TORONTO TRANSIT COMMISSION
REPORT NO.

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 • Provincial • Federal • Municipal* ➢ City of Toronto (59.96%) ➢ Region of York (40.04%) *City/Region Responsible for Cost Overruns	 **Total**	 $1,059 M 697 M 526 M 352 M **$2,634 M**	 	
Expended to Date (September 30, 2012)			**$914 M**	
Commitments to Date **Future Commitments**			 **Total**	$1,920 M 714 M **$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.

Contract	Completion
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.

Event	Date
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

Event	Date
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. • 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.

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October 10, 2012
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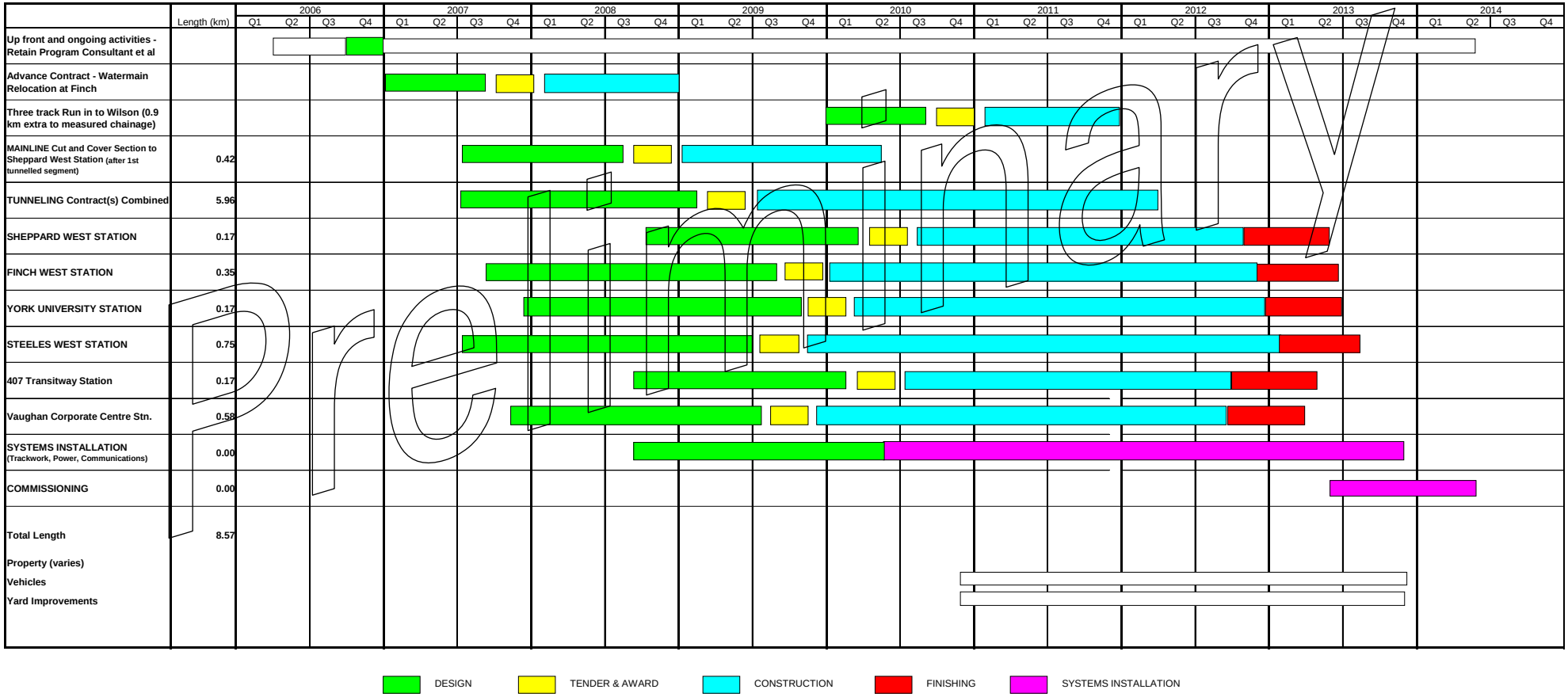
Attachment: Attachment A – Schedule 2006-2008
Attachment B – Schedule 2008-2012
Attachment C – Schedule 2012-2016

Attachment A
Schedule 2006 – 2008

TORONTO TRANSIT COMMISSION - SUBWAY EXPANSION PROGRAM
SPADINA SUBWAY EXTENSION : DOWNSVIEW TO VAUGHAN CENTRE - Main Construction Contracts

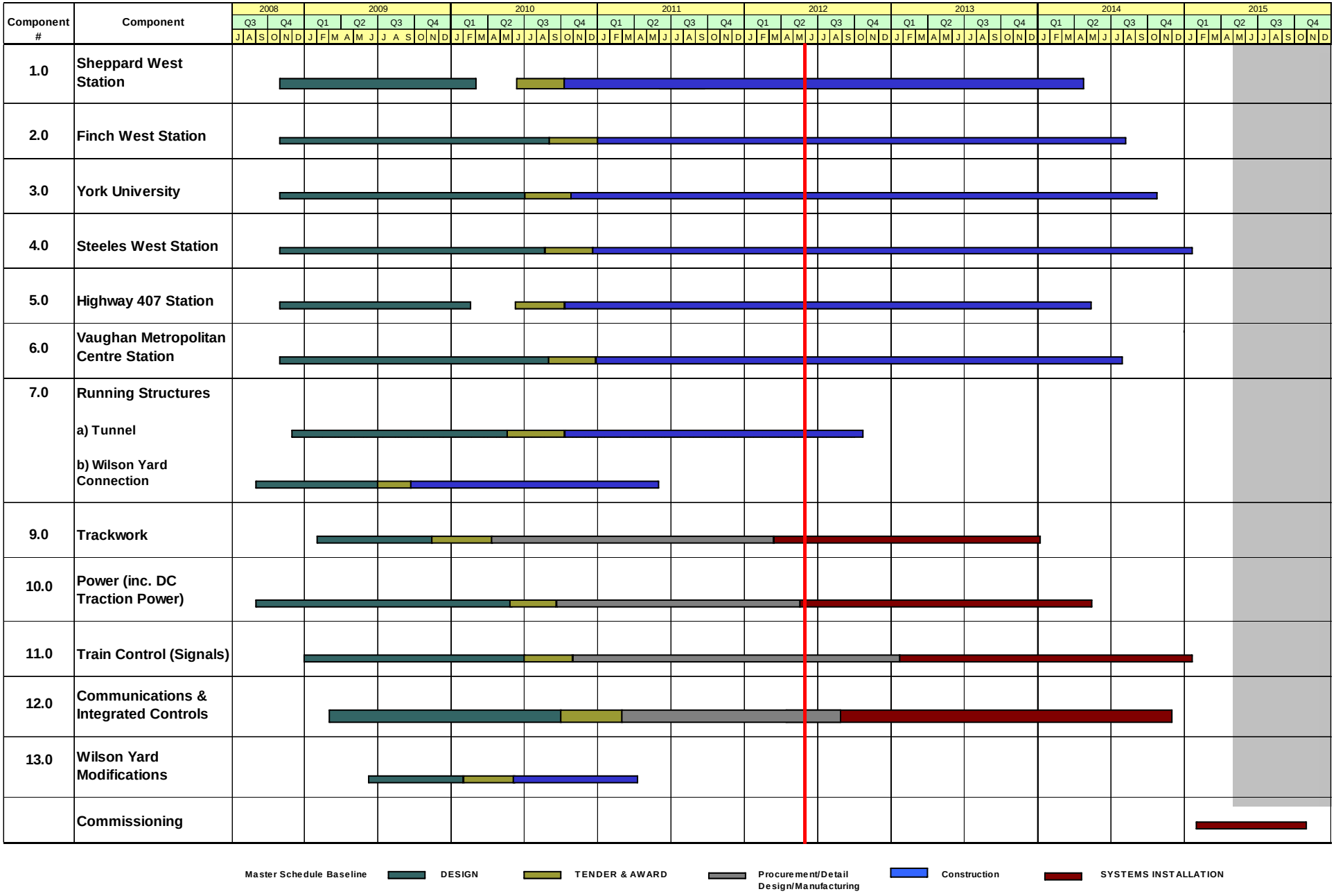
(With York Region Section Included)



Attachment B
Schedule 2008 – 2012

Toronto-York Spadina Subway Extension

Master Schedule Summary



Attachment C
Schedule 2012 – 2016

Toronto-York Spadina Subway Extension
Master Schedule Summary