds ($128 million in net present value terms) than the Hybrid alternative ($29 million in net present value terms).

Figure 17: Potential Land Proceeds by Alternative

Area	**Remove (Optimized Boulevard)**	**Hybrid**
West of Cherry Street	$79,000,000	--
Between Cherry Street & the Don River	$97,000,000	$39,000,000
Total, 2013$	$176,000,000	$39,000,000
Total, Net Present Value	$128,000,000	$29,000,000

Conclusion

The Remove (Optimized Boulevard) alternative entails lower capital and operations and maintenance costs as well as greater revenue potential than the Hybrid alternative. As a result, **the Remove (Optimized Boulevard) alternative is preferred.**

7. APPENDIX: DECEMBER 2014 STAKEHOLDER MEETING MINUTES

HR&A facilitated meetings on December 11, 2014 with three different stakeholders groups to understand their perspective on Toronto's competitiveness, the importance of Downtown Toronto, Downtown's strengths and weaknesses, and risks confronting Downtown Toronto. HR&A conducted these meetings as part of the Gardiner Expressway Environmental Assessment Study (EA) and how the alternatives being evaluated relate to Downtown's and Toronto's economic competitiveness.

Below are key findings from those meetings.

Think Tanks

- Civic Action
- Martin Prosperity Institute
- Ryerson City Building Institute
- Toronto Financial District BIA
- Toronto Region Board of Trade
- Urban Land Institute

- The area around Union Station is the most desirable place for employment in the Greater Toronto Area (GTA) with its unparalleled regional transit access and ease of doing business-to-business meetings. Union Station is the hub for all GO transit lines, will offer one-seat access to Pearson International Airport in the near future, and provides connections to the TTC subway. Downtown's business density makes it easy to conduct meetings with clients, service providers, and government.

- Downtown Toronto is also able to compete with other financial services centers like Boston and other GTA submarkets like Mississauga because of its attractive public realm and walkability, including the PATH. Downtown has a clear advantage over GTA submarkets, but the competition is catching up through housing, public realm, and transit infrastructure investment.

- In addition to financial services and among other sectors that cluster in Downtown, Downtown Toronto has been the hotbed for the startup community in the GTA.

- Downtown Toronto offers "big city livability" that has attracted significant population growth and talent, but those living Downtown still represent just a small sliver of the employee base for Downtown employers. As such, it is critical to not only continue improving Downtown's attraction to talent, but also Downtown's regional labour pool accessibility. While no other GTA submarket offers the regional transit access offered in Downtown Toronto, the frustration with travel to/from Downtown via both mass transit and car is acute.

- Improved mass transit on high-density corridors is seen as a way to enhance regional labour pool accessibility.

- Besides transportation, other risks to Downtown Toronto include the reliability of utility systems (i.e., energy, water), the high cost of housing, and the potential displacement of arts & culture due to high occupancy costs. Downtown suffers from aging utility infrastructure that requires improvement and/or replacement.

- As for real estate pressures, waterfront development is seen as a possible "relief valve." The group questioned what land uses could feasibly be developed in that part of the waterfront, given the location.

Real Estate Owners and Developers

- Brookfield Properties
- Cadillac Fairview
- Colliers International
- First Gulf
- GWL Realty Advisors
- Oxford Properties
- Menkes Development Ltd.
- RealPAC

- Downtown Toronto offers amenities, now and into the future, that cannot be found elsewhere: district energy, all-season walkability with the PATH network, Billy Bishop Airport, and Union Station, including its future revitalization and rail service to Pearson International Airport.

- Downtown Toronto needs new land to accommodate new construction, and transit to both service that land and relieve pressure on Union Station. The new waterfront-area lands offer the land that cannot be found elsewhere in Downtown and offers the opportunity, with appropriate high-quality transit, to allow Toronto to continue to flourish. SmartTrack may very well be one of the means of accomplishing this, but there may be other approaches.

- In terms of transportation, Downtown Toronto (including the waterfront and airport) needs to be a better place to circulate within - walking and transit is insufficient. A modern, higher-quality taxi system has been mentioned as part of the solution.

- Street congestion in Downtown Toronto hampers reliable delivery, and gridlock from the airport makes a poor first impression on prospective tenants coming from outside the GTA. At first blush, removing Gardiner Expressway capacity is seen as contributing to those problems. Building owners are frustrated with the inability to ensure on-time building services, and have trouble marketing their property when prospective tenants are stuck in traffic traveling to/from the airport. Some building owners believe better signalization could improve flow, regardless of any changes to the Gardiner Expressway, offering some degree of relief.

- Under any alternative, building owners are concerned about the duration of construction in Toronto. They are concerned about disruption to their tenants' ability to conduct business, and

see infrastructure works in Toronto being unnecessarily lengthy with poor project communications regarding schedule.

- There is a belief that that the growing live-work trend in and near Downtown will continue to increase.

Employers

- CBC
- National Bank of Canada
- Royal Bank of Canada
- SunLife

- By far the most attractive aspect of Downtown is the regional accessibility offered by Union Station. Some companies considered alternative locations or splitting up their workforce in locations across the GTA but felt consolidation near regional transit would be preferable for employee quality of life and corporate cohesion.

- Some companies are seeing a shift in employee travel and neighborhood preferences in which their employees are looking to live Downtown or near transit, or for those living in the suburbs, have been shifting towards transit. This may be due to lifestyle preferences but also a sense of long and unpredictable travel time when traveling by car to Downtown.

- The inability to predict travel time negatively impacts some businesses that need to use cars/trucks throughout the day. The combination of street and Gardiner Expressway congestion hurts their ability to be responsive.

- Some companies offer executive staff a parking space, which encourages those employees to drive.

- Toronto's waterfront is already an occasional recreational amenity for workers. The Gardiner Expressway, since it is elevated, does not cut off Downtown workers from accessing the waterfront as a place to walk, run, enjoy lunch, or spend time after work.

Appendix D
Capital Cost and Net Present Value Estimate Assumptions

Capital Cost and NPV Estimate Approach

The estimate of probable costs that was completed for the evaluation of alternative solutions involved the determination of comparative capital and operations and maintenance costs over a 100-year period starting in 2013. This was completed for the Hybrid Alternative. The methodology used for the alternative was based on the City's Gardiner rehabilitation costing methodology. The same approach as used to cost the previous alternatives was used to cost the Hybrid alternative as is presented below.

Capital Cost Estimate

Capital costs in the estimates were defined as the major capital expenditures necessary for either new bridge or road construction or for bridge deck replacement. These included cost determination for the following Major Costs Items:

1. Roadworks
    - Lakeshore Boulevard
    - Other Roadworks and Intersections
2. Structures
    - Bridge and Ramp Demolition
    - Bridge Deck Replacement
    - Other Bridges (e.g. Transition Areas, River Crossing)
    - New Ramp Bridges
    - Bridge Deck Modification
    - Bent Relocations
3. Utility Relocations
4. Traffic Maintenance During Construction
    - Major Detours, Temporary Roadworks and Outside corridor works
5. Landscaping and Urban Design
    - Type 1: Hardscape w/ Planting Area (Urban, street trees in paving, structural soil)
    - Type 2: Hardscape w/ Planting Areas & Special Amenities (skate park, court sports, 1/3 planting)
    - Type 3: Hardscape w/ Planting Areas (Paving, Gardens, Street trees, 1/3 Planting)
    - Type 4: Softscape (Primarily groundcover Planting, trees, Paths, 2/3 planting)
    - Vegetative green screening of railway retaining wall (non-structural)

For utility costs, an inventory of the buried utilities under the existing Gardiner Expressway was developed and costed for complete removal and relocation. 15% of this cost was assigned for the Hybrid.

A 5% allowance for traffic maintenance during construction was determined as a percentage of the total Major Cost Items as follows.

Totals for the Major Cost Items outlined above were developed and the following percentages added to determine the total capital costs for each alternative:

- Engineering and design costs – 8%
- Contingencies – 13.5%
- An additional 20% cost range was applied for the total capital, operations and maintenance costs

Quantities (e.g. deck areas, LSB lanes) for costing were taken from concept plans for each of the alternatives. Unit costs were applied to these quantities to determine the capital cost. The unit costs were estimated based on the following principles:

- The major reference for prices was the Ontario Ministry of Transportation (MTO)'s Parametric Estimating Guide (PEG), 2011.
- For items not directly related to the MTO PEG (e.g. bridge demolition, and bent relocation) the work was quantified and priced according to MTO's Highway Costing (HiCo) 2013 data base with adjustment based on similar project experience.
- Other items that were not covered or not directly related to PEG or HiCo were estimated based on recent, similar project experience and added to the total cost. These include the following:
    - intersection costs (drainage, curb, pavement marking etc.); and
    - landscaping and urban design

Although the majority of unit prices were based on the MTO PEG, price adjustments were made. Prices from recent City of Toronto projects (e.g. bridge removal, and deck replacement) were reviewed and some of the unit prices were adjusted to account for complexity of the Gardiner project, the increased durability required to provide for the extended service life of 100 years, use of advanced construction materials and the work in downtown core. Unit prices used in the analysis were corrected to 2013 year values, and are in line with current market prices. Additional adjustments were made as follows;

- Available MTO PEG 2011 prices were updated with inflation rate of 5% per year for two year in order to represent 2013 prices.
- In agreement with Delcan's 2014 peer review report, a complexity factor of 2.6 was applied for new bridge construction item – New Bridge Gardiner and Ramp. This was to account for the difficult urban city construction environment for bridge work. This factor was not considered applicable to demolition, road, signal, and other structural items.
- All deck replacement unit cost was adjusted to be in consistent with City's Gardiner Rehabilitation Life Cycle Analysis.

Life Cycle Costs and Operations and Maintenance Considerations

A life cycle cost analysis was conducted for the alternatives for a 100-year cycle starting in 2013. The City previously had conducted a Life Cycle Analysis for maintaining the Gardiner. A similar approach was applied to the Hybrid. The capital and remedial treatment cost occurrences were assigned throughout the 100 year time line using year 2013 construction costs without adjustment for inflation. The maintenance methodology followed the City of Toronto's model proposed for Major and Minor Arterial Roads. A 4% discount rate was applied to convert all costs to 2013 present value and summed together as the total LCCA cost for each individual alternative. The following are the key comments and assumptions related to this analysis:

- All capital cost work items carried forward from the original Maintain (west of Cherry Street) shall be carried out in accordance to the original Maintain's time line.
- The majority of the capital costs for new bridge works (demolition of Logan Ramp and construction of new ramp structures in the vicinity of Cherry Street) were started in 2020 and carried out over a period of 4 years followed by designating specific life-cycle repairs over the remaining period up to 100 years

- The decks of the ramps follow a similar model once their remaining life-spans expired.
- Operations and maintenance (O&M) costs include allowances for the following:
    - Superstructure Repairs (OWP) – overlay, waterproof and pave
    - Superstructure Repairs (PWP) – patch, waterproof and pave
    - Bent Repairs
    - Steel Painting
- O&M unit costs were based on ongoing and recent City costs for these types of remediation works.
- It was assumed that the new decks will have a life span of 100 years, having been replaced with reinforcing materials inert to chlorides such as Stainless Steel and/or Glass Fibre Reinforced Polymer (GFRP) in conjunction with high performance concrete, waterproofing membrane and asphalt protection layer.
- The section of the F.G. Gardiner Expressway from Yonge Street was divided into eight (11) zones based on similar condition, dates of construction or rehabilitation for the existing deck. The capital and O&M costs for these zones were developed for each of the alternatives:
    - Zone 1: Jarvis Street to Small Street
    - Zone 2: Small Street to Cherry Street
    - Zone 3: Cherry Street to Don River
    - Zone 4: Gardiner to LSB Ramps at east
    - Zone 5: Jarvis on-ramp
    - Zone 6: Sherbourne off-ramp
    - Zone 7: Gardiner off ramp to DVP
    - Zone 8: DVP on-ramp to Gardiner
    - Zone 9: Yonge Street to west of Jarvis Street
    - Zone 10: West of Jarvis Street to Jarvis Street
    - Zone 0: LSB Bridge over the Don River

Life cycle costs have been summarized in two ways:

- All 2013 capital and maintenance costs were assigned over the 2013 – 2113 timeline at the appropriate years and discounted to a 2013 net present worth
- The initial phase construction capital costs (essentially in the period of 2020 to 2028) were stripped out of the 100 year timeline and classified as 2013 capital costs and the remaining costs in the 100 year period were discounted to 2013 and added to the 2013 capital costs.

The above costing methodology was peer reviewed by an independent consultant and has been adjusted based on comments and suggestions that were received. Property costs are not included in the capital cost estimates