



STAFF REPORT ACTION REQUIRED

Procurement Authorization of Scarborough Rapid Transit (SRT) Vehicle Structural Repairs

Date:	April 20, 2017
To:	TTC Board
From:	Chief Executive Officer

Summary

This report requests the Board's approval to complete the structural repairs for 26 Line 3 Scarborough vehicles as part of the Line 3 life extension program.

The repair work is urgently required to address corrosion holes found in the vehicle frames. These holes were found during a vehicle condition assessment to determine the feasibility of operating existing SRT vehicles to 2026. If the problem areas are not repaired as soon as possible, the ongoing stress of service operations may result in fatigue cracks that will jeopardize the ability to safely continue operating Line 3. The fleet does not have spare vehicles that can be permanently removed from service. Waiting for cracks to appear before executing repairs is not an option, as it would result in vehicle shortages and drastically increased repair costs (the frames would then need to be replaced not repaired).

An existing contract was initiated with Bombardier Transportation Canada Inc. to develop and test a repair method for the problem corrosion holes. Two vehicles have been repaired to date in order to validate the repair methods and determine a cost estimate. Approval is being requested to amend this contract to repair the remaining 26 vehicles on a sole source basis.

A second vendor (CAD Rail in Montreal) was initially considered in an attempt to develop a competitive bid, but only Bombardier was technically capable of developing a repair calculated to last 10 additional years of service.

Recommendations

It is recommended that the Board authorize:

1. Contract amendment to Bombardier for Repair and Replacement Contract XL5004, increasing the amount by \$6,040,671.52 for the repair of the remaining 26 SRT

vehicles, bringing the total contract price to \$6,773,127.35 and extending the contract expiry date to December 19, 2019 on the basis of sole source of which:

- i. \$4,996,211.38 is set as base repair work for the fleet which includes the removal of the vehicle floors and door corner post structural components, performing a condition assessment of the frames, re-assembly of the vehicle, installation of new floor substructure and installation of new flooring material.
- ii. \$1,044,460.14 has been included in the above contract price as an allowance for additional condition based repairs that may be required on the vehicle frames. Condition based repairs will require TTC approval prior to being performed and the repair will be based on one of three fixed repair rates.

Financial Summary

Sufficient funds for this expenditure are included in the TTC's 2017 – 2026 Capital Budget and Plan for the Scarborough Subway Extension (SSE) Capital Budget as approved by the Board on November 21, 2016 and approved by City of Toronto Council on February 15, 2017.

The Chief Financial & Administration Officer has reviewed this report and agrees with the financial information.

Accessibility/Equity Matters

This report has no accessibility or equity issues.

Decision History

The following links and table provide history and background related to the decision process for SRT Life Extension Program.

Decision of Transit City Plan:

https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2007/Mar_21_2007/Other/Toronto_Transit_City.pdf

Decision of revised Transit City Plan and maintain SRT service until the proposed Scarborough RT Line opening in 2016:

https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2010/May_6_2010/Supplementary_Reports/Transit_City_Implica.pdf

Decision of LFLRV Plan Changed to Scarborough Subway Extension (SSE) and maintain the SRT service until SSE opening in 2023:

https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2014/June_24/Reports/Scarborough_Subway_Extension_Update.pdf

Issue Background

As a result of the decision to extend the life of Line 3, including rolling stock, the TTC requested Bombardier, the original equipment manufacturer, to perform a review and assessment of the fleet condition in July 2015. While undergoing an assessment of the vehicle structures, perforations and sizable corrosion holes (in the critical high-stress joints of the door post and the car-body frames) were discovered.

A finite element analysis on the frames further determined that the corrosion holes, if not addressed, could lead to fatigue cracks that would compromise the structural integrity of the vehicle's frame. The existing condition could potentially lead to catastrophic vehicle failure and put the service plan of operating the system until 2026 at risk. The finite element analysis showed that the existing stress levels around the corrosion holes exceed the original intended stress levels. Failure to repair this condition as soon as possible may lead to fatigue cracks, and the need to replace entire frames as opposed to perform a less expensive repair. In order to mitigate and eliminate this risk, the frames must be restored as soon as possible.

Considering the nature and complexity of the problem, the uniqueness of the repair work, and learning that this type of repair had never been performed on these vehicles before, the TTC began to seek assistance from external companies to develop a repair method. The TTC contacted two potential contractors with service histories of performing similar structural repairs, with the goal of developing two vendors to participate in a multi-phased bid process to perform the repairs on the fleet:

- 1) Bombardier - this option offered the engineering support of the vehicle OEM who possesses the proprietary design information of the carbody structure. Bombardier also possesses experience in these types of repair methods.
- 2) CAD Rail Industries – Montreal site (or hereafter known as CAD) a good track record for performing complex frame repairs to replace corroded structural components with GO-Transit and VIA Rail vehicles. However, CAD has not designed or performed repairs to self-propelled rail vehicles before (significantly more complex in structural design and repair).

It was imperative that the TTC validate the design and repair method proposals from each contractor prior to proceeding with a competitive bidding process for the remaining 26 vehicles. The TTC secured two independent structural engineering consulting firms (WS Parsons in June 2015 and CH2M Hill in June 2016) to evaluate the design and repair methods from Bombardier and CAD. Bombardier and CAD were provided one car each to demonstrate their design and repair methods.

Bombardier's structural design submission for the repair process was deemed satisfactory by WS Parsons. The structural design submission from CAD was deemed unacceptable by CH2M Hill as CAD was not able to develop a technically satisfactory repair method, primarily due to their lack of engineering resources to design and adequately confirm the acceptability of repair.

Scope of Work

The scope of the fleet repair is broken into two parts: “base repairs” that will be completed on every vehicle, and “condition dependant repairs” that may be completed on each joint between the door post and the car-body frames (8 per vehicle) as required. The “base repair” will consist of shipping, teardown, inspection, surface rust removal, painting, structural subfloor replacement, and modern composite floor material installation. During the inspection Bombardier will identify the “condition dependant repairs” that are needed for each of the 8 joints. Bombardier has provided three repair prices for varying degrees of deterioration in the frames. TTC will approve the condition dependant repairs for each vehicle prior to Bombardier proceeding.

The fleet cost for the base repairs on all 26 vehicles is \$4,996,211.38 (\$170,054.85 per vehicle, plus tax).

Comments

A Request for Quotation (RFQ) was issued to Bombardier on January 25, 2017 for structural repair services of 26 Line 3 vehicles on the basis of sole source as follows:

- The RFQ requested firm pricing with committed production rates and deliveries to meet the requirements of the life extension program and schedule.
- TTC staff contacted Bombardier to negotiate price reductions as well as improved delivery rates. Upon completion of the negotiations they indicated that it offered its best pricing and delivery and could not reduce pricing further (an overall price reduction of 33%).
- The labour/engineering rates are in line with the rates provided under Contract XL5004.

Based on the above reasons, the base repair and condition dependant rates are considered to be reasonable.

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