



**STAFF REPORT
ACTION REQUIRED**

**Algonquin Island Bridge –
Environmental Assessment Study**

Date:	May 12, 2014
To:	Public Works and Infrastructure Committee
From:	General Manager, Transportation Services
Wards:	Ward 28 (Toronto Centre-Rosedale)
Reference Number:	P:\2014\Cluster B\TRA\TIM\pw14012tim.docx

SUMMARY

The Algonquin Island Bridge, a timber trestle structure connecting Algonquin Island to Ward's Island, was constructed in 1938 and currently serves pedestrians, cyclists, and service vehicles. The bridge underwent extensive rehabilitation in 1998, including construction of a new deck; however, recent bridge inspections have identified some decay in the timber piles and a need for additional repairs or possible replacement.

Due to the age and historical significance of this structure, an Environmental Assessment was required to determine how best to address the condition and rehabilitation needs of this structure. As a result of the Environmental Assessment, which included extensive public consultation, it is recommended that the bridge be replaced in its existing location with a new structure of similar design with new materials, so that it continues to serve all users and satisfy Canadian bridge standards.

The cost of replacing the bridge structure, estimated to be \$4.3 million, as well as any required interim repairs, will be funded by the City's Bridge Rehabilitation Program.

RECOMMENDATIONS

The General Manager, Transportation Services recommends that:

1. City Council authorize the General Manager, Transportation Services to issue a Notice of Completion and to file the Environmental Study Report (ESR) for the Algonquin Island Bridge Environmental Assessment Study in the public record

for a minimum 30 days in accordance with the requirements of the Municipal Class Environmental Assessment.

Implementation Points

Following approval of this report by City Council, the ESR will be filed in the public record for a minimum 30-day public review period. If there are no conditions placed on the project by the Minister of the Environment, the City would be authorized to proceed to detail design and subsequently to implementation.

Detail design of the preferred alternative in 2015 will lead to construction of a new bridge in 2016/2017. Load testing is currently being arranged to determine the nature and extent of any interim repairs required prior to this construction.

Financial Impact

The estimated cost for the recommended design, expected to be constructed in 2016/2017, is \$4.3 million and is to be funded from the City's Bridge Rehabilitation Program. The initial estimate for interim repairs to decayed timber piles is approximately \$150,000 (including repairs to additional piles that could not be inspected in detail), though the exact scope and cost of the interim repair work will be determined through the load testing that is currently being arranged. Any interim repairs will also be funded from the City's Bridge Rehabilitation Program.

Funding of \$1 million for this project is included in 2015 as part of the 2014 Capital Budget and 2015-2023 Capital Plan for Transportation Services (City Bridge Rehabilitation). While this funding is adequate for the anticipated cost of interim repairs, additional funding requirements would need to be considered as part of future City Bridge Rehabilitation budget submissions to complete the project.

The long-term maintenance for the new bridge will include a minor rehabilitation at a cost of \$750,000 after 25-30 years and major rehabilitation of \$2 million after 50 years.

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

ISSUE BACKGROUND

Built in 1938, the Algonquin Island Bridge is currently the sole link between Algonquin Island and Ward's Island (see Attachments 1 and 2). The bridge primarily offers access for pedestrians, cyclists and City of Toronto and other service vehicles. Currently, the bridge has a posted advisory load restriction of 12 tonnes.

The Algonquin Island Bridge has an overall length of 62.5 metres consisting of thirteen spans of variable lengths. Originally the bridge deck consisted of Douglas Fir plank

decking supported by eleven sawn timber stringers. The main span is 12.45 metres in length and spans over the water channel.

In 1992, the City of Toronto commissioned a limited bridge condition survey to determine the condition of the existing bridge structure. Based on the findings of this survey, the bridge was rehabilitated in 1998.

In 2011, with the bridge nearing the end of its expected useful life, Engineering & Construction Services staff requested an Environmental Assessment by Infrastructure Planning to evaluate options to significantly rehabilitate or replace the bridge.

COMMENTS

Recent bridge inspections have identified some decay in the timber piles and concrete pile caps, and a need for more repairs. Through the public consultation, it has also been determined that improvements are also required to the deck to improve traction and prevent water from ponding.

The replacement now being recommended would allow the structure to meet the Canadian Highway Bridge Design Code, remove the load restriction, and improve conditions for pedestrians and cyclists by enhancing drainage and traction.

Due to the age of the structure and its potential heritage value, an Environmental Assessment was required in order to determine whether to rehabilitate or replace the bridge, and to develop a cost-effective and long-term solution that allows the bridge to continue to serve all intended users.

Environmental Assessment Process

The Algonquin Island Bridge Environmental Assessment Study has been completed in accordance with the requirements under the Municipal Class Environmental Assessment (the Class EA). If City Council endorses the study recommendations, the ESR will be filed in the public record for a minimum 30-day review period.

The EA Study was carried out with the assistance of technical consultants and supported by a Technical Advisory Committee (TAC) with staff from Transportation Services; City Planning; Parks, Forestry & Recreation; and Engineering & Construction Services.

Public Consultation

Public involvement has been an integral and ongoing part of the study process for the Algonquin Island Bridge EA Study. The public consultation requirements of the Municipal Class EA were met and exceeded. The project website (at www.toronto.ca/algonquinbridge) was set up in November 2013, after consultation had begun with affected stakeholders.

Two Public Information Centres (PICs) were held over the course of the study – the first on December 5, 2013, and the second on May 1, 2014. The first provided a brief overview of the existing conditions, history of the bridge, need for repairs, and various potential location and design options. Taking into account feedback from the December 2013 meeting and written comments, the second PIC presented two recommended options for public feedback – major rehabilitation or replacement in its existing location with a new structure consisting of modern materials, but resembling the existing bridge.

There was majority support for the replacement bridge option, in particular the composite timber-concrete trestle design. This support comes with the condition that accommodation of pedestrians on the new bridge, in the form of comfortable walking conditions, take high priority in the design, and that the community continue to be consulted through the detail design phase, via a design liaison committee for which PIC attendees have signed up. Fewer attendees were in support of the rehabilitation option, and there was mixed support for dedicated sidewalks.

Study Findings

Part of the Environmental Assessment consisted of a Cultural Heritage Resource Assessment. The study concluded that the location of the existing bridge holds historical significance and that there are design elements that should be preserved or recognized. However, much of the original material has been replaced over the years through regular maintenance and rehabilitation, and the slope and clearance of the bridge deck were modified in 1998. These considerations would allow for either a rehabilitation of the existing bridge, or for its replacement with a design that respects the original structure's aesthetic appeal and cultural heritage.

The following two technically supported options emerged, and both were presented as recommended options to the public on May 1, 2014.

Option 1: Major rehabilitation of existing bridge. This option would replace approximately 80 percent of the timber components of the bridge, would cost approximately \$4.3 million, and would require significant continuing maintenance.

Option 2: Replacement of the bridge with a new structure of similar design, but built with modern materials including concrete. This option is also expected to cost approximately \$4.3 million, and would last approximately 75 years, requiring limited regular maintenance.

It was determined that the slope of the bridge could be modified, but the existing horizontal and vertical navigational clearances would need to be maintained with either option, to allow current boating activity to continue and to avoid the need to obtain approval under Transport Canada's Navigation Protection Act (NPA).

While the latest timber pile inspection has determined that some components would need to be replaced within the next year, this repair would address only the specific piles

identified in the inspection as having experienced significant decay, and would not be nearly at the scale or cost of any of the rehabilitation options considered to date. The inspection report also recommends at minimum reassessing the condition of the remainder of the piles and caps within three years. This timing coincides roughly with the intended construction period for bridge replacement.

(1) Evaluation of Alternative Designs for Preferred Solution

The major criteria used to evaluate the options for the Algonquin Island Bridge were Heritage and Design, Accessibility, Lifecycle Needs, and Cost. The following alternative solutions were initially evaluated:

1. Rehabilitate Existing Bridge
2. Build New Trestle Bridge
3. Build New Precast Concrete Arch Bridge
4. Build New 3-Span Steel Girder Bridge
5. Build New Movable Bridge
6. Build New Causeway

The preferred solutions based on the evaluation were determined to be alternatives 1 and 2. Alternative Designs were then developed for each of these preferred solutions.

- Rehabilitate Existing Bridge: Minor Rehabilitation, Moderate Rehabilitation, or Major Rehabilitation
- Build New Trestle Bridge: Concrete or Timber-Concrete Composite

These alternative designs have been compared based on total lifecycle costs, potential to address immediate community concerns with the existing design, and public feedback received. It should be noted that the existing load restriction would remain under the Minor Rehabilitation design, although a non-slip coating would be applied to the existing timber deck surface and drainage would be improved under this option. The Major Rehabilitation would reduce the grade of the approach span, and would accommodate heavy vehicles (as would the Moderate Rehabilitation).

A new bridge would be constructed out of modern materials, but in the existing location and in a design that respects the heritage value of the existing structure, with a similar trestle form. At an expected cost of approximately \$4.3 million, similar to the cost of the Major Rehabilitation (and with slightly lower long-term repair/maintenance/rehabilitation costs), the new bridge offers the opportunity to upgrade the supports, provide a 75-year life span, and widen the structure to provide more comfortable and distinct sidewalks.

From a lifecycle cost perspective, the replacement option (number 2) resulted in the best value and still allows for maintenance of the existing trestle design. Both options will require rehabilitation and replacement at some point within the 75-year lifespan of the structure, but costs to rehabilitate the existing bridge are higher than those to rehabilitate a new bridge in approximately 30 years. The design is to be a timber-concrete composite

– with slightly higher maintenance needs and costs than an all-concrete design, but more functional timber, which is more consistent with the historical design.

(2) Recommended Plan

Construction of a new bridge in the existing location is recommended, based on a comprehensive evaluation of benefits and costs, and consultation with the community. The community has requested that they continue to be involved through the detail design phase, and that the new bridge be designed to give priority to the movement, comfort, and safety of pedestrians, while accommodating the occasional use of heavy vehicles (such as garbage and sewage pumper trucks). While providing this allowance, the new bridge will, through design details, discourage regular use by heavy and very large vehicles.

The new structure will have both timber and concrete components, and is intended to be both durable and consistent with the historical trestle design. This general design is illustrated in Attachment 3.

Project Cost and Implementation

Construction cost estimates were created for each of the bridge rehabilitation and replacement options. The expected cost of the preferred option is approximately \$4.3 million (with an expected minor rehabilitation cost of \$750,000 after 25-30 years and major rehabilitation of \$2 million after 50 years).

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SIGNATURE

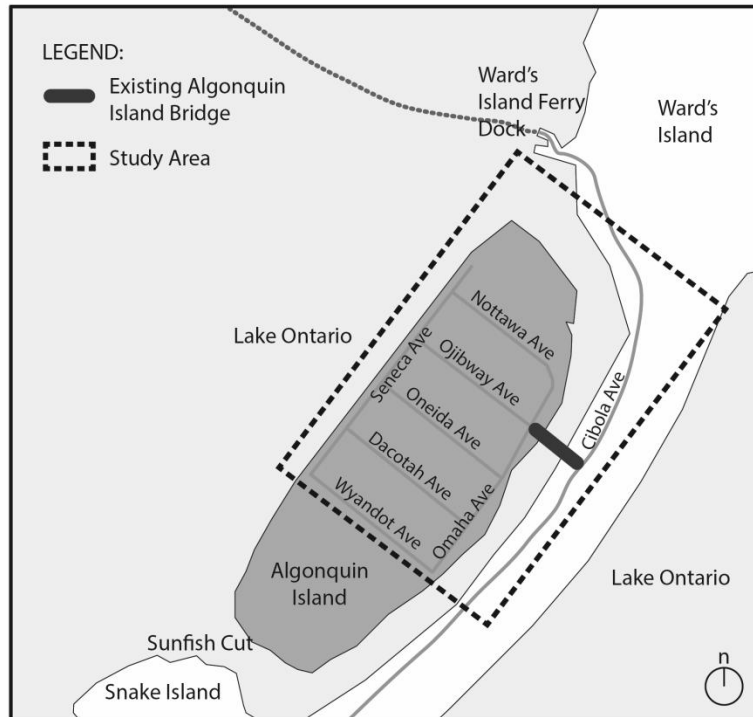
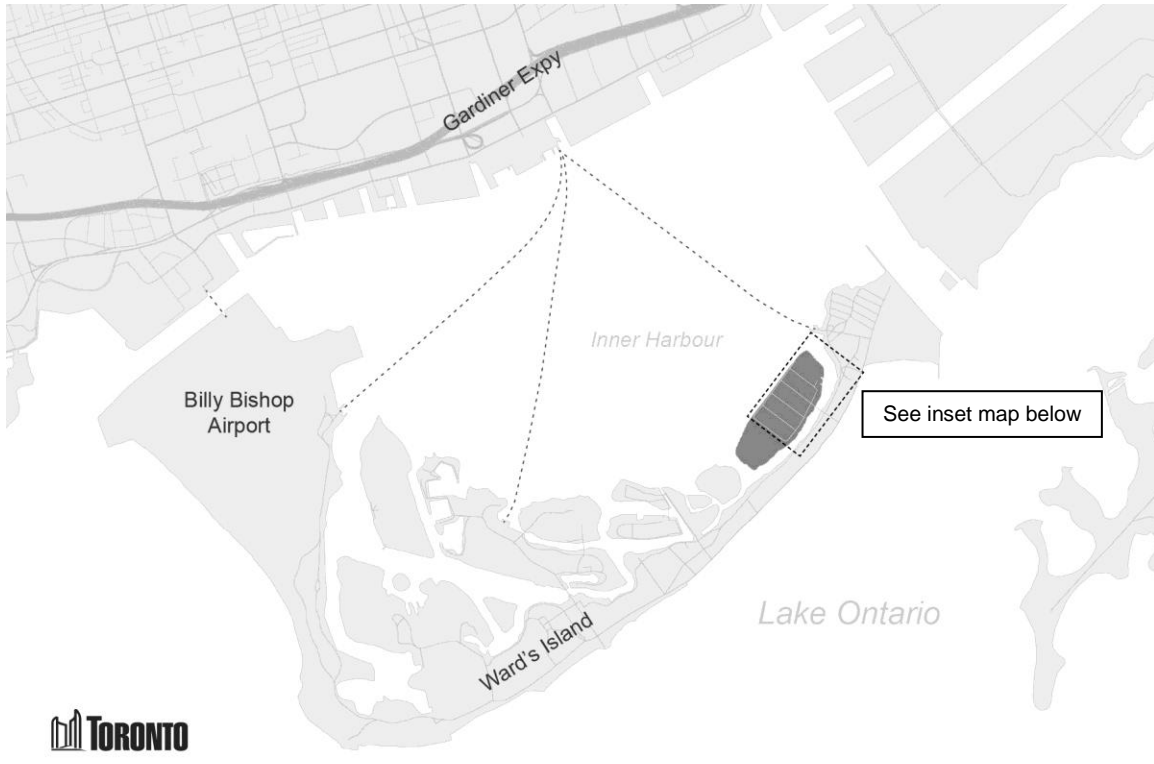
Stephen Buckley
General Manager, Transportation Services

ATTACHMENTS

Attachment 1: Study Area
Attachment 2: Existing Bridge
Attachment 3: Recommended Plan

ATTACHMENT 1

Study Area



ATTACHMENT 2
Existing Bridge



ATTACHMENT 3 Recommended Plan

