TORONTO TRANSIT COMMISSION
REPORT NO.

MEETING DATE: October 24, 2012

SUBJECT: DOWNTOWN RAPID TRANSIT EXPANSION STUDY (DRTES)
PHASE 1 STRATEGIC PLAN

ACTION ITEM

RECOMMENDATIONS

It is recommended that the Commission:

1. Receive and accept the findings of the, *Downtown Rapid Transit Expansion Study – Phase 1 Strategic Plan*, the results of which are summarized in this report. The complete report is posted on the TTC's web site at:

   http://www3.ttc.ca/About_the_TTC/Projects_and_initiatives/Downtown_Rapid_Transit_Expansion_Study/index.jsp.

   The study, which has been completed by a joint study team of TTC and City of Toronto staff, provides a comprehensive review of issues and options related to rapid transit services into the downtown to 2031 and beyond. The study concludes that:

   - the Yonge Subway and a number of GO Rail corridors are overcrowded today;
   - both GO and TTC have plans to increase the capacity of their systems over the next 10-to-20 years, including projects such as:
     - introduction of higher-capacity Toronto Rocket trains and the implementation of Automatic Train Control on the Yonge Subway line;
     - significant increases in peak hour train service on most GO rail lines, contingent on funding availability;
   - by 2031 transit ridership into the downtown is expected to grow by 51%. The planned capacity improvements will keep pace with this ridership growth in many corridors, however, the forecast growth in longer-distance trips from the north and east in particular is expected to be greater than the growth in capacity planned for these corridors;

- an extension of the Yonge Subway line to Richmond Hill would result in significant overcrowding on the Yonge subway line by 2031, even with the currently-planned capacity improvements in place;

- the construction of an initial phase of a "Downtown Relief Line" on the east side of the downtown would address these capacity concerns for the foreseeable future. Such a project would cost in the order of $3.2 billion to complete;

- there may be other means to relieve the forecast overcrowding on the Yonge line, and overcrowding on the GO Rail corridors in the east by increasing the attractiveness and capacity of local rapid transit services in existing rail corridors. A full assessment of these options was beyond the scope of the current study;

- TTC and City staff are proceeding with Phase 2 of the Downtown Rapid Transit Expansion Study to determine a preferred alignment, technology, station locations and property protection requirements for the first phase of a relief line from the east connecting the Danforth Subway with the downtown;

- TTC, City, and Metrolinx staff are continuing to work collaboratively on options to address the rapid transit capacity issues identified in the report;

2. Confirm its support for City Council's January 2009 direction that *"Metrolinx be requested to prioritize the Downtown Relief Line in advance of the Yonge North Extension in order to accommodate capacity issues resulting from the extension of the Yonge Subway";*

3. Forward this report to:
   - the City of Toronto as input to their Five-year Review of the City's Official Plan which is currently underway,
   - Metrolinx and the Province of Ontario as input to their ongoing planning work related to the GTHA Regional Transportation Plan, and
   - the Regional Municipality of York as input to their on-going work related to the proposed extension of the Yonge Subway to Richmond Hill.

FUNDING

Funding of $2.028 million was included in the TTC 2012-2016 Capital Program budget as approved by Council on January 17, 2012 under program 3.9 Buildings & Structures – Downtown Relief Line Study, category Expansion. A request for an additional $1.0 million in funding to complete phase 2 of this study, for a total of $3.028 million, has been included in the 2013-2022 Capital Budget which was approved by the Commission on September 27, 2012. Commitments for this work can be accommodated within existing approvals until approval of the revised budget by Council in January.

BACKGROUND

In January 2009, Toronto City Council approved an Environmental Assessment Study for an extension of the Yonge Subway from Finch Avenue to Highway 7 and this project is currently in the Metrolinx Regional Transportation Plan. In conjunction with that approval, Council also passed a number of motions related to concerns that such an extension would exacerbate the already-significant crowding conditions that occur on the Yonge Subway at peak times. In particular, Council approved the following motions:

- *"Metrolinx be requested to prioritize the Downtown Relief Line within its 15-year plan . . .;*

- *"Metrolinx be requested to prioritize the Downtown Relief Line in advance of the Yonge North Extension in order to accommodate capacity issues resulting from the extension of the Yonge Subway;*

- *"The Toronto Transit Commission be requested to commence the proper studies, including Environmental Assessments as required, to evaluate the merits of the Downtown Rapid Transit Line . . .;"*

This report responds to these motions of Council.

DISCUSSION

Transit services to and from the downtown core are reaching the limits of their practical peak capacity today and, with continuing growth and development in the Greater Toronto Area, the need for improvements to existing transit service is clear. Both Metrolinx (in the Regional Transportation Plan), the City of Toronto, and the Toronto Transit Commission have identified a number of potential infrastructure, operational, and policy improvements to provide additional transit capacity into, and within downtown Toronto. However, these may not be sufficient to accommodate the forecast growth in travel into the downtown area.

Within the downtown core, south of College Street from Bathurst to Parliament, the existing residential population of 71,000 is projected to increase by 83% to 130,000 by 2031. During the same period, employment is expected to grow from the current 315,000 to 404,000 (28% increase) by 2031. In addition, the City's plans call for significant growth in areas immediately adjacent to the downtown core, notably in the Waterfront and the "shoulder" areas east and west of the downtown. Significant growth is also forecast in the remainder of the city and in the Greater Toronto Area. This is expected to further increase travel demand coming into and out of the downtown core. In total, future transit demand into the downtown core is expected to increase by 55% from 155,000 to 236,000 morning peak-period trips.

Significant inbound transit capacity deficiencies exist today in the morning peak period, particularly on the Yonge Subway and on many GO rail lines. Streetcar routes east and west of the downtown are similarly constrained. To address these deficiencies, and to manage growth, the TTC is:

- Increasing the capacity of the Yonge Subway line through the acquisition of new, larger Toronto Rocket trains, and implementing an Automatic Train Control system. These improvements are expected to increase line capacity by 35%.

- Increasing the capacity of the downtown streetcar network through the acquisition of new, larger articulated streetcars.

In addition, there are also significant planned improvements to GO Rail services consistent with Metrolinx's Regional Transportation Plan.

The project team, in consultation with Metrolinx staff, developed a "2031 Reference Network." This reference network is distinct from the 25 Year transit network contained in Metrolinx's Regional Transportation Plan, and involves more conservative assumptions about the amount of new transit infrastructure in place by 2031. These include all committed rapid transit improvements currently being implemented and an enhanced GO network that resembles a medium-term expansion scenario developed for GO's Electrification Study.

Even with the currently-planned GO and TTC improvements, the Yonge Subway line and much of the GO Rail network is forecast to be at, or over, capacity for trips into the downtown Toronto area during the peak periods in 2031. The most-serious capacity issues are related to long- and medium-distance trips from the east and north. There is a complex relationship between the level of demand for rapid transit into the downtown and the capacity of the system to provide for those demands, and there are a number of key issues that will need to be addressed in the next 20 years:

The Yonge Subway will reach capacity – Even assuming a significant increase in the Yonge Subway capacity with the implementation of Toronto Rocket trains and Automatic Train Control signaling systems, the Yonge Subway line will still be approaching capacity. Capacity will continue to be constrained south of Bloor-Yonge Station. There will be little spare capacity on the Yonge Subway to accommodate further increases in transit ridership beyond those forecast for 2031. In addition, if the Barrie and Stouffville GO lines do not have adequate future capacity to accommodate all intending travelers, then some of these riders will want to divert to the Yonge-University Subway line, adding further demand to the line and exacerbating its potential capacity problems.

The proposed extension of the Yonge Subway from Finch Avenue to Highway 7 is forecast to result in ridership exceeding the capacity of the Yonge Subway line before 2031 if no further action is taken to relieve overcrowding on the line.

Some GO lines will not have sufficient capacity – Many of the GO Rail lines to the downtown will be at capacity, even with the improvements included in the reference network. From the north, passenger demand is forecast to exceed the capacities of the Barrie and Stouffville GO lines. Ridership on the Lakeshore East GO line is estimated to significantly exceed the future capacity of the line.

Bloor-Yonge Station has limited capacity for passenger transfers – Bloor-Yonge station is currently a key transfer point in the subway network. Today, virtually all demand from the east and significant demand from the west on the Bloor-Danforth line destined to the downtown core transfer at Bloor-Yonge station, resulting in very large transfer volumes at this station. The situation is exacerbated by full trains on the Yonge Subway, resulting in increased dwell times on the station platforms. With the currently-planned rapid transit network and services, by 2031 the critical passenger transfer movements at Bloor-Yonge Station are expected to increase by 45% and will require substantial improvements to be made at Bloor-Yonge Station to increase passenger capacity.

TTC Union Station and other downtown subway stations – Although the TTC is implementing improvements to Union Subway Station, the significant growth in passenger flows at this and other downtown subway stations (such as King Station) may approach or exceed station capacities in the future, during peak periods.

Surface transit operations in mixed traffic – With the new larger streetcars in operation, surface services can provide adequate capacity to accommodate the forecast demand from the "shoulder" areas adjacent to the downtown ***only if*** the current quality of service provided in mixed traffic can be maintained and improved. Typically, such quality improvements can be achieved only through significant traffic operational changes ranging from increased parking and turning prohibitions up to various types of transit rights-of-way.

Attaining higher self-containment – Higher self-containment in the downtown area – that is, where a greater proportion of jobs in the downtown area are filled by downtown residents -- could result in a reduction of long-distance commute trips destined for the downtown. Therefore, policies that result in higher self-containment would help to decrease the need for future investments in rapid transit facilities into the downtown.

To address this, two types of alternative solutions were identified in the study:

1. Policy options that would help to minimize the need for future investments in rapid transit facilities into the downtown while achieving the City's planning objectives related to city-building and sustainable transportation as outlined in the City's Official Plan.

2. Capital investments that would increase rapid transit capacity into the downtown from the east and north that also:

- provide rapid transit services to the developing areas adjacent to the downtown; and

- provide opportunities for transit-oriented redevelopment.

While planning policies, such as these, can *assist* in addressing the issues identified, significant deficiencies in transit capacity will ultimately require capital investment for transit infrastructure improvements.

Capital Investments to Increase Rapid Transit Capacity into the Downtown

Given the key issues detailed above, the DTRES study considered rapid transit infrastructure alternatives along two primary corridors: a "downtown relief" corridor creating a new travel option for passengers on the Bloor-Danforth subway line to travel into the downtown (DRL); and a rapid transit alternative along the Lakeshore rail corridor providing more rapid transit capacity into the downtown from south Scarborough and south Etobicoke. In each case, the alternatives are envisioned as high-capacity, grade-separated rapid transit similar to a subway service, operating as part of the TTC system with current TTC fares.

Although GO Transit service improvements could also, potentially, address the issues identified, in particular for additional transit capacity from the north, they were not assessed in detail as part of this study. Improvements to GO Rail corridors to the north (Stouffville, Richmond Hill, and Barrie) were discussed with Metrolinx/GO staff, but a detailed analysis of these options was determined to be beyond the scope of the current TTC/City study. There may be options to improve rapid transit capacity into the downtown on these corridors, but these options require further study by Metrolinx/GO in conjunction with their ongoing plans for upgrading these lines.

The effect of each of the infrastructure alternatives assessed in the study was compared to both the 2031 Reference Network as well as the Reference Network + Yonge Subway Extension (from Finch to the Richmond Hill Centre).

Four phases of the DRL infrastructure alternative, involving a subway-like transit service operating in a tunnel, were considered to serve the downtown area:

- DRL 1 – East only via King (St. Andrew to Pape Station)
- DRL 2A – East and West via King (Dundas West to Pape Station)
- DRL 2B – East only with a northerly extension (St. Andrew to Eglinton and Don Mills)
- DRL 3 – East and West with a northerly extension in the east (Dundas West to Eglinton and Don Mills)

These options are illustrated in Exhibits 1 to 4 (attached). Although the alignments shown on these DRL exhibits reflect an illustrative-only King Street alignment and example DRL station locations, **the specific alignment and station locations will be assessed and determined during future phases of the project**.

Two Lakeshore Rapid Transit alternatives were also considered which would provide local rapid transit (subway-like) services parallel to the Lakeshore GO corridor:

- Lakeshore RT East (Rouge Hill to Union)
- Lakeshore RT East and West (Rouge Hill to Long Branch)

Both Lakeshore options include the construction of a tunneled section of the line through the downtown area with a new underground station in the vicinity of Yonge Street and Front Street. This concept is consistent with concepts present by Metrolinx staff to their Board in November 2011 as part of the *Union Station 2031* study.

These options are illustrated in Exhibits 5 and 6 (attached).

All six infrastructure options present significant benefits which have been assessed along with estimates of the capital costs required to construct the lines, and their complexity of implementation. Table 1, below, summarizes the cost and benefits of the alternatives.

Considering the growth plans of the City of Toronto, future transit demands, and the needs of the rapid transit network in the downtown area, the DRL options were found to be preferable to the options involving rapid transit on the Lakeshore East and West GO lines, for the following reasons:

- relief to the Yonge Subway Line
- relief to Bloor-Yonge Station
- network flexibility for the TTC subway network
- improved service to the downtown shoulder areas

In addition, the DRL options with an extension to Eglinton Avenue East provide a north-south rapid transit corridor between the Bloor Subway line and Eglinton Avenue, which could be extended further north on the Don Mills corridor.

An initial phase of the project extending from the University Subway line in the downtown (St Andrews or Osgoode Station) easterly to connect with the Danforth Subway at Pape Station provides the greatest and most immediate benefit to relieving overcrowding on the Yonge Subway. As a second phase of the DRTES project, staff are proceeding with an analysis of alignment, technology and station location options for this initial phase of the project.

SUMMARY

TTC and City staff, in close cooperation with Metrolinx staff, have completed a strategic study of future rapid transit needs into the downtown. The study focused on the specific problem of overcrowding on the Yonge Subway line, but also included a broader review of issues and opportunities.

The study concludes that increased rapid transit capacity to relieve overcrowding on the Yonge subway line will be required in advance of any further extension of the line north of Finch Station. This relief could be provided by a first phase of a "Downtown Relief" subway line from Pape Station into the downtown. It may be possible to provide similar relief through more intensive use of existing GO Rail corridors, but a detailed study of these options was beyond the scope of the current study.

October 24, 2012
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Attachments: Exhibits 1 to 6

Table 1: Summary Assessment of Infrastructure Alternatives

The following is an analysis of the ability for a selection of potential infrastructure improvements to address various key requirements and criteria determined within the problem statement of the project.
This matrix summarizes this assessment with a quantifiable means where possible, based on modeling and analysis work performed for the peak AM hour.
For the TTC Downtown Relief Line and GO Transit improvements, the modeling analysis used the 2031 Reference + Yonge Subway Extension.

Infrastructure Improvements	2031 Reference Network	2031 Reference Network w/ Yonge Extension	TTC Downtown Relief Line (DRL-1, East)	TTC Downtown Relief Line (DRL-2-A, East + West)	TTC Downtown Relief Line (DRL-2-B, East, North to Eglinton)	TTC Downtown Relief Line (DRL-3, East + West, North to Eglinton)	Lakeshore RT East	Lakeshore RT Full
Requirements								
Relieves Yonge demand south of Bloor	⊘	☒☒	☑☑	☑☑	☑☑☑	☑☑☑	☑	☑
Relieves demand at Yonge-Bloor Station	⊘	⊘	☑	☑☑	☑☑	☑☑☑	☑	☑
Relieves demand on other YUS Stations south of Bloor	⊘	⊘	☑	☑☑	☑	☑☑	☒☒	☒☒
Minimize rapid transit (GO and subway) capacity deficiencies	⊘	⊘	☑	☑☑	☑	☑☑	☑☑	☑☑☑
Minimze local transit capacity deficiencies	⊘	⊘	☑	☑☑	☑	☑☑	☑	☑
Impact to Boardings and Alightings at TTC Union Station	⊘	☒	☑	☑☑	☑	☑☑	☒☒	☒☒
Impact to Boardings and Alightings at GO Union Station	⊘	⊘	☑	☑☑	☑	☑☑	☑☑	☑☑
Additional Benefits								
Improves total transit capacity in shoulder areas outside the downtown core	⊘	⊘	☑☑	☑☑☑	☑☑	☑☑☑	☑☑	☑☑
Increases rapid transit (GO and subway) modal share and transit ridership	⊘	⊘	☑	☑☑	☑☑	☑☑	☑☑	☑☑
Improves flexibility in subway operations	⊘	⊘	☑	☑☑	☑☑	☑☑☑	⊘	⊘
Increases accessibility to rapid transit (larger catchment area, ease of access)	⊘	⊘	☑	☑☑	☑☑	☑☑☑	☑	☑
Supports Waterfront development through improved rapid transit accessibility	⊘	⊘	☑	☑	☑	☑	☑☑	☑☑
Opportunity for intensification / revitalization of shoulder areas	⊘	⊘	☑☑	☑☑	☑☑	☑☑	☑☑☑	☑☑☑
Provides a significant alternative to inbound automobile travel	⊘	⊘	☑☑	☑☑	☑☑	☑☑☑	☑	☑
Construction Feasibility								
Risk Complexity	⊘	⊘	☒☒	☒☒☒	☒☒☒	☒☒☒	☒☒☒	☒☒☒
Cost (High Estimate)*	⊘	⊘	~ $3.2B	~ $6.2B	~ $5.5B	~ $8.3B	~$5.3B	~$8.0B

LEGEND

- ☑ Minor Positive Relationship
- ☑☑ Positive Relationship
- ☑☑☑ Major Positive Relationship
- ☒ Minor Negative Relationship
- ☒☒ Negative Relationship
- ☒☒☒ Major Negative Relationship
- ⊘ Neutral relationship with 2031 Reference Network

Exhibit 1: DRL 1 – East via King Street (St. Andrew to Pape)

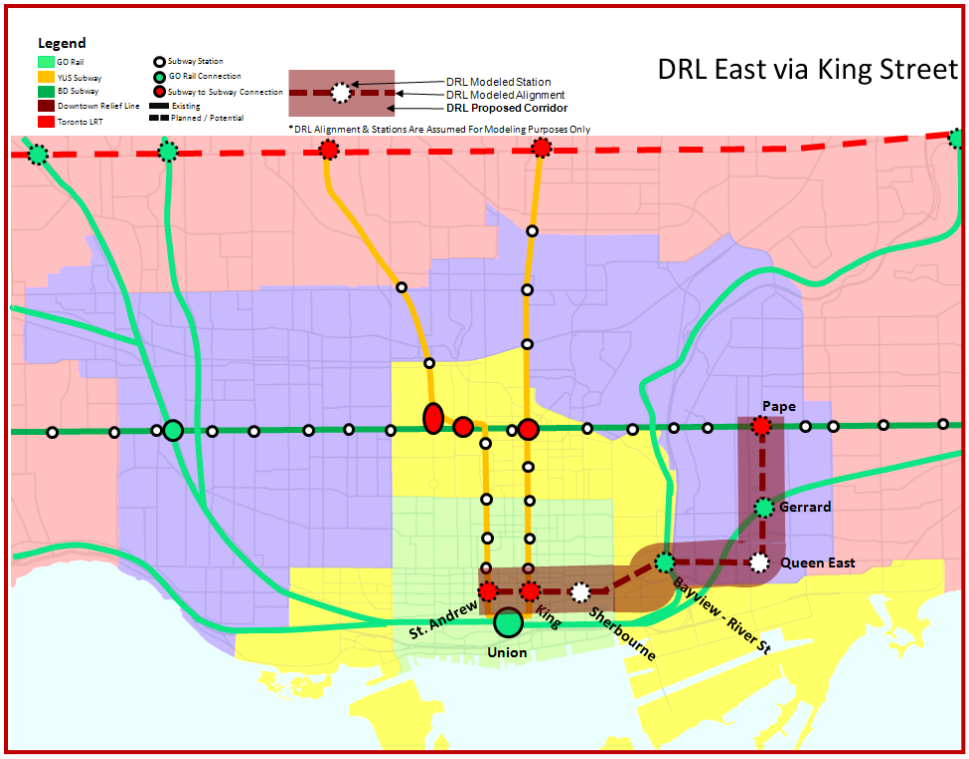

Exhibit 2: DRL 2A – East and West via King Street (Dundas West to Pape)

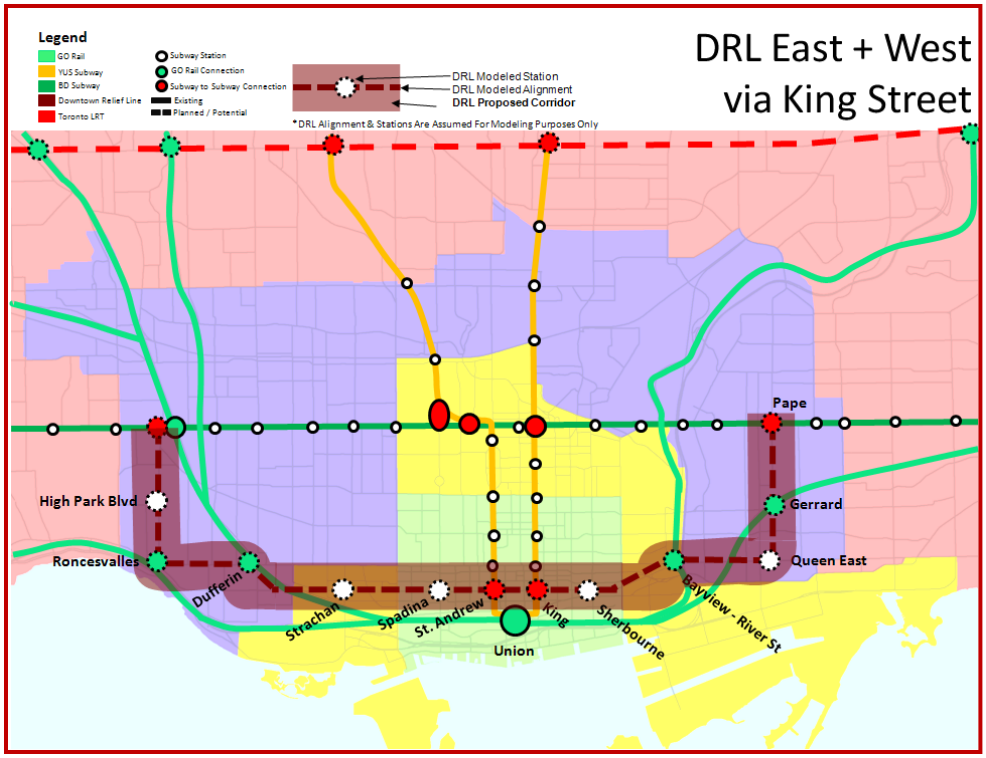

Exhibit 3: DRL 2B – East with Extension to Eglinton Avenue (St. Andrew to Don Mills and Eglinton)

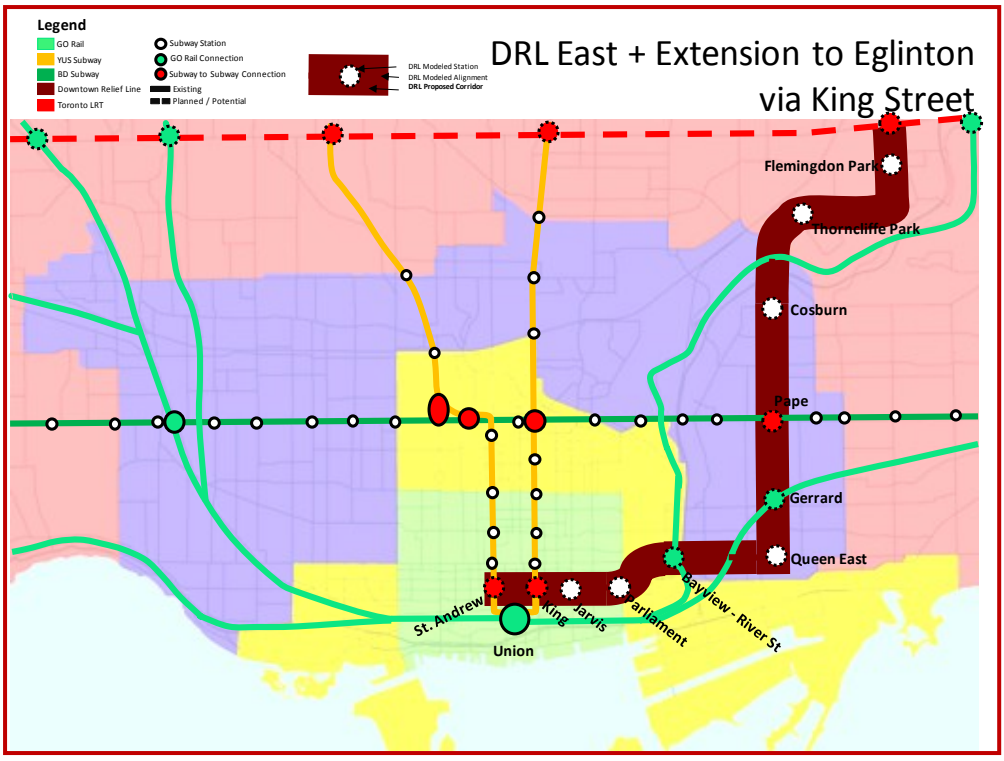

Exhibit 4: DRL 3 – East and West with extension to Eglinton Avenue (Dundas West to Don Mills and Eglinton)

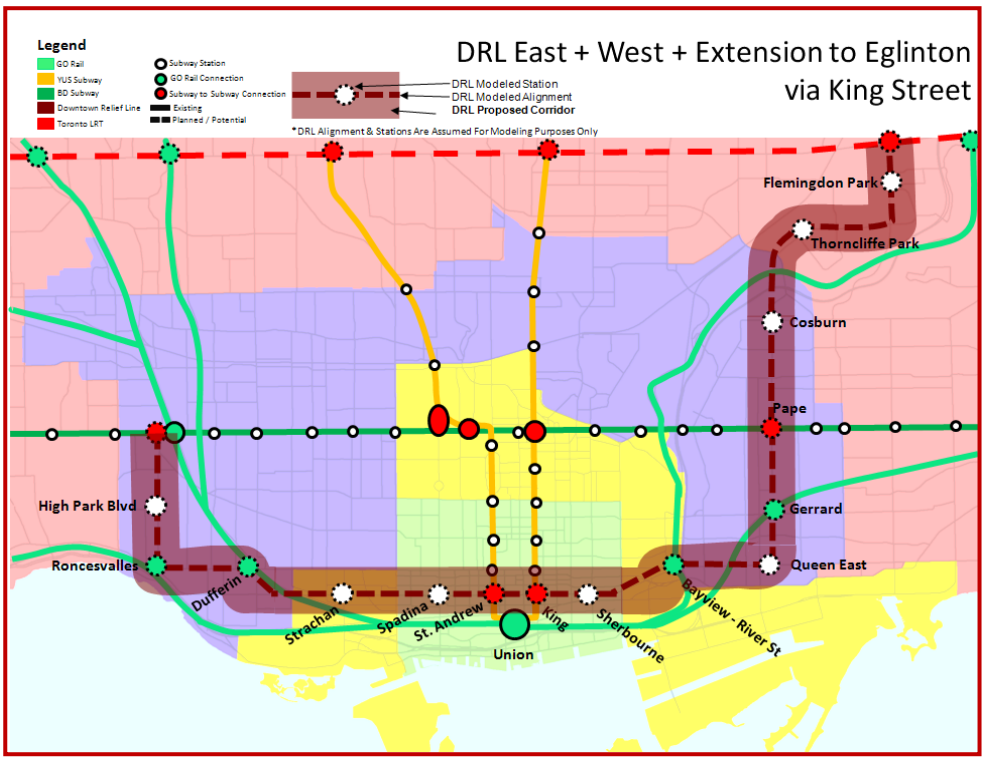

Exhibit 5: Lakeshore RT East
(Rouge Hill to Union)

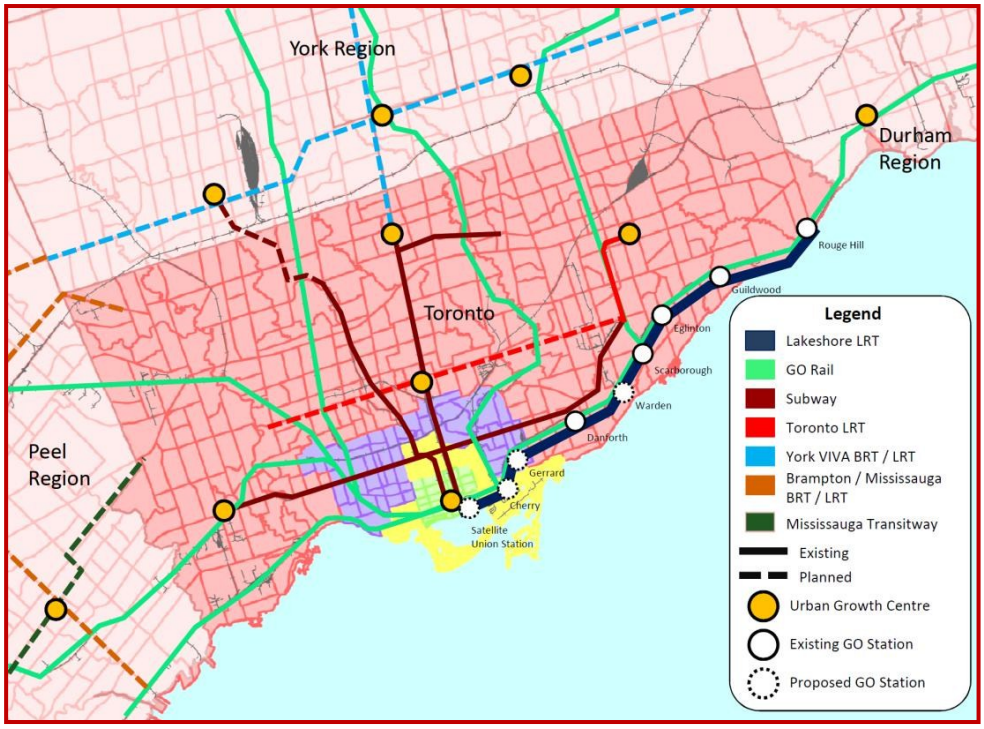

Exhibit 6: Lakeshore RT East and West
(Rouge Hill to Long Branch)