



## **STAFF REPORT ACTION REQUIRED with Confidential Attachment**

### **Automatic Train Control (ATC) Project Quarterly Update Report**

<b>Date:</b>	June 22, 2015
<b>To:</b>	TTC Board
<b>From:</b>	Chief Executive Officer
<b>Reason for Confidential Information:</b>	This report contains advice that is subject to solicitor-client privilege including communications necessary for that purpose.

#### **Summary**

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The Board requested staff to report quarterly on the progress of the Automatic Train Control (ATC) project starting June 2015. This first report covers the history of how the project evolved to date, the project scope, current status and a 3 month look ahead.

Approval was received at the March 26, 2015 Board meeting to transfer the Computer Based Interlocking (CBI) scope of work from Ansaldo to Alstom and consolidate the work and responsibility of four contracts and two companies into a single contract with Alstom. This contract change has been signed and work is well underway with the completion date of 2020 and budget of \$562.8 million maintained.

Consolidated within the scope of the ATC project is the commissioning of the signaling system on the TYSSE extension before the end of 2017. This work is also well underway and on schedule. Progress will also be covered in this quarterly report.

#### **Recommendations**

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##### **It is recommended that the Board:**

1. Receive the information as set out in the Confidential Attachment;
2. Authorize that the information provided in the confidential attachment is to remain confidential in its entirety as it contains information that is subject to solicitor-client privilege.

## **Financial Summary**

This report has no financial impact as the purpose is to provide a status update on the progress of the ATC project. A financial expenditure summary is contained in Appendix B of this report.

## **Accessibility/Equity Matters**

This report and recommendations have no accessibility or equity issues.

## **Decision History**

The history of how the ATC projects(s) evolved is contained in Appendix A.

## **Issue Background**

The existing TTC subway signaling system consists of an aging infrastructure and a train operation technology that is not capable of supporting an ever-increasing passenger ridership. This results in delays due to signal equipment breakdowns, overcrowding on station platforms and customer service deterioration. The signaling system is therefore in need of both end of life replacement and an increase in capacity. The resignaling of Line 1 achieves both of these objectives.

From 2008 TTC incrementally awarded four publically tendered contracts to address the immediate, medium and long term challenges related to the resignaling of Line 1 and more recently the signaling of TYSSE. Ansaldo, Alstom, Thales won different elements of the overall solution.

In late March 2015 after an expert independent study of the signaling contracts for Line 1 and TYSSE the CBI systems scope was transferred from Ansaldo to Alstom. This consolidated the work and responsibility into a single contract with Alstom. This change ensures TTC gets the maximum performance and reliability from ATC for many years to come on both Line 1 and TYSSE.

## **Comments**

### **Executive Summary**

Following the award of the contract change to Alstom TTC has progressed well in all areas of the ATC project. While not complete for the entire project a detailed analysis of the scope, budget and schedule provides a good level of confidence all will be successfully achieved as planned.

A schedule for the Engineering Test Track & Training Facility (ETTF) is complete and confirms proof of concept for the new solution will be achieved by the end of 2015. The Phase 1 (Wilson – St Clair West) schedule is mature enough to provide confidence in the July 2017 commissioning into service date. Phase 2 (TYSSE) schedule is currently being completed in detail and key dates integrated into the TYSSE master schedule. Initial indications are positive that the signaling system will be ready to commission before the end of 2017.

Given the simplification of many areas of the project and the significant reduction in closures required for implementation the project is well on track to complete within budget.

Progress since March consists of setting up an integrated team made up of TTC, TYSSE, Bechtel and Alstom staff. This is working well and the team has met several times. An additional ATC strategy team, supported by an external expert consultant has also been established and is also working well. Good progress has been made with the design and engineering work streams and construction in the phase 1 area. Integration testing is complete on the TR with a train having run in ATC mode at ETTF. The first TR will commence formal dynamic testing in mid June 2015 and the ETTF is planned to be functional in the fall of 2015.

### **Project Objectives:**

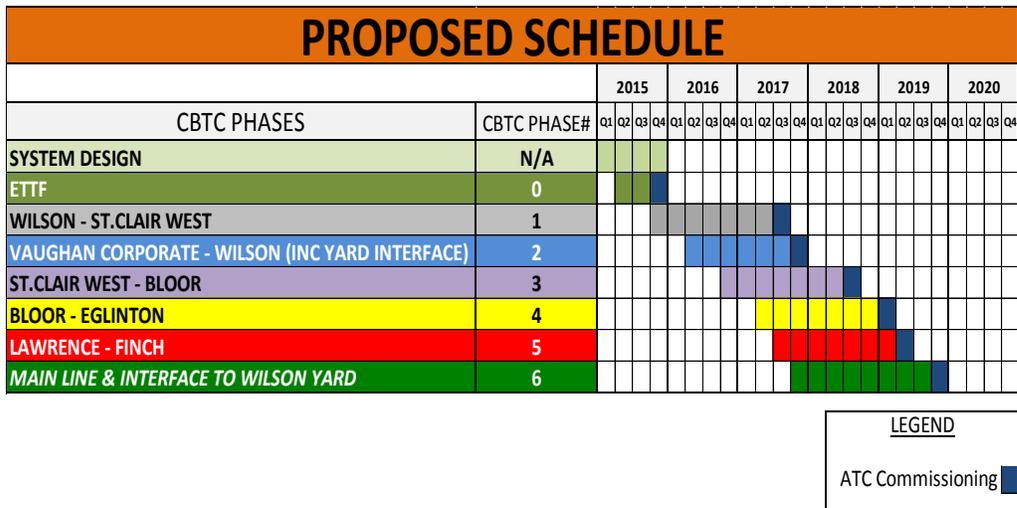
1. To achieve a state-of-good-repair of the signaling/train control systems on the line, with associated improvements in system reliability/availability and reductions in system maintenance;
2. To provide a capability for a “step change” increase in passenger carrying capacity on the line through Automatic Train Operation (ATO) and the use of a modern, moving block, train control solution supporting safe, short-headway operations;
3. To implement the project with minimum impacts to revenue service operations;
4. To implement the project on schedule and within budget.

### **Project Scope**

1. The scope of the ATC project is to re-signal the entire Line 1 from Finch to Downsview and, as a continuation, to provide ATC signaling for the TYSSE extension up to Vaughan Corporate Centre.
2. The signaling solution consists of an Alstom Ubalis 400, product based overlay system with both a control centre and a Back Up Control Centre.
3. The entire fleet of Toronto Rockets is being equipped with ATC in addition to the fleet of essential work cars.
4. Given very high levels of ATC availability and reliability equipping the entire fleet enables a significantly simplified secondary system to be deployed. This secondary system is an axle counter system overlaid on the existing system, thus minimizing service disruption during implementation and greatly reducing future maintenance demands.
5. Provide a sustained operating headway in the order of 110 seconds (approximately 32.7 trains-per-hour) under driver-supervised ATO performance
6. Implementation of ATO into and out of Wilson Yard Hostler platforms

### **Project Schedule – Key Dates**

Following the contract award in March 2015 to Alstom a robust schedule has been developed for the Engineering Test Track and Training Facility (ETTF) confirming proof of design will be in 2015. The Phase 1 schedule has a level of maturity that provides good confidence in a mid-2017 commissioning. This logic is being flowed through to Phase 2 (TYSSE) with the same confidence that TYSSE signaling will be ready to open before the end of 2017 in ATC. Key dates for TYSSE signaling are currently being integrated with the TYSSE project master schedule. Preliminary phase 3-6 schedule development shows the last phase opening before the end of 2019 and project completion before mid-2020. A fully detailed, resource loaded schedule for the entire project will be complete before the next quarterly report.



### Project Budget

The current assessment of the project implementation shows that the project will be delivered within the approved budget. A summary of key areas of expenditure is in Appendix B.

#### Line 1

In Project 2.4, YUS ATC Resignaling in the State Of Good Repair category as set out on pages 295-297 of the 2015-2024 TTC Capital Budget with an estimated final cost of \$563 million as approved by City Council on March 10/11, 2015.

#### Line 2

In Project 2.4, Bloor-Danforth ATC Resignaling in the State of Good Repair category as set out on pages 299-301 of the 2015-2024 TTC Capital Budget with an estimated final cost of \$430 million as approved by City Council on March 10/11, 2015.

#### TYSSE

As set out on pages 1035-1037 of the 2015-2024 Capital Budget (category Expansion) \$2.634 billion as approved by City Council on March 10/11, 2015.

#### Current Project Status

- Integrated Team established – ATC, TYSSE, Bechtel and Alstom
- Expert ATC advisory panel established
- Work streams for all aspects of project underway
- ETTF installation planned completion fall 2015
- Full ATC/ATO demonstration planned for the fall 2015
- Axle counter trial planned at Wilson station late 2015
- ETTF proof of design concept completed by end of 2015

#### Engineering and Design

- Requirements management process for new scope in place
- All work streams established

**Trains and Work Cars**

- 82 Toronto Rockets (TR) in total
- 64 TR's equipped on TTC property and equipped with ATC equipment
- 55 TR's have the ATC equipment statically tested and passed. 10 of these require some rework
- 6 rounds of integration testing complete, software is mature for dynamic testing
- Formal dynamic testing starts on first train 15 June 15
- First TR train run in automatic mode on Test Track (ETTF)
- Work cars dedicated work stream underway

**TYSSE**

- Integrated solution with Line 1
- Teams working very well together
- ETTF and Phase 1 work well under way. This will provide significant advantages for TYSSE solution and help secure opening date before end of 2017
- Equipment rooms available for installation early 2016
- Track & Radio Frequency surveys start – June 2015
- PNR contract in negotiation as per May Board report
- No more funds required , other than those already committed

**Construction on Line 1**

- Pre March 26 Board Report
  - St Patrick's to Summerhill 36,000' cable tray
  - St Clair- Eglinton: 12,200' cable tray
  - Downsview- Clanton Park: 4,300' cable tray
  - 400 messenger poles at Davisville
- Post March 26 Board Report
  - Eglinton West- Glencairn: 3,600' cable tray
  - 365 ground screws, messenger poles along with various runs of messenger cable from Eglinton West to Glencairn
  - 2 large communication pole screws and poles at Glencairn

<b>3 Month Look ahead</b>	<b>Date</b>
1. Complete dynamic testing of first TR train	July 15, 2015
2. Complete design of ETTF	Aug 14, 2015
3. Complete Review of all Requirements	Sept 30, 2015
4. Complete dynamic testing of 4 additional TR's	Sept 30, 2015
5. Complete installation of ETTF with new signaling equipment	Sept 30, 2015

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## **Appendices**

Appendix A – Project and Contract History  
Appendix B - Financial Summary

## **Attachments**

Confidential Attachment – Changes to TTC Signaling contracts

## Appendix A

### PROJECT AND CONTRACT HISTORY

#### **2008: Existing Signal System Replacement with CBI – South Yonge (Contract C31PV07834)**

Signal system replacement on South Yonge was identified as Phase 1 on Line 1 (i.e. St Patrick to Eglinton Stations). Approval was received from the Board for award of a contract in September 2008 for design, supply and installation of a CBI signal system on the south Yonge portion of Line 1 to Ansaldo. This was initiated through a pre-qualified competitive procurement process. Minutes of the Board meeting are available on the TTC website. Refer to: Agenda Item 12 in the following link:

([http://www.ttc.ca/About\\_the\\_TTC/Commission\\_reports\\_and\\_information/Commission\\_meetings/2008/Sept\\_18\\_2008/Supplementary\\_Agenda/index.jsp](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2008/Sept_18_2008/Supplementary_Agenda/index.jsp))

#### **2009: ATC – Entire Line 1 (Contract C31PV08752)**

Approval was received from the Board in April 2009 for award of a contract to Alstom for design, supply and installation of ATC on the entire Line 1 and supply of ATC equipment for installation on 39 Toronto Rocket subway trains through a publicly advertised competitive procurement process. Minutes of the Board meeting are available on the TTC website. Refer to Agenda Item 4 in the following link:

([http://www.ttc.ca/About\\_the\\_TTC/Commission\\_reports\\_and\\_information/Commission\\_meetings/2009/Apr\\_27\\_2009/Agenda/index.jsp](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2009/Apr_27_2009/Agenda/index.jsp))

#### **2011: ATC – Additional Trainsets for Line 1 (Contract C31PV08752)**

A contract change was subsequently issued June 2011 to Alstom pursuant to approval from the Board to increase the supply of ATC equipment for Toronto Rocket subway trains from 39 to 60 trains (21 sets of equipment). Minutes of the Board meeting are available on the TTC website. Refer to Agenda Item 5 in the following link:

([http://www.ttc.ca/About\\_the\\_TTC/Commission\\_reports\\_and\\_information/Commission\\_meetings/2011/April\\_6\\_2011/Agenda/index.jsp](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2011/April_6_2011/Agenda/index.jsp))

#### **2012: Existing Signal System Replacement with CBI – Remainder of Line 1 (Contract C31PV11825) and Addition of CBI on TYSSE Line (Contract A70-9)**

Approval was received from the Board for award of contracts in March 2012 for design, supply and installation of a CBI signal system for the remainder of Line 1 in four phases and for addition of new CBI based signal system to the TYSSE line to Ansaldo through a pre-qualified competitive procurement process. Minutes of the Board meeting are available on the TTC website. Refer to Agenda Item 13 in the following link:

[http://www.ttc.ca/About\\_the\\_TTC/Commission\\_reports\\_and\\_information/Commission\\_meetings/2012/March\\_30/Minutes\\_Other/Sup\\_Agenda\\_Mar\\_30.jsp](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2012/March_30/Minutes_Other/Sup_Agenda_Mar_30.jsp)

**2012: Existing Speed Control System Update to Line 1 and add to TYSSE (Contract C31PA12738)**

Approvals was received from the Board in September 2012 for award of a contract to Thales Canada for design and supply of Speed Control System update on Line 1 and add to the TYSSE line. Minutes of the Board meeting are available on the TTC website. Refer to Agenda Item 14 in the following link:

[http://www.ttc.ca/About\\_the\\_TTC/Commission\\_reports\\_and\\_information/Commission\\_meetings/2012/September\\_27/Supplementary\\_Agenda/index.jsp](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2012/September_27/Supplementary_Agenda/index.jsp)

**2013: ATC – Additional Trainsets for TYSSE (Contract C31PV08752)**

A contract change was issued January 2013 to Alstom to increase the supply of ATC equipment for Toronto Rocket subway trains from 60 to 70 trains. Approval for this contract change was within staff's signing authority under the Authorization for Expenditures and Other Commitments Policy.

**2014: Changes to Scope and Schedule for Alstom ATC Contract**

Approval was received from the Board in April 2014 for changes to the contract scope and schedule with Alstom for design, supply and installation of ATC on the entire Line 1 and supply of ATC equipment for an additional 10 Toronto Rocket subway trains. Minutes of the Board meeting are available on the TTC website. Refer to Agenda Item5a in the following link:

[http://www.ttc.ca/About\\_the\\_TTC/Commission\\_reports\\_and\\_information/Commission\\_meetings/2014/April\\_30/Agenda/index.jsp](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2014/April_30/Agenda/index.jsp)

**2015: Changes to Scope and Schedule for Alstom ATC Contract**

Approval was received from the Board in March 2015 for changes to the contract scope with Alstom for design, supply and installation of CBI on the entire Line 1 following adoption of certain technical amendments

[http://www.ttc.ca/About\\_the\\_TTC/Commission\\_reports\\_and\\_information/Commission\\_meetings/2015/March\\_26/index.jsp](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2015/March_26/index.jsp)

## Appendix B

### Financial Summary - ATC Resignaling

	(In Thousands)	Estimated Forecast at Completion	Total Actual Spend To Date	2015 Probable Spend
			Dec/31/2014	
<b>E</b>				
	Consultant costs	37,135	21,257	4,327
	TTC Engineering costs	59,940	26,463	3,094
<b>T</b>		<b>\$ 97,075</b>	<b>\$ 47,720</b>	<b>7,421</b>
<b>S</b>		<b>\$ 3,773</b>	<b>\$ 2,765</b>	508
<b>A</b>		-		
	Contract costs	196,577	62,938	24,468
	TTC Installation costs	65,910	24,408	2,279
<b>T</b>		<b>\$ 262,487</b>	<b>\$ 87,346</b>	<b>26,747</b>
		<b>\$ 16,902</b>	<b>\$ 12,598</b>	<b>1,500</b>
<b>C</b>		<b>\$ 44,258</b>	<b>\$ 9,897</b>	5,759
<b>P</b>		<b>\$ 72,950</b>	<b>\$ 50,888</b>	3,528
<b>P</b>		<b>\$ 33,620</b>	<b>\$ 7,584</b>	1,500
<b>O</b>		<b>\$ 3,108</b>	(5,442)	(2,104)
<b>P</b>		<b>\$ 28,662</b>		<b>3,000</b>
<b>T</b>		<b>\$ 562,835</b>	<b>\$ 213,355</b>	<b>\$ 47,859</b>

Notes:

1. Changes in signaling contracts will result in a significant underspend in 2015
2. ATC closures and associated costs will also be significantly reduced in 2015