



**STAFF REPORT
ACTION REQUIRED**

Revisions to the F.G. Gardiner Expressway Rehabilitation Project

Date:	March 28, 2013	
To:	Public Works and Infrastructure Committee	
From:	John Livey, 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:\2013\ClusterB\wf\pw13001	

SUMMARY

This report provides an overview of the current and on-going rehabilitation program for maintaining the Gardiner Expressway, and the required changes to the phasing of the program with the resumption of the Environmental Assessment (EA) for the easterly 2.4-kilometre segment of the Gardiner between Jarvis Street and The Don Roadway.

The rehabilitation program and the resulting budget is based on a phasing plan that originally called for eastern deck replacement between Jarvis Street and The Don Roadway from 2013 to 2018, followed by western deck replacement between Strachan Avenue and Rees Street from 2019 to 2024. With the resumption of the EA, the deck replacement work will now begin in the west end and key interim repairs will be completed between Jarvis Street and The Don Roadway – the area that is the subject of the EA.

The resumption of the Gardiner East EA necessitates adjustments to the Transportation Services approved 2013 Capital Budget and 2014 to 2022 Capital Plan. The overall result is a \$10.2 million decrease in Transportation Services 2013 Capital Budget and 2014 to 2022 Capital Plan, but an overall increase for this project over 13 years (2013 to 2025) of approximately \$19.4 million.

Details of the original Gardiner 10-Year Capital Plan and the proposed revisions are described in the Financial Impact section and Attachment 1 of this report.

Information about the Gardiner Expressway rehabilitation program and related matters, including links to the Gardiner Individual EA study, is available on the City of Toronto web site at <http://www.toronto.ca/transportation/gardiner>

The requirements of the Gardiner Rehabilitation Project and the ongoing EA have to be aligned. This requires a Council decision on a preferred EA option by the Spring of 2014 so that work to refine the option, finalize the design and submission to the Minister of Environment can all be completed by the Spring of 2015.

RECOMMENDATIONS

The Deputy City Manager recommends that:

- 1) Public Works and Infrastructure Committee endorse the recommendations contained in this report and forward this report directly to the Executive Committee meeting of April 23, 2013 for its consideration;
- 2) City Council approve a revised phasing of the F.G. Gardiner Expressway Rehabilitation Project to start the deck replacement program on the Westerly Deck instead of the Easterly Deck, resulting in a decrease of \$10.166 million in Transportation Services' 2013 to 2022 Capital Budget and Plan for the F.G. Gardiner project (CTP122) comprised of the following changes to the F.G. Gardiner sub-projects:
 - a. Deletions and cash flow adjustments as follows:
 - i. CTP122-04 - Phase 1 – Don Roadway to Cherry St. resulting in a cash flow reduction of \$20.0 million in 2013 and reductions in future year commitments of \$39.5 million in 2014; \$0.250 million in 2015 and \$0.250 million in 2016.
 - ii. CTP122 - Phase 2 – Cherry St. to Parliament resulting in a reduction in the Transportation Services Capital Plan of \$73.150 million comprised of \$35.880 million in 2015; \$36.770 million in 2016; \$0.250 million in 2017 and \$0.250 million in 2018.
 - iii. CTP122 - Phase 3 – Parliament to Jarvis resulting in a reduction in the Transportation Services Capital Plan of \$76.820 million comprised of \$37.690 million in 2017; \$38.630 million in 2018; \$0.250 million in 2019 and \$0.250 million in 2020.
 - iv. CTP122 - Phases 4 - 6 – Strachan to Rees resulting in a reduction in the Transportation Services Capital Plan of \$164.430 million comprised of \$39.600 million in 2019; \$40.590 million in 2020; \$41.600 million in 2021 and \$42.640 million in 2022.

- v. CTP122 – Bent Repairs resulting in a reduction in the Transportation Service's Capital Plan of \$26.210 million comprised of \$3.0 million in 2015; \$3.080 million in 2016; \$3.150 million in 2017; \$3.230 million in 2018; \$3.310 million in 2019; \$3.390 million in 2020; \$3.480 million in 2021 and \$3.570 million in 2022.
- b. An overall reduction of \$9.985 million for CTP122-05 – At-Grade Repairs (and reallocation of these funds to the newly created Program Management sub-project – Recommendation 2c.ii.), which is comprised of:
 - i. A cash flow increase of \$1.3 million in 2013 and changes to future year commitments of \$0.400 million in 2014; (\$1.337 million) in 2015; (\$1.374 million) in 2016; (\$1.406 million) in 2017 and (\$1.442 million) in 2018.
 - ii. A reduction in the Transportation Services Capital Plan of \$6.127 million comprised of \$1.472 million in 2019; \$1.516 million in 2020; \$1.554 million in 2021 and \$1.585 million in 2022.
 - c. Creation of new sub-projects as follows:
 - i. Elevated Portion - Capital Budget and Plan totalling \$337.683 million. Cash flow of \$11.100 million in 2013 and future year commitments of \$30.844 million in 2014 and \$34.224 million in 2015. A Capital Plan totalling \$261.515 million comprised of \$34.649 million in 2016; \$35.516 million in 2017; \$36.404 million in 2018; \$37.314 million in 2019; \$38.247 million in 2020; \$39.203 million in 2021 and \$40.183 million in 2022.
 - ii. Program Management - Capital Budget and Plan totalling \$62.746 million. Cash flow of \$2.340 million in 2013 and future year commitments of \$5.156 million in 2014; \$5.680 million in 2015; \$6.568 million in 2016; \$6.732 million in 2017; \$6.900 million in 2018; \$7.073 million in 2019; \$0.250 million in 2020; \$0.250 million in 2021. A Capital Plan totalling \$14.805 million comprised of \$7.0 million in 2020; \$7.181 million in 2021 and \$7.617 million in 2022.

Financial Impact

The recommended amendments to the F.G. Gardiner Rehabilitation project will result in a reduction of \$10.166 million to the Transportation Services 2013 to 2022 Capital Budget and Plan, as well as an overall increase in total costs for this project over 13 years (2013 to 2025) of \$19.376. Details of the revised project summary are provided in Attachment 1.

The \$10.166 million reduction in the 10-Year Capital Plan and the \$19.376 million overall increase in the 13-year project primarily results from:

- \$9.1 million in additional 2013 costs for key interim repairs on the Gardiner east of Jarvis Street;
- additional inflationary costs of \$7.3 million outside of the 10-Year Capital Plan arising from deferring deck rehabilitation work originally budgeted to occur in 2013 into 2025; and
- an additional \$3.0 million for At-Grade Repairs arising from a combination of updated costs to complete the 2013 to 2014 workplan and additional 2013 costs for overhead sign requirements.

An additional \$16.960 million has also been added to the revised 13-Year project for year 2025 related to Bent Repair and At-Grade Section costs, which had always been anticipated in 2025 and future years but was not captured in the original 12-Year project costs as the highest priority deck replacement work on the F.G. Gardiner Rehabilitation was anticipated to be completed by 2024.

Sub-Project Restructuring and Project Phasing

The recommended amendments to the F.G. Gardiner Rehabilitation project will result in a change to the sub-project structure, which was originally based on the following project phasing:

- Phase 1 – The replacement of the main deck from Cherry Street to the Don Roadway (2013 to 2014);
- Phase 2 – The replacement of the main deck from Parliament to Cherry Streets (2015 to 2016);
- Phase 3 – The replacement of the main deck from Jarvis to Parliament Streets (2017 to 2018); and
- Phases 4 to 6 – The replacement of the main deck from Strachan Avenue to Rees, with the phasing still to be determined (2019 to 2022 with cost estimates outside the 10-Year Capital Plan into 2024).

The recommended sub-project structure includes one sub-project for all rehabilitation work on the elevated portion of the F.G. Gardiner, including bent repairs. This will allow capital work to proceed from 2014 to 2015 on the revised first phase of the project for repairs to the West Deck from 240m west of Strachan to 480m east of Strachan. The order of repairs to the remaining West Deck that are described in this report to be completed from 2016 to 2019 will be confirmed once the Strategic Rehabilitation Plan is completed in late 2013. The Elevated Portions sub-project also includes capital costs from 2020 to 2022 for work on the East Deck that is subject to change pending completion of the Environmental Assessment.

Costs associated with the program management assignment are no longer incorporated in the various F.G. Gardiner sub-projects. Creating a new sub-project for this requirement

allows City staff to issue a multi-year program management assignment to facilitate all rehabilitation and repair requirements.

Capital Financing Adjustments

The recommended amendments to the F.G. Gardiner Rehabilitation project will result in a reduction to debt financing of \$5.260 million in 2013 and a further reduction to financing from the Capital Financing Reserve of \$4.906 million from 2014 to 2022. Financing for additional costs from 2023 to 2025 will be considered as part of the 2014 and future year Capital Budget processes.

The Deputy City Manager and Chief Financial Officer has reviewed this report and agrees with the financial impact information

DECISION HISTORY

F. G. Gardiner Rehabilitation Project

At its meeting of May 16, 2012, the Public Works and Infrastructure Committee received a presentation from the Executive Director, Technical Services on the Condition of the Gardiner Expressway:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.PW15.13>

At its meeting of August 29, 2012, the Bid Committee awarded Tender 130-2012, for the F.G. Gardiner Expressway Structure Repair from York Street to Jarvis Street, to Grscan Construction Ltd. and Torbridge Construction Ltd. in accordance with the revised Contract Details:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.BD89.2>

In considering the City's 2013 Capital Budget and 2014 to 2022 Capital Plan on January 15 to 16, 2013, City Council approved a \$505 million budget for the F.G. Gardiner Expressway Rehabilitation Project. Council also directed that Capital and Repair/Maintenance cost items relating to the Gardiner Expressway east of Jarvis Street be tracked as a distinct Capital Project and that the General Manager, Transportation Services, in consultation with the Executive Director of Technical Services provide, as part of the 2014 to 2023 Capital Budget and Plan submission, impacts arising from the strategic plan for the rehabilitation, repair and maintenance of the F. G. Gardiner Expressway, including an assessment of its asset value. The report recommendations #68 through #75 can be found at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.EX27.1>

Gardiner Expressway/Lake Shore Boulevard Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study

In July 2008, City Council authorized the City to act as co-proponent with Waterfront Toronto to undertake an Environmental Assessment (EA) for the 2.4-kilometre elevated segment of the Gardiner Expressway east of Jarvis Street to The Don Roadway and to

reallocate funds reserved for the Front Street Extension to other approved waterfront projects:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2008.EX22.1>

In September 2008, Planning and Growth Committee considered a "Further Report on Removal of the Gardiner Expressway East from Jarvis":

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2008.PG19.3>

In January 2009, Council approved the deletion of Front Street West from "Schedule 2: The Designation of Planned but Unbuilt Roads" in the City's Official Plan, and adopted Official Plan Amendment No. 64:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2009.PG22.2>

In August 2009, City Council authorized the submission of the Gardiner East EA Terms of Reference to the Minister of Environment:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2009.EX33.17>

In November, 2009, the Minister of Environment approved the EA Terms of Reference:

http://www.waterfronttoronto.ca/explore_projects2/the_gardiner_expressway/the_gardiner_ea_terms_of_reference

In considering the City's 2013 Capital Budget and 2014 to 2022 Capital Plan on January 15 to 16, 2013, City Council reallocated \$4.41M within the Waterfront Revitalization Initiative budget for the Gardiner Expressway and Lake Shore Boulevard Reconfiguration Environmental Assessment (EA). See Recommendation #84:

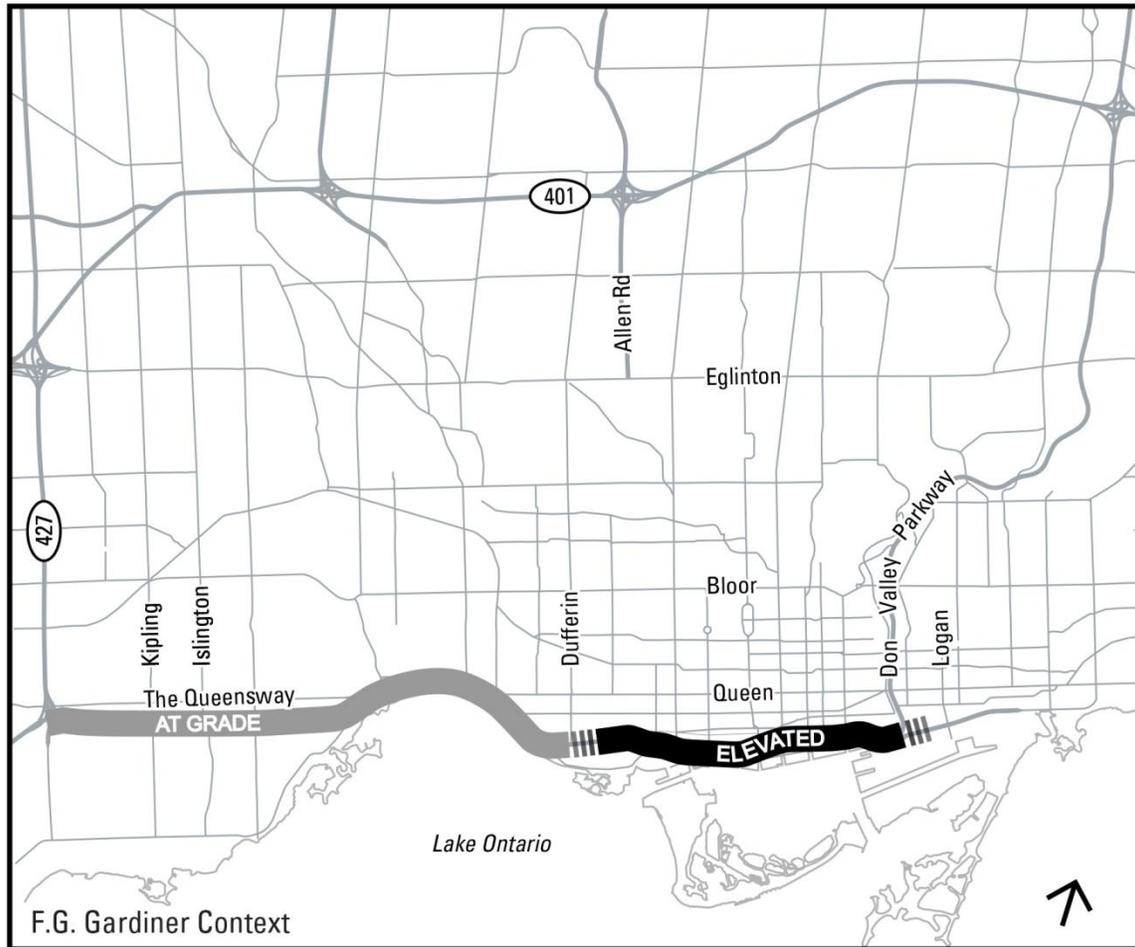
<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.EX27.1>

ISSUE BACKGROUND

The F.G. Gardiner Expressway is a key transportation artery that extends 18 kilometres from the Queen Elizabeth Way at Highway 427 to east of the Don Valley Parkway. It is owned and maintained by the City of Toronto. A 7-kilometre segment, from Dufferin Street to east of the Don Valley Parkway near Logan Avenue, is elevated on a concrete and steel structure. This elevated section of the Gardiner has a surface area of approximately 300,000 square metres, about one-third of which is made up of expressway ramps.

Like much public infrastructure in Canada, the expressway is near the end of its original design life and is the subject of ongoing maintenance and repair. Constructed in sections between 1955 and 1966, the effects of weathering, salt, and the loads and impacts imposed daily by thousands of vehicles are taking their toll. The period in which the Gardiner was built coincided with the construction of many of the City's bridges, although some reinforced concrete bridges have been in service since the 1920s, such as the Dundas Street West bridge over the Humber River.

Figure 1: F.G. Gardiner Expressway Context



The Gardiner was designed in accordance with the prevailing bridge design code of the time, specified as Factor of Safety of 1.65, which indicated that the structure was designed to support 165% of the maximum expected loading. The original design drawings and observed field conditions during recent repairs are consistent with design standards. Current structural design codes use a different design methodology that generally results in a more economical structure. The Factor of Safety against structural failure used today is between 1.25 and 1.5 depending on the type of loading being considered.

Demolition of Gardiner East of Don River

In the 1990s, the need for the 1.3-kilometre long elevated segment of the Gardiner east of the Don River to Leslie Street was assessed. Following completion of an Environmental Assessment, the segment east of Bouchette Street was dismantled between 1999 and 2001 at a cost of approximately \$40 million, or \$62.4 million inflated to today's dollars. Road right-of-way, public art and pedestrian and cycling trails were constructed alongside the exposed section of Lake Shore Boulevard East.

COMMENTS

The City has an on-going rehabilitation program for maintaining the expressway in a safe and operable condition. As part of the City's 2013 Capital Budget process, Council approved \$505 million in capital funding over 10 years for Gardiner rehabilitation. This report provides information regarding three aspects of the Gardiner Expressway Rehabilitation Project:

- Adjustments to the rehabilitation program to reflect the restart of the Gardiner Expressway and Lake Shore Boulevard Reconfiguration Environmental Assessment, in which the City and Waterfront Toronto (WT) are actively exploring options for the future of a 2.4-kilometre portion of the elevated expressway from Jarvis Street east to the Don Valley Parkway near Logan Avenue;
- The capital requirements for the portion of the rehabilitation program that will extend beyond the 10-Year Capital Budget period approved in 2013; and
- Reallocation of funds within the 10-Year Capital Program to reflect the initiation of a comprehensive Strategic Rehabilitation Plan.

Specifically, this report provides information on:

- Current and planned rehabilitation activity
- Rehabilitation Practices Engineering Peer Review (IBI Report)
- Falling Concrete Incidents
- Strategic Rehabilitation Plan
- Gardiner Expressway Environmental Assessment (EA) east of Jarvis Street

1. Current and Planned Rehabilitation Activity

A variety of maintenance and rehabilitation activities are undertaken on the Gardiner Expressway every year, which range from basic cleaning to the replacement of major structural components. Over the past decade, the City has spent nearly \$75 million on Gardiner rehabilitation and maintenance. In addition, extensive study, field work and engineering analysis have been undertaken to support the design and implementation of rehabilitation activities. This section of the report provides an overview of current activity.

Current and planned rehabilitation activities on the Gardiner involve a multi-faceted approach that addresses both the structural integrity of the expressway and the day-to-day general safety and maintenance, and consists of:

- a) Visual inspections and controlled chipping

- b) Ground penetrating radar (GPR) and detailed condition survey
- c) West of York Street Bent repairs and temporary bracing
- d) York Street to Jarvis Street rehabilitation contract
- e) Advancement of West Deck replacement
- f) Jarvis Street to Don Roadway interim repairs

Figure 2: Typical Section of the F.G. Gardiner Expressway

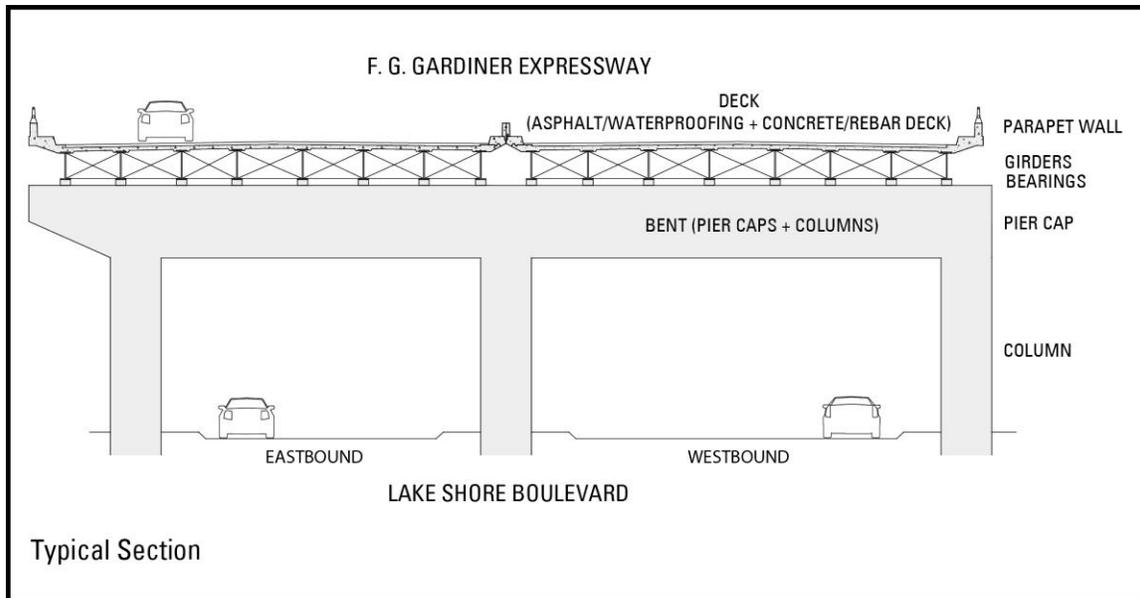


Figure 2 provides a typical cross-section of the structure of the Gardiner Expressway looking west in the areas east of Jarvis Street and west of York Street. The bents are composed of steel-reinforced concrete. Steel girders sit on top of the bents and provide the support for the steel-reinforced concrete deck. The deck is topped with an asphalt driving surface. Steel-reinforced concrete parapet walls keep vehicles in the travelled portion of the expressway and provide support bases for streetlights and directional signs.

1a) Visual Inspections and Controlled Chipping

Standardized inspections of the Gardiner Expressway are conducted every two years, in accordance with the Ministry of Transportation, Ontario (MTO) “Ontario Structure Inspection Manual” (OSIM). These inspections are to identify structural problems, give a condition rating to the structure and make recommendations for future rehabilitation. The OSIM inspections are completed by in-house and contracted services.

Visual inspections of the underside and fascia of the structure are also conducted twice per year and mainly deal with non-structural concrete issues. The inspectors look for items such as loose pieces of concrete, wet or bulging areas or cracking concrete. These visual inspections guide the Controlled Chipping Program undertaken by Transportation Services, which includes the use of manual or electric chipping hammers to remove

potentially loose pieces of concrete cover from the sides or underside of the structure. All accessible areas of the underside of the Gardiner, which is approximately 95% of the total 300,000 square metre area, were inspected and chipped as required in 2012. This process is being repeated in 2013.

The second 2012 semi-annual visual inspection of the overhead elements (the underside of the expressway) of the elevated Gardiner for signs of loose concrete was completed in December 2012. Since January 2013, two crews have been working daily, weather permitting, until all areas identified for chipping from this 2012 visual inspection have been closely inspected, tested and any confirmed loose concrete removed. Completion is expected by the end of April 2013.

As a result of an December 2012 investigation into a falling concrete event (in an area where concrete has been previously repaired) the City revised the Controlled Chipping Protocol to use electric chipping hammers to both remove loose concrete and to test previously repaired areas where manual hammer sounding may not have been effective.

1b) Ground Penetrating Radar (GPR) and Detailed Condition Survey

In 2012, field work was conducted on the Gardiner using a Ground Penetrating Radar (GPR) platform. GPR is a method of assessing the condition of a bridge deck using radar pulses on the concrete deck surface that are recorded and processed to produce a colour-coded map of deck deterioration. The GPR survey was completed over multiple evenings during off-peak hours without measurable impact to the regular traffic flow. Three GPR sensors mounted on a trailer were used to simultaneously survey the centre of each lane as well as the left/right wheel paths. Approximately 1.3 million readings were taken and analyzed using the American Society for Testing and Materials standard ASTM D6087-08 "Standard Test Methods for Evaluating Asphalt-Covered Concrete Bridge Decks Using Ground Penetrating Radar."

The GPR survey, which was completed in November 2012, surveyed the entire elevated portion of the expressway, including all access ramps and continuous lanes (east and westbound) east of the Dufferin Street overpass to the Don Valley Parkway transfer ramps. The survey also included the elevated portion of Lake Shore Boulevard over Spadina Avenue. The interim results of the GPR are consistent with the City's observed condition of the deck through the Visual Inspections Program. The GPR results confirmed the following deck area and associated ramps for repair:

- the CNE GO Station (Bent 13) to east of Strachan Avenue (Bent 49)
- east of Strachan Avenue (Bent 49) to mid-way between Bathurst Street and Spadina Avenue
- west of Jarvis Street to just east of Cherry Street
- east of Cherry Street (Bent 302) to west of the Don Roadway (Bent 324)

These areas require repair in advance of other portions of the expressway, but the inspection results have not shown the areas as unsafe or in need of emergency repairs.

The above is a preliminary assessment subject to revision as further information becomes available. To validate the GPR findings, the GPR survey will be calibrated with a Detailed Deck Condition Survey, which is currently being conducted as part of the Strategic Rehabilitation Plan described in Section 2 below.

Together, the GPR survey, Deck Condition Survey, hammer sounding, and other information and observations will be utilized to prioritize future rehabilitation work for the Gardiner as part of a Strategic Rehabilitation Plan for both the elevated and at-grade sections of the Gardiner, described in Section 2 below.

When this work is complete it will be posted on the City's Gardiner web site at <http://www.toronto.ca/transportation/gardiner> where information about the Gardiner Expressway Rehabilitation Project and related matters can be found.

1c) West of York Street Bent Repairs and Temporary Bracing

Bents refer to the main supporting columns and beams (or “pier caps”) on the Gardiner Expressway. Repairs to Gardiner bents are conducted on an ongoing basis, with repairs to all 342 bents to be completed over the next 30 years. Designs for repairs to five bents west of Strachan Avenue are currently being initiated, with rehabilitation planned to be undertaken in fall 2013. This assignment also includes the design of temporary timber bracing to be installed at approximately 10 locations west of York Street. Once the designs are completed, work crews contracted by Transportation Services will install the bracing.

1d) York Street to Jarvis Street Rehabilitation Contract

Rehabilitation work, begun in the summer of 2012, is still underway on the Gardiner Expressway from York Street to Jarvis Street. The primary work includes concrete box girder repair and replacement, and associated deck rehabilitation at an estimated cost of \$12.2 million, including engineering and construction costs. This work includes further cover concrete removal as warranted and concrete repair of all segments that have experienced previous falling concrete incidents. The work is expected to be complete in late July 2013, and should extend the life of the deck structure through this segment until 2029, with only minor maintenance work during that period.

1e) Advancement of Western Deck Replacement

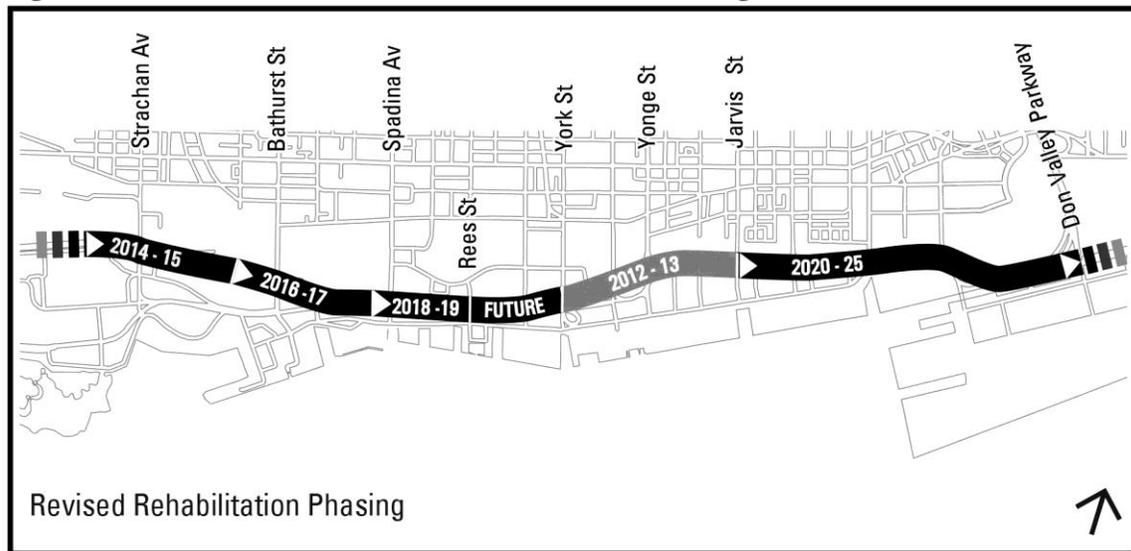
The 10-Year Gardiner Expressway Rehabilitation Project approved by City Council in January 2013 was based on a phasing plan that called for eastern deck replacement between Jarvis Street and The Don Roadway from 2013 to 2018, followed by western deck replacement between Strachan Avenue and Rees Street from 2019 to 2024. Detailed design work for the eastern deck replacement was complete and construction was poised to begin.

However, the reallocation of funds during the 2013 Capital Budget to the Gardiner East EA, which is examining options for the same Jarvis Street east segment of the expressway, has necessitated revisions to the rehabilitation program phasing and costs. As outlined in this report, these revisions include:

- Deferral of full deck replacement east of Jarvis Street;
- Completion of detailed design work and interim repairs to the expressway east of Jarvis Street in 2013, as described in f) below, resulting in an additional \$9.1 million to ensure this area is safe and serviceable during the course of completion of the EA;
- Completion of detailed design work for the western deck replacement with construction commencing in 2014 instead of 2013; and
- Additional inflationary costs of \$7.3 million outside of the 10-Year Capital Plan arising from deferring deck rehabilitation work originally budgeted to occur in 2013 into 2025.

A request for proposals for the detailed design of the western deck replacement has been issued, and design is expected to begin in May 2013. Due to the lead time required to complete the design, the first phase of the western deck replacement cannot begin until 2014.

Figure 3: Revised Gardiner Rehabilitation Phasing



Until there is a decision by City Council to make any changes to the Gardiner east of Jarvis Street based on the outcome of the EA Study, it is still recommended to plan for the replacement of the eastern deck as the second major phase beginning in 2020. Details of the proposed revisions to the Gardiner 10-Year Capital Plan are depicted in Figure 3 above and described in the Financial Impact section of this report.

1f) Jarvis Street to Don Roadway Interim Repairs

Given that the EA study may result in significant reconfiguration or even removal of the structure, this report recommends deferral of a commitment to full reconstruction of the Gardiner east of Jarvis Street until the EA study conclusions are known and approved by City Council.

During the City's 2013 Budget process, Engineering and Construction Services provided a briefing note to Budget Committee on the minimum repairs and associated costs required to maintain the east end of the Gardiner for the duration of the Gardiner East Environmental Assessment:

http://www.toronto.ca/budget2013/pdf/cap13_bn_gardiner_repair.pdf

On this basis, the revised F.G. Gardiner Rehabilitation Project includes \$9.1 million for key interim repairs to the East Deck, with repair/replacement of the deteriorated parapet walls being the largest component of the cost. City staff will continue to evaluate minimum repair requirements for the East Deck of the Gardiner. It is possible that this could result in further rehabilitation repair requirements and lane closures.

Engineering and Construction Services staff have initiated the detailed design and preparation of an interim repair contract for this easterly segment of the Gardiner. The scope of work will include a combination of temporary timber bracing, localized deck repairs, and repair/replacement of severely deteriorated parapet walls. The results of the Ground Penetrating Radar (GPR) survey, close visual inspection of the underside of the Gardiner, hammer soundings and asphalt pavement conditions will determine where timber bracing will be located. Design work is planned to be completed in early April 2013 and rehabilitation will begin in the summer. The need for any further repairs to the eastern segment prior to the completion of the Gardiner East EA will be reviewed on a yearly basis to ensure the continued integrity of the eastern portion of the expressway.

Beyond six years, full easterly deck replacement at a cost of approximately \$200 million (2013 dollars) will be required. This means that there are six years to complete the EA, receive EA approval, identify dedicated funding and begin construction of the preferred EA alternative. Deck replacement could occur sooner if it is determined through future inspections to be necessary.

1.2 Rehabilitation Practices Engineering Peer Review (IBI Report)

In August 2012, the City commissioned the IBI Group to undertake an independent assessment of the City's Gardiner Expressway maintenance practices after several incidents of concrete falling from the structure. City staff wanted to ensure that the visual inspections of the Gardiner's concrete cover were reliable indicators of the concrete's durability.

On November 29, 2012, city staff received a final report from IBI. This report is posted on the Gardiner website. The report includes four key recommendations. These four

recommendations, with current and planned City actions that address each recommendation, are provided below:

1. *Recommendation* - Initiate a strategy development program to investigate, prioritize, and subsequently repair and/or replace the deck over the entire length of the Expressway.

City Action - The development of a comprehensive Strategic Rehabilitation Plan for the entire expressway, which is outlined in Section 2 below, will be completed by December 2013, and will be the basis of all capital spending on the Gardiner starting in 2014.

2. *Recommendation* - Confirm existing data by carrying out comprehensive, in-depth investigations throughout the length of the elevated Expressway.

City Action - Detailed visual inspections complying with Ontario Structural Inspection Manual requirements and Ground Penetrating Radar surveys of the entire Expressway structure were completed in December 2012. The results of these comprehensive investigations will be confirmed by further detailed deck condition surveys in key areas covering about 10,000 square metres of the elevated expressway during May/June 2013.

3. *Recommendation* - Establish an Expressway Management/Maintenance Group with sole responsibility for the Expressway.

City Action - The Strategic Rehabilitation Plan is being completed by McCormick Rankin and will be delivered through a long-term Program Management Assignment that will be tendered in late 2013. This assignment will include the programming, detailed design and contract administration for all major Gardiner repairs over a six-year period.

4. *Recommendation* - Until such time as comprehensive repairs are carried out, provide protection against falling concrete in the form of a physical barrier in high-risk public areas. Where possible, the risk areas should be secured to prevent public access.

City Action - The City's controlled chipping program, confirmed by IBI as an effective tool, addresses the concerns regarding falling concrete and will continue through 2013.

To address overall safety, the City has focused efforts in areas where there are roadways and pedestrians under the Expressway. IBI noted other, high-risk areas, such as in the vicinity of the Exhibition Place GO Station. There have been two incidents of falling concrete in this area and City staff have secured the areas to prevent public access until appropriate repairs can be completed.

The widespread use of protective barriers such as netting on the underside of the Gardiner will obstruct City staff's direct access to the Gardiner. Given the requirement for direct access to perform necessary inspections, testing and repairs, the installation of netting is not recommended at this time.

As stated above, visual inspections and controlled chipping will continue to be used to minimize the risk of falling concrete. Smaller scale use of protective barriers can still be undertaken, such as the wire mesh barriers installed on the westbound Lake Shore Boulevard underpass of the Gardiner Expressway at the Humber River in advance of the rehabilitation of this structure, currently scheduled for 2014.

1.3 Falling Concrete Emergency Protocol and Incidents

Given the age and condition of the elevated portion of the Gardiner Expressway, there have been a few incidents where a piece of concrete has fallen from the deck or parapets. The City responds to falling debris incidents on the Gardiner with an emergency response protocol. Calls are immediately forwarded to an on-call team and a Supervisor is dispatched to the location within one hour to assess the incident. A crew is mobilized onsite to closely inspect the area and take all steps necessary to make the location safe. If necessary, the area is cordoned off until a structural engineer has instructed crews to complete further repairs.

There have been two falling concrete events to date in 2013. The first occurred on January 1, 2013 when concrete fell near the ticket booth of the Exhibition Place GO station. No damage or injuries occurred as a result of this event. The concrete fell from one of the bents adjacent the GO station. Controlled chipping was undertaken on the two bents bordering the GO station and the area surrounding these bents has been fenced off to limit public access. Repairs to these two bents are included in a Bent Repair Contract to be completed in 2013, as described earlier in this report.

The second falling concrete event on February 15, 2013 occurred in a parking area reserved for Toronto Police Service and Exhibition Place staff, located west of the Exhibition Place GO station. A private vehicle was damaged as a result of this event. The parking area was subsequently closed until controlled chipping could be completed on all parts of the Gardiner above the parking area.

Future confirmed incidents will be posted on the Gardiner website.

2. Strategic Rehabilitation Plan

Acting on the November 2012 recommendations of the IBI report, City staff retained McCormick Rankin to develop a Strategic Rehabilitation Plan for the entire Gardiner Expressway (Highway 427 to Logan Avenue). The scope of work broadly includes

determining the costs and timelines for rehabilitating the entire length of the Gardiner to ensure it remains in a safe and serviceable condition, while minimizing traffic disruption. The schedule calls for the Strategic Rehabilitation Plan to be complete by December 2013. Interim results from the Strategic Rehabilitation Plan, which will be approximately 60% complete by September 2013, will be used to inform the 2014 Capital Budget process.

Initial activities will include a detailed condition survey of approximately 3% or 10,000 square metres of the deck area. This detailed deck condition survey will be used to confirm the Ground Penetrating Radar survey results completed for the entire deck in December 2012. McCormick Rankin has provided preliminary conclusions from survey results based on previous inspections and observations from recent repair work. The data confirmed the previous assessment that the Gardiner deck areas east of Jarvis Street and west of Spadina Avenue, like those between Strachan Avenue and Rees Street, require repair in advance of other portions of the expressway. Also, as noted in section 1e) of this report, the segment of the Gardiner east of Jarvis Street has more advanced deterioration of the parapet walls than the western segment of the expressway. The majority of interim repair costs in this area relate to parapet wall rehabilitation.

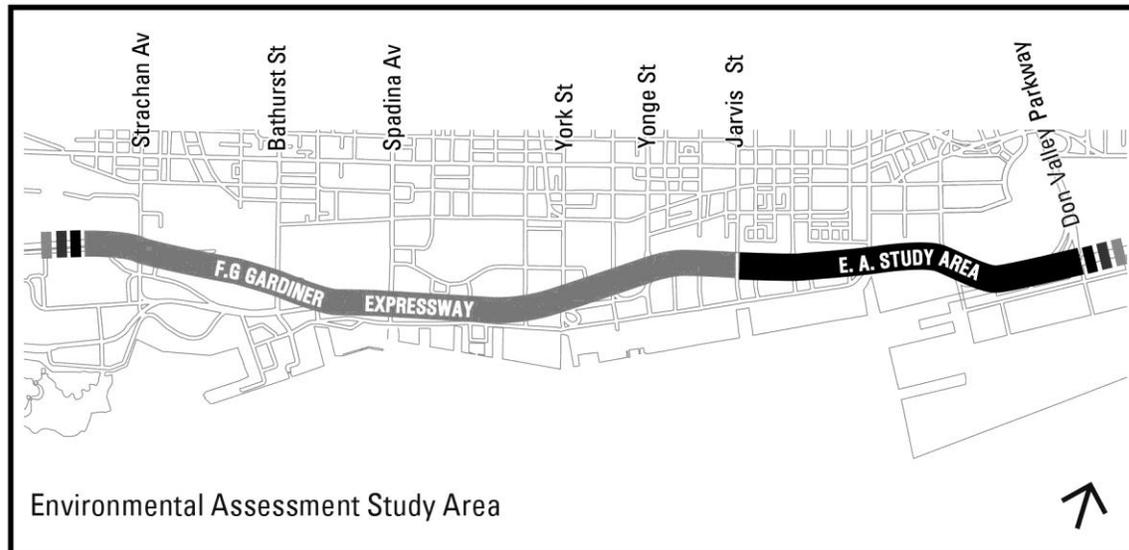
In this segment east of Jarvis Street, staff are undertaking a combination of temporary bracing, localized deck repairs, and repair/replacement of severely deteriorated parapet walls in order to keep the area serviceable for the duration of the EA process.

The Strategic Rehabilitation Plan will develop various scenarios for any permanent rehabilitation work east of Jarvis Street. The Plan can be amended to schedule any subsequent construction of the preferred EA alternative approved by Council, which may follow the EA by several years due to the design and precursor work required.

3. Current Gardiner Expressway/Lake Shore Boulevard Reconfiguration Environmental Assessment and Integrated Urban Design Study (Gardiner East EA)

In July 2008, City Council authorized the City to act as co-proponent with Waterfront Toronto to undertake an Individual EA for a 2.4-kilometre segment of the Gardiner Expressway and Lake Shore Boulevard from Jarvis Street to just east of the Don Valley Parkway at Logan Avenue. The EA study, which is the subject of a separate report to Committee, is intended to examine broad strategies for this easterly portion of the expressway in line with the Official Plan and the Central Waterfront Secondary Plan.

Figure 4: Gardiner East EA Study Area



As identified in the Terms of Reference for the EA study approved by Council and the Minister of the Environment in 2009, study alternatives for the east elevated expressway include:

1. "Do Nothing," other than the planned structural rehabilitation
2. Retain the existing structure and improve the urban fabric
3. Replace the Gardiner with a new at- or below-grade expressway
4. Remove the elevated expressway east of Jarvis and reconfigure Lake Shore Boulevard as a Great Street featuring a new bridge to the DVP.

The EA study is expected to take approximately two years to complete, followed by submission to the Minister of the Environment for approval. A decision about an Individual EA of this complexity can take five or more years, as time can be spent addressing protracted hearings, or judicial or Ministerial challenge.

The resumption of this EA in 2013 has necessitated changes to the Gardiner Expressway Rehabilitation Project as outlined in this report, including a deferral of a decision regarding full reconstruction of the easterly segment of the expressway pending Council's selection of a preferred EA alternative in the spring of 2014.

The requirements of the Gardiner Rehabilitation Project and the ongoing EA have to be aligned. This requires a Council decision on a preferred EA option by the Spring of 2014 so that work to refine the option, finalize the design and submission to the Minister of Environment can all be completed by the Spring of 2015.

Further information on the Gardiner Expressway / Lake Shore Boulevard Reconfiguration EA and Integrated Urban Design Study is contained in a separate report.

CONTACTS

Stephen Buckley
General Manager
Transportation Services
Tel: 416-392-8431
sbuckle@toronto.ca

Tony Pagnanelli
Acting Executive Director
Engineering and Construction Division
Tel: 416-392-8256
tpagnan@toronto.ca

SIGNATURE

John W. Livey F.C.I.P.
Deputy City Manager

Attachment 1: F.G. Gardiner Expressway Revised Rehabilitation Project
Financial Summary

**Attachment 1: F.G. Gardiner Expressway Revised Rehabilitation Project
Financial Summary (\$M)**

Revised F.G. Gardiner Rehabilitation Strategy	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10-Year	2023	2024	2025	13-Year Total
Program Management															
Program Management Sub-Project Total:	2.3	5.2	5.7	6.6	6.7	6.9	7.1	7.2	7.4	7.6	62.7	7.8	6.9	7.1	84.6
Elevated Portion (Including Bent Repairs)															
East Deck – interim repairs	9.1										9.1				9.1
West Deck (Strachan Avenue)	0.6	30.8	34.2								65.7				65.7
Remaining West Deck and Bent Repairs	1.4			34.6	35.5	36.4	37.3				145.3				145.3
East Deck and Bent Repairs								38.2	39.2	40.2	117.6	41.2	35.2	36.0	230.1
Elevated Portion (Including Bent Repairs) Sub-Project Total:	11.1	30.8	34.2	34.6	35.5	36.4	37.3	38.2	39.2	40.2	337.7	41.2	35.2	36.0	450.1
At-Grade Section (427 to Dufferin)															
At-Grade Section Sub-Project Total:	6.3	10.4	8.9	9.1	9.4	9.6	9.8	10.1	10.3	10.6	94.6	10.9	11.1	11.4	128.0
Total Project	19.7	46.4	48.8	50.4	51.6	52.9	54.2	55.6	57.0	58.4	495.0	59.9	53.3	54.6	662.7

Revised F.G. Gardiner Rehabilitation Strategy - Incremental Changes incorporated in the table above	2013	2014 - 2022	10-Year	2023 - 2024	2025	13-Year Total
East Deck – interim repairs	9.100		9.100			9.100
Elevated Portion - Inflationary Changes			0.000	(1.722)	9.004	7.282
Elevated Portion (Including PM Costs)	(15.660)	(6.601)	(22.261)	(6.352)	28.613	0.000
2025 Bent Repairs (Including PM Costs)			0.000		N/A	0.000
At-grade Section (Including PM Costs)	1.300	1.695	2.995	(0.001)	N/A	2.994
Total Recommended Incremental Changes	(5.260)	(4.906)	(10.166)	(8.075)	37.617	19.376