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March 27, 2015

Mr. Joseph Pennachetti
City Manager
City of Toronto
Toronto City Hall
11th Floor, East Tower
100 Queen Street West
Toronto, ON M5H 2N2

Dear Mr. Pennachetti:

At its meeting on Thursday, March 26, 2015 the TTC Board considered the attached report entitled "Toronto-York Spadina Subway Extension – Schedule and Budget Change".

The Board approved the following action:

"It is recommended that the Board approve the following recommendations and then forward to the City of Toronto and Regional Municipality of York:

1. Endorse the end of 2017 as the earliest achievable date for the opening of the TYSSE.
2. That the TTC Chair, Vice-Chair and CEO be delegated the authority to retain a third party project-management firm as an incentivized project manager as per the confidential recommendation to this report as Appendix A (Confidential Attachment), as outlined in Option 1.
3. That, in accordance with the current funding commitments, the City of Toronto and Regional Municipality of York share funding of the increase in project costs of \$150 million (exclusive of HST). This equates to \$90 million to the City of Toronto and \$60 million to the Regional Municipality of York.
4. That the City of Toronto Council consider funding its portion of costs through mechanisms such as: the TTC's 2014 operating budget surplus, net property sales and/or potential deferral of projects.
5. Direct the CEO of the Toronto Transit Commission to report back by December 31, 2015 on a determination of construction claims costs.
6. Receive the confidential information as set in the Confidential Attachment and adopt the recommendations in the Confidential Attachment, as amended.



7. The information as set out in the Confidential Attachment be released to the public upon execution of an agreement outlined in recommendation no. 2".

The Board also adopted the following ancillary motion:

- i) That the CEO of the TTC provide a report by the fourth quarter of 2015 outlining the specific, substantive changes that will be made in the planning and project management for the Scarborough subway as compared to the Toronto-York Spadina Subway Extension.

The foregoing is submitted for your consideration.

Sincerely,



Vincent Rodo
Chief Financial & Administration Officer

1-11
Attachments

Copy: B. Macgregor, York Region, CAO





**STAFF REPORT
ACTION REQUIRED
With Confidential Attachment**

Toronto-York Spadina Subway Extension – Schedule and Budget Change

Date:	March 26, 2015
To:	TTC Board
From:	Chief Executive Officer
Reason for Confidential Information:	This report contains advice that is subject to solicitor-client privilege, including communications necessary for that purpose

Summary

The Toronto-York Spadina Subway Extension (TYSSE) will be an important part of both the TTC network and regional transit, dramatically improving transit in Toronto and the GTA.

The purpose of this report is to provide the Board with a comprehensive summary of the TYSSE project from conception to present and the impact to both schedule and budget.

The TYSSE project is currently 70 per cent complete. However, it has been determined that the publicly stated opening date of the end of 2016 and the approved budget are not achievable. This report recommends that a comprehensive project “reset” involving a new third-party project manager be undertaken to deliver the project by December 31st, 2017 at an estimated budget increase of \$150M.

Recommendations

It is recommended that the Board approve the following recommendations and then forward to the City of Toronto and Regional Municipality of York:

1. Endorse the end of 2017 as the earliest achievable date for the opening of the TYSSE.
2. That the TTC Chair, Vice-Chair and CEO be delegated the authority to retain a third party project-management firm as an incentivized project manager as per the confidential recommendation to this report as Appendix A (Confidential Attachment 1) to follow.

3. That, in accordance with the current funding commitments, the City of Toronto and Regional Municipality of York share funding of the increase in project costs of \$150 million (exclusive of HST). This equates to \$90 million to the City of Toronto and \$60 million to the Regional Municipality of York.
4. That the City of Toronto Council consider funding its portion of costs through mechanisms such as: the TTC's 2014 operating budget surplus, net property sales and/or potential deferral of projects.
5. Direct the CEO of the Toronto Transit Commission to report back by December 31, 2015 on a determination of construction claims costs.
6. Receive the confidential information as set in the Confidential Attachment.
7. The information as set out in the Confidential Attachment be released to the public upon execution of an agreement outlined in recommendation no. 2.

Background

It has been determined that a project opening date of December 31, 2016 is not achievable. Three separate third-party consultants have been retained with the objective of providing the TTC CEO and the project's Executive Task Force (ETF) with advice on measures to ascertain possible mitigations to recoup project schedule. The project options as presented in this report are consistent with the recommendations of those third-party consultants.

Project Options

In order to fully understand the earliest achievable date for opening, a variety of options were identified. From this the four most viable options are described in this report.

Each option has different costs and delivery dates although they share some characteristics. Under any option, it is important to note the direct relationship between costs and delivery dates. Specifically, the longer the project takes to deliver, the greater the cost of maintaining the project team at a cost of \$70M per year (Appendix B). Furthermore, the longer the project takes to deliver, the greater the risk of claim costs from the project contractors. A phased opening of the TYSSE was examined and is explained later in this report.

Three of the options (other than maintaining the status quo) involve a "commercial reset" (the "reset"). This process involves extensive negotiation with the project contractors with an objective to incentivize them to meet a revised project schedule date.

Two of the options involve a new third-party engineering firm taking over as a project manager through to project completion.

The remaining two options involve TTC remaining as project manager with one of those options requiring the addition of a third-party engineering firm to act as a “facilitator”.

None of the options detailed below address current contractor claims. These will be addressed with a further report to the Board by the end of 2015.

Table 1 – Project Options

	New Third Party Project Manager		TTC remains Project Manager	
	OPTION (1)	OPTION (2)	OPTION (3)	OPTION (4)
	Sole source management	RFP for management	Small project change	1. No change – TTC Project Team
Earliest Opening Date	Q4 2017	Q2 2018	Q4 2018	Q2 2019
TTC ongoing project costs	\$70M	\$105M	\$140M	\$175M
External consultant	\$80M	\$75M	\$15M	\$10M
TOTAL KNOWN COSTS	\$150M	\$180M	\$155M	\$185M

1. Retain incentivized sole-source third-party project manager to deliver

This approach puts a third party Project Management consultant company directly in charge of leading the Project delivery to achieve the end of 2017 opening date. Significant addition of consultant staff would be deployed along with the existing project team. This approach assumes a sole source contract pending negotiations to minimize the procurement time.

The estimated cost of this option would include one additional year of existing Project Management cost of \$70M and the cost of the third-party project manager of approximately \$80M to project completion. It is anticipated that the cost of \$80M would include significant incentives conditional upon meeting schedule and budget milestones and ultimately the opening by the end of 2017.

Pros

- Allows full reset of TTC / contractor relationship
- Incentivizes third party to deliver to time and budget
- Understanding of cost claims by end of 2015
- Begin operations by end of 2017
- Sole source saves 6 months (\$35m)
- Lowest internal management cost due to earliest delivery date

- Lowest overall cost

Cons

- Requires sole source contract

2. Retain incentivized third-party project manager via RFP to deliver

Similar to Option one (1), but the process of retaining the third-party project manager would be done through an RFP. It is anticipated that a competitive bidding process would perhaps generate some savings out of the \$80M contract. However, it is also anticipated that the process would take approximately six (6) months and this increases the Project team cost by \$35M. This option would have an earliest opening date of mid 2018 (end 2017 plus additional 6 months delay). This delay could more than offset any potential RFP savings.

Pros

- Allows full reset of TTC / contractor relationship
- Incentivizes third party to deliver to time and budget
- Understanding of cost claims by mid-2016
- Potential cost savings through RFP process

Cons

- Adds 6 months to undertake RFP at a minimum additional cost of \$35M
- Begin operations by mid-2018 at earliest

3. TTC Project Management Continues. Retain Third Party Consultant / Facilitator

Similar to Option four (4), but this option retains a third party facilitator to develop the Project “reset” with various contractors. The facilitator would act as arbitrator in maintaining the adherence of each party to its obligations under the reset agreement. Further resources would be added to the TTC’s project and claims management capability, and would attempt to improve the relationship with contractors.

This option would see the opening date of the TYSSE changed to the end of 2018 (at the earliest). Given that the project currently has funds through the end of 2016, this would result in approximately \$140M total cost overrun plus \$15M in additional project and claims management support and a third party facilitator.

This option would allow the TTC an understanding of potential end settlement for costs and facilitate a reset in TTC / contractor relationship by the end of 2015.

Pros

- Some potential improvement to TTC / contractor relationships
- Understanding of cost claims by end of 2015

Cons

- Not enough change to fundamentally reset relationships
- Begin operations by end of 2018 at earliest
- Increased claim risk

4. TTC Project Team Continues – Status Quo

This approach maintains the TTC Project Team as the project delivery agent. The TTC internal project management team, and its integrated consultants, costs approximately \$70M/year.

The opening date of the TYSSE under this option would be Q2 2019 at the earliest. Given that the project currently has funds through the end of 2016, this would result in at least \$175M total cost overrun plus an additional allowance of \$10M to provide enhanced contract administration and claims activities.

Pros

- None

Cons

- Change not enough to deliver results
- Latest opening of all options
- Increased claim risk

Financial Impact

The approved TYSSE budget is \$2.634 billion. Table 2 below sets out the funding provided by each partner. The total cost is split between the Federal government, the Province of Ontario, the City of Toronto and York Region. The one-third municipal share is split between Toronto (59.96%) and York Region (40.04%). Under the current funding agreements, the municipalities are responsible for making up any cost overruns.

In 2006, the Province provided funding of \$670 million for TYSSE project costs, creating the “Move Ontario Trust” to hold and invest project funds. In 2007, the Province added funding of \$200 million to the Trust, for total principal of \$870 million. Including interest income, total Provincial and Trust funding was estimated at \$1.059 billion.

In 2007, the federal government pledged up to \$697-million towards eligible project costs, subsequently providing \$75 million up-front, and \$622 million by way of Building Canada Fund Contribution Agreement.

Table 2 - Project Funding

Funding Partner:	\$ Millions	% of funding
Federal	697	26.5%
Provincial/Move Ontario Trust	1,059*	40.2%
Toronto	526	20.0%
York Region	352	13.3.0%
Total	2,634	100.0%

*includes anticipated investment income (of \$189M in the Move Ontario Trust)

Table 3 outlines the extent of funding and budget remaining for the project. Table 4 outlines total existing commitments and known future commitments through to December 31, 2016 only.

Table 3 – Total Project Funding

	\$ Millions
Total Budget	2,634
Total Expenditures to Date	1,639
Remaining Budget	995

Table 4 – Remaining Project Commitments

	\$ Millions
Stations	377
Tunnels, communications, signals and project management	138
Wilson Yard	48
External Project Management	60
Vehicles	73
Other	9
Total Remaining Existing Commitments	705
Future Planned Contracts	98
External Project Management Costs	52
Property Costs	45
Contract Change Allowance	95
Total Future Commitments	290
Total required to end of December 2016	995

The total current budget approved for this project is \$2.634 billion. A total of \$1.639 billion has been expended to the end of 2014, leaving \$995 million remaining. Of that unspent amount, contractual commitments on existing contracts of \$705 million are in place and a further \$98 million in new contracts will be let to the end of 2016. Internal project management costs and other costs such as insurance, project office leases, etc. amount to \$52 million to the end of 2016. Property costs of \$45 million will also be incurred. That would leave a \$95 million allowance for contract changes. Those changes will continue to be very carefully scrutinized and the possibility exists that not all of this will be required and this may help defray some other costs on this project. It should be noted that there is no project contingency remaining in the current budget.

Depending on the option selected to complete this project, between \$150-\$185 million will be needed for the commercial reset and to complete the remaining work. The recommended project option suggests the City of Toronto fund its \$90 million share through a number of mechanisms such as: the TTC's 2014 operating budget surplus, net property sales and/or potential deferral of projects. As noted elsewhere in this report, staff will report out by the end of the year on expected construction claims costs.

Accessibility Matters

All stations on the TYSSE have extensive facilities (such as elevators, escalators, tactile markings, etc.) that comply with AODA. Furthermore the service the TYSSE provides will improve access to jobs and opportunities for a large number of Torontonians and any delay to the start of service delays access to these opportunities.

Decision History

Since 2001, Toronto City Council and the TTC board have been kept apprised, and approvals sought and granted, on various matters related to this project as outlined in Appendix C. Furthermore, the TTC Board has received updates from TTC staff as the project managers. In May 2007 Toronto City Council and York Region established an Executive Task Force (ETF), which meets monthly, whose responsibilities are described under the Governance section below.

Issue Background

(a) Project Scope Evolution

Planning for the Toronto-York Spadina Subway Extension began in the 1990s. In 2000, the Toronto Transit Commission completed and tabled its Rapid Transit Expansion Plan, which planned an extension of the Yonge-University-Spadina subway from its current terminus at Downsview Station to a new terminal station to be located at one of the following locations:

- York University
- Steeles Avenue West

- Continuing to Steeles Avenue and routing eastward to a Yonge line station
- A Vaughan Station north of Steeles

The exact routing, station locations, schedule, scope and budget were roughly defined.

In 2003, the City of Toronto and the TTC began preliminary work on a subway extension to Steeles West, although no funding was committed.

In 2004-2005, funding was made available for the TTC and the City of Toronto to begin work on an Environmental Assessment.

In 2007 and 2008 the final Provincial and Federal Environmental assessments were completed defining a subway expansion to Vaughn Metropolitan Centre.

(b) Governance

In May 2007, Toronto City Council approved the TYSSE Project Delivery Structure, including:

- TTC acting as TYSSE Project Manager with the following responsibilities:
 - Report to the TTC Board on procurement awards, change approvals and status updates;
 - Report to the ETF as below;
 - Provide general project management;
 - Define the Project scope;
 - Recommend delivery options/strategy;
 - Implement the Project;
 - Award contracts and provide contract administration;
 - Prepare and provide updates on Project budgets;
 - Provide updates on status of the Project.
- The establishment of a joint City/York Region "Executive Task Force" (ETF) comprised of three senior staff members (co-chaired by the Toronto City Manager and York Region CAO) from each municipality, to perform oversight to ensure project delivery in accordance with Council directions. The ETF is responsible for:
 - General oversight of the Project;
 - Budget recommendations, management and financial controls;
 - Progress reporting;
 - Approval of the Project delivery strategy.
- In order to assist the ETF, the ETF retained an Independent Auditor. The Independent Auditor was jointly appointed by the City of Toronto's Auditor General, York Region's Manager of Audit Services and the TTC's Chief Auditor. The parties agreed that for this Project, the Independent Auditor would be the TTC Audit Department.

- ETF also retained the services of an Independent Engineer in order to assist the ETF in carrying out its responsibilities.

In June 2008, as part of a report to the TTC Board, the TYSSE governance model (as detailed above)

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2008/Jun_18_2008/Reports/TYSSE_Memorandum_of_Understanding.pdf was adopted and is attached as Appendix D.

As part of the overall governance model, the TTC's procurement and contract administration policies and procedures continue to govern. The project delivery model, project schedule and adjustments, major contract awards and contract changes have been, and continue to be, approved by the TTC and the Board in accordance with TTC policies.

(c) Project Challenges

In October 2012, the TTC Board endorsed a report relating to a change in the date of completion of the TYSSE from the end of 2015 to the end of 2016. This report is critical to the understanding of the continuing issues on the TYSSE project and is appended as Appendix E: a section is provided below. Furthermore, contractor performance, as outlined in this report, has continued to have an effect upon the completion date.

Funding Approvals

The time to obtain funding approvals and start-up for the project took longer than expected (approximately one year from funding announcement). This resulted in an implementation schedule that did not include sufficient float to compensate for unforeseen conditions or contractor delays.

Station Design

The time and effort taken to reach agreement with the stakeholders on the various station designs was significantly longer than originally foreseen. There were a number of concept and design changes that were made to address the requirements of various regulatory stakeholders, which depending on the station, included the TTC, Parc Downsview Park, City of Toronto, York University, GO Transit, Ministry of Transportation Ontario, Region of York and City of Vaughan. This extended the design period. Some workarounds and reductions in contract tendering and award periods mitigated some of these impacts. The impacts to the design schedules varied from three to seven months.

Utilities

The work required to relocate utilities was more complex and more extensive in scope than had been scheduled. This was further compounded by slow response from non-municipal controlled utilities

TYSSE was able to largely work around some of the extended utility work but nevertheless the project suffered a number of delays in relocating utilities such as Toronto Hydro, PowerStream, and various water mains and sewers.

Overall, the impacts were in the range of two to 11 months, although workarounds were found for most of those of longer duration.

Fatal Accident at York University Station Site

The sub-contractor to the general contractor of the Highway 407 Station and the Northern Tunnels, including York University, suffered a tragic fatality at the York University Station site on October 11, 2011.

The Ministry of Labour initially closed all of the sites where this contractor was working, reopening all except the York University Station site within a week. The York University Station site in the immediate locale of the accident was kept closed until the Ministry completed their investigation in February 2012. This was a schedule critical item that impacted the schedule by approximately four months.

Current Status

The project, to date, is approximately 70 per cent complete, with detailed tunnel, station and trackwork completion as set out below in Table 4. Systems installation will begin upon completion of construction.

Table 5 – Station and Trackwork completion

Stations	% Complete
Downsview West/Southern Twin Tunnels	89
Finch West	78
York University	35
Pioneer Village	72
Hwy 407 & Northern Twin Tunnels	82
Vaughan Metropolitan Centre	73
Trackwork	70

Since October 2012 when the TTC board approved the change to the completion schedule date to the end 2016, concerns continued to be raised and attempts made to address further schedule impacts.

Issues Reporting

The TTC Board has been briefed by staff on numerous occasions about the status of the TYSSE and concerns around contractor(s) performance. In addition, the CEO Report is updated monthly that reflect project status for the board and public. The Executive Task Force have met monthly. The “Move Ontario Trust” has also met monthly to consider project funding requests and other issues. A Federal “Management Committee” established under the Federal contribution agreement for the project has met 4 times a year to receive project updates.

A special meeting of the TTC Board was held on December 6, 2013 to advise on issues arising from the performance of contractor(s). Staff were directed to report back on progress and possible resolutions. At its meeting of March 26, 2014, the TTC Board considered a confidential report on this matter, adopting the staff recommendations.

The Executive Task Force were also apprised of issues relating to contractor(s). The ETF requested that project staff continue work to resolve the issues raised and requested the project manager develop concrete strategies for maintaining budget and schedule.

Skilled Trades and Overtime Premiums

Some contractors have cited a lack of skilled trade resources in the GTA as one reason for the difficulty they are having in not maintaining schedule.

While there is a shortage of some skilled trade resources in the GTA affecting progress on many large construction projects in the region, there is also an unwillingness by some contractors and their subs to work premium (overtime) hours on the TYSSE project.

The project team has attempted to negotiate some incentives to work overtime and weekends, but contractors are demanding immediate resolution to larger issues before committing to any schedule acceleration.

Contractor(s) Relationships and Performance

As concerns about schedule slippage and the relationships and performance of some contractors became more pressing, the TTC CEO became involved in direct discussions with some contractors in an attempt to mitigate schedule and cost impacts. These discussions intensified by the middle of 2013 and continue to date.

The CEO of the TTC has met on 27 separate occasions with his contractor counterparts to try and resolve issues around premiums, incentives, and schedule adherence.

Relationships between some contractors' project managers and some TTC project managers have been, admittedly, strained. All parties continue work to resolve these issues, re-assigning staff or moving staff as appropriate, to ensure ongoing, positive working relationships.

Independent Schedule Reviews

In 2014, ongoing concerns that an end of 2016 completion date was not possible continued to grow. The TTC conducted three separate reviews relating to project schedule completion to ascertain possible mitigations to recoup schedule.

Parsons Brinkerhoff

In the summer of 2014, project staff undertook a comprehensive schedule review with the assistance of an independent consultant firm Parsons Brinkerhoff. The review evaluated current schedule progress and related project risks. It recommended a re-baseline of the Project schedule, development of detailed construction schedules for each station in collaboration with each contractor, monthly contractor productivity monitoring and review of systems integration. It concluded that based on the current progress, i.e. no changes to project delivery, project management or contractor incentives, the line would

open in early 2019 with a high degree of confidence, and by mid-2018 with a low degree of confidence.

This analysis and conclusions were presented firstly to the TTC CEO and then to the ETF in July, 2014. These conclusions gave rise to the pursuit of additional work in order to assess viable delivery options.

APTA Peer Review

Subsequently, the TTC CEO requested that the American Public Transit Association (APTA) provide a team of experts from various North American transit agencies to conduct a Peer Review of the project schedule to fully understand options that would allow delivery by the end of 2017. The findings outlined a variety of concerns including anomalies in the correlation of the contractor's and project schedules, delays in resolution of contract changes and needs to increase scheduling staff. Its analysis was presented to the ETF on November 20, 2014 and concluded that a project opening date of the end of 2017 could be achieved if a project "reset" was implemented. The "reset" involved contractor partnering, resolution of outstanding contract changes / claims, 'incentivizing' contractor schedule acceleration and increased project scheduling / controls.

APTA was also asked to look at a phased opening of the line. They concluded that, at best, the TTC could achieve an early opening to York University Station by only two to three months, while delaying the opening of the rest of the line by a minimum of six months, with additional costs in excess of \$12 million.

Bechtel Review

The TTC CEO then retained Bechtel, a large multi-national construction company with significant experience in large project management and delivery, to review the present project status. This included APTA's findings and to provide their view on how the TTC could deliver TYSSE at the earliest schedule completion date with minimum additional costs. Their report was presented to the TTC and ETF in early February 2015. That report concurred with APTA's findings of a "reset", and further added that a change in project management would be required, to deliver an end of 2017 completion date. The report outlined implementation of a new project schedule and contractor incentives, resolve of adversarial contractor relationships, and improvement of processes for cost / contract / claims resolution.

Both APTA and Bechtel agree that the TTC should:

1. Incentivize contractors and obtain agreements for an end of 2017 opening date.
2. Develop a process / timeline to resolve outstanding claims.
3. Establish a collaborative environment to develop a common goal and improve project relationships

(a) Claims Impact

Contractor claims on large projects are not unique to the TTC. They are common in the industry and all big projects must continually work to resolve and settle claims through the life of a project, and beyond.

To date, the TTC has received a significant number of claims from contractors, the values of which will change throughout the life of a contract. The TTC contract allows contractors to submit and adjust claims – up or down – until 60 days after the date of “Contract Substantial Completion” and, therefore, the value of various claims fluctuates throughout the life of the contract before it is set.

Contractors are required to provide a detailed claims analysis to the TTC describing:

- Event, action, inaction by the TTC that caused a claim to arise
- Entitlement under the contract for additional time or cost, or both
- Analysis of the cost or time resulting from TTC action or inaction

The TTC believes it will require until the end of 2015 to review the claims to a reasonable degree and provide an estimate of their expected value. Staff will provide the Board with an updated report at that time, indicating the project’s expected final costs based on this analysis.

The project will undertake this task with the assistance of an external claims consultant.

Justification

The funding partners and the TTC continue to agree: the TYSSE will benefit the region, carrying 30 million riders in its first year and, therefore, have a positive impact on congestion, greenhouse gas emissions and development.

There is also agreement on the need to deliver this project as quickly as possible, for the least amount of additional costs, and with the highest degree of confidence. It is therefore recommended that the TTC board and Toronto City Council approve Option One in this report.

Contact

A. Byford, Chief Executive Officer
Telephone: 416-393-3890; Email: andy.byford@ttc.ca

- Attachments - Appendix A - Confidential Attachment 1 (to follow)
- Appendix B - Estimated Project Management Costs – 2017
- Appendix C - Decision History
- Appendix D - TYSSE Executive Task Force
- Appendix E – October 24, 2012 TTC Board Report
- Appendix F - Parsons Brinckerhoff Schedule Workshop Update/Risk Analysis
- Appendix I - Bechtel Executive Summary

APPENDIX B

Estimated Project Management Costs - 2017

Activity	Millions	Resources
Project Management	\$19.80	106 Staff - Consultant, Spadina Link, TTC
Controls	\$6.60	27 Staff - Consultant, Stantec
Construction Management	\$14.80	39 Staff - Consultant, Morrison Hershfield
Other Consultants	\$0.80	Independent Engineer, Community Outreach, Statutory Photographer
Design	\$7.10	Design Consultant support during construction - Aecom, TSGA, Arup, HMM
Property	\$2.40	Extended leases etc.
Municipalities	\$1.80	CoT and York Region Costs
Permits and Approvals	\$0.45	Extended permits and approvals
Insurance	\$5.80	
Systems - External	\$0.45	Corrosion Engineering, and Fire Ventilation Consultant
Geotechnical	\$1.35	Geotechnical support during construction - Consultant, Golder
Offices	\$4.00	5160 Yonge and 1120 Finch
Close-out	\$5.20	124 Staff - Various Consultants and TTC
Total	\$70.55	

APPENDIX C

Decision History

At its meeting of August 29, 2001, the TTC Board received the RTEP report which planned for an extension of the TTC Spadina Subway.

https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2001/Aug_29_2001/Other/Rapid_Transit_Expans.pdf

At its meeting of April 16, 17 and 18, 2002, City Council endorsed an extension of the Spadina Subway.

<http://www.toronto.ca/legdocs/2002/agendas/council/cc020416/plt4rpt/cl003.pdf>

At its meeting of June 16, 2004, the TTC Board approved the terms of reference for the Spadina Subway Extension Environmental Assessment.

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2004/Jun_16_2004/Other/Spadina_Subway_Exten.jsp

At its meeting of February 1, 2 and 3, 2005, City Council re-affirmed its position that the Spadina Subway Extension was its top priority for subway expansion.

<http://www.toronto.ca/legdocs/2005/minutes/council/cc050201.pdf>

At its meeting of September 25, 26, 27, 2006, Council adopted the recommendations of Policy and Finance Committee Report No 7, Clause 35.

<http://www.toronto.ca/legdocs/2006/agendas/council/cc060925/pof7rpt/cl035.pdf>

At its meeting of May 23, 24, 25, 2007 (EX 8.5), Council directed that "the capital contribution from the City not exceed its share (59.96%) of the one-third funding that would be attributable to the municipal sector and that a request be made to the Provincial and Federal Governments to provide a full two-thirds funding of actual Project capital costs.

<http://www.toronto.ca/legdocs/mmis/2007/ex/reports/2007-04-30-ex08-cr.pdf>

At this meeting, Council also approved a project delivery structure that included TTC as Project Manager, and the principles of an Operating Memorandum of Understanding (MOU) between Toronto, TTC, and York Region.

In this report, Council approved a municipal cost sharing of 59.96 % City of Toronto/ 40.04 % Regional Municipality of York ("York Region"), based on a recognition of municipal boundaries and responsibilities, and of shared system infrastructure, to the benefit of both parties.

This cost sharing arrangement is set out in a Capital Cost Allocation Memorandum of Understanding between the City and York Region.

At its meeting of September 12, 2007 (Report3), the Board received a report outlining the impact of delaying the implementation of the Project.

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2007/Sept_12_2007/Other/Toronto-York_Spadina.pdf

At its meeting of March 26, 2008 (Report 8(c)), the Board approved the Project Delivery Strategy.

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2008/March_26_2008/Other/Toronto_York_Spadina.jsp

At its meeting of June 18, 2008 (Report 8(a)), the Board approved the principles as between the City, York Region and TTC relating to operations and operational costs of the TYSSE Project

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2008/Jun_18_2008/Reports/TYSSE_Memorandum_of_Understanding.pdf

Finally, on June 23, 2008 (EX21.8), Council authorized senior City and TTC staff to "negotiate on behalf of the City, a Building Canada Fund Contribution Agreement relating to the Toronto-York Spadina Subway Extension with the Federal Government of Canada and the Regional Municipality of York ("York Region")".

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2008.EX21.8>

This agreement was signed in September 2008, by the then Mayor of the City of Toronto, and Chair of York Region, and included a project completion date of March 31, 2016,

At its meeting of January 21, 2009 (Supplementary Agenda, Report #13) the Board received a report outlining the use of a design-bid-build as the approved Project Delivery Strategy for TYSSE.

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2009/Jan_21_2009/Supplementary_Reports/Toronto-York_Spadina.pdf

At its meeting of October 24, 2012 (Supplementary Agenda, Report #13), the Board approved the extension of the TYSSE Project Completion date from December 2015 to the fall of 2016.

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2012/October_24/Supplementary_Reports/TYSSE_Schedule_Statu.pdf

At its special meeting of December 6, 2013, the Board received a confidential update on the TYSSE Project.

http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2013/December_6/Reports/TYSSE-Contract_A31-1.pdf

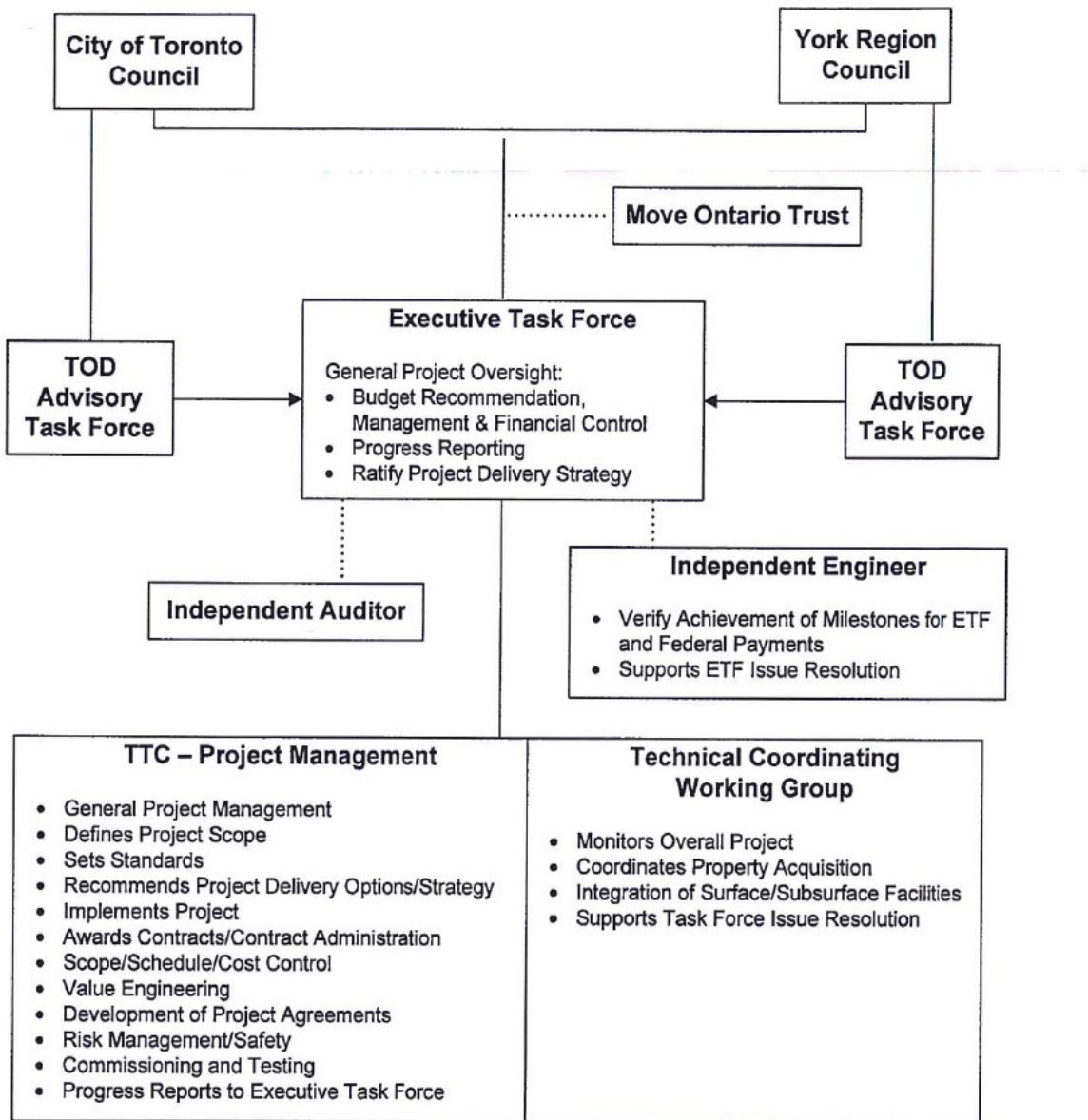
At its meeting of March 26, 2014 (Report 1(a) with Confidential Attachment), the Board received confidential information relating to the TYSSE Project

[http://www.ttc.ca/About the TTC/Commission reports and information/Commission meetings/2014/March_26/Reports/TYSSE_Pioneer_Village_Steeles_West_Station_Contract_A31_1.pdf](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2014/March_26/Reports/TYSSE_Pioneer_Village_Steeles_West_Station_Contract_A31_1.pdf)

At its meeting of January 21, 2015, the Board received a report outlining large litigation files relating to the TTC.

[http://www.ttc.ca/About the TTC/Commission reports and information/Commission meetings/2015/January_21/Reports/Large_Litigation_Matters.pdf](http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2015/January_21/Reports/Large_Litigation_Matters.pdf)

TORONTO-YORK SPADINA SUBWAY EXTENSION EXECUTIVE TASK FORCE



Note: As part of the overall governance model, the TTC’s procurement and contract administration policies and procedures continue to govern. The Project delivery model, Project Schedule and adjustments, major contract awards and contract changes have been approved by the TTC and the Board in accordance with TTC policies.

TORONTO TRANSIT COMMISSION REPORT NO.

APPENDIX E

MEETING DATE: October 24, 2012

SUBJECT: TORONTO-YORK SPADINA SUBWAY EXTENSION
SCHEDULE STATUS UPDATE

ACTION ITEM

RECOMMENDATION

It is recommended that the Commission:

1. Receive this report noting that:
 - a) The Toronto-York Spadina Subway (TYSSE) project worked to a compressed schedule.
 - b) The TYSSE project faced schedule impacts that are not unusual for a project of this size and complexity.
 - c) The scheduled completion date is adjusted to the fall of 2016.
2. Forward this report for information to the TYSSE Executive Task Force, the Move Ontario Trust and the Management Committee, established under the Building Canada Fund Contribution Agreement for the Toronto-York Spadina Subway Extension.

FUNDING

There are no funding implications arising from this report.

BACKGROUND

The TTC is undertaking the design and construction of an underground subway line from the existing Downsview Station on the Yonge-University-Spadina line located in the City of Toronto, to the proposed Vaughan Metropolitan Centre located in the City of Vaughan, Region of York. The 8.6 km extension includes six new stations and will include both tunnelled and cut and cover sections.

The TYSSE project is being funded by the Government of Canada, the Province of Ontario, the City of Toronto and the Regional Municipality of York. The TTC is managing the design and construction of the TYSSE project and will own and operate the subway extension.

What follows is the general status and chronology of the project, including the status of station designs, tunnelling, contract awards and a series of events that staff have worked to mitigate, but has caused the scheduled completion date to be delayed several months from December 2015 to the fall of 2016.

DISCUSSION

General Status

At the time of writing, the general status of the project was as follows:

Approved Budget (costs at year of occurrence)	\$2,634 M			
Contributions				
<ul style="list-style-type: none"> • Provincial • Federal • Municipal* <ul style="list-style-type: none"> ➤ City of Toronto (59.96%) ➤ Region of York (40.04%) 		\$1,059 M		
		697 M		
		526 M		
		352 M		
	Total	\$2,634 M		
*City/Region Responsible for Cost Overruns				
Expended to Date (September 30, 2012)			\$914 M	
Commitments to Date				\$1,920 M
Future Commitments				714 M
			Total	\$2,634 M

Design

- Approximately 98% of facilities (stations, tunnels, parking lots, bus terminals, etc.) have been designed.
- Approximately 60% of systems (track, traction power, signals, communications, etc.) have been designed.

Construction

- Approximately 90% of facilities contracts have been awarded and are in various stages of construction.
- Approximately 30% of systems contract have been awarded and are in various stages of construction or manufacture.

On the major contracts, the status is as follows:

- a) Sheppard West Station and the Southern Tunnels
 - Awarded November 18, 2010.
 - Work is progressing and is approximately 50% complete.
- b) Finch West Station
 - Awarded June 2, 2011.
 - Work is progressing and is approximately 25% complete.
- c) York University Station
 - Awarded July 25, 2012.
 - Work is scheduled to commence in January 2013.
- d) Steeles West Station
 - Awarded September 2, 2011.
 - Work is progressing and is approximately 15% complete.
- e) Highway 407 Station and the Northern Tunnels
 - Awarded January 19, 2011.
 - Work is progressing and is approximately 25% complete.
- f) Vaughan Metropolitan Centre Station
 - Awarded June 21, 2011.
 - Work is progressing and is approximately 25% complete.

Professional Services

All major engineering and related services contracts have been awarded for some time and are now in various stages of completion.

<u>Contract</u>	<u>Completion</u>
Project Management	60%
Construction Management	45%
Project Controls	55%
Station and Tunnel Design	95%
Geotechnical and Testing Services	70%
Various Speciality Services	70%

Some of the above contracts and other work had schedule impacts which are covered further in the Schedule Update that follows.

SCHEDULE UPDATE

Background

In order to understand the current schedule status it is important that the background of the project as a whole and the development of the current schedule be explained.

The Toronto-York Spadina Subway Extension evolved from the TTC's 2000 Rapid Transit Expansion Plan (RTEP) and other plans that foresaw the extension of the Yonge-University-Spadina Subway from its current terminus at Downsview Station northward. Several plans were considered, including:

- termination at York University
- termination at Steeles Avenue West
- continuation eastward from Steeles Avenue West to connect to the Yonge line station
- continuation at a station location in Vaughan north of Steeles Avenue West

In 2003 the TTC and the City of Toronto began initial broad based consideration of the extension. By 2005, the City and TTC were prepared to commit to an extension to Steeles West and began work on an Environmental Assessment.

The following is a chronology of events beginning at the time of the preparation of the Environmental Assessment for an extension initially from Downsview Station to Steeles Avenue West.

<u>Event</u>	<u>Date</u>
Preliminary estimates.	December 2005
Environmental Assessment filed.	February 2006
Provincial funding announced. Announcement included 2.4 km additional extension to Vaughan.	March 2006
Preliminary schedule indicated completion in 7.8 years from start of design. (Refer to Attachment A)	March – April 2007
Federal funding announced.	March 2007
Environmental Assessments released (Approved in October 2006 but not released until March 2007).	March 2007

<u>Event</u>	<u>Date</u>
Verbal and written requests to City, Region, Province to consider funding for staffing, organizing project, cost avoidance work (project start-up).	December 2006 – March 2007
Formal request to Move Ontario Trust to fund staffing, organizing, start-up project. <ul style="list-style-type: none"> • schedule completion was July 2015 • no funding confirmed – start-up deferred • Contribution Agreement formalizing funding from the Federal Government not in place 	July 2007
Organization of the Toronto-York Executive Task Force (ETF) to monitor progress and oversee scope and financial controls.	June – October 2007
Regular meetings of the ETF commenced. Funding for project start-up requested – referred to Move Ontario Trust.	October 2007
No organization, funding, offices, etc., in place.	March 2007 – April 2008
Ongoing work by City, Region, Provincial and Federal Governments to finalize Building Canada Fund Contribution Agreement.	March 2007 – September 2008
Provincial/Municipal approval to partially staff, organize project (partial start-up).	April 2008
Contribution Agreement concluded and project funding confirmed (full start-up).	September 2008
Project fully started.	September 2008
First design consultants retained.	October 2008
Design started.	November 2008
Schedule compressed to complete late 2015 (7.2 years from start of design) instead of October 2016 (7.8 years from start of design). Refer to Attachment B	
Utility relocation, early works.	2009 – 2011
Major (\$100 M+) contract awards.	November 2010 to July 2012

Schedule Benchmarking

1. Sheppard Subway/TYSSE

The Sheppard Subway was one of the projects encompassed by the Rapid Transit Expansion Program (RTEP) which began in the early 1990's. In the mid-1990's issues of funding and continuation of this and other RTEP projects caused a suspension of work on the Sheppard Subway project until August 1996. Accordingly, a meaningful comparison between TYSSE and Sheppard can only be made for the period following the start of tunnelling during which period the scope and nature of the work was quite similar to that of TYSSE.

Sheppard Subway

- 6.4 km, 5 stations
- Schedule to construct/commission from commencement of tunnelling February 1997 5.7 years

TYSSE

- 8.6 km, 6 stations
- Schedule to construct/commission from commencement of tunnelling February 2011 4.9 years

2. Other Transit Projects

It is difficult to compare the schedule of TYSSE with other transit projects worldwide due to prevailing local approaches and site circumstances.

However, TTC and TYSSE directly investigated projects in Vancouver, Seattle, Denver, Madrid and Barcelona and canvassed for information worldwide. It found similarities and comparable schedules in various jurisdictions in North America with similar processes for governance, government approvals, safety requirements, conclusion of agreements between funding partners, environmental assessments, funding approvals, property acquisitions, and utility relocations.

The TTC has conducted a high level review of the implementation time for major subway projects (12) worldwide. The review concluded that there is no typical/standard schedule. However, on average, subway implementation took about nine years from the start of design to opening date. One significant exception is the Madrid metro. It is considered as having achieved the fastest implementation time (approximately five years). TTC staff took a more detailed analysis of the characteristics of the Madrid metro that expedited the implementation time.

The following major issues were identified in relation to Madrid:

- a) Continuous Expansion Program
 - continuity of organization, procedures, standards
 - less time required to establish project organization
- b) Approvals/Permits
 - no formal environmental assessment or public participation
 - no municipal permits required (building permits, site plan, etc.)
- c) Property Acquisition
 - government owns property below 10 metres
 - quick property expropriation process
- d) Decision Making
 - project director reports to the Minister for major decisions
 - political decisions were made within 24 hours
- e) Not required to meet more rigorous North American fire, life and safety codes and standards.

From the information available, the schedule being adopted for TYSSE is competitive with schedules of other projects carried out under similar circumstances.

Major Schedule Impacts

The following is an itemized listing of impacts to the project to date:

1. Funding Approvals

The chronology outlined above establishes that the schedule adopted was aggressive. The time to obtain funding approvals and start-up for the project took longer than expected (approximately one year from funding announcement). This resulted in an implementation schedule that did not include sufficient float to compensate for unforeseen conditions or contractor delays.

2. Station Design

The time and effort taken to reach agreement with the stakeholders on the various station designs took significantly longer than originally foreseen. There were a number of concept and design changes that were made to address the requirements of various regulatory stakeholders, which depending on the station, included the TTC, Parc Downsview Park, City of Toronto, York University, GO Transit, Ministry of Transportation Ontario, Region of York and City of Vaughan. This extended the design

period. Some workarounds and reductions in contract tendering and award periods mitigated some of these impacts. The impacts to the design schedules varied from three to seven months.

3. Utilities

The work required to relocate utilities was more complex and more extensive in scope than had been scheduled. This was further compounded by slow response by non-municipal controlled utilities.

TYSSE was able to largely work around some of the extended utility work but nevertheless the project suffered a number of delays in relocating utilities such as Toronto Hydro, PowerStream, and various water mains and sewers.

Overall the impacts were in the range of two to 11 months, although workarounds were found for most of those of longer duration.

4. Fatal Accident at York University Station Site

The sub-contractor to the general contractor of the Highway 407 Station and the Northern Tunnels, including York University, suffered a tragic fatality at the York University Station site on October 11, 2011.

The Ministry of Labour initially closed all of the sites where this contractor was working, reopening all except the York University Station site within a week. The York University Station site in the immediate locale of the accident was kept closed until the Ministry completed their investigation in February 2012. This was a schedule critical item that impacted the schedule by approximately four months.

5. Contractor Performance

The schedule progress by some contractors was slow during some stages of the work following award, in particular:

a) Highway 407 Station and the Northern Tunnels

The contractor struggled to progress work from the beginning of the work and fell significantly behind schedule at the five major sites under its control. In particular, start-up of tunnelling and work on the Highway 407 Station fell far behind schedule. This contractor also suffered from a poor safety record, in particular the spin-off consequences from the fatality of October 11, 2011 which caused the shut down of sites and slow down in work.

Intense efforts by TYSSE staff and the contractor to improve showed evidence of improvement by early 2012 and continue to this date.

At this time, this contractor is performing well including safety management at all sites, in particular in its tunnelling operation which is now advancing at a record pace.

Notwithstanding its current progress, this contractor will not be able to recover much of the schedule loss in 2011 that saw it falling approximately six to eight months behind schedule for the various sites. TYSSE staff continue to work closely with this contractor to maximize progress.

b) Vaughan Metropolitan Centre Station

This contract was started up and initially progressed aggressively until late 2011 at which time site issues, co-ordination and other circumstances some beyond the ability of the contractor to control caused slow progress.

This contractor has, over the last few months, resolved site issues and made improvements to site management, co-ordination and resource deployment. It is now advancing well, has recovered some lost schedule but remains four to five months behind schedule due to earlier problems.

c) Sheppard West Station and the Southern Tunnels

Work on this contract started well and has continued well for the station component. However, tunnelling has not proceeded well and continues to fall further behind schedule. Efforts by TYSSE to have improved performance on the tunnelling have intensified, but at this time tunnelling progress remains slow.

Schedule Management

The project employs full-time professional schedulers who undertake a comprehensive review and update of the complete master schedule every month.

On a monthly basis, the construction site managers forward to the scheduling section an update of schedule information for each contract to analyse and update the master schedule. The updated schedule is then reviewed to determine the critical at-risk activities and TYSSE management and supervisory staff deploy and act on plans to address the problem.

The master schedule has 1,560 activities scheduled at this time, of which 725 are active. Not all activities are schedule critical. The master schedule is then “rolled-up” into versions with a lesser level of detail, the final one being shown as Attachment C. This reflects the currently expected duration of the project.

At this time, given that the project has approximately four more years to complete and although cognizant that it will be faced with issues yet unknown, TYSSE believe that completion by the fall of 2016 is achievable.

Schedule Risk Assessment

By early 2012 a review of the schedule impacts as noted strongly suggested that completing the project by December 2015 was unlikely. A number of workarounds, alternate work methods and acceleration achieved limited schedule recovery but were not sufficient to maintain the original schedule.

In mid-2012 schedule risk assessments were facilitated by independent transit scheduling experts. The conclusion was that maintaining the original schedule was no longer viable even by extensive acceleration measures and corresponding additional expenditures.

The risk analysis has been followed up by intensive schedule recovery workshops held on a weekly basis. These workshops explored potential initiatives to recover schedule that allow TYSSE staff to initiate action to achieve schedule recovery.

Many initiatives have been adopted and others are in discussion with the contractors. Some, such as major acceleration have some risk of failure and will require the outlay of significant funds as contract changes beyond the contracted amount and will require extensive analysis, scrutiny and successful negotiations with contractors. Efforts in this regard are ongoing, but the level of success in negotiating major accelerations with contractors is unknown at this time.

Initiatives coming from schedule analysis, observed performance and better contractual situations and risk analysis are expected to achieve some schedule improvements.

CONCLUSION

1. The TYSSE project faced a number of major schedule impacts that, while normal for a project of this magnitude and complexity, could not be absorbed in the compressed schedule already adopted.
2. The schedule performance, given the factors affecting the schedule and comparison with similar projects remains favourable.

3. There remains significant risk to the schedule, that is beyond the control of staff, including:
 - force majeure (circumstances beyond anyone's control)
 - labour disputes
 - receiverships
 - repeat poor contractor performance
 - contractor default

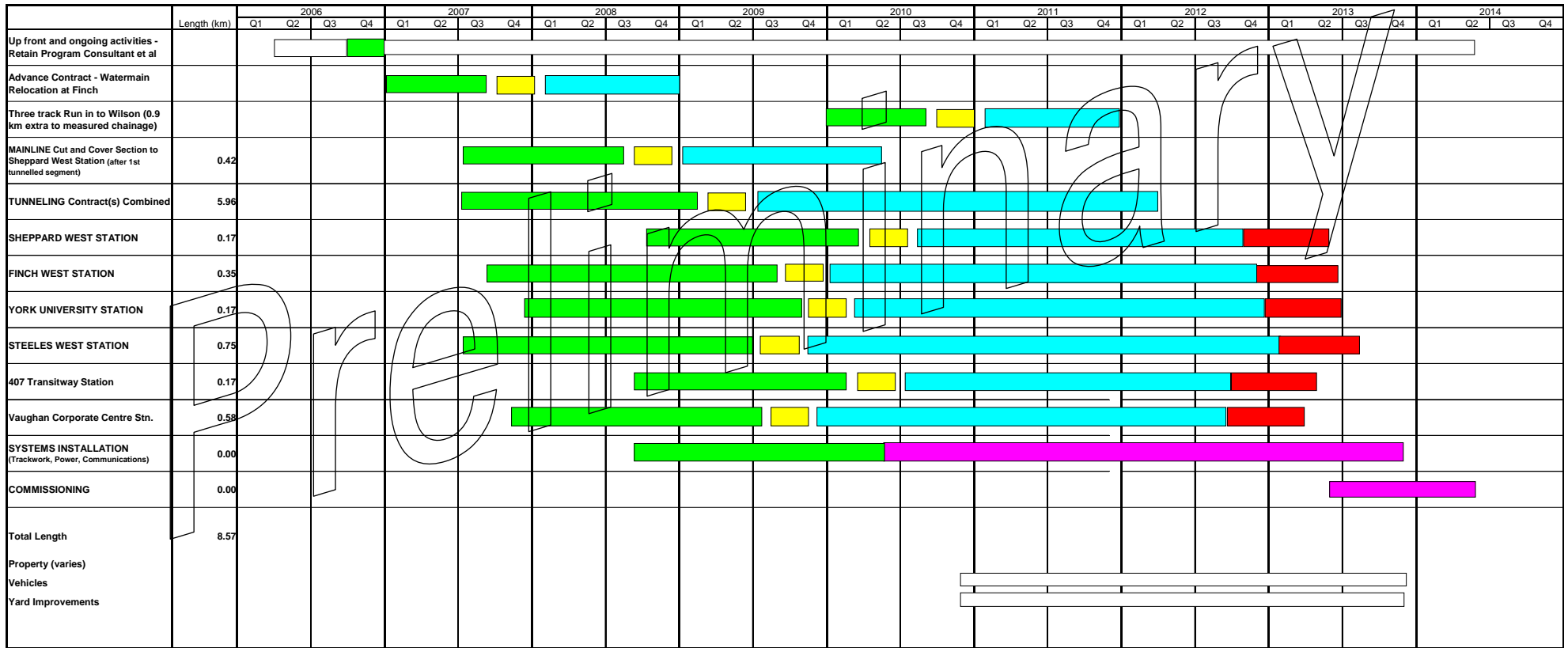
4. Given all factors and analysis done by TYSSE and efforts to improve the schedule, opening by the fall of 2016 is likely. This date has been provided to the Executive Task Force and is a reasonable completion date.

October 10, 2012
70-2-1
03-04-000080910

Attachment: Attachment A – Schedule 2006-2008
Attachment B – Schedule 2008-2012
Attachment C – Schedule 2012-2016

Attachment A Schedule 2006 – 2008

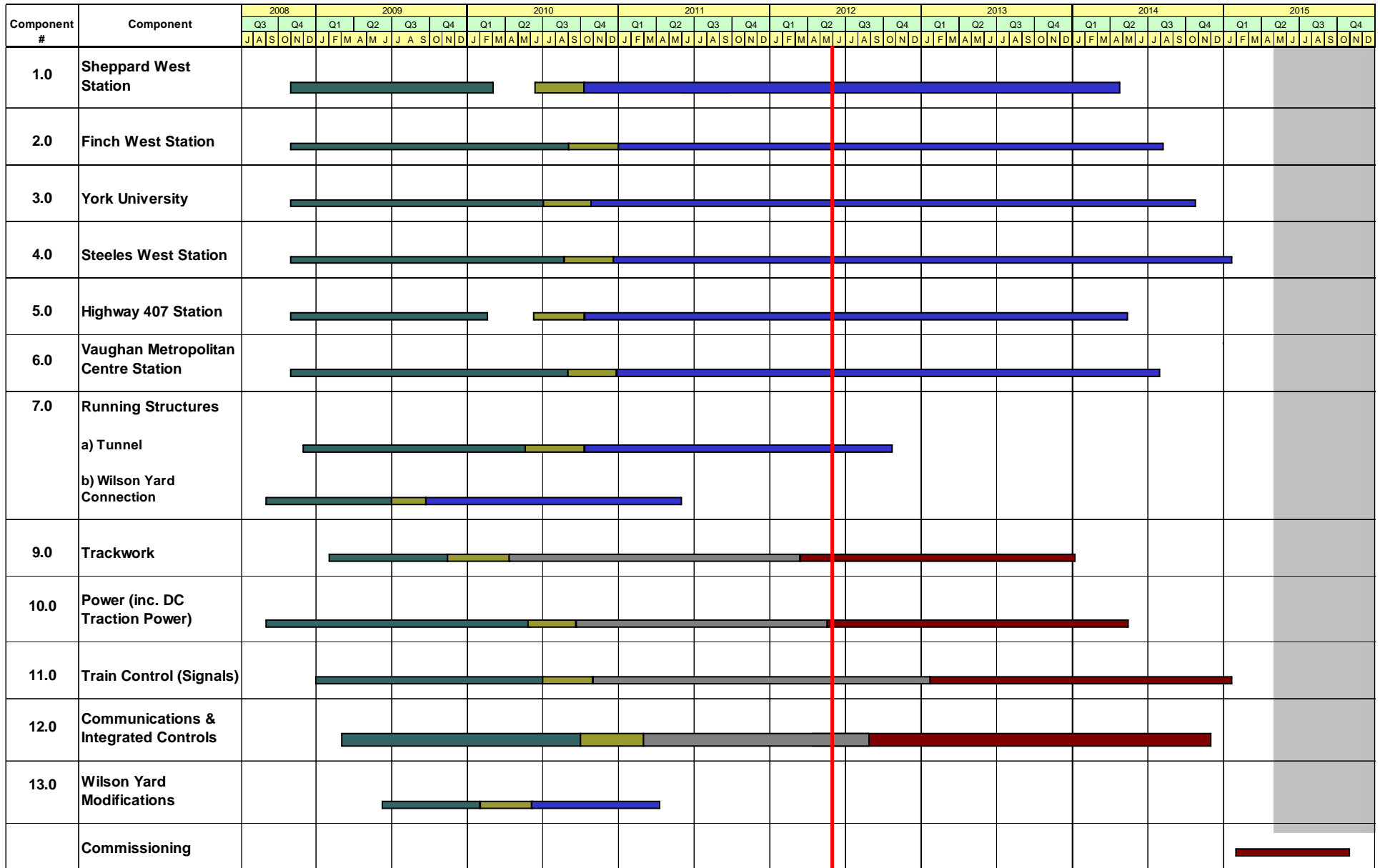
TORONTO TRANSIT COMMISSION - SUBWAY EXPANSION PROGRAM SPADINA SUBWAY EXTENSION : DOWNSVIEW TO VAUGHAN CENTRE - Main Construction Contracts (With York Region Section Included)



DESIGN
 TENDER & AWARD
 CONSTRUCTION
 FINISHING
 SYSTEMS INSTALLATION

Attachment B Schedule 2008 – 2012

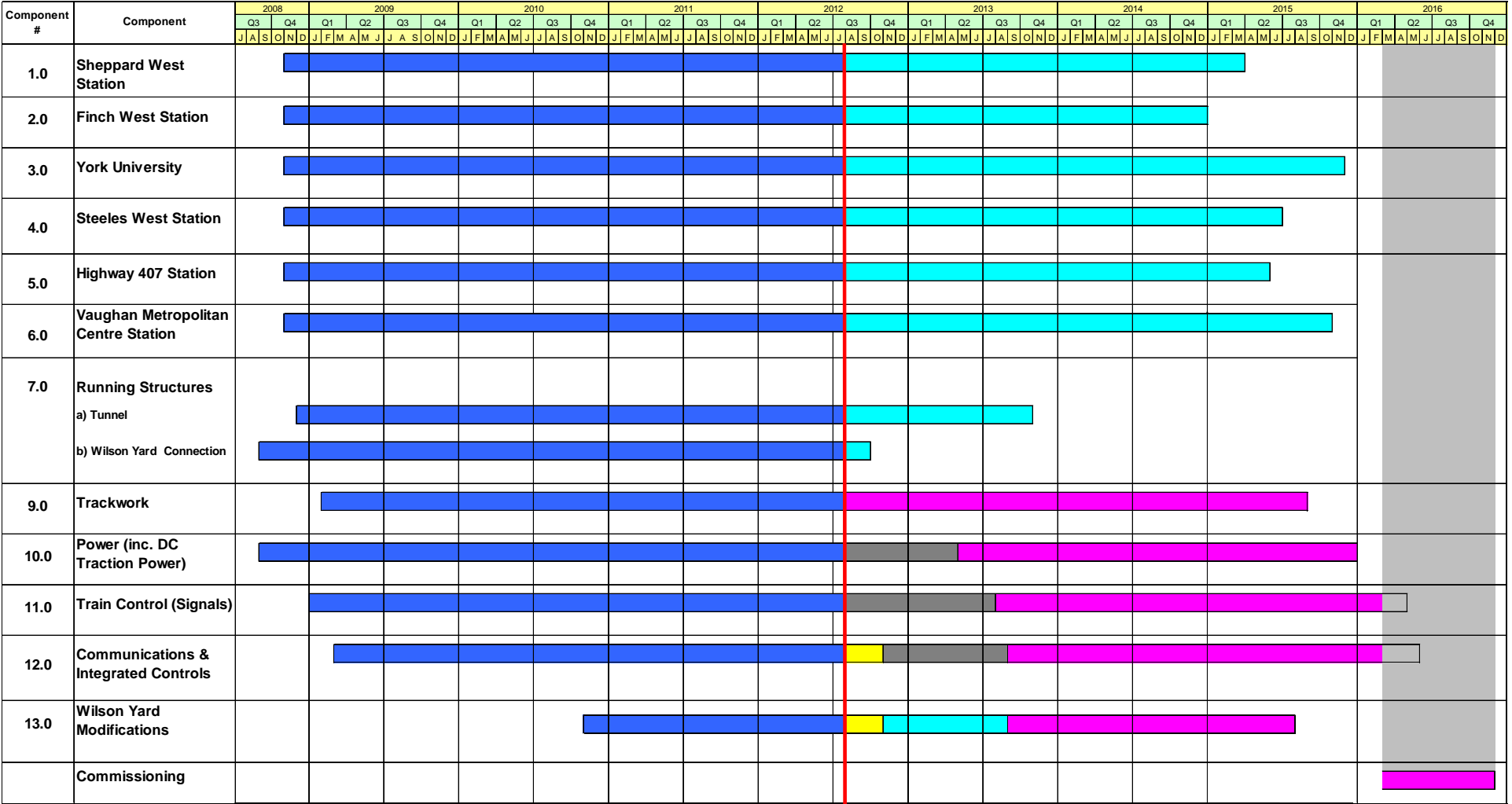
Toronto-York Spadina Subway Extension Master Schedule Summary



Master Schedule Baseline
 DESIGN
 TENDER & AWARD
 Procurement/Detail Design/Manufacturing
 Construction
 SYSTEMS INSTALLATION

**Attachment C
Schedule 2012 - 2016**

**Toronto-York Spadina Subway Extension
Master Schedule Summary**



Current
 Actual
 DESIGN
 TENDER & AWARD
 CONSTRUCTION
 PROCUREMENT / DETAIL DESIGN / MANUFACTURING
 SYSTEMS INSTALLATION



Toronto-York Spadina Subway Extension

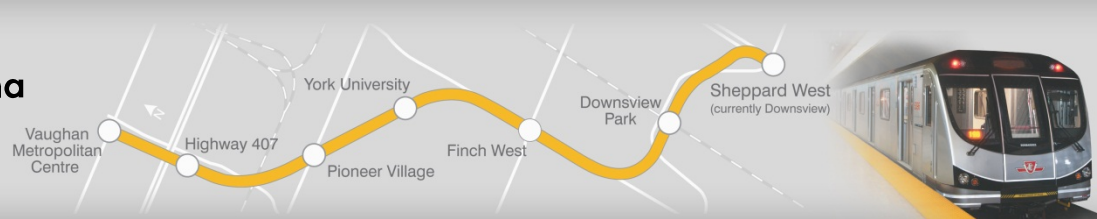


APPENDIX F

Schedule Workshop Update / Risk Analysis

Executive Task Force Meeting July 28, 2014

Peter J. Allibone
Vice President, Transit & Rail
Parsons Brinckerhoff



TYSSE Schedule Issue Statement

- YYSSE construction is in transition from tunnels to stations
- Different contractor for each station:
 - Downsview Park – AECOM / McNally
 - Finch West – Bonfield
 - York University – Ellis Don
 - Steeles West – Walsh
 - Highway 407 – OHL / FCC
 - Vaughan Metropolitan Centre – Carillion
- Slow start by most station contractors
- Burn rate is good indicator of progress and 5 of 6 stations are behind spending curve



Consequences of Delayed Contract Completion

- Completion of certain station construction elements key to starting systems installation:
 - Trainway
 - Switchgear and switchboard rooms
 - Signals and communication equipment rooms
 - Systems ducts and raceways
- Installation of systems required for integrated testing
- Systems installation and testing may introduce risk of further delay
- Late completion of stations and/or systems means:
 - Delayed revenue service opening
 - Additional claims by contractors
 - Increased cost of program management



Goals of Schedule Recovery Process

- Define the magnitude of station construction problem
- Seek realistic basis for developing recovery plan
- What is likely revenue opening date?



Recovery Process Step 1 – Schedule Workshop

- Held at TTC offices, June 3 and 4
- Attended by:
 - TYSSE program management staff
 - TYSSE Construction Site Managers
 - TYSSE systems design team
 - ECE risk management team
 - Independent Engineer
 - York Region
 - City of Toronto
 - Ron Birkelbach, Parsons Brinckerhoff Director Systems, NE
- Facilitated by:
 - Peter Allibone, Parsons Brinckerhoff



Recovery Process Step 2 – Develop Baseline Program Schedule

- Develop new P6 Baseline Program Schedule incorporating updated station construction and systems installation durations
- Incorporate Construction Site Managers' input on key systems handover and completion dates
- Synchronize with Time Chainage Schedule
- Preliminary Baseline Program Schedule issued June 16



Recovery Process Step 3 – Revise Baseline Program Schedule

- Conduct schedule review and sanity check by Construction Site Managers
- Review schedule logic
- Update after receiving June contractor invoices
- Revised Baseline Program Schedule issued July 11, 2014
- Shows revenue service opening May 2018
- This represents a deterministic opening date subject to:
 - Contractors maintain June 2014 monthly rates of progress
 - No prolonged labour disputes
 - No prolonged MOL work stoppage
 - No contractor receivership / abandonment



Recovery Process Step 4 – Risk Management

- Conducted by ECE Risk Management Section
- Risk Management is a
 - Systematic process for identifying and managing risks
 - Proactive, predictive and preventative approach
- Risk is an uncertain event that, if it occurs, has a positive or negative effect on at least one project objective



Risk Register

- Populate Risk Register with risks identified during Schedule Workshop
- Review Baseline Program Schedule to understand critical path and key activities
- Risk Workshop on July 14- 15/14 facilitated by ECE Risk Management team attended by:
 - TYSSE program management staff
 - TYSSE Construction Site Managers
 - TYSSE systems design team
 - Independent Engineer
- Approximately 60 risks identified
- Review schedule key activities, dates, durations and dependencies with the risk owners to understand impacts on project completion



Risk Register Sample

IDENTIFICATION					(6) INITIAL ASSESSMENT				MANAGEMENT AND MITIGATION			
(1) Risk I.D.	(2) Date Risk Identified	(3) Threat (T) / Opportunity (O)	(4) Risk Description	(5) Effect	Probability	Cost	Time	H&S, E, PD, QP	Risk Score	(7) Risk Response Action Items	(8) Risk Owner / Risk Action Owner	(9) Action Due Date (s)
7	3-Jun-14	O	Advance the completion of the SWS signals room to mid-Oct 2014.	Advance the start of the signals contractor.	4		4		16	1. Work with the contractor to prioritize and resequence the work to advance the completion of this room.	G. Kubica	1. 31-Jul-14
34	15-Jul-14	T	Delay in completion of the South Wye (DS-5).	- Delay to special track installation. - Impact to Finch W Station. - Delay Contract A75-24 - cables and equipment installation.	4		3		12	1. Workaround with Bondfield to give unimpeded access to OHL/FCC for 3 weeks to complete backfilling. 2. TYSSE Construction team to review in detail the schedule re-sequencing proposal.	G. Panagopoulos / T. O'Donnell / T. Zander	1-2. 31-Jul-14
42	15-Jul-14	O	Advance completion of DS-10 to the end of Oct 2014.	Advance track installation contractor access.	3		3		9	1. Contractor to continue working during the weekends.	D. Jevremovic	1. 15-Jul-14 to 31-Oct-14

Risk Identification

Qualitative Analysis

Risk Response

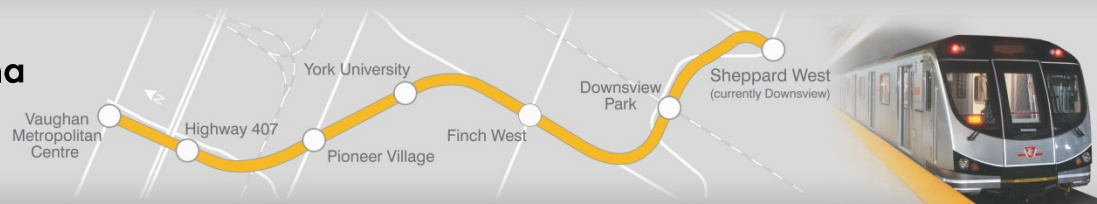


Risk Scale

- The scale is used to provide a consistent approach for evaluating the probability that a risk will occur and the impact on the project objectives.

Large Projects (> \$ 25 M)

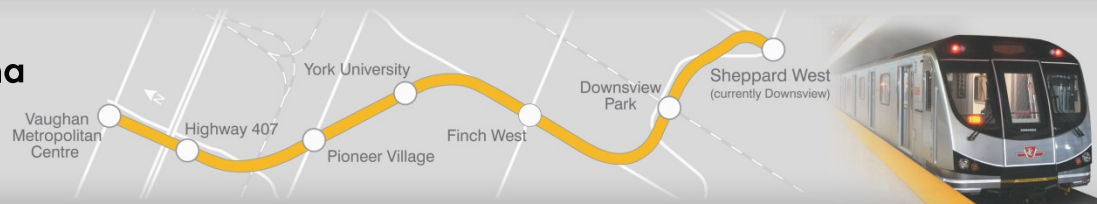
Rating	Very Low (1)	Low (2)	Medium (3)	High (4)	Significant (5)
Probability	< 10%	10% - 35%	36% - 65%	66% - 90%	> 90%
Cost Impact	< \$250K	\$250K - \$500K	\$500K - \$2M	\$2M - \$5 M	>\$5 M
Schedule Impact	< 1 week	1 - 4 weeks	4 - 12 weeks	12 - 24 weeks	>24 weeks
Health & Safety (H&S)	Medical attention/no lost time injury	Medical attention/lost time minor injury	Critical injury/multiple lost time injuries	Critical injury/permanent long term disabilities	Fatalities
Environment (E)	Insignificant/little impact on local, regional or global scale	Impacts the environment (directly or is a contributing factor) on a small or local scale	Impacts the environment (directly or is a contributing factor) on a medium scale (regional or global)	Impacts the environment (directly or is a contributing factor) on a large or global scale	Catastrophic/Large-scale detrimental effect on the environment
Public Disruption (PD)	Insignificant/little impact on traffic, business, services, etc.	Minor impact on traffic, business, services, etc.	Multiple complaints. Moderate impact on traffic, business, services, etc.	Disruption to traffic, business, etc.	Extended disruption (s) to traffic, business, services, etc.
Quality of Delivered Product (QP)	Insignificant/little effect on non-critical items	Minor effect on non-critical items	Moderate effect on critical items	Serious effect on critical items	Major quality issues



Risk “Heat Map”

- The risk ranking is determined by the risk score (Probability x Impact) to identify the critical risks.

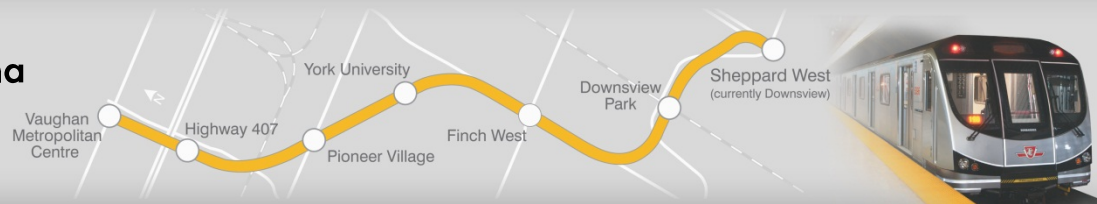
		Impact Rating				
		1	2	3	4	5
Probability Rating	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5



Risk Input Sample

- Baseline Program Schedule dates, contractor dates, and past and current contractor performance were considered in assigning probability and impact.

ID	Threat/ Opportunity	Contractor	Risk description	Probability of delay occurring	Potential impact	Risk Score
1	T	Walsh	Delay in completion of the Steeles West Station trainway (including king piles removal) impacting track installation contractor.	40%	> 24 wks	15
2	T	OHL/FCC	Delay in completion of the South Wye (DS-5) impacting track installation contractor.	75%	4-12 wks	12
3	T	EllisDon	Delay in completion of the York University Station trainway impacting track installation contractor.	50%	> 24 wks	15
4	T	Bondfield	Delay in completion of the Finch West Traction Power Substation completion.	5%	12-24 wks	4
5	O	Carillion	Advance completion of the Drop Shaft #10 at VMC Station.	50%	4-12 wks	9
6	T	Aecon	Delay in completion of the Sheppard West Station wall 1262 repair.	5%	< 1 wk	1



Quantitative Risk Analysis

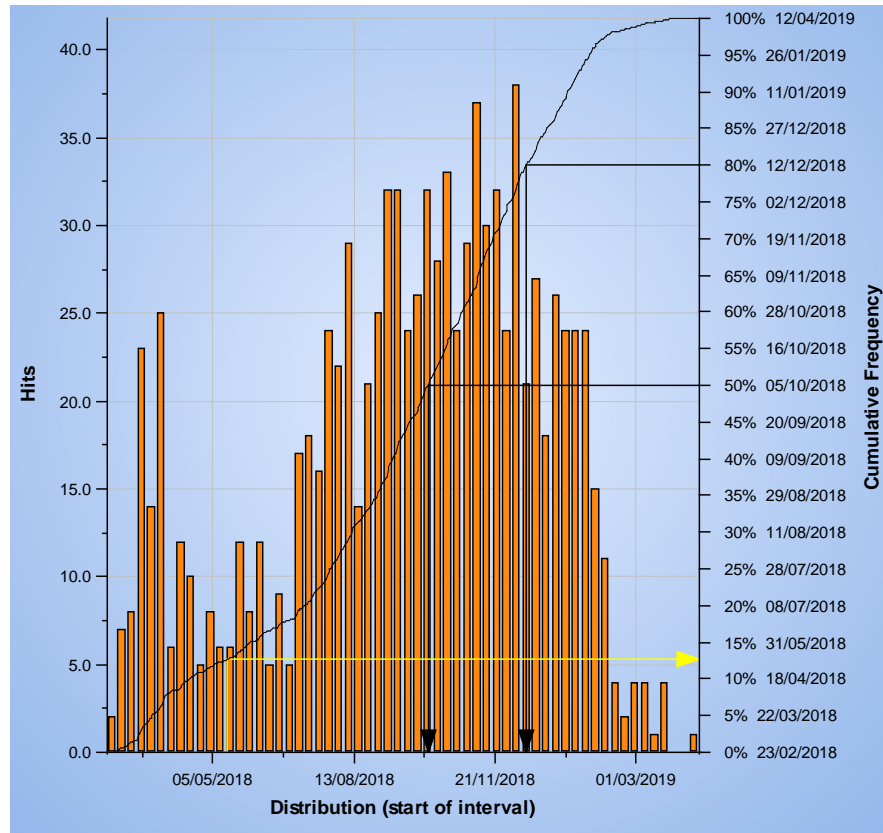
- Quantitative Risk Analysis (Monte Carlo simulation) is a process to numerically analyse probability and impact of each risk and analyze the combined effect on the program schedule.
- Input
 - Baseline Program Schedule
 - Duration uncertainties (Optimistic/ Most Likely/ Pessimistic)
 - Risk probabilities and impacts
- Output
 - Risk Distribution Graph with confidence level of achieving the deterministic revenue service date and other selected highlighters
 - Tornado Graph



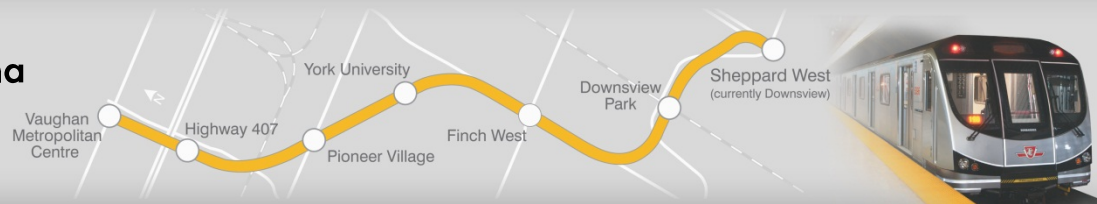
Toronto-York Spadina Subway Extension



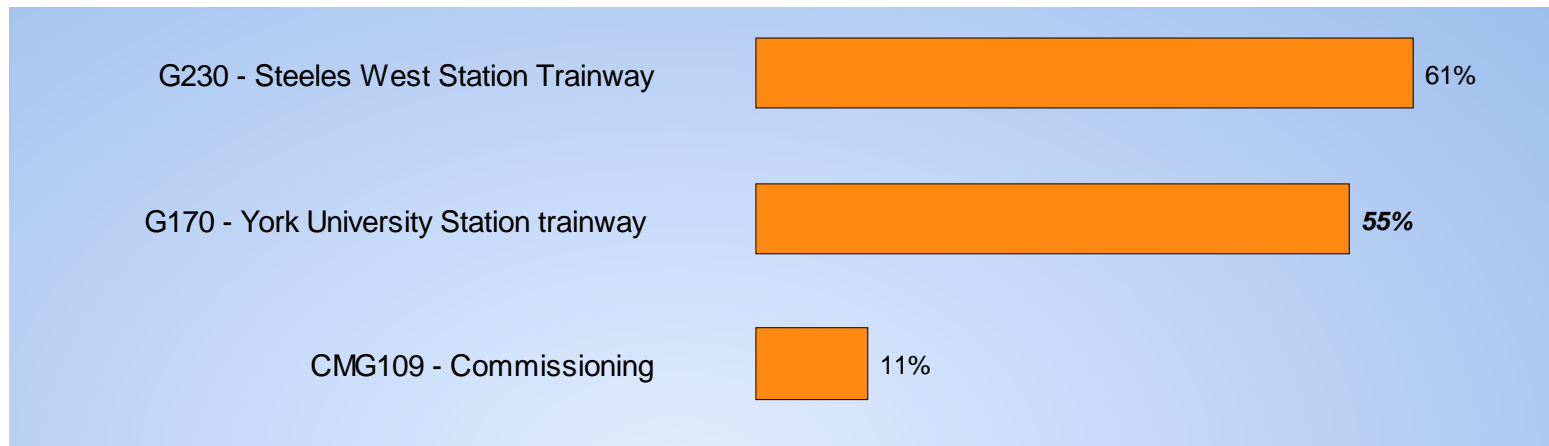
Risk Distribution Graph



Confidence Level	Projected Revenue Service Date
13%	14-May-18
50%	5-Oct-18
90%	11-Jan-19



Tornado Graph – Duration Sensitivity

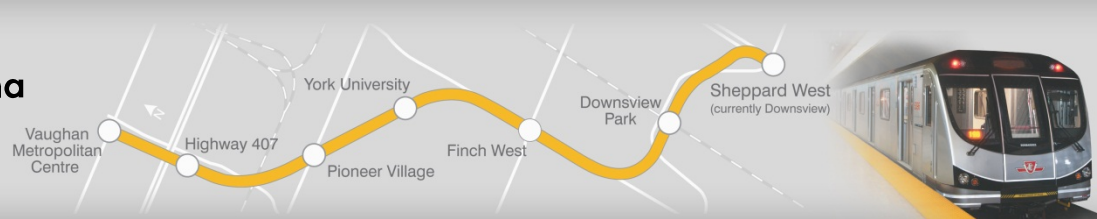


- Duration sensitivity measures correlation between task duration and project duration
- The task with highest duration sensitivity is the task most likely to increase project duration



Commentary on Risk Analysis

- Revenue Service opening 90% probability - January 2019
- Program project management cost increase - \$75 M - \$100 M
- Completion / Probability Curve shows 4 months between 50% and 90% probabilities
- Steep Completion / Probability curve represents overwhelming impact of two risks on or near Critical Path:
 - Steeles West Trainway for systems installation
 - York University Trainway for systems installation
- Other station risks are off Critical Path and absorbed by float
- Target mitigation of availability of Steeles West and York University Trainways to advance revenue service opening



Options for staged opening

- Is there significant benefit to staged opening?
- Three options considered;
 - Service to VMC bypassing Steeles West
 - Degraded service Finch West to York University
 - Service to York University with turnback at Steeles West



Service to VMC bypassing Steeles West

- Open line before Steeles West Station is complete
- Revenue opening 2 months early – November 2018
- Steeles West opening delayed 4 months – May 2019
- Safety sign-off may be an issue
- Estimated additional cost = \$17 M - \$25 M
 - Extended Project Management - \$12 - \$15 M
 - Estimated additional systems cost - \$5 M - \$10 M
- Requires further study to verify dates and costs



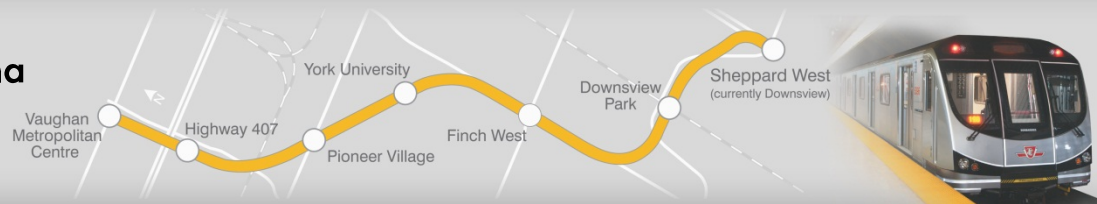
Degraded Service Finch West to York University

- Operate every third train to York University
- Degraded service opens 9 months early – April 2018
- Subway ventilation required at Steeles West Station
- Increased risk of failure or suspending service without back-up power from Steeles West Station
- Safety certification may be an issue
- Extends overall project completion 6 months – July 2019
- Estimated additional cost = \$28 M to \$40 M
 - Extended Project Management - \$18 M - \$20 M
 - \$5 M - \$10 M additional and temporary systems
 - \$5 M - \$10 M additional commissioning
- Requires further study to verify dates and costs



Service to York University with turnback at Steeles

- Requires completion of York University Station
- Service opening 9 months early – April 2018
- Requires completion of Steeles West Trainway and cross-over south of Steeles West Station
- Subway ventilation required at Steeles West Station
- Increased risk of failure or suspending service without back-up power from Steeles West Station
- Safety sign-off may be an issue
- Extends overall project completion 6 months – July 2019
- Estimated additional cost = \$28 M to \$40 M
 - Extended Project Management - \$18 M - \$20 M
 - \$5 M - \$10 M additional and temporary systems
 - \$5 M - \$10 M additional commissioning
- Requires further study to verify dates and costs



What's Next

- Work with Steeles West and York University Station contractors (Walsh & Ellis Don) to mitigate trainway completion risks
- Monitor acceleration of contractor productivity required to maintain progress
- Update Baseline Program Schedule with mitigated Steeles West and York University Station trainway risks
- Perform updated Risk Analysis to determine revised 90% probable revenue service opening date
- Confirm that improvement in opening date is cost-effective against any additional cost of mitigating Steeles West and York University Station risks
- Re-assess early opening options



Other Recommendations

- Require detailed P6 construction schedules from each station contractor and systems installer based on Updated Baseline Schedule
- Use monthly updated contractor schedules to develop monthly Updated Program Schedule
- Manage progress by comparing monthly Updated Program Schedules with Updated Baseline Program Schedule
- Assess actual progress against risk-mitigated 90% probable revenue service opening date
- Implement process NOW to mitigate potential systems installation and testing problems
 - Interface Management Database
 - Room Turnover Manager
 - Integrated Testing Program

Bechtel Executive Summary

Basis of Assessment

The American Public Transportation Association (APTA) Peer Review previously undertaken at the request of the Toronto Transit Commission (TTC) was the starting point for the Project Assessment. The APTA Peer Review concluded that improving the effectiveness of the delivery of the Toronto-York Spadina Subway Extension (TYSSE) Project (the Project) to the best possible completion date would depend largely on implementing a 'reset' of the management approach on the Project.

We interpret this recommended reset to include three primary components, with detail drawn from the APTA exit presentation.

- Establish improved relationships with partners
- Rebaseline project controls
- Provide for commercial resolution.

We agree with the APTA conclusions.

Project Assessment

Our Project Assessment has focused on the issues underlying the recommended reset, and has incorporated our own observations, analyses, and insights. The access provided to us by the Project for project-control data and tools, change records, progress reports, executive presentations, and personnel interviews - as well as for contractor schedules, interviews, and jobsite walks - has given us a clearer understanding of the status and relationships.

The details of our assessment of this information are described in the body of this Project Assessment Report (the Report), and provide the background for our recommendations below. The Report addresses key areas of inquiry: Schedule; Design; Construction; Cost, Contracts, and Commercial; and Project Execution Approach.

Recommendations

For our assessment, we recommend that the Project reset be conducted with the following steps:

1. Rebaseline the Project schedule:
 - Develop a fully integrated Project Master Schedule
 - Rebaseline Contractors' schedules with aggressive, yet achievable, milestones
 - General progress-tracking tools and graphics
 - Add specialist resources to assist in the development of these processes.
2. Mitigate delivery barriers caused by continuing design change:
 - Refocus the station design teams for more responsive Project-Designer construction-phase services, with urgency focused on prioritized issues

- Take a series of steps in systems design to clarify interfaces, manage configuration, monitor assets, and support detail logistical/handover planning in the above schedule
 - Implement a signalling design for early operation of the extension section
 - Add resources to manage interfaces and assurance.
3. Address the adversarial relationships among the contractors and the Project construction teams, and realign them for effective delivery:
 - Improve the relationships among parties with more open communication and agreements honored, streamline processes, and colocate teams at the sites
 - Take a collaborative approach to problem solving, engaging the teams in quick turnaround and issue ownership
 - Take an active role in interface management, anticipating needs and enabling contractors to coordinate and cooperate with each other
 - Place a design representative onsite to improve prompt issue understanding and resolution
 4. Improve tools and processes for cost, contracts, and claims to provide more responsive and informative commercial management:
 - Rebaseline cost and change positions with a bottom-up cost estimate, rationalizing the status of liquidated damages, and addressing cash flow
 - Improve change management by reconciling logs/registers, quantifying the open issues, and reducing reliance on change directives in favour of quotations, with a focused presence at sites
 - Ring-fence historic claims and establish a resolution plan, set timelines for key steps to resolve major changes and monitor progress, and consider payment on account towards probable settlements
 - Add resources to place contract administrators on each site
 - Add a claims manager and specialist resources to form a claims team
 5. Establish a collaborative ethos around the reset of the Project to align objectives and grow trust among the Project partners:
 - Refocus the Project organization with new leadership, adjust the reporting relationships, and add the specialist resources called for in several of the recommendations above
 - Foster collaborative working to build more productive relationship, including conducting team workshops; co-locating TTC, design, and contractor staff; and partnering at senior and executive levels
 - Reward key progress to acknowledge and celebrate activities that contribute meaningfully to delivery, and incentivize selected interim and final milestones to focus the contractors on achieving necessary progress
 - Give the project director sufficient authority to act in the best interests of the Project in a timely manner.

If the above reset steps, along with the more detailed recommendation set out in this Report, are fully implemented, we believe that the current Project delivery date could be improved to 31 December 2017.