

# TORONTO TRANSIT COMMISSION REPORT NO.

**MEETING DATE:** January 21, 2009

**SUBJECT:** YONGE SUBWAY EXTENSION – ADDITIONAL INFORMATION  
CONCERNING COSTS AND RIDERSHIP/CAPACITY

## **ACTION ITEM**

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### **RECOMMENDATION**

It is recommended that the Commission consider this report in conjunction with the companion report entitled “Yonge Subway Extension - Final Report on Transit Project Assessment Process – Approval of Staff Recommendations” and forward the report directly to Toronto City Council for consideration at its meeting on January 27/28, 2009, noting that:

- a) Information related to the comments of Mr. Junkin and the results of the January 20, 2009 public meeting will be the subject of a separate report from the Chief General Manager directly to City Council.
- b) This report has been prepared jointly by City and TTC Staff.

### **FUNDING**

Refer to the funding statement in the report entitled “Yonge Subway Extension – Final Report on Transit Project Assessment Process – Approval of Staff Recommendations”.

### **BACKGROUND**

At the December 17, 2008 Commission meeting, the Commission approved the following motions with respect to the Yonge Subway Extension project:

1. Noting the complexity of the project and the multiple and diverse implications of the project for the TTC, staff be requested to report to the next TTC Commission meeting and the Executive Committee of the City on the implications and possibilities that may be provided by using an Individual EA process or a Class EA process to review this project (see Discussion, Section g).
2. That staff be requested to report back to the Commission in January on (see Discussion, Sections c and h):
  - The projected operating cost of the completed project;
  - Likely inter-regional fare scenarios;
  - Expected ridership figures on opening day; and
  - Impacts to the Yonge Extension from GO Transit expansion projects, specifically in the Yonge Corridor.

3. The staff be requested to report back on the feasibility of purchasing a seventh car or lengthening the six cars that would make up a new train (see Discussion, Sections d and e).

The Executive Committee considered a City staff report, along with the December 17, 2008 Commission Report at its meeting on January 5, 2009. The Executive Committee:

1. Requested the City Manager, in consultation with the Chief General Manager, Toronto Transit Commission, to submit a report directly to Council for its meeting scheduled to be held on January 27, 2009 on:
  - The range of possible ancillary costs to the Yonge Street extension, including the following (see Discussion, Section f):
    - Yonge-Bloor Station alterations;
    - Subway fleet expansion;
    - Possible need for 2<sup>nd</sup> entrances at Yonge Stations south of Bloor Street;
    - Possible need for an eastern downtown relief line from Pape Station to downtown;
    - Subway yard costs; and
    - Possible need for the Sheppard Subway to be extended westbound to Downsview and the Wilson Yard.
  - Possible sequencing scenarios of major public transit infrastructure projects and their relationship to the Yonge Street extension project (see Discussion, Section e).
2. Requested the Toronto Transit Commission to direct staff to review the report entitled “Analysis of Yonge Subway Extension Final Report on TPAP and Future Actions” prepared by Mr. Karl Junkin; to meet with Mr. Junkin to discuss his concerns, and report thereon directly to Council for its meeting scheduled to be held on January 27, 2009 (see Discussion, Section i).

At the December 17, 2008 meeting, the Commission also requested additional information to be provided directly to the January 27/28, 2009 City Council meeting as follows:

- 5) Request the TTC/City Staff to submit a report outlining the capacity and ridership issues associated with the Yonge Subway line directly to the January 27/28, 2009 City Council meeting. The report should include consideration of the following (see Discussion, Sections a, b, c, d and e):
  - Growth in background TTC ridership;
  - Ridership impacts of the Transit City lines, planned GO Transit rail improvements and the Metrolinx Regional Transportation Plan proposal for a downtown core relief rapid transit;
  - The ridership diverted from the Yonge Subway to the Spadina Subway with the opening of the Spadina line to the Vaughan Corporate Centre; and
  - The extension of the Yonge Subway to Richmond Hill Centre.
  
- 7) Request staff, in light of the public concerns about the capacity of the Yonge Subway south of Finch Station, to arrange additional public meetings in January 2009 to outline the planned capacity improvements that will be made to the YUS subway line in parallel with the implementation of the Yonge Subway Extension project and that the results of these meetings be reported directly to the January 27/28, 2009 City Council meeting (see Discussion, Section j).

This report responds to all of the above requests for additional information concerning the Yonge Subway Extension project and its potential downstream impacts on the existing Yonge Subway System, with the exception of Executive Committee Recommendation #2 and the results of the January 20, 2009 public meeting which will be the subject of a separate report from the Chief General Manager directly to the January 27/28, 2009 City Council meeting.

## **DISCUSSION**

The Yonge Subway Extension project is a complex project due, in part, to the actual and perceived impacts of the project on the existing Yonge Subway and its relationship to other planned improvements in the overall GTA transit network.

**a) Historical Background**

Capacity issues associated with the Yonge Subway are not new and have been studied extensively since the Yonge Subway began operating close to its practical capacity in the early 1980's. As the system is now experiencing ridership levels on the Yonge line (south of Bloor) close to historical high levels, it is important to reflect on the conclusions of the Rapid Transit Expansion Study (RTES) in 2001 with respect to these issues:

“The TTC’s most significant asset is the Yonge Subway line into the downtown core. It represents the backbone of the subway network and has been the critical factor in the development of the Central Business District (CBD) of the City of Toronto. As a result, a large number of studies have been undertaken in the last 20 years to ensure that the on-going operating performance of the line is maximized. This is especially important given the long lead time to design and construct facilities or system improvements to alleviate congestion on the Yonge Subway line at its peak point (south of Bloor Street). Various concepts to increase the capacity of the Yonge Subway line have been studied including the following:

- modify the existing subway signalling system to operate reduced headways;
- replacing the existing signalling system with more modern technology to permit significant increases in operating capacity;
- adding a third platform to Yonge-Bloor Station line to reduce the bottleneck at that location caused by excessive train dwell times to load and unload passengers;
- constructing another subway line into the downtown core (a downtown “relief” line) that would have Bloor-Danforth Subway riders from the east transferring to another line into the downtown prior to Yonge-Bloor Station;
- interim express bus services into the downtown core to defer the need for additional rapid transit investment into the CBD; and
- looping of the Yonge and Spadina Subway lines to form two continuous circle lines. This would eliminate the need for trains to turn around at terminal stations which is a constraint on the achievable headway. Looping in combination with other improvements could allow additional trains to be added to the Yonge Subway line.”

The RTES Study concluded that with the implementation of a new signalling system (ATO/ATC) on the YUS line that the looping of the Yonge and Spadina lines at Steeles Avenue was not required and that radial extensions of the two lines could be implemented as the next step in expansion of the subway system. Looping of the Yonge and Spadina lines (if required) could be pushed further north (e.g. Highway 7) if required in the future. The conclusions of the RTES Study contributed to the undertaking of the Spadina Subway and Yonge Subway extension environmental studies for radial extensions of both lines.

The RTES study noted the following with respect to the capacity of the Yonge Subway:

“Based on previous studies, the theoretical design capacity of the Yonge Subway is 32-34,000 per hour assuming 130 second headways and 27-28 trains per hour. This assumes a loading standard of 1,200 riders/train. However, since the completion of these studies, the TTC has adopted a new loading standard of 1,100 passengers per train. Based on past TTC experience the theoretical capacity of the subway is not sustainable on an on-going basis in part due to uneven passenger loading of trains along the platform. A loading standard of 1,100 per train reflects the actual capacity that can be operated while maintaining acceptable levels of comfort and customer satisfaction. As a result, the actual practical capacity of the subway is 29,700 to 30,800 per hour.”

When Yonge Subway ridership south of Bloor peaked in the 1980’s, significant operational problems resulted as noted in the RTES Final Report:

- “• reliability of service declined;
- passengers at major transfer stations (particularly Yonge-Bloor Station) were routinely left at platforms and passengers were forced to wait 2 or 3 trains to board;
- platform congestion during delays reached serious levels;
- passenger complaints related to congestion and delays rose significantly; and
- recovery from delays were more lengthy and even minor delays caused significant operational reliability problems.”

Due to overall growth in TTC ridership, the opening of the Sheppard Subway in 2001, increased cross boundary ridership, the growth of the North York City Centre/intensification of development in the Yonge Corridor and the recovery in downtown core employment levels, these capacity and ridership problems are beginning to manifest themselves again and must be addressed.

**b) Yonge Subway at a Crossroads**

While a number of studies, decisions and investments have been undertaken over the past two decades to improve the capacity of the existing Yonge Subway to handle increased ridership, the Yonge Subway requires further investments and improvements to maximize the operational performance and increase the capacity of this important existing infrastructure.

The Yonge Subway is at an investment crossroads due to recent growth in TTC/Yonge Subway ridership and planned improvements to the transit network in the GTA which could increase peak point ridership on the Yonge Subway, including the following generators of future ridership growth:

- the Yonge Subway extension to Richmond Hill Centre;
- the Transit City initiative including the Finch West, Sheppard East, Eglinton and Don Mills LRT lines;
- growth in Sheppard Subway ridership; and
- general growth in overall TTC ridership.

All of the above growth factors will contribute, to varying degrees, to the need to improve the capacity of the Yonge Subway to accommodate existing ridership levels and respond to future ridership growth. The growth in YUS subway ridership is a network capacity issue that must be viewed and addressed in rapid transit network context.

The above impacts will be offset to some degree by improvements in GO Rail service levels and the opening of the Spadina Subway extension to the Vaughan Corporate Centre in 2015 and can be mitigated by the gradual implementation of ATO/ATC and increased service levels on the YUS Subway line.

**c) Ridership Analysis**

**Existing Yonge Corridor Ridership**

As shown in Exhibit 1, Yonge Subway peak point ridership peaked in the mid-1980's at approximately 30,000 passengers per hour and declined to a low of 20,400 per hour in 1996-97. Since the late 1990's, peak point ridership has steadily increased back to approximately the 30,000 per hour level.

Over the period from 1985 to the late 1990's the TTC modal share of morning peak period trips into the downtown core crossing the central area cordon declined from 57% to 43%. Since the late 1990's the TTC transit modal split to the downtown core has stabilized around 46 percent.

During the same period (1985-98), GO rail ridership in the peak three hour period (6 - 9 a.m.) in the Stouffville, Richmond Hill and Bradford (now Barrie) GO corridors has increased significantly (see Exhibit 2) and GO's share of travel to the downtown core (for all GO rail lines) has increased from 7% in 1981 to 16% in 1999. Since 1999, GO Transit's share of the downtown travel market has continued to increase to almost 19% by 2006.

#### GO Rail/Yonge Subway Ridership Relationship

The relative modal share of TTC and GO Transit into the downtown core is influenced by a large number of factors including the following:

- Population/employment growth in the 905 region which is well served by GO Transit;
- Employment levels and parking costs/availability of parking in the downtown core;
- GO rail service levels and GO rail service extensions implemented over time in response to demand in outlying areas;
- Congestion levels on the Yonge Subway line;
- Overall economic conditions/ trends in TTC ridership;
- Fare levels on TTC and GO; and
- The cost of TTC commuter parking.

The Yonge Subway and north/south GO Rail lines serve different travel markets. Almost all GO Rail passengers are destined to the downtown core and are making longer-distance trips where the travel time savings to ride GO (relative to the TTC) is worth paying a premium fare to ride the GO system. The subway is used by people making shorter distance trips to a variety of destinations including the downtown and by longer-distance riders to the downtown who are not prepared to pay a premium fare to ride the GO system.

The relationship between GO and TTC ridership in the areas potentially served by the Yonge Subway is complex to forecast as people's choice of mode depends on relative fares, ease of access to rapid transit stations and speed of travel. For example, a large percentage of riders arriving downtown at Union Station walk as far as College Avenue to avoid the payment of a TTC subway fare to access their destination. This significantly exceeds the walking distance (500 to 600 metres) considered to be convenient based on empirical data and is assisted by the availability of the underground PATH network in the downtown connecting Union Station to points as far north as Dundas. Decisions regarding fares, station locations/access and the frequency of service provided on GO Rail can result in significant numbers of passengers switching between GO Rail and the Yonge Subway for access to the downtown. Forecasts of future ridership on the Yonge subway have a significant range reflecting the fact that many of these decisions are unknown at this time.

Yonge Subway Ridership to 2031

Preliminary projections of ridership (a.m. peak hour) on the Yonge line at selected points to 2031 are estimated as follows:

<b>Station</b>	<b>Existing</b>	<b>2031</b>
South at Steeles	N/A	15-17,000
South at Finch	10,500	17-19,000
South at Bloor	30,000	37-42,000

The above estimates are based on the City’s GTA model with comparisons and adjustments made using the results from the TTC’s MATIDUC model. The models both incorporate changes to the GTA transit network including the following network improvements to 2031:

- Spadina Subway to Vaughan Corporate Centre;
- Yonge Subway to Richmond Hill Centre;
- Two zone TTC fare system at the City of Toronto boundary;
- Full implementation of Transit City lines and related bus routing changes,
- York Region population and employment forecasts for intensification in Yonge and Spadina corridors north of Steeles and City of Toronto forecasts south of Steeles Avenue (based on Official Plan forecasts and waterfront development);
- GO ten year plan for improved GO rail service including all day service on the Richmond Hill GO line;
- Expansion of existing Highway 407 GO services;
- No Highway 407 Transitway; and
- VIVA BRT services north of Richmond Hill Centre Station and VIVA BRT on Highway 7 connecting through Richmond Hill Centre and Vaughan Corporate Centre Station.

The models do not include the Highway 407 Transitway (although service in that corridor is represented by Highway 407 GO services).

The above ridership projections are preliminary and reflect some additional work that has been done to rationalize the forecasts between those presented in the December Commission report and City/TTC models. While the work done to this point suggests that the line volumes and peak point volume forecasts are reasonable, additional work is required to assess the implications of GO rail ridership and station by station usage.

Opening day ridership forecasts are not currently available and will be the subject of future modelling efforts.

#### Diversion Effect of Downtown Relief Line

Based on a more extensive transit network to 2031, Metrolinx has estimated peak point ridership of 42,000 per hour south of Bloor.

As well, Metrolinx has tested the diversion effect of constructing the Downtown Relief line (Pape to Queen). The Metrolinx forecast shows Yonge line ridership south of Bloor of 25,100 per hour with 17,500 peak hour riders diverted to the Downtown Relief line from the east. The City/TTC modelling has not tested the impact of a downtown relief line and as a result, the Metrolinx estimates of the diversionary effect (41% of Yonge line riders would be diverted to the downtown relief line) are the only estimates available of this impact. The Metrolinx forecasts include different population and employment forecasts for Toronto/York based on the projected impacts of the Places to Grow Act. In addition, the Metrolinx model included a number of service/network improvements over and above those in the TTC/City model results outlined in this report, including the Highway 407 Transitway, 10 minute Regional express GO rail services in the Richmond Hill GO corridor in the 10 year period (2021 to 2031), extension of Highway 407 east, GO service to Guelph and the extension of Highway 404.

The Metrolinx forecasts are considered to be optimistic as the capital investment in the transit network to achieve the projected ridership levels is significant in scale.

#### Diversion Effect of Spadina Subway

In the Spadina Subway Extension EA, it was estimated that the opening of the Spadina Subway line to Vaughan Corporate Centre would divert 2,300 peak period riders (1,300 peak hour riders) from the Yonge Subway line to the Spadina line. This represents a diversionary effect of approximately 4% of existing peak point Yonge Subway ridership.

#### Ridership Impacts South of Bloor

Forecasts of future ridership have been prepared for 2031 assuming that the Transit City LRT lines and both the Spadina and Yonge Subway extensions into York Region are constructed. As shown in Exhibit 3, in this scenario, ridership on the Yonge Subway south of Bloor Street is expected to grow from the current level of 30,000 passengers per hour in the morning peak to 37,000 to 42,000 passengers per hour in 2031. As was noted earlier, the assumptions made with respect to service levels and relationship to ridership between the Yonge Subway and GO Rail are complex and must be subjected to detailed assessment. Such a detailed assessment has not yet been done.

In order to better understand the relative contribution of the Transit City initiative and Yonge Subway extension project to growth in peak point ridership south of Bloor to 2031, additional model runs were undertaken excluding these individual projects to identify their unique contribution to the overall growth in demand on the Yonge Subway south of Bloor. These runs indicate that, of the forecast 7,000 to 12,000 growth in ridership on the Yonge Subway south of Bloor:

- approximately 20% is related to the extension of the Yonge Subway to Richmond Hill;
- 10% is attributable to the Transit City lines; and
- the remaining 70% is derived from base growth in population and employment (both within the City of Toronto and externally) and the contribution of other transit network improvements.

These estimates are subject to further review.

It should be noted that in the time available since the December 17, 2008 Commission meeting, it has not been possible to undertake a similar analysis of the individual incremental impacts of each Transit City line.

**d) Yonge Subway Capacity Network Improvements**

As outlined in Exhibit 4, to respond to network ridership pressures, a number of initiatives are planned to improve Yonge Subway capacity. The expected timing of each of these capacity improvements relative to the potential opening of the Yonge Subway project and the implementation issues associated with each initiative are outlined in Exhibit 5.

The planned timing for the implementation of the Transit City initiative is outlined in Exhibit 6 while Exhibit 7 outlines the timeline for the implementation of all known elements to 2021. Although efforts to model the ridership benefits of the entire Transit City initiative are currently underway, it is anticipated that the lines with the biggest potential to impact overall Yonge Subway line ridership (and hence capacity/congestion) are the Sheppard East, Finch West and Eglinton lines and to a lesser degree the Jane, Don Mills and Scarborough Malvern lines. As indicated above, the Transit City LRT lines, in total, are expected to account for approximately 10% of the overall growth in ridership expected on the Yonge Subway line south of Bloor to 2031.

In the next decade, the infrastructure and initiatives to improve Yonge Subway capacity are expected to result in the operational sequence of events outlined in Exhibit 8.

Exhibit 9 summarizes the capacity improvements that are possible to respond to projected growth in Yonge Subway ridership.

It will be critical to fix the capacity of Yonge-Bloor Station to be able to support further service improvements/ridership on the Yonge Subway line. With the appropriate improvements to Bloor-Yonge Station, staff believe that with ATO/ATC, Toronto Rocket cars and the diversion effect of the Spadina Subway extension the tools exist to improve Yonge Subway capacity to absorb projected increases in Yonge Subway ridership in the short to medium term. GO rail service improvements and related infrastructure improvements in combination with the implementation of 7 car trains and the Downtown Relief line (as a last resort) can respond to ridership pressures in the long term.

**e) Possible Sequencing of Major Public Transit Infrastructure Projects**

City/TTC staff are currently analyzing, in parallel with a Metrolinx Benefits Analysis of priority projects, the potential prioritization of network investment options. Given the above implementation/timing of capacity improvements, it is only possible to comment in a preliminary way on the capacity implications of future rapid transit expansion. While a full analysis is not available at this time, some key principles can be articulated with respect to “possible sequencing scenarios of major public transit infrastructure projects and their relationship to the Yonge Subway extension project” as requested by the Commission.

Yonge Subway Extension Issues

In considering this project a number of network sequencing issues should be considered. As outlined in previous reports, new, larger Toronto Rocket trains must be purchased, the Spadina Subway extension must be fully funded and open for revenue service prior to the Yonge Subway extension, and the upgrading of the YUS Subway signalling system must be fully funded prior to opening the Yonge Subway extension.

These three conditions appear to be satisfied as the Toronto Rocket cars will be in place by 2012, the Spadina Subway is expected to open approximately 2 years prior to the earliest opening of the Yonge Subway and Metrolinx’s funding of the implementation of ATO/ATC is in place. Additional capacity considerations with respect to the Yonge Subway project include the following:

- the project will contribute to the need and timing of the expansion of the capacity of Yonge-Bloor Station;
- it will be important to implement planned GO rail service improvements in parallel with the implementation of the Yonge Subway extension project to off load Yonge Subway extension ridership to the extent possible by diverting downtown oriented ridership to the GO system. However, improved GO rail service should be considered necessary in combination with the Yonge Subway project not as an alternative to it; and
- the capacity of existing Yonge Subway stations (particularly south of Bloor) to accommodate future ridership growth on the YUS line will need to be addressed.

Transit City Initiative

With respect to Yonge Subway capacity, consideration should be given to the following issues in the implementation of the Transit City initiative:

- various components of the Transit City initiative will contribute to the need and timing of the expansion of Yonge-Bloor Station;
- it will be important to implement GO rail service improvements in parallel with the implementation of the Transit City initiative to off load Yonge line ridership to the extent possible;
- the first stage of the Eglinton line should consider the impacts of the line on Yonge and Spadina ridership levels and the objective of better balancing ridership on the two lines;
- the capacity of the existing Yonge Subway stations to accommodate future ridership growth will need to be addressed particularly related to the timing of the Eglinton, Don Mills and Jane LRT lines and their impacts on ridership south of Bloor; and
- similar to the Yonge Subway project, it will be important that the Spadina Subway line, ATO/ATC and Toronto Rocket fleet be fully implemented prior to the opening of the first Transit City line that has the potential to significantly increase Yonge Subway ridership south of Bloor.

Downtown Relief Line

The Downtown Relief line should be considered as a last resort to address capacity issues into the downtown core after the implementation of the planned capacity improvements to the existing subway system including the following:

- Toronto Rocket cars are fully implemented on the YUS line;
- ATO/ATC full implementation and operation of 105 second headways;
- improved service levels on north-south GO rail lines; and
- improvement to the capacity of Yonge-Bloor Station.

The above rationale is based on maximizing the use and capacity of existing transit (GO/TTC) infrastructure prior to the implementation of costly new rapid transit lines into the downtown core. The Downtown Relief line should only be considered for implementation if employment growth in the downtown core continues as projected and after all attempts to increase the capacity of existing infrastructure have been exhausted and a new line into the downtown core is the only alternative to respond to ridership and capacity constraints at that time. This is an important principle given funding constraints for rapid transit investments. Clearly, maximizing the capacity of existing infrastructure is preferred over costly investments to significantly improve rapid transit capacity into the downtown core.

Feasibility/Timing of Operation of 7 Car Subway Trains

The possible addition of a seventh car to the existing 6 car trains (or stretching the existing 6 car trains) operating on the TTC subway system is a complex engineering, technical and operational issue that requires further study. The operation of longer trains impact station platforms, the implementation of platform edge doors in stations, crossovers, switches, yard capacity, existing subway car houses and on line operational facilities. As a result, the technical feasibility of longer trains remains to be determined and the feasibility and capital cost implications require further study. A staff report will be submitted in Spring 2009 outlining the cost/feasibility of operating longer subway trains.

What is clear at this time is that stretching the existing Toronto Rocket car from 75 ft in length to 83 ft in length as part of the existing car order is not feasible. The inswing and outswing of the longer subway vehicle conflicts with the existing tunnel configuration.

The implementation of longer trains, if feasible and cost effective, would have between a 10% and 16.6% improvement in Yonge line capacity.

**f) Ancillary Potential Costs**

Exhibit 10 outlines the preliminary costs associated with various ancillary projects and the rapid transit initiatives that contribute to the need for each project and the relative contribution of each initiative to long term system needs.

**g) EA Process**

As outlined previously in the report, the complexity of the factors that impact the need and timing of capacity improvements, service improvements and strategic rail yard needs means that it is difficult or impossible for any single Environmental Assessment to address these needs from an overall network perspective. This is consistent with the approach taken with respect to the Wilson Yard expansion to respond to the RTEP initiative in the mid 1990's, Transit City and the Yonge/Spadina Subway extension projects. In all of the above cases, the yard and/or system wide capacity/network issues resulting from an individual line were addressed separately from the impacts of the lines themselves. Similarly, the Yonge-Bloor capacity studies undertaken in the mid 1980's were in response to the Network 2011 rapid transit initiative (Eglinton, Sheppard, Spadina, Downtown Relief Line, etc.) rather than being considered by a single project.

It is important that yard, capacity and other ancillary projects be examined from an environmental perspective on a network basis as the impacts of such facilities, timing of implementation, strategies to minimize operating and capital costs and maximize the quality of service to the public are network wide.

In response to TTC/City input to streamline the EA process for transit projects, the Province of Ontario has exempted public transit projects from the requirements of the EA Act (and class or individual EA's) provided that the proponents comply with specific conditions as part of a project assessment process. The Transit Project Assessment Process (TPAP) is being followed for the Yonge Subway Extension project and the Transit City initiative and avoids the need to undertake either class EAs or individual EAs for these initiatives. Utilizing the full EA process for the Yonge Subway extension project would delay the project by 24 months and cost in excess of \$3 million and would have a similar impact on individual Transit City TPAP efforts.

As noted above, the yard, capacity and other related impacts of individual infrastructure projects are best dealt with on a network basis separate from the individual rapid transit initiative.

**h) Operating Cost/Fare Issues**

No detailed assessments of operating costs and revenues of the proposed line have been undertaken to date. The costs and revenues which will directly affect the TTC are dependent on the operating agreements which have yet to be developed with York Region and the funding partners regarding the operation of the line. Typically subway operations have a low operating cost per passenger kilometre due to the high capacity of the trains, and their location in high-demand corridors. As the forecast ridership on the extension is similar to the ridership currently carried on the outer ends of other subway lines in the system, assuming the TTC receives a reasonable allocation of fares for passengers carried on the line, the net operating cost of the subway extension would be similar to current subway costs.

The estimated gross operating costs of the Yonge Subway extension to Richmond Hill Centre are \$28.2 million (2008 dollars) but this will be offset, to some degree, by savings in TTC bus operations costs in the corridor, but these savings have not as yet been estimated. Similarly, revenues for the TTC from the line from passenger fares, commuter parking, advertising, retail leasing, etc. are still to be determined.

Based on analysis undertaken previously for the Spadina Subway Extension project; however, it is reasonable to expect that the net cost of operating the line could be in the range of \$5M to \$10M per year.

The cost recovery for the Spadina Subway line was based on a two zone fare system (with the exception of York University students) and the above potential net operating costs could only be achieved on the Yonge Subway extension with a two zone system in place.

**i) Deputation from Karl Junkin**

TTC staff are arranging to meet with Mr. Junkin to discuss his deputation to the January 5, 2009 meeting of Executive Committee. A verbal update on the results of the discussion with Mr. Junkin will be available at the January 21, 2009 Commission meeting and the Chief General Manager will submit a report directly to City Council on January 27/28, 2009 on this issue.

**j) Additional Public Consultation**

An additional public meeting has been arranged as follows:

- Tuesday January 20, 2009
- Open House 5:00 – 7:00 pm
- Presentation 7:00 – 8:30 pm, questions and answers
- North Toronto Memorial Community Centre, 200 Eglinton Avenue West

The above meeting was advertised in the Toronto Star and Metro newspapers and on the TTC, City and York Region websites. In addition, the Councillors in the Yonge corridor from Steeles Avenue to Bloor Street (Wards 16, 22, 23, 24, 25 and 27) were requested to forward the meeting notice to their ratepayer and general mailing lists and York Region distributed electronic copies of the meeting notice to approximately 4,000 people on the project mailing list. The results of the public meeting will be available in a verbal report from TTC staff at the January 21, 2009 Commission meeting and in the CGM's report directly to the January 27/28, 2009 City Council meeting.

**JUSTIFICATION**

The information in this report responds, to the extent possible, to the requests for additional information on Yonge Subway costs and ridership. Staff continue to support the Yonge Subway recommended as outlined in previous reports subject to the conditions identified.

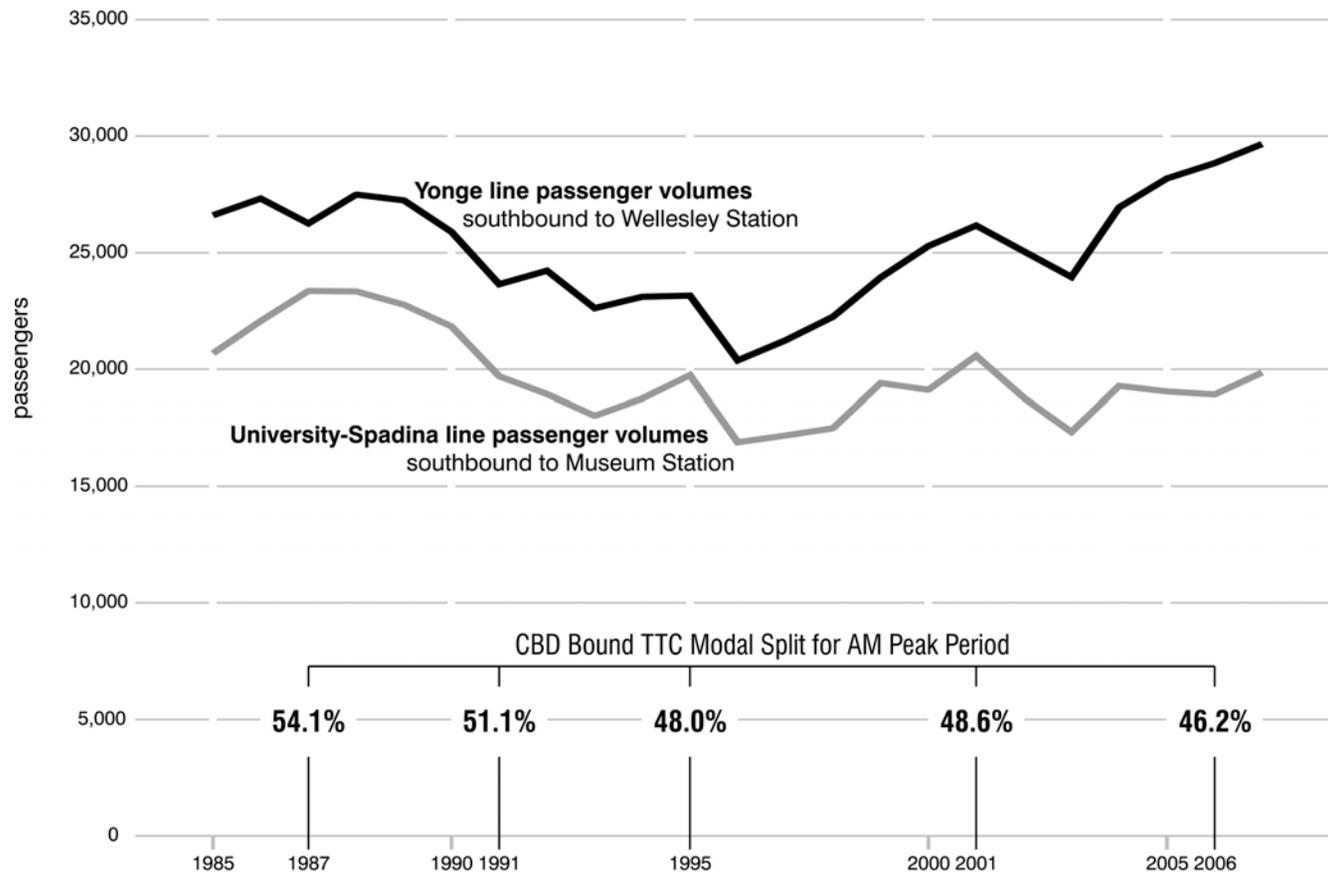
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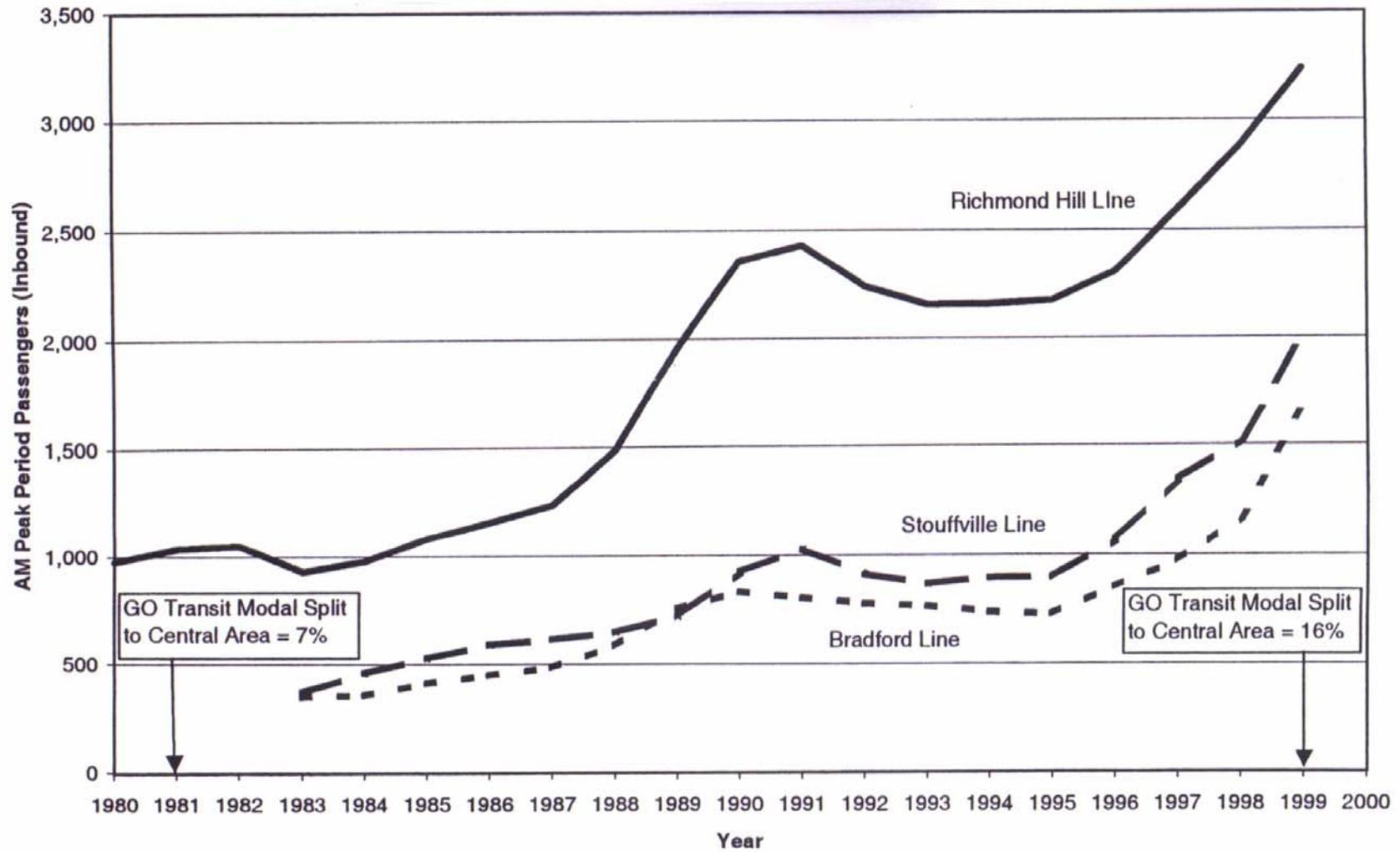
Exhibits: 1 - 10

**Exhibit 1 – YUS Subway Peak Point//Peak Direction Line Volumes (1980-1999)**

**Yonge-University-Spadina Subway  
AM Peak Hour / Peak Direction Line Volumes**  
1985-2007, with selected modal splits



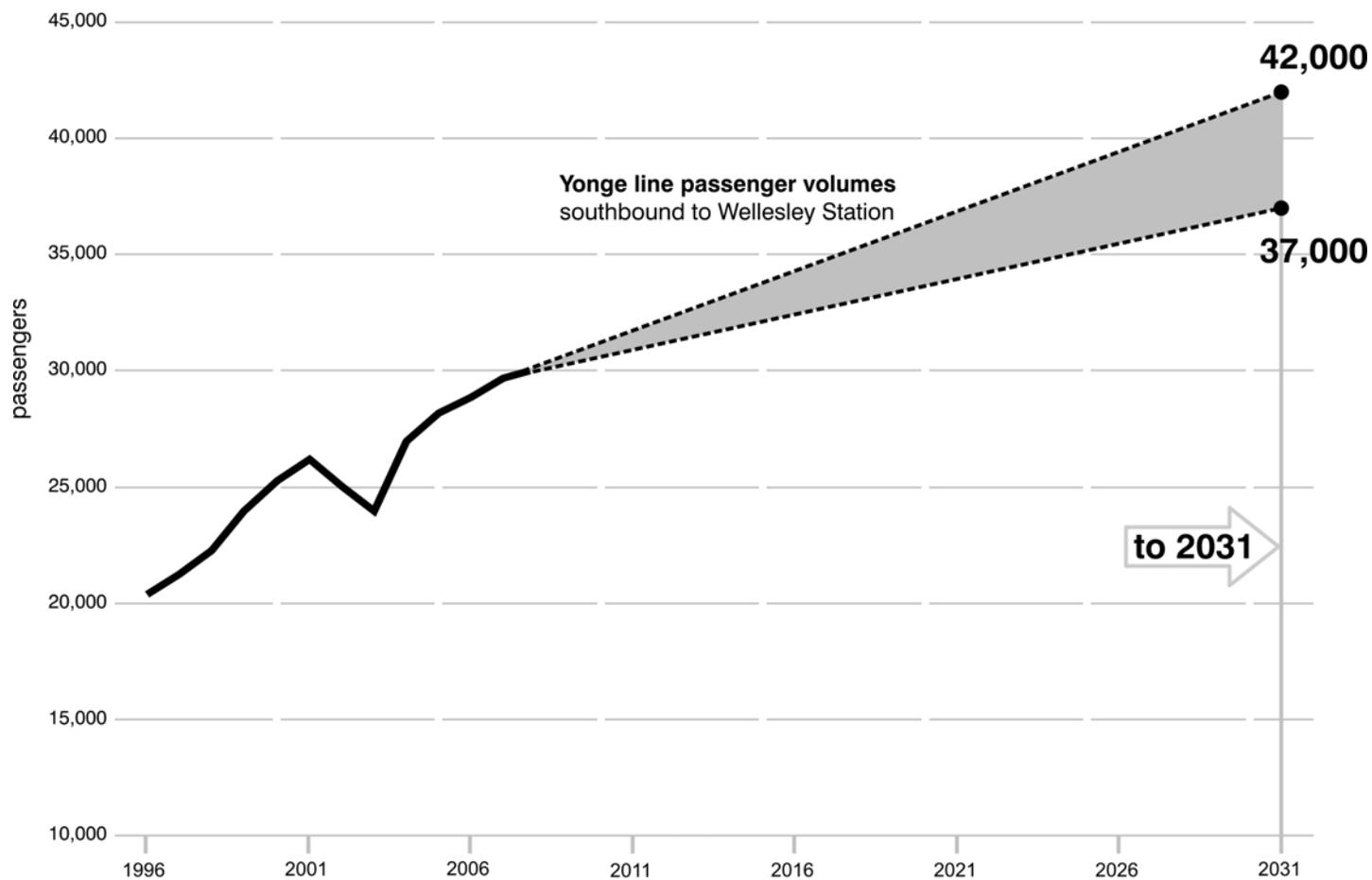
**Exhibit 2 – GO Rail AM Peak Period Ridership – North Lines (1980-1999)**



### Exhibit 3

## Yonge Subway, AM Peak Hour / Peak Direction Volumes

1996-2007, projected to 2031



## Exhibit 4 - Capacity Improvements /Impacts on Yonge Subway Line



new subway cars have increased capacity



closer spacing

between trains



7th car added to train



transfer to Spadina Subway



new parking spaces on Spadina Subway extension

### Exhibit 5 – Sequence of Events/Operational Strategy for Increased Subway Capacity

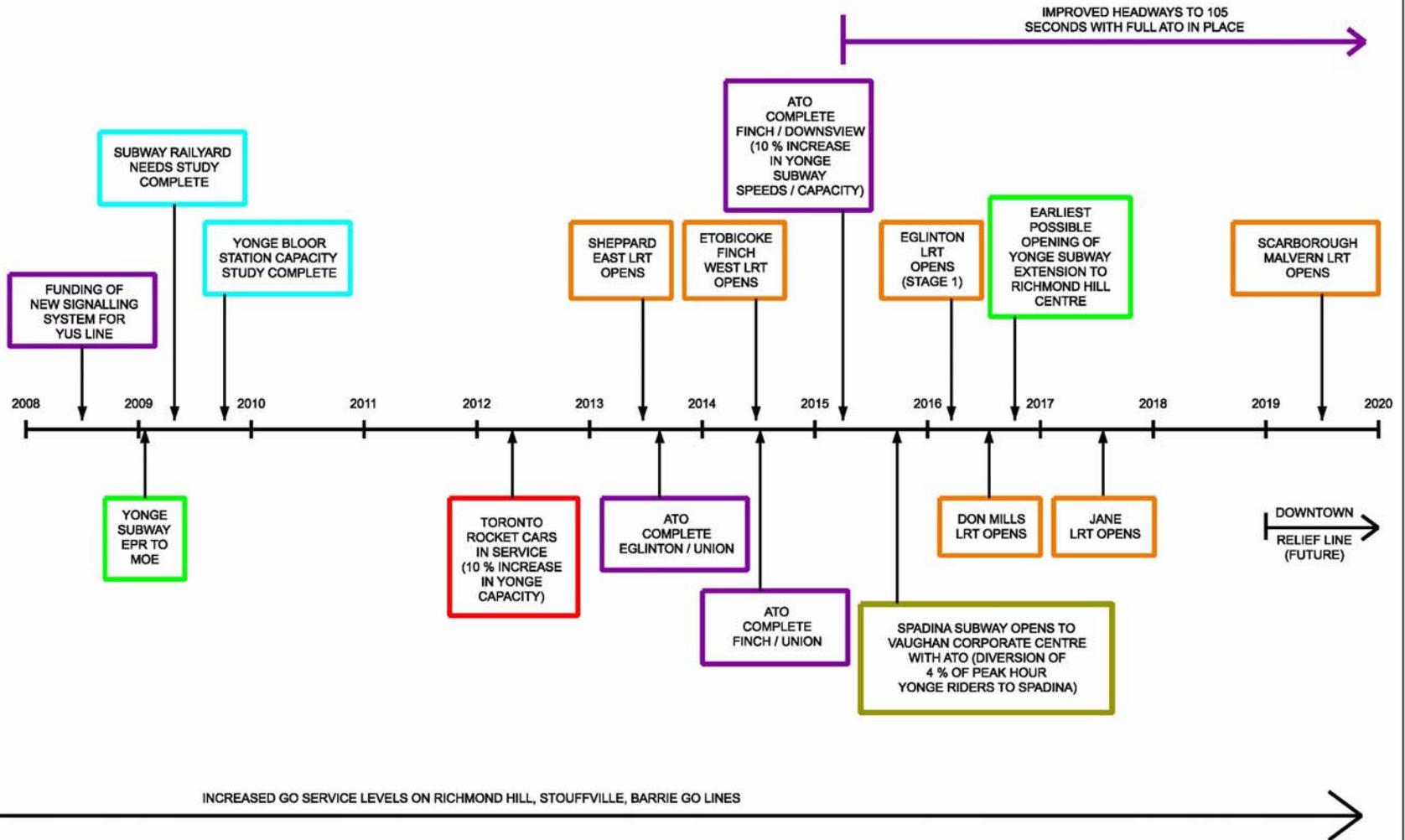
Event	Year	Impact on Yonge Line	Funding Available
Toronto Rocket cars in service	2011	<ul style="list-style-type: none"> <li>• Increased capacity due to interconnected subway cars</li> <li>• Better distribution of riders within subway trains (positive impact on Yonge-Bloor congestion particularly at north end of Bloor Station)</li> </ul>	Yes
Spadina Subway opens (with ATO)	2015	Diversion of peak period riders from Yonge	Yes
ATO/ATC in place (Finch to Downsview)	2015	<ul style="list-style-type: none"> <li>• Allows reduced headways (Finch – Downsview) with increased operating speed, no impact on vehicle fleet</li> <li>• Accommodates future growth due to Yonge/Transit City</li> <li>• Allows the implementation of platform edge doors</li> </ul>	Yes
Earliest Potential opening of the Yonge Subway Extension (with ATO)	2017	Toronto Rocket cars in service plus ATO, offset by Yonge Extension increased ridership and diversion effect of Spadina Subway	Pending
Growth to 2031	2017-2031	<ul style="list-style-type: none"> <li>• Gradual increase in service levels with ATO to 105 second headways</li> <li>• 7<sup>th</sup> car added if/when needed following full implementation of improved service levels to 105 second headways</li> </ul>	Vehicle fleet for ATO/ATC not budgeted  No
Downtown Relief Line	Beyond 2031	<ul style="list-style-type: none"> <li>• A last resort following initiatives to maximize the utilization of existing infrastructure</li> </ul>	No
Capacity of Yonge-Bloor Station	TBD	<ul style="list-style-type: none"> <li>• Study currently underway to assess options for increased station capacity and ridership triggers for implementation of improved capacity</li> <li>• It is critical that the capacity of Yonge-Bloor Station be enhanced to support Yonge Subway ridership growth</li> </ul>	No

### Exhibit 6 Transit City – Key Dates

<b>Line</b>	<b>Start Construction</b>	<b>Revenue Service</b>
Sheppard East	2009	2013
Etobicoke - Finch West	2010	2014
Eglinton Crosstown (Stage 1)	2010	2016
Waterfront West	2010	2015
Don Mills	2012	2016
Jane	2013	2017
Scarborough Malvern	2014	2019

# Exhibit 7

## TIMELINE FOR YONGE SUBWAY CAPACITY / RIDERSHIP MILESTONES



## **Exhibit 8 – Details of Yonge Subway Capacity Improvements**

Capacity Improvements	Timing	Peak Point Improvement/ Implementation Issues
New Subway cars with increased capacity	<ul style="list-style-type: none"> <li>• Toronto Rocket cars in service by 2012.</li> <li>• Initial car order (234 cars) in production.</li> <li>• Option for remaining cars (126) remains to be exercised.</li> </ul>	<ul style="list-style-type: none"> <li>• 10% improvement in Yonge Subway capacity.</li> </ul>
Closer spacing between trains	<ul style="list-style-type: none"> <li>• ATO/ATC in place as follows:               <ol style="list-style-type: none"> <li>a) Eglinton – Union (2013)</li> <li>b) Finch – Eglinton (2014)</li> <li>c) Union – Downsview (2015)</li> <li>d) Downsview – Vaughan Corporate Centre as part of Spadina Extension (2015)</li> <li>e) Finch to Richmond Hill Centre as part of Yonge Extension (2017)</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>• Overall 36% improvement with the gradual implementation of improved service levels with ATO/ATC.</li> <li>• Initial 10% improvement in line speeds expected in 2015 with Finch to Downsview implementation (no additional vehicles required).</li> <li>• Increased service levels (to 105 second headways) beyond 2015. Requires the purchase of additional vehicles over and above the existing TTC capital budget</li> <li>• Allows the implementation of platform edge doors with the resulting impact on system reliability, safety and capacity</li> </ul>
Diversion effect of Spadina Subway riders attracted from Yonge Subway Corridor	<ul style="list-style-type: none"> <li>• TYSSE project expected to be operational in 2015 approximately two years prior to earliest opening of Yonge Subway Extension.</li> </ul>	<ul style="list-style-type: none"> <li>• 2,300 peak period riders diverted from Yonge to Spadina.</li> <li>• Represents 1,300 peak point riders or 4% of existing Yonge Subway ridership.</li> </ul>
7 <sup>th</sup> car added to existing 6 car subway train consist	<ul style="list-style-type: none"> <li>• Long term strategy post 2015 (see implementation issues).</li> </ul>	<ul style="list-style-type: none"> <li>• Only possible with full implementation of ATO/ATC in 2015.</li> <li>• Due to impacts in station platforms, crossovers, tail tracks, yards and subway car houses adding a 7<sup>th</sup> car is a long term strategy following the full implementation of improved service levels to 105 second headways.</li> <li>• Has the ability to improve capacity by approximately 10 to 17% if feasible in the long term.</li> </ul>
Yonge-Bloor Station capacity improvements	<ul style="list-style-type: none"> <li>• Study underway in January 2009.</li> <li>• To be completed by Fall 2009.</li> </ul>	<ul style="list-style-type: none"> <li>• Study to identify specific triggers and timing for capacity improvements.</li> <li>• Likely to be required prior to Yonge Subway extension being and/or implementation of key components of Transit City.</li> <li>• A key requirement to accommodate future Yonge ridership growth.</li> </ul>
Capacity of existing Yonge/University Subway stations	<ul style="list-style-type: none"> <li>• Second exit capacity improvements have been prioritized from an implementation perspective and planned for Summerhill, College, Wellesley, Dundas and Museum Stations</li> </ul>	<ul style="list-style-type: none"> <li>• Planned network improvements (Transit City, Yonge, Spadina, etc.) may result in minor changes in priorities for improvements in station capacity in the downtown core.</li> </ul>

## Exhibit 9 – Summary of Key Capacity Improvements

Initiative	Year	Capacity Impact on Yonge
Toronto Rocket Cars	2011	+ 10% improvement
ATO/ATC in place (Finch – Downsview)	2015	+ 10% improvement in operating speeds (see overall ATO improvement below)
Spadina Subway	2015	- 4% diversion of Yonge riders to Spadina
Improved service levels/closer train spacing (to 105 seconds, with ATO)	2015 to Future	+ overall 36% improvement (including above increased operating speeds)
7 car subway trains	Long Term	+ 10% to 17% improvement
Downtown Relief Line (Pape-Queen)	Long Term	<ul style="list-style-type: none"> <li>• Diversion of 41% of Yonge peak point riders to relief line</li> </ul>
Growth in GO Rail Ridership	On-going	<ul style="list-style-type: none"> <li>• Potential to off load long distance trips from Yonge Subway</li> </ul>
Yonge-Bloor Station	On-going	<ul style="list-style-type: none"> <li>• A key requirement to accommodate future growth in Yonge ridership</li> </ul>

## Exhibit 10 – Ancillary Potential Costs for Capacity Improvements

Capacity/System Improvement Station	Preliminary Capital Cost (2008 dollars)	Initiatives that Contribute to Project Need and Justification
Yonge-Bloor Capacity Improvements	<ul style="list-style-type: none"> <li>• \$450 million</li> </ul>	<ul style="list-style-type: none"> <li>• Yonge Subway Extension to Richmond Hill Centre</li> <li>• Transit City initiative (various lines)</li> <li>• growth in Toronto/York Region</li> <li>• intensification in existing Yonge Subway corridor</li> </ul>
Subway Fleet Expansion	<ul style="list-style-type: none"> <li>• Vehicle fleet to accommodate 105 second headways is between 48 and 72 additional vehicles, depending on the maintenance spares ratio. This excludes the vehicles for the Yonge and Spadina vehicles which are already in their respective project budgets, see implementation issues.</li> <li>• Based on \$3.5 million per vehicle, the fleet implications of ATO/ATC service level improvements are \$168 million to \$252 million.</li> </ul>	<ul style="list-style-type: none"> <li>• Spadina Subway extension to Vaughan Corporate Centre (vehicles already included in project budget)</li> <li>• Yonge Subway extension to Richmond Hill Centre (vehicles already included in project budget)</li> <li>• Transit City initiative (various lines)</li> <li>• Increased service levels with ATO/ATC to respond to system growth/intensification</li> </ul>
Second exits at Yonge Stations south of Bloor	<ul style="list-style-type: none"> <li>• Up to \$15 million per station.</li> <li>• Upgrades to 5 stations at \$5M included in the TTC capital program.</li> </ul>	<ul style="list-style-type: none"> <li>• Yonge Subway Extension to Richmond Hill Centre</li> <li>• Transit City initiative (various lines)</li> <li>• Increased service levels with ATO/ATC to respond to system growth/intensification</li> </ul>
Downtown Relief Line (Pape to Queen)	<ul style="list-style-type: none"> <li>• 7 kilometres x \$300 million per kilometre = \$2.1 billion.</li> <li>• Assumes underground alignment using subway technology.</li> </ul>	<ul style="list-style-type: none"> <li>• Yonge Subway extension to Richmond Hill Centre</li> <li>• Transit City initiative (various line)</li> <li>• Increased service levels with ATO/ATC in response to system growth/intensification</li> <li>• Capacity of Yonge-Bloor Station following capacity improvements</li> </ul>

## Exhibit 10 – Ancillary Potential Costs for Capacity Improvements (Continued)

Capacity/System Improvement Station	Preliminary Capital Cost (2008 dollars)	Initiatives that Contribute to Project Need and Justification
<p>Subway Yard Expansion to Match Growth in Vehicle Fleet</p>	<ul style="list-style-type: none"> <li>• New yard (\$350 - \$450 million) or Satellite yard (\$150 - \$250 million).</li> <li>• Note that an allowance for the storage and maintenance of subway cars related to the Yonge/Spadina extension projects are already included in the respective project budgets assuming expansion of existing yards (Wilson).</li> <li>• A Subway Rail Yard Needs Study is currently underway to determine an overall yard strategy and the results of this study may increase the yard cost attributable to both the Spadina and Yonge projects</li> <li>• The study will also examine the need/timing for a Sheppard Subway West extension (Yonge-Downsview) to bring trains in to service on the Yonge line directly from Wilson Yard via the Sheppard West extension. The implementation of a Sheppard Subway is also a network issue vis-à-vis Finch/Sheppard LRT network configuration.</li> </ul>	<ul style="list-style-type: none"> <li>• Yonge Subway extension to Richmond Hill Centre</li> <li>• Spadina Subway extension to Vaughan Corporate Centre</li> <li>• Transit City initiative (various lines)</li> <li>• Increased service levels with ATO/ATC in response to system growth/intensification</li> </ul>

**Exhibit 10 – Ancillary Potential Costs for Capacity Improvements (Continued)**

Capacity/System Improvement Station	Preliminary Capital Cost (2008 dollars)	Initiatives that Contribute to Project Need and Justification
Sheppard Subway Extension (Yonge-Downsview)	<ul style="list-style-type: none"> <li>• 4.2 kilometres x \$325 million per kilometre = \$1.36 billion</li> </ul>	<ul style="list-style-type: none"> <li>• Yonge Subway extension to Richmond Hill Centre</li> <li>• Transit City initiative (particularly the Finch/Sheppard LRT lines)</li> <li>• Increased service levels with ATO/ATC in response to system growth/intensification</li> <li>• Capacity of Wilson/Davisville yard to accommodate growth in subway car fleet. Deadhead mileage implications of existing and future yards</li> <li>• Impact of the growth in the subway car fleet/AM rush hour service start up on nightly window for subway maintenance</li> <li>• Potential need for network connection from Wilson Yard to Sheppard Subway to Yonge Subway to allow Yonge trains to be fed directly to the Yonge Subway without deadhead mileage via Union Station</li> </ul>