



STAFF REPORT ACTION REQUIRED

Tunnelling Options for the F.G. Gardiner Expressway

| | | |
|--------------------------|--|---|
| Date: | September 4, 2015 | |
| To: | Executive Committee | |
| From: | Deputy City Manager, Cluster B | |
| Wards: | Ward 5 – Etobicoke-Lakeshore Ward 13 – Parkdale-High Park Ward 19 – Trinity-Spadina Ward 28 – Toronto Centre-Rosedale | Ward 6 – Etobicoke-Lakeshore Ward 14 – Parkdale-High Park Ward 20 – Trinity-Spadina Ward 30 – Toronto-Danforth |
| Reference Number: | P:\2015\ClusterB\WF\EX15006 | |

SUMMARY

This report responds to a request from City Council for an analysis of the feasibility of tunnelling the F.G. Gardiner Expressway. Council made the request during consideration of "Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study – Updated Evaluation of Alternatives" (Gardiner East EA) on June 10-12, 2015. See PW4.1 at:

<http://app.toronto.ca/tmmis/viewPublishedReport.do?function=getCouncilMinutesReport&meetingId=9692>

This report does not recommend further analysis of the option of tunnelling the Gardiner – either for the eastern deck or the full elevated expressway. The Gardiner East EA should be completed, with Council's approval of a preferred alternative design in early 2016, so that the preferred alternative design can be implemented immediately following Provincial approval of the EA.

Any delay in implementing the Gardiner East EA for the purpose of pursuing a Gardiner tunnel option would have serious implications, including delay in the implementation of the F.G. Gardiner Expressway Strategic Rehabilitation Plan and risks to the safety of users of the expressway's deteriorating elevated decks (considered to be unserviceable beyond 2020). Pursuing a tunnel option while also rehabilitating the elevated structure would result in considerable throwaway costs: up to \$230 million for the Gardiner East; and up to \$2.6 billion for the full Strategic Rehabilitation Plan study area. Further, adjacent neighbourhoods and planned developments, including those in the East Bayfront, Port Lands and South of Eastern

precincts, would be subject to ongoing uncertainty and paralysis from continued indecision about the Gardiner.

The idea of tunnelling the Gardiner Expressway is a persistent one. Constructed in sections between 1955 and 1966, the elevated Gardiner has been perceived as a fundamental barrier to the city's waterfront. Retention of the Gardiner has been seen as contrary to revitalization of the waterfront and adjacent precincts. Boston, Seattle and other cities have pursued expressway tunnelling, despite the considerable cost and construction impact.

Proposals to tunnel all or portions of the Gardiner have been around for more than 60 years. In the 1950s, plans for tunnelling the Gardiner in the vicinity of Parkdale and Exhibition Place were examined. The idea re-emerged in the late 1980s, with enough public interest to inspire serious tunnelling proposals in 1987, 1991, 1999 and 2000. These proposals are described in detail in this report.

While the idea of tunnelling the entire length of the Gardiner (as opposed to the Gardiner East) is attractive it is also impractical. It would take between 10 and 15 years to gain the necessary City and Provincial permits and approvals that would be required to start construction. Federal involvement would generate additional permits and approvals. Construction would require up to 10 years.

Any proposal to tunnel the entire length of the Gardiner would be a different problem or undertaking from that described in the current Gardiner East EA. A new Individual EA process would have to be started. A new Terms of Reference would have to be developed for approval by City Council and the Ontario Minister of Environment and Climate Change (MOECC). Based on past experience, such an EA would require close to 10 years to initiate and complete. Provincial EA approvals would follow, as would detailed design and procurement; combined, these steps would require two to four years.

Given the scale and complexity of any undertaking to tunnel the Gardiner, City Council approvals at both ends of the pre-construction phase of the project would take a number of years, especially if reports are deferred or referred back to staff for further analysis. If the project were to be funded from tolling revenues, and/or if it were to involve the use of P3/AFP procurement, City Council approvals would take even longer.

Tunnelling between Jarvis Street and the Don River was considered as a "Replace" option early in the Gardiner East EA study process, during the development of alternative solutions. However, tunnelling was abandoned as a feasible option due to cost, risk and a number of technical issues. Specifically the tunnel Replace option would have involved:

- Capital costs of up to \$2.5 billion (\$2013) plus lifecycle costs;
- Lengthy transition areas with steep grades that would occupy more than half of the available 2.3-kilometre study area and act as an additional barrier to the waterfront; and
- No connectivity for tunnel traffic to the area's north-south streets.

The opportunity to pursue tunnelling as a feasible option for the Gardiner has been passed over on numerous occasions since the 1950s, including in the 1990s when Metro Council twice chose to retain and ameliorate the existing expressway rather than tunnel. Considerable time and energy have been spent evaluating the many proposals over the years in attempts to see if a tunnelling option could work. Despite the many inspired proposals from many sources – Four Guys off the Wall, the Royal Commission on the Future of the Toronto Waterfront, Canadian Highways International Corporation and Waterfront Toronto – cost, risk, construction impact and the challenge of connecting east-west traffic to north-south streets have kept the tunnelling concept from emerging as a viable solution for the Gardiner Expressway. The lack of vacant land/property for implementation, a result of intensification, has recently emerged as a further constraint. For example, it would be very difficult to find the room for temporary detour routes that would be necessary during the construction of a tunnel. In addition, less than one-quarter of the traffic on the Gardiner uses it as a through-route; from commercial to recreational and business commuters, the majority of Gardiner travel demand is generated within and to destinations in the downtown core.

The City must get on with rehabilitating the Gardiner, inclusive of developing and implementing the recommended "Hybrid" design for the Gardiner East EA. Notwithstanding the allure of Gardiner tunnelling proposals over the years, this report concludes that the opportunity to undertake a tunnel for all or portions of the Gardiner Expressway has passed. Regardless of cost constraints, which could be in excess of \$10 billion for a corridor-wide tunnel, the condition of the eastern deck demands immediate and measured action through completion of the Gardiner East EA.

RECOMMENDATIONS

The Deputy City Manager, Cluster B recommends that Council receive this report for information.

FINANCIAL IMPACT

There are no direct financial implications resulting from the adoption of this report. The Deputy City Manager and Chief Financial Officer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

At its meeting of March 4, 2014, the Public Works and Infrastructure Committee received a Report from the Deputy City Manager, Cluster B, on Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study. This included the Alternative Solutions Evaluation Interim Report, which dismissed a tunnel option because of an estimated \$2.5 billion cost, the need for long transitions at each end

of the tunnel, and the lack of connectivity to the north-south roads that link the corridor to the downtown. The meeting decision document can be found at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2014.PW29.2>

At its June 10 to 12, 2015 meeting, City Council selected the Hybrid as the preferred Gardiner East EA alternative in considering the report "Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment and Integrated Urban Design Study – Updated Evaluation of Alternatives (PW4.1)," as well as the Supplementary Report (PW4.1.a). See PW4.1 at: <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.PW4.1> In so doing, Council directed staff to prepare a report on options for road pricing (tolling) related to the Gardiner Expressway and Don Valley Parkway for the September 21, 2015 meeting of the Executive Committee. A related report on the F.G. Gardiner Expressway Strategic Rehabilitation Plan Procurement Strategy will be before the same meeting of the Executive Committee. Council also directed that a report on the feasibility of tunnelling the Gardiner be presented to the September 22, 2015 meeting of Public Works and Infrastructure Committee (PWIC). To facilitate discussion of the tunnelling report in conjunction with the tolling and rehabilitation plan procurement reports, this report is being presented to Executive Committee instead of PWIC.

Council also referred the package attached to Motion 10b moved by Councillor Giorgio Mammoliti to the City Manager for consideration in any future discussion of options for the remaining portion of the Gardiner Expressway.

<http://www.toronto.ca/legdocs/mmis/2015/cc/comm/communicationfile-53580.pdf>

COMMENTS

This report addresses the most recent tunnel option examined as part of the Gardiner East EA and the reasons it did not emerge as the preferred EA alternative. Historical tunnelling proposals for the entire expressway from its western start at Highway 427 to its terminus east of the Don Valley Parkway (DVP) at Logan Avenue are then described, along with the financial, scheduling and other implications of continuing to pursue a tunnelling option for the Gardiner.

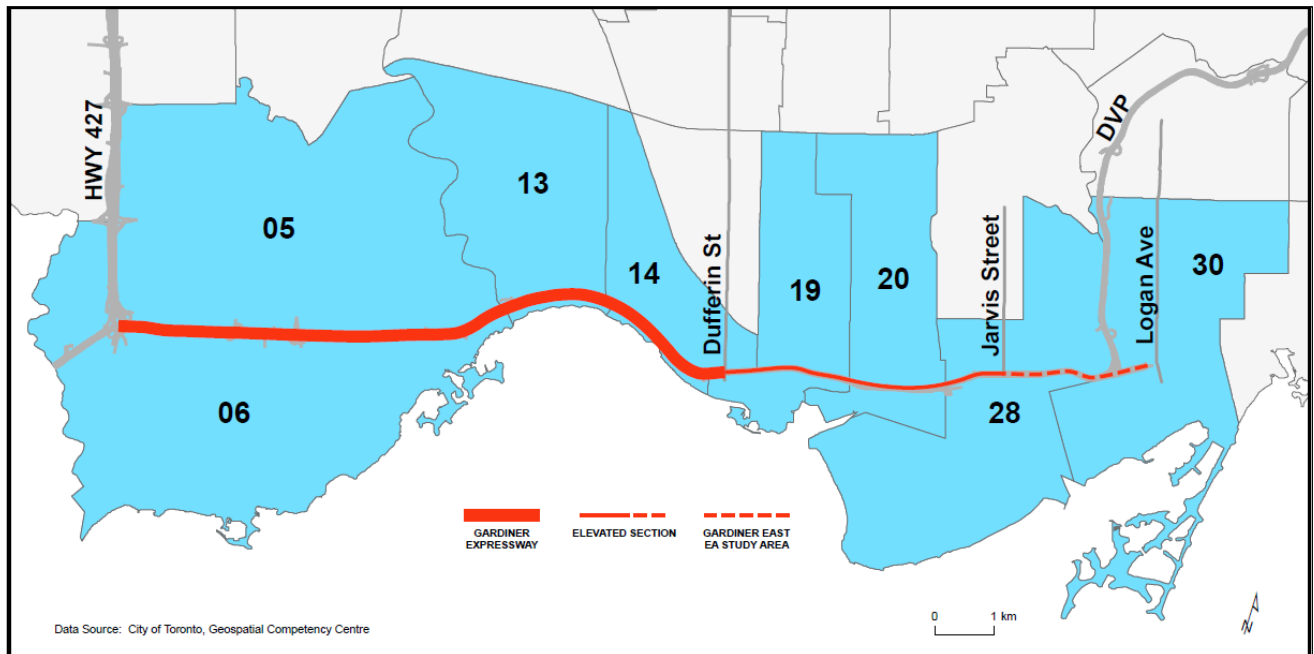
1. Overview of Gardiner East EA

Begun in 2008, the Gardiner East EA is examining options for the future of the elevated expressway east of Jarvis Street. The Terms of Reference phase was completed in 2009, followed by a Gardiner ideas competition. After a comprehensive public and stakeholder consultation program and a number of reports to Public Works and Infrastructure Committee (PWIC) in 2014 and 2015, Council selected the Hybrid option as the preferred EA alternative at its meeting of June 10-12, 2015. The total approved EA budget is \$8.4 million.

Alternative design concepts for the Hybrid are now being developed and will be presented to stakeholder groups and the public both before and after submission to September 22, 2015 Public Works and Infrastructure Committee. Public consultation meetings on alternative designs will be held in November, after which a preferred Hybrid design alternative will be presented to

Committee and Council in early 2016. Once endorsed, approval for the preferred Hybrid design will be sought from the Minister of Environment and Climate Change (MOECC) in late 2016, a full eight years since the start of the Gardiner East EA.

Figure 1: Gardiner Expressway Wards, including Gardiner East EA Study Area



As is well documented in Committee and Council reports, the eastern deck of the Gardiner Expressway is at the end of its service life. Interim repairs are maintaining the structure in a safe and operable condition until the start of full deck replacement in 2020. A timely resolution to the eastern Gardiner is imperative. Its poor condition has necessitated an additional \$5 million worth of emergency repairs this year, for a total of \$14.1 million in the last few years.

2. Gardiner East EA Tunnel Option

This section provides an analysis of why the tunnel option did not emerge as a frontrunner in the current exercise of defining the future of the Gardiner East. An eastern tunnel concept was developed as part of the Replace family of options in 2013 during the evaluation of alternative solutions for the Gardiner East EA. The 1.2-kilometre tunnel would have replaced the Gardiner east of Jarvis Street with an alternate expressway facility. Other Replace alternatives examined included a rail embankment extension to support a new expressway and a new elevated expressway through the corridor. The tunnel option was not carried forward as the Replace alternative. The reasons for this are presented below, along with further information and detailed engineering aspects of the EA tunnel concept evaluated for the Gardiner Expressway between Jarvis Street and the Don River.

Concept Outline

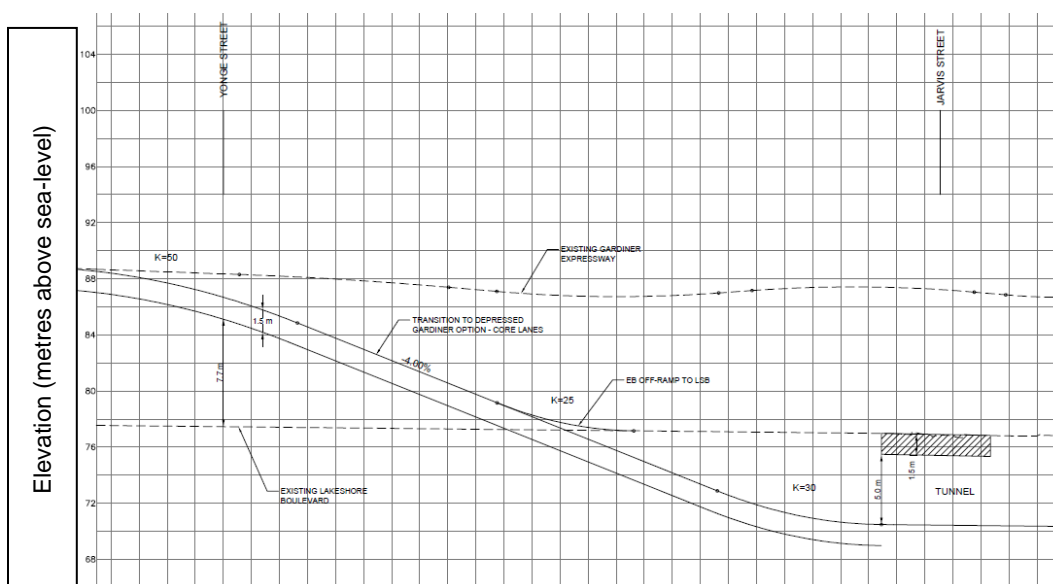
The tunnel concept evaluated as part of the Gardiner East EA consisted of a high-speed through-road beneath Lake Shore Boulevard that would extend from just west of Jarvis Street to the Don River. A 70-kilometre-per-hour design speed was assumed for the ramps, with a corresponding maximum ramp grade of 5% and mainline grade of 4%. The transition from above-grade ramps to the below-grade tunnel would be about 500 metres west of the Don River, approximately half the length of the Keating Precinct, and 600 metres west of Jarvis Street.

The tunnel would require the construction of expensive and intrusive ramps to and from the tunnel. At the east end, the tunnel option would require modifying the Gardiner–DVP ramps so that they would pass over the Don River (at a clearance based on a 350-year storm event) before descending below ground level west of the Don River at an appropriate road grade. The potential for tunnel flooding would be high and additional flood proofing measures in the Keating Precinct would likely be required.

As per previous tunnel concept work carried out as part of this project, an appropriate tunnel grade below the existing ground level of 6.5 metres was considered the absolute minimum depth. Figure 2 shows a tunnel profile transition treatment developed for the west end of the corridor, based on providing sufficient clearance so as not to affect the existing grade of Jarvis Street. This treatment would require that transition work extend west of Yonge Street, which would be problematic due to the encroachment of new building development on the north side of the corridor in this location.

The tunnel transition treatment in Figure 2 uses a 4% transition grade. At the east end of the corridor, a 5% transition grade was considered acceptable, as the road elements are considered ramps and not mainline road elements.

Figure 2: Tunnel Transition Profile – West Corridor (Yonge Street to Jarvis Street)



Groundwater elevations relative to sea level in the project area between Parliament Street and the Don Valley Parkway range between 74.7 to 75.7 metres and 73.8 to 74.6 metres from Yonge Street to Parliament Street (about two metres below surface). For comparison, Lake Ontario levels typically range from 74 to 75 metres above sea level. Bedrock elevation is between 65.5 to 68 metres in the section between Parliament Street and Cherry Street (about 9 to 12 metres below surface). If constructed, most of the tunnel would be in the groundwater zone but above the bedrock layer. A major bedrock valley is present between Cherry Street and the DVP, where bedrock elevation is as low as 41.5 to 43.4 metres at its deepest, well below the tunnel elevation. The assorted fill layer is oil-impregnated with historical leakage from various pipelines in the area (Parliament Street to DVP), which would have to be removed and disposed of with tunnel excavation.

Relocation of Utilities

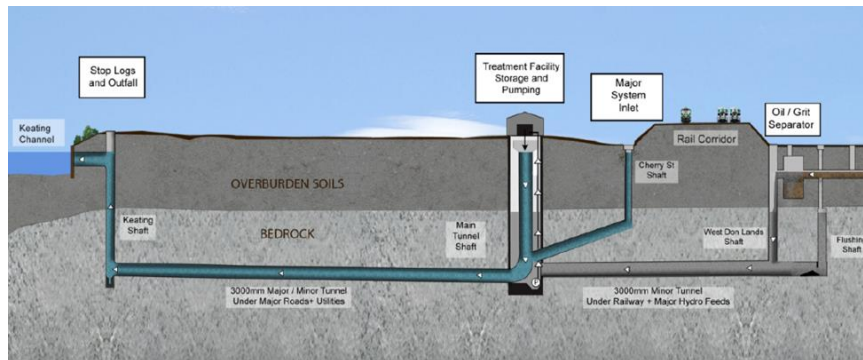
A considerable number of utilities exist in the section from Jarvis Street to the DVP, as summarized in Figure 3. Complete relocation of these utilities would be required prior to construction with any tunnel concept at an approximate cost of \$33 million (in 2013\$), as estimated by the affected utility companies.

Figure 3: Tunnel Concept Utility Infrastructure and Relocation Costs (2013\$)

| Utility | sizes | Unit Cost | Length of Conflict (m) | Total Cost |
|-----------------------|-------------------|-----------------|------------------------|-------------------------|
| Gas Main | 500mm | | 665 | \$5,000,000 |
| Toronto Hydro conduit | | | 1935 | \$21,500,000 |
| Cable conduit | Fiber Optic Cable | \$331 | 175 | \$57,925 |
| Bell conduit | Fiber Optic Cable | | 200 | \$2,099,000 |
| Watermain | 300mm | \$725 | 785 | \$569,125 |
| Storm Sewer | 1200mm-1525mm | \$1400 - \$1800 | 1830 | \$2,928,000 |
| Sanitary Sewer | 300mm - 1050mm | \$850 - \$1350 | 855 | \$983,250 |
| | | | Total | \$ 33,137,300.00 |

The newly constructed West Don Lands Storm Water Quality Facility’s outfall would also be affected, although there is a possibility that the outfall is deep enough to allow the tunnel to pass over top. Constructed entirely in the bedrock layer, the top of the outlet tunnel would be expected to be below the bottom of the road tunnel, as shown in Figure 4, but this would need to be confirmed.

Figure 4: Cross Section of West Don Lands Outlet Sewer (Looking West)



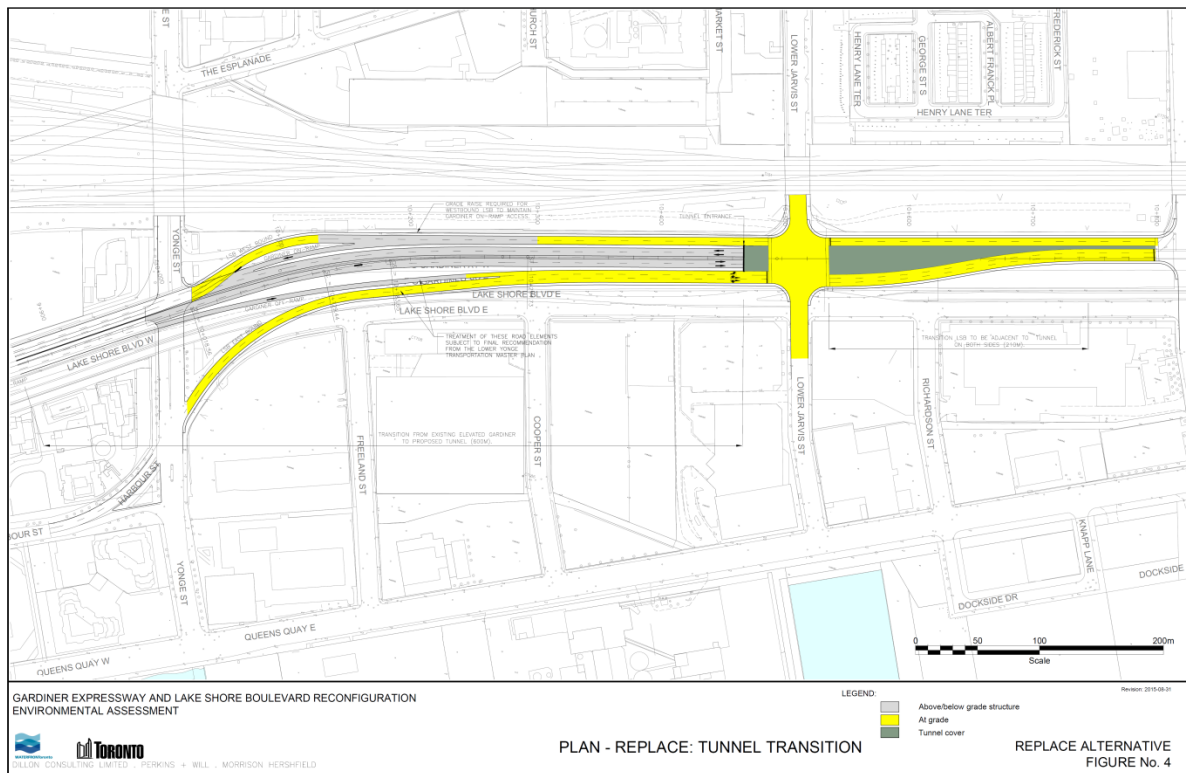
Clearance Requirements and Tunnel Transition Lengths

The tunnel would need to connect with above-grade ramps at the east end of the corridor that would cross over the Don River to link to the remaining elevated Gardiner at approximately Yonge Street. The need to connect the tunnel with these elevated roadways results in lengthy transition areas. At the east end, the height of new Gardiner–DVP ramps that would be needed for a tunnel would be defined by various clearance requirements. Considering the required height over the Don River to allow for floodwater conveyance, the minimum height of the ramp would need to be about 5.5 metres above-grade. This assumes a flood elevation of 79.5 metres above sea level.

There would likely be other clearance requirements on the west side of the Don River, including road, rail and possible clearance for the planned Don River mouth sediment and debris management facility, for example. As such, it is expected that the elevated ramps immediately west of the Don River would likely require an elevation above-grade of at least 7.5 metres. From this height, it is expected that the transition length in the Keating Precinct from above-grade ramps to the below-grade tunnel would need to be about 500 metres.

The total length of the Gardiner Expressway corridor between Yonge Street and the Don River is approximately 2.3 kilometres. About 1,100 metres of the corridor would be expressway transition areas and about 1,200 metres would be tunnel. As such, just under half of the corridor would consist of transition areas, which would have a negative impact on the urban character of the area and also act as a barrier to north-south movement. Also, the tunnel would not provide for transfer ramps between Jarvis Street and the DVP. As such, there would be no access from the tunnel to four major arterial roadways (Jarvis, Sherbourne, Parliament and Cherry Streets) as well as numerous smaller side streets. The first north-south street that westbound tunnel traffic would have access to would be Yonge Street, while eastbound tunnel traffic would first have access to the Don Roadway.

Figure 5: Typical Transition Section of Proposed Gardiner East Tunnel



Issues Associated with a Gardiner East Tunnel Option

As documented here, a considerable number of issues with the tunnel option were identified during the EA evaluation of the Replace with Tunnel option for the Gardiner East corridor. These issues led to the elimination of the "Replace with Tunnel" EA option as reported to PWIC at its March 4, 2014 meeting. See:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2014.PW29.2> Among the issues identified are:

- Significantly higher capital costs than other options at an estimated \$2.5 billion (\$2013), as well as significant operating and maintenance costs;
- Required transitions to/from the tunnel at each end that would extend for nearly half the entire study area (at 1,100 metres) in order to connect with above-grade roadways at both ends of the corridor (to cross over the Don River to connect with the DVP at the east end of the corridor and to reconnect with the remaining elevated Gardiner east of Jarvis St. at the west end of the corridor);
- Much of the transition area would be an open cut requiring a significant increase in the existing Gardiner / Lake Shore right-of-way (as the at-grade Lake Shore Boulevard could not overtop these transition areas), which would result in a barrier to north-south movement across the corridor;

- A through-tunnel expressway would not serve the needs of 80% of morning peak hour expressway users who want to access the downtown area, necessitating a complex tunnel design to allow traffic to exit and access north-south arterial roads and additional right-of-way width for exit/access ramps;
- Tunnel construction will likely encounter significant sections with contaminated materials and high water table levels, leading to construction and operational complexities and schedule delays;
- A minimum standard transition concept developed for the west end would likely result in the need to replace the Gardiner deck on the north side, west of Yonge Street, a location with significant existing land constraints;
- The design of the tunnel would be further complicated by the need to prevent floodwater from entering the eastern tunnel opening within the floodplain of the Don River; and
- A complex phasing and lengthy construction period would be required with significant traffic detouring during this period.

Considering the reasons noted above, the characteristics of the East Gardiner study area and traffic demand patterns, the tunnel option for the eastern section of the expressway was not proven to be a viable solution under the Gardiner EA Terms of Reference. The tunnel option was therefore not recommended as the alternative EA solution.

3. Past Proposals for Tunnelling the Gardiner Expressway

The primary objective of most Gardiner tunnel proposals has been to provide capacity for non-stop through trips, although these trips represent a relatively small proportion of all traffic using the elevated Gardiner Expressway. Providing local access to and from the Downtown from a tunnelled expressway would be both costly and intrusive, requiring ramps and portals to connect to the surface street network where feasible. As a result, tunnel proposals have been linked to revenue schemes, such as user tolls or income from new development on freed-up lands.

The following section summarizes the history of tunnelling proposals for the Gardiner Expressway corridor. As documented here and in Appendix 1 at some length, since the 1950s, Gardiner tunnel proposals have emerged and receded with some regularity, particularly from the 1980s on.

Early History – 1950s

Options for tunnelling portions of the Gardiner Expressway corridor as a whole emerged from the very conception of a "lakeshore expressway" in April 1954 when Metropolitan Toronto Council reviewed the first plans. By October of the same year, however, a debate arose as to whether the central portion of the expressway between Bathurst and Cherry Streets would be at-grade along existing streets, be elevated or tunnelled. But as the new at-grade expressway segment between the Humber River and Dowling Avenue was being built in 1955, the route and form of the central section remained undecided and the tunnel proposal was not pursued.

In 1958, the tunnel idea emerged once more, this time as a 1.6-kilometre "subway section" for the Spencer Avenue (near Dufferin) to Strachan Avenue segment, only to be dismissed by Metro

Executive Committee the same year. Among the list of concerns were utility relocations, high construction and maintenance costs, impacts on streetcar service, and technical difficulties. Within the same decade, Metro Council twice opted to pursue an elevated expressway over tunnel options for a central section of the new expressway.

1980s – The Tunnel in the Harbour

In the late 1980s an unsolicited tunnel proposal to divert the Gardiner into a tunnel in the harbour parallel to the shoreline led the Ontario Premier's Special Advisor on Waterfront Development to commission a Gardiner tunnel study. Around the same time, "The Four Guys off the Wall" put forward a central waterfront redevelopment proposal that included the harbour tunnel proposal. Claiming it could be built in time for the 1996 Olympics, their proposal consisted of a six-lane tunnel approximately 15 metres below the lake, which could be extended on land under Queens Quay east of Yonge Street.

Metro Toronto staff outlined the many drawbacks of the proposal in 1990, including difficult terminal and transition points, heavy volumes on arterial roads, impacts on storm sewers and harbour discharge, steep gradients and expense. Staff proposed two other tunnels: a deeper offshore tunnel (\$2 to \$3 billion) and a shallower tunnel (\$1 to \$2 billion), both of which were felt to be costly and technically challenging. Consequently, Metro Council took no action on any of the tunnel proposals.

1991 – The Royal Commission "Bury" the Gardiner Concept

In November 1991, the Royal Commission on the Future of the Toronto Waterfront released "Report 15: The Toronto Central Waterfront Transportation Study," assessing Retain, Remove and Bury options for the elevated Gardiner Expressway. There were three Bury concepts: one short and two long tunnels, one of which was based on the Four Guys harbour tunnel proposal. Report 15 dismissed the long tunnel concepts on the basis of utility and LRT impacts, the pronounced impact of ramps and costs, all of which outweighed land use and other proposed benefits. While the short tunnel option between Strachan Avenue and Portland Street was found to have merit, the transition ramps between the elevated and tunnelled sections would be very intrusive. Once again, Metro Council opted to "retain and ameliorate" the Gardiner over tunnel proposals.

1999 – Canadian Highways International Corporation Tunnel Proposal

In the late 1990s, the builders of the recently opened Highway 407 toll road, Canadian Highways International Corporation (CHIC), outlined a six-lane \$1 billion tunnel proposal between Dufferin and Yonge Streets that could be implemented through a public-private partnership. They also indicated that the remaining elevated expressway further east of Yonge Street to the Don River could be removed but did not cost this portion.

Review of the CHIC's tunnel option in early 1999 noted lengthy construction and traffic disruption, difficult phasing, cost and risk. A requested report back on the costs and community readiness for tolling and public-private partnerships included an analysis by KPMG outlining the

lengthy environmental assessment and procurement processes for such an endeavour. In July, City Council concluded that the issue of what to do with the Gardiner Expressway was best dealt with as part of the development of the newly amalgamated City's Strategic Plan and Official Plan, and referred the matter to the Office of the Mayor for further consideration.

2000 to 2003 – Fung Task Force Report

In March 2000, the Toronto Waterfront Revitalization Task Force led by Robert Fung released a \$1.2 billion proposal to remove the elevated expressway between Strachan Avenue and the Don River and replace it with a combination of a 1.5-kilometre tunnel between Strachan and Spadina Avenues, as well as an at-grade boulevard east of Spadina. The Task Force report noted that additional transportation studies would be needed to ensure replacement road capacity was first in place. These concepts were reviewed by City Council in July 2000.

By January 2003, the Waterfront Reference Group, (a committee of Council established to guide City involvement in waterfront revitalization for the first three years of the initiative), had eliminated tunnelling from earlier staff recommendations for a full EA study of Retain, Replace (including a tunnel) and Remove Gardiner options. Council endorsed the Reference Group's recommendation and concluded that a scoping study to identify Terms of Reference for a Gardiner EA should be limited to "retain and ameliorate" proposals. Two months after this direction, as part of its adoption of the Central Waterfront Secondary Plan, City Council requested staff to review a number of Gardiner proposals, including Replace (featuring a short section of tunnelling), Transform and Great Street (Remove).

2004 to 2008 – Waterfront Toronto's Analysis of the Short Tunnel Proposal

Staff's review of the Gardiner options described above resulted in a July 2004 proposal to replace the elevated expressway with an at-grade boulevard as well as a short two-kilometre, four-lane tunnel between Strachan and Spadina Avenues. Bored tunnel costs were estimated and confirmed by Morrison Hershfield and the entire Replace option was estimated to cost \$1.475 billion, excluding property acquisition and design enhancements. Three years later, after much consideration by staff, and with consideration of shifting political priorities, City and Waterfront Toronto staff recommended the more affordable Great Street (Remove) option over the tunnel option. Council opted to pursue this less expensive Waterfront Boulevard concept in 2008. The City of Toronto and Waterfront Toronto then initiated the current EA for the Gardiner east of Jarvis Street.

4. Expanding the Gardiner East EA Scope and Study Area

The Terms of Reference (ToR) for the Gardiner Expressway East and Lake Shore Boulevard Reconfiguration EA and Urban Design Study was approved by City Council and the MOECC in 2009. It sets out the purpose of the EA, which is 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 DVP at Logan Avenue. Under the EA Act, an individual EA must be prepared in accordance with the approved ToR. Tunnelling of the entire Gardiner Expressway /

Lake Shore corridor would have scope and impacts significantly broader than those of the current approved Gardiner East EA.

In order to consider tunnelling of the entire Gardiner corridor, a new ToR would need to be developed. Only once ToR approval is obtained could a new EA study commence on tunnelling of the full Gardiner corridor. A new EA study would need to fulfill the following requirements as per the EA Act:

- Statement of Purpose for the Undertaking;
- Description of and Rationale for the Undertaking and the Alternatives;
- Description of the Existing Environment, Effects, and Mitigation Measures ;
- Consultation;
- Evaluation of Alternatives; and
- Identification and assessment of the Preferred Alternative (the undertaking).

This would involve developing and obtaining Council approval for a new work program and budget. A new EA Terms of Reference with different problem/undertaking, scope and impacts than the current EA would then need to be developed and approved by Council and the Minister of the Environment and Climate Change (MOECC). The public would also need to be consulted before and after the ToR approval, and a new Stakeholder Advisory Committee would have to be established. Given the broader scope of the project, the consultation required would be significantly more extensive than that required for the current EA.

The Terms of Reference stage alone would take approximately one year followed by about six months for its approval. Given the profile and complexity of a corridor-wide Gardiner EA, the new EA itself would likely take a minimum of an additional seven years to complete. As such, the total time period to complete a new EA process is expected to take close to 10 years, followed by an uncertain period for MOECC review and approval of the completed EA Report. Considering these timelines, an approved EA for a tunnel would not be in hand until approximately 2025, perhaps longer depending on issues and local stakeholder interest in the project. Such a course of action is precluded by the interim nature of the repairs on the east deck of the Gardiner which are maintaining the Gardiner in a safe and operational condition until scheduled deck replacement in 2020.

A new EA to consider the tunnelling of the entire Gardiner would also create uncertainty with respect to the current EA and would likely generate arguments that the Gardiner East EA should be put on hold until the new EA is completed. Even if the current Gardiner East EA were to be completed and implemented, starting a new EA with the objective of tunnelling in the long-term would be of limited, if any, value. EAs have time-sensitive “shelf lives.” An EA approval obtained today would have to be completely revisited in order to take into account changes in conditions that have taken place over any significant time period prior to implementation.

MOECC Individual EA Review and Approval Process

The MOECC's review and decision-making process for an Individual EA is regulated under Ontario Regulation 616/98 – the Deadline Regulation. Depending on the complexity of the EA,

the review and decision process by the MOECC can take from seven months to several years from the date of submission of the final EA Report. The MOECC's review process involves opportunities for government agencies, interested persons and Aboriginal communities to review the EA Report and submit their concerns directly to the MOECC. The City and Waterfront Toronto would have an opportunity to review any comments received and advise the MOECC about issues raised and how they have been addressed during the EA process or how they can be addressed as part of other regulatory processes.

Post EA Activities: Engineering and Detailed Design Phase

Upon receipt of formal approval from the MOECC, the EA recommended undertaking / project would then proceed to the detailed design phase, which includes the following major elements to be completed:

- Detailed design;
- Procurement;
- Property acquisition / easement requirements;
- Utility relocation;
- Capital infrastructure coordination;
- Refinement of construction staging plan; and
- Construction tendering.

The complexity of the EA approved project impacts the timeframe required to complete the design of the facility. Although some of the above work items can occur in parallel, given the complexity of the proposed project, the detailed design phase could take a number of years to complete. During the detailed design phase, project cost, construction phasing and timing, limits of property acquisition/easement and utility relocation requirements would all be refined.

5. Funding Options

Council directed staff to report back on options to fund tunnelling, such as highway tolling and public private partnerships, which also include options with no cost to the taxpayer.

Tolling

A companion report on this agenda, titled "Tolling Options for the Gardiner Expressway and the Don Valley Parkway," discusses tolling technologies and high-level estimates for potential revenues generated under various tolling options. The report identifies tolling rates necessary to offset, after tolling costs, the capital, operating and maintenance costs for the rehabilitation of the Gardiner Expressway.

As indicated in this report, the tunnel replacement option considered early in the Gardiner EA study process was conservatively estimated to cost up to \$2.5 billion (2013\$) plus lifecycle costs. A corridor-wide tunnel would cost significantly more, potentially greater than \$10 billion. On a preliminary basis, it appears that the toll amounts required to recover these costs would need to

be about two-to-five times higher than those needed to recover the F.G. Gardiner Expressway Strategic Plan costs, in order to avoid an impact on the tax base.

Public-Private Partnerships

Public-private partnerships (P3s) are a widely used approach to procuring large-scale public infrastructure projects as a single project. Under a P3, asset ownership remains in public hands while construction, delivery, financing and sometimes operations and maintenance are undertaken by the private sector according to specific terms and conditions. These terms and conditions include private-sector partner responsibility for delivering a project on time, and on budget.

Alternative Financing and Procurement (AFP) is a P3 approach that was developed and refined by Infrastructure Ontario, an agency of the Province of Ontario. Although AFP or P3 procurement is sometimes characterized as a funding source, it is not. Nevertheless, the AFP process can be advantageous for large, complex projects, and has been used for tunnelling projects in Ontario. The AFP process is being recommended for the Gardiner Strategic Plan procurement.

6. Conclusion

This report does not recommend further analysis of tunnelling the Gardiner, either for the eastern deck or the full elevated expressway. Any proposal to delay or discontinue working on the Gardiner East EA, which is nearing completion, in order to begin a new Individual EA study for tunnelling the entire corridor should be discouraged.

Pending completion of the Gardiner East EA, Council authorized \$9.1 million in interim repairs for the eastern leg of the expressway in January 2013. Rehabilitation work began in July 2013 and was completed this year. The scope of work included a combination of temporary bracing, localized deck repairs, and repair/replacement of severely deteriorated parapet walls. An additional \$5 million worth of needed interim repairs is expected to begin this fall. Pursuit of a tunnelling option for the Gardiner is inconsistent with the City's aim to retain the eastern deck in a safe and operable condition, given the 10 to 15 years it would take to gain the necessary City and Provincial permits and approvals for tunnelling prior to construction, as well as the 10 years construction duration.

The opportunity to pursue tunnelling proposals for all or a portion of the Gardiner Expressway corridor occurred several decades ago. The opportunity passed in large part because tunnelling proposals have generally represented high cost and high risk alternatives. Councils have voted consistently to "retain and ameliorate" the elevated Gardiner. A tunnel for the Gardiner East EA segment between Jarvis Street and the Don River was also examined and ruled out as an alternative solution under the Replace family of options in the EA, for reasons noted in this report.

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Appendices

Appendix 1 – Past Proposals for Tunnelling the Gardiner Expressway
Appendix 2 – Gardiner Skyway Vision

Appendix 1 – Past Proposals for Tunnelling the Gardiner Expressway

The following section summarizes the history of tunnelling proposals for the Gardiner Expressway corridor.

Early History – 1950s

The Gardiner Expressway was originally referred to as the Lakeshore Expressway during its conception. Plans for its construction were presented by the consulting firm of Margison Babcock Associates to Metropolitan Toronto Council in April 1954. However, elements of the plan proved contentious and by the time the Lakeshore Coordinating Committee convened in October 1954 to determine the final route, five expressway variations were up for consideration. The Globe and Mail newspaper reported on these choices in an October 2, 1954 article entitled “All Expressway Plans Now Ready for Sifting by Metro Committee”. The article characterized the discussion as centring on two principal points of dispute: whether the west section of the expressway alignment would follow a waterfront route or a route north of the Canadian National Exhibition; and whether, in the central part, the expressway would utilize existing streets, or be elevated or tunnelled.

The tunnel proposal was put forward by landscape architect Edwin Kay who proposed that the expressway should run underground between Bathurst and Cherry Streets. No estimates of the cost of the tunnel proposal were provided. The Dowling Avenue to Spadina Avenue section of the proposed expressway was approved along the route to the north of the CNE on November 23, 1954 (see Clause 1 of Report No. 6 of the Metro Roads Committee). Work first began in late 1954 on building the at-grade section of the expressway between the Humber River and Dowling Avenue which, at the time, was the least contentious part of Margison’s original plan for the west end of the route. The route and form of the central section of the proposed expressway remained undecided and the tunnel proposal was not pursued.

It was at the time of the completion of the first section of the expressway between the Humber River and Dowling/Jameson Avenues in August, 1958 that the Chief Engineer of one of the construction companies working on the project, Mr. R. T. Lyons, proposed an alternative alignment for the next eastward section of the expressway. The Lyons proposal was for a 1.6-kilometre section of the expressway between Spencer Avenue (near Dufferin Street) and Strachan Avenue to be built “in a subway section”. The unusual design created an individual tunnel for each lane of traffic and required the removal of the Loblaws building to accommodate the connecting ramps to Bathurst and Fleet Streets. The proposal was strongly criticized by the Metro Commissioner of Roads in a report (Clause 15 of Report No. 36) to the Metro Executive Committee meeting of September 9, 1958.

The report from the Commissioner of Roads noted a number of practical difficulties with the tunnel design. Among the list of concerns were: lane configurations; the disturbance of the Military Cemetery at Fort York; utility relocations; high maintenance costs (ventilation; lighting, drainage and emergency services); tight curves and gradients of the connecting ramps, and the difficulty of connecting the tunnel to the elevated structure of the proposed Highway 400 Extension. It was estimated that the tunnel would cost at least \$10.8 million, more than twice the

\$4.4 million cost of the original Metro proposal. The TTC were also concerned that the tunnel would involve substantial additional cost to reconfigure streetcar service to the CNE from the east end and to provide vehicle storage space. Nevertheless, the CNE Board felt the tunnel proposal had “a great deal of merit”. However, Metro Council acted on the advice of the Commissioner of Roads to “take no action with respect to the proposal of Mr. Lyons”. Within the same decade, Metro Council twice opted to pursue an elevated expressway over tunnel options for a central section of the new expressway.

It should be noted that as of August 13, 1957, the Lakeshore Expressway was formally renamed the Frederick G. Gardiner Expressway, before the first section of the expressway was completed and during the time of Mr. Gardiner’s tenure as Metro Chairman. The expressway was constructed and connected to the Don Valley Parkway in 1964. The final section from the Don River to Leslie Street was completed in 1966. For the next two decades, the new Frederick G. Gardiner Expressway became an accepted part of the City’s waterfront and new development in the area adapted to its presence. However, as heavy industry, rail freight and other port-related activities began to move out of the waterfront to be replaced by more intense employment and residential uses, a growing interest in re-assessing the role of the expressway developed. In particular, these changes in the character of the corridor brought increasing demands to re-establish connections between the city and the lake.

1980s – The Tunnel in the Harbour

In 1987, Colin Bent Associates (Architects) put forward a proposal to divert the Gardiner Expressway into a tunnel in the harbour that would parallel the shoreline between Jameson Avenue and Yonge Street. The idea prompted the Ontario Premier’s Special Advisor on Waterfront Development to retain Transportation Systems Associates to further study both a tunnel and depressed expressway configuration. Around this time, William Teron, a developer and head of a construction technology company, teamed up with Colin Bent to spearhead "The Four Guys off the Wall" who created a comprehensive proposal for the redevelopment of the central waterfront that included the harbour tunnel concept. Their proposal was presented to the Royal Commission on the Future of the Toronto Waterfront at its public hearing in April 1990.

The Four Guys proposal for replacing the Gardiner was presented as a high-level sketch with a number of possible variations. Using patented technology, the six-lane tunnel was to be constructed “in the dry” behind a cofferdam approximately 15 metres below ground. East of Yonge Street, the tunnel could be extended under Queens Quay. The tunnelling technology had been successfully employed in Paris, France and it was claimed that the tunnel in the harbour could be completed in time for the 1996 Olympics, should Toronto’s bid prove successful. Park space was to be created on the reclaimed land above the tunnel with shallow slipways to allow small craft to access the quays.

No firm cost estimate of the tunnel was made but it was reported in the press as being around \$1 billion. The proponents felt the cost of the project could be covered by the revenues generated by the redevelopment of the lands that would become available by the removal of the elevated expressway. However, the redevelopment proposal presented to the Royal Commission restricted

all new development to the north side of Queen's Quay and there were concerns that this meant development densities would be forced to unacceptably high levels.

Metro Toronto staff commented on the harbour tunnel proposal in a 1990 report that reviewed the future of the Gardiner Expressway (See Clause 1 of Report No. 10 of the Metro Transportation Committee, May 1990). The staff report noted that, although the tunnel would replace the capacity of the elevated expressway, all traffic accessing the Downtown from the tunnel section would have to cross Queens Quay and these heavy volumes would negatively impact the character of the street and the operation of the new LRT line. The overall effect of the tunnel would be to draw traffic through the central waterfront. Other issues identified by Metro staff included:

- traffic would no longer be able to divert between Lake Shore Boulevard and the expressway in the event of a breakdown on either one;
- the construction of the tunnel would be difficult to phase because the high cost of the terminal or transition points would preclude these being built as temporary end points since the tunnel was built in stages;
- the tunnel would impact storm sewers that discharge into the harbour;
- larger vessels would no longer be able to access the quays, and
- maintenance costs would be high.

However, the report noted that the greatest drawbacks of the harbour tunnel proposal were the sub-standard horizontal curvatures at the west and east ends of the tunnel and steep gradients, particularly on the ramps connecting to the north-south surface streets. Metro staff proposed two alternative designs: one, a longer, deeper tunnel further offshore (estimated cost \$2 to 3 billion); the other, a shallower expressway tunnel close to the dock wall with open-cut ramps to surface streets only six metres above (estimated cost \$1 to 2 billion). The Metro staff review concluded that the fundamental challenge would be to develop an affordable financing scheme for the tunnel proposal.

In considering the Metro staff report at its meeting of May 9, 1990, Metro Council adopted the recommendation that the Metro Commissioners of Planning and Transportation provide, among other things, "information on the way in which the Teron proposal for Frederick G. Gardiner Expressway may be considered further in respect to the future of the said Expressway." Consequently, Metro Council took no action on any of the tunnel proposals. The subsequent release of Report 15 of the Royal Commission on the Waterfront increased the number of tunnel options as described in the section below.

1991 – The Royal Commission “Bury” the Gardiner Concepts

In November 1991, the Royal Commission released “Report 15: The Toronto Central Waterfront Transportation Study” in which three generic concepts were assessed for the treatment of the elevated Gardiner Expressway: (i) Retain; (ii) Remove, and (iii) Bury. Three illustrative road system schemes were developed for each concept. For the Bury concept, these were:

- 3a) A short tunnel from west of Strachan Avenue to just east of Portland Street;

- 3b) A long tunnel on or close to the existing expressway alignment from west of Strachan Avenue to east of Parliament Street; and
- 3c) A long tunnel, based on the Four Guys harbour tunnel proposal, from Jameson Avenue to the Don Valley Parkway, largely built on new fill just south of the existing harbour shoreline.

Report 15 concluded that the land use and other benefits of the long tunnel concepts would not justify the very substantial additional costs and should not be considered further. The long tunnel concepts included ramp connections via portals to Spadina Avenue, York Street and Jarvis Street which consumed considerable amounts of land and would be difficult to traverse. It was estimated that the large front-end costs would incur interest charges that would overwhelm revenues from recaptured land value.

The long underground tunnel (3b) would impact many underground utilities and would have to negotiate the underground Harbourfront LRT line at Bay Street. Underground servicing problems would likely preclude opportunities for building directly atop the tunnel structure.

The shoreline tunnel (3c) was ranked the most costly and most risky concept. Report 15 noted:

“While a tunnel under the shoreline would create new land, much of which could be a linear waterfront park, the negative impact of major ramps serving the tunnel would be quite pronounced and the size and amenities of Toronto Bay would be reduced. The challenge . . . is not to create new land by further filling Toronto Bay but, rather, to make better use of the extensive land already available in the Central Waterfront” (p. 96).

Report 15 implied that the short underground tunnel (Strachan to Portland) had some merit and would allow for the removal of the elevated section of the expressway through the Garrison Common area. However, the transition ramps between the elevated and tunnelled sections of the expressway would be very intrusive. Metro staff’s response to Report 15 noted that: “While Metro acknowledges that there are valid environmental, urban design and affordability concerns with burying the Gardiner, staff do not support a plan to dismantle it and replace it with an at-grade boulevard”. Given this position, Metro staff concluded that “retain and ameliorate” was the only viable option in the foreseeable future (See Clause 18 of the Metro Economic Development and Planning Committee meeting of November 30, 1992).

Based on this advice, at its December 9 to 10, 1992 meeting, Metro Council adopted the recommendation to advise the Waterfront Regeneration Trust which succeeded the Royal Commission that "based on the present evidence, the only viable short-term option for the Gardiner Expressway is to 'retain and ameliorate' the facility, which encompasses physical and operational improvements." (See Clause 3 of Report No. 19 of the Metro Economic Development and Planning Committee meeting of November 30, 1992.) Once again, Metro Council adopted "retain and ameliorate" the Gardiner as the most viable option over the tunnel proposals.

1999 – Canadian Highways International Corporation (CHIC) Tunnel Proposal

Shortly after amalgamation, the Canadian Highways International Corporation (CHIC) outlined a proposal to replace the elevated Gardiner Expressway with a six-lane tunnel. The initial proposal was for a tunnel to be built between Dufferin and Yonge Streets at an estimated cost of around \$1 billion. The proposal included the option of removing the remaining section of the elevated expressway from Yonge Street to the Don River but no cost estimates for the extended tunnel proposal were provided.

CHIC had built the recently opened Highway 407 toll road to the north of the City and claimed that the cost of the proposed Gardiner tunnel could also be covered by imposing user tolls. The concept was only presented in conceptual terms, principally from an engineering perspective, as it was anticipated that if the concept were to advance it would be subject to a competitive bidding process. It was expected that this long tunnel proposal would be implemented through a public-private partnership (PPP) process. A novel feature of the CHIC proposal was to create an urban boulevard by cantilevering an eight-lane Lake Shore Boulevard over the expressway trench with a centre gap for ventilation and light.

City staff's response to the CHIC proposal raised many of the concerns common to most tunnel concepts (see January 25, 1999 joint report from the Commissioners of Works and Emergency Services and Urban Planning and Development Services which was considered by the Planning and Transportation Committee at its meeting of February 8, 1999). These concerns included high cost and risk, the long period of construction and traffic disruption, and the difficulties of phasing the project. It was felt that neither the short nor the long version of the tunnel could be ready in time for the 2008 Olympics which the City was bidding to host. City staff felt that recent developments adjacent to the central section of the elevated Gardiner Expressway had reduced the options and relevance of burying the expressway. Notably, options for building detour roads during construction were becoming very constrained. Concern was also expressed over the need to look at the tunnel proposal in a broader land use planning context. Staff argued that decisions on such a massive and complex proposal should await the completion of the City's overall Strategic Plan and its new Official Plan. As a result, the Planning and Transportation Committee requested staff to report back on four areas of interest:

1. The costs and process involved in developing a plan for the redevelopment of the F. G. Gardiner Expressway (FGG);
2. The costs and process involved in embarking on a public-private sector partnership with specific information on resources required to undertake a request for qualifications / request for proposals for the redevelopment of the FGG;
3. An economic analysis of the costs and benefits of burying the FGG; and
4. A process to determine if the community is prepared to accept tolls to travel downtown.

The City retained the firm of KPMG LLP to assist in analyzing what would be involved in issuing a competitive procurement process to replace the elevated section of the Gardiner Expressway. KPMG estimated that the procurement process would take at least two years and

cost between \$5 to 7 million, excluding staff costs. In addition, as with all tunnel proposals, there would be the requirement to go through a lengthy and expensive Environmental Assessment (EA) process. The findings of the KPMG analysis and the response to the other issues raised by the Committee were presented in a joint report of the Commissioners of Works and Emergency Services and Urban Planning and Development Services dated June 28, 1999, which came before the Planning and Transportation Committee at its meeting July 14, 1999. This report concluded that:

“It is clear from the work undertaken to date that the City is not in a position at this time to make a firm decision on whether or not to proceed with the detailed planning required to develop a request for proposals for the possible burial of the FGG....Given the magnitude of the resources required to undertake the planning and development of a public-private partnership for the possible burial of the FGG, staff recommend that the recently initiated Strategic Plan and Official Plan processes be used to develop the strategic context for the future of the FGG. The planning process should include an assessment of the fiscal impact on the City, and the economic benefits and costs to businesses and other stakeholders within the City that could be realized through improvements to transportation facilities in the Lake Shore corridor. Only when this strategic context has been finalized should Council consider embarking on the more detailed and costly process of developing the detailed plans for the FGG and the Request for Proposals process for a public-private partnership”.

Recommendation 1 of the June, 1999 joint report stated that: “the issue of the long-term disposition of the F. G. Gardiner Expressway be dealt with as part of the development of the City’s Strategic Plan and Official Plan and that no further work be undertaken on the proposal by the Canadian Highways International Corporation (CHIC) until the adoption of the Strategic Plan and Official Plan by City Council”.

When this recommendation came before Council at its meeting of July 27, 1999 (see Clause No. 5 of Report No. 3 of the Planning and Transportation Committee), it was amended by striking out the direction that no further work be undertaken until the adoption of the Strategic Plan and the Official Plan and referring this part of the recommendation to “the Office of the Mayor for further consideration and report as appropriate”.

2000 to 2003 – The Report of the Toronto Waterfront Revitalization Task Force

In June 1999, Toronto Council approved the demolition of the east end of the elevated Gardiner Expressway from Bouchette to Leslie Street. In March of the following year, the report of the Toronto Waterfront Revitalization Task Force entitled *Our Toronto Waterfront: Gateway to the New Canada* was released. Based on considerable analysis, the report known as the Fung Report recommended taking Council's actions further by proposing that virtually all of the remaining elevated expressway, as far west as approximately Strachan Avenue, be removed. This section of the expressway was to be replaced by the combination of a 1.5-kilometre underground roadway between Strachan and Spadina Avenues, and a surface arterial east of Spadina Avenue. The total replacement cost was estimated to be in the order of \$1.2 billion (in 2000\$). The 1.5-kilometre tunnel section is very similar to the short tunnel option put forward in

the Royal Commission's 1991 "Report 15." The cost of the tunnel was not broken out separately from the \$1.2 billion total figure. Tolling was proposed as a means of revenue generation.

The work of the Task Force was carried out around the same time the City was developing a Secondary Plan for the Central Waterfront area. City Planning staff's preliminary report, "Our Toronto Waterfront - Building Momentum" (July 2000), recommended that Council endorse in principle the concepts put forward in the Fung Report but noted that additional transportation studies were required to ensure that replacement road capacity would be in place before dismantling the elevated expressway.

In an October 17, 2002 joint report to the Waterfront Reference Group from the Commissioner of Urban Development Services and the Commissioner of Works and Emergency Services, it was recommended that the City undertake a full Environmental Assessment (EA) study of the Gardiner/Lake Shore Corridor to evaluate the three fundamental alternatives of: (i) Retain (and ameliorate); (ii) Replace (below-grade and/or at-grade options), and (iii) Remove. The staff report remarked that "all cards should be on the table" for analysis, including a "do nothing" scenario and combinations of options (i), (ii) and (iii) above. However, when the joint report came before the Waterfront Reference Group at its meeting of January 9, 2003, the staff recommendation for an EA study of all the options for reconfiguring the Gardiner / Lake Shore Corridor was rejected and replaced by the following recommendations:

"Council support undertaking a 'scoping study' to identify Terms of Reference for a Gardiner/Lake Shore Corridor Environmental Assessment (EA) study, limited, as far as the Gardiner Expressway is concerned, to "retain and ameliorate" proposals that include evaluating the potential of incorporating development under the elevated portion of the expressway on condition that the scoping study is funded through the Toronto Waterfront Revitalization Corporation (TWRC) and includes public consultation and reports back to the appropriate committee(s), and

When staff report on the results of the scoping study in 2004, they also report on:

- (a) the costs involved in the City undertaking a full Environmental Assessment of the Gardiner / Lake Shore Corridor; and
- (b) all previous studies relating to removing the Gardiner Expressway."

In considering the actions of the Waterfront Reference Group at its meeting of February 4, 5 and 6, 2003, Council adopted the above recommendation without amendment (see Clause 3 of Report No. 1 of the Policy and Finance Committee).

In April 2003, Council adopted the Central Waterfront Secondary Plan ("Making Waves"). The Secondary Plan reiterated the requirement that replacement road capacity must be in place prior to removing the elevated expressway. Policy (P1) of the Secondary Plan states that: "The new waterfront road system, including the reconfiguration of the elevated expressway, should maintain the capacity of the existing road network."

2004 to 2008 – Waterfront Toronto’s Analysis of the Short Tunnel Proposal

The Gardiner / Lake Shore Corridor Study Team released the "Technical Briefing" report in July 2004. The study looked at three generic options: (i) Replace, including a short tunnel section; (ii) Transform, and (iii) the "Great Street," replacing the elevated expressway with at-grade streets.

The study estimated that it would cost \$1.475 billion (\$2004) to replace the elevated expressway from Strachan Ave. to the Don River with a combination of below- and at-grade roads. As part of the Replacement approach, the Technical Briefing report examined putting the expressway in a four-lane, 2-kilometre twin tunnel with five portals from west of Strachan Avenue to Spadina Avenue. In this version, westbound traffic would remain below grade between Spadina Avenue and Bay Street in order to reduce conflicts with heavy volumes of eastbound traffic turning left to access the downtown in the morning peak period. The total cost of the entire dismantling (from Strachan Avenue to the Don Valley Parkway) was estimated to be \$1.4 billion assuming the tunnel section was built using the cut-and-cover technique. If the tunnel were bored for 1.2 kilometres at a depth of around 76 metres to avoid disturbing the Fort York cemetery, the cost was estimated to increase to \$1.475 billion. A more southerly alignment for this section of tunnel under Fleet Street was estimated to cost about the same as boring under Fort York.

WT retained the firm of Morrison Hershfield to analyze more fully the “constructability, structural feasibility and cost” of the three generic options and the results were published in December, 2004. The Morrison Hershfield report also included staging plans and identified issues that need to be managed during construction, particularly maintaining traffic flows. The report confirmed the \$1.475 billion cost of the Replace option with a bored section of tunnel, although this cost figure excludes property acquisition and design enhancements. More details regarding the complexity of the tunnel proposal were provided, including the:

- Need for temporary supports for the existing Gardiner structure between Simcoe Street and Spadina Avenue;
- Need for temporary and expensive detour roads during the construction period;
- Need for slurry wall construction in some areas to deal with soft earth (fill) and high groundwater table;
- Need for groundwater control measures;
- Impact on the many underground utilities that run through the tunnel area;
- Barrier effects of the access ramps and portals; and
- Impact of the ramps that provide the transition from the elevated expressway to the tunnel in the vicinity of Exhibition Place.

After reviewing these technical reports, WT identified a variation of the “Great Street” option as the preferred alternative which did not include a tunnelled section. However, neither the preferred “Great Street” option nor any of the other road system concepts were brought forward for Council’s endorsement. WT and City staff continued to evaluate the “Great Street” option. Three years later, after much consideration by staff and with consideration of shifting political priorities, City and Waterfront Toronto staff recommended the more affordable Great Street (Remove) option over the tunnel option. Council opted to pursue this less expensive Waterfront

Boulevard concept in 2008. The City of Toronto and Waterfront Toronto then initiated the current EA for the Gardiner east of Jarvis Street.

Appendix 2 – Gardiner Skyway Vision

<http://www.toronto.ca/legdocs/mmis/2015/cc/comm/communicationfile-53580.pdf>