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# Yonge Relief Network Study (YRNS)

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Report for June 25<sup>th</sup> Metrolinx Board Meeting

Leslie Woo, Chief Planning Officer

Anna Pace, Director, Project Planning and Development

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# Summary of Yonge Relief Network Study (YRNS)

- The Relief Line and the Yonge North Subway Extension are both included in The Big Move and have been identified as 'Next Wave' priority projects
- The YRNS recognizes the importance of the Relief Line and the Yonge North Subway Extension in the context of the regional transit network
- YRNS was conducted in partnership with the City of Toronto, Region of York and TTC
  - YRNS Steering Committee, chaired by Metrolinx's Chief Planning Officer includes
    - Chief Planner for the City of Toronto
    - Chief Capital Officer of the TTC
    - Transportation Services Commissioner for York Region
    - President, York Region Rapid Transit Corporation
  - The Technical Advisory Committee included staff from the City of Toronto, TTC, York Region, and the Ministry of Transportation
- YRNS consisted of three major phases
  - Phase 1: Development of a long-list of measures and projects that could address congestion on the Yonge Subway
  - Phase 2: Understanding the problem - future base case
  - Phase 3: Future Scenarios

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# Recommendations

## It is recommended that the Board:

1. Receive the findings of the Yonge Relief Network Study noting that:
  - a. Significant relief to the Yonge Subway will be achieved with currently committed transit improvements underway including:
    - i. TTC's automatic train control and new subway trains;
    - ii. The Toronto-York Spadina Subway Extension; and
    - iii. GO Regional Express Rail
  - b. Based on 1(a) above, more rapid transit service and capacity that is currently funded and being implemented will meet the future 15 year demand, assuming current forecasts on the growth rate of downtown employment and the implementation of TTC automatic train control on the Yonge Subway
  - c. The options to address Yonge Subway capacity in the long term were compared and assessed
    - i. The Relief Line between the Danforth Subway and Downtown, currently under study by the City of Toronto and TTC, will provide significant relief to the Yonge Subway and Danforth Subway
    - ii. The extension of the Relief Line to north towards Sheppard Ave East will provide additional positive benefits

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# Recommendations Cont'd

2. Direct the Metrolinx CEO to work with the City of Toronto City Manager and the TTC CEO to develop an integrated approach to advance the Relief Line project planning and development, incorporating further business case analysis and the findings of the Yonge Relief Network Study to:
  - further assess the extension north to Sheppard Avenue East to identify a preferred project concept,
  - inform the planning underway by the City of Toronto and TTC to identify stations and an alignment for the Relief Line from Danforth to the Downtown area
  - continue to engage the public in this work as it develops
3. Direct staff to work in consultation with York Region, City of Toronto and the TTC to advance the project development of the Yonge North Subway Extension to 15% preliminary design and engineering;
4. Thank the YRNS Stakeholder Advisory Committee for their commitment, insight, input and advice to the study under the leadership of the co-chairs (Henry J.P. Wiercinski and Dr Pamela Robinson);
5. Thank the YRNS Peer Review Panel (consisting of Dr Jeff Casello, University of Waterloo and Dr Amer Shalaby University of Toronto), for their assistance and advice to the study; and
6. Report back to the Board in Spring 2016 on progress in advancing project planning and development on the Relief Line and Yonge North Subway Extension

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# Outline

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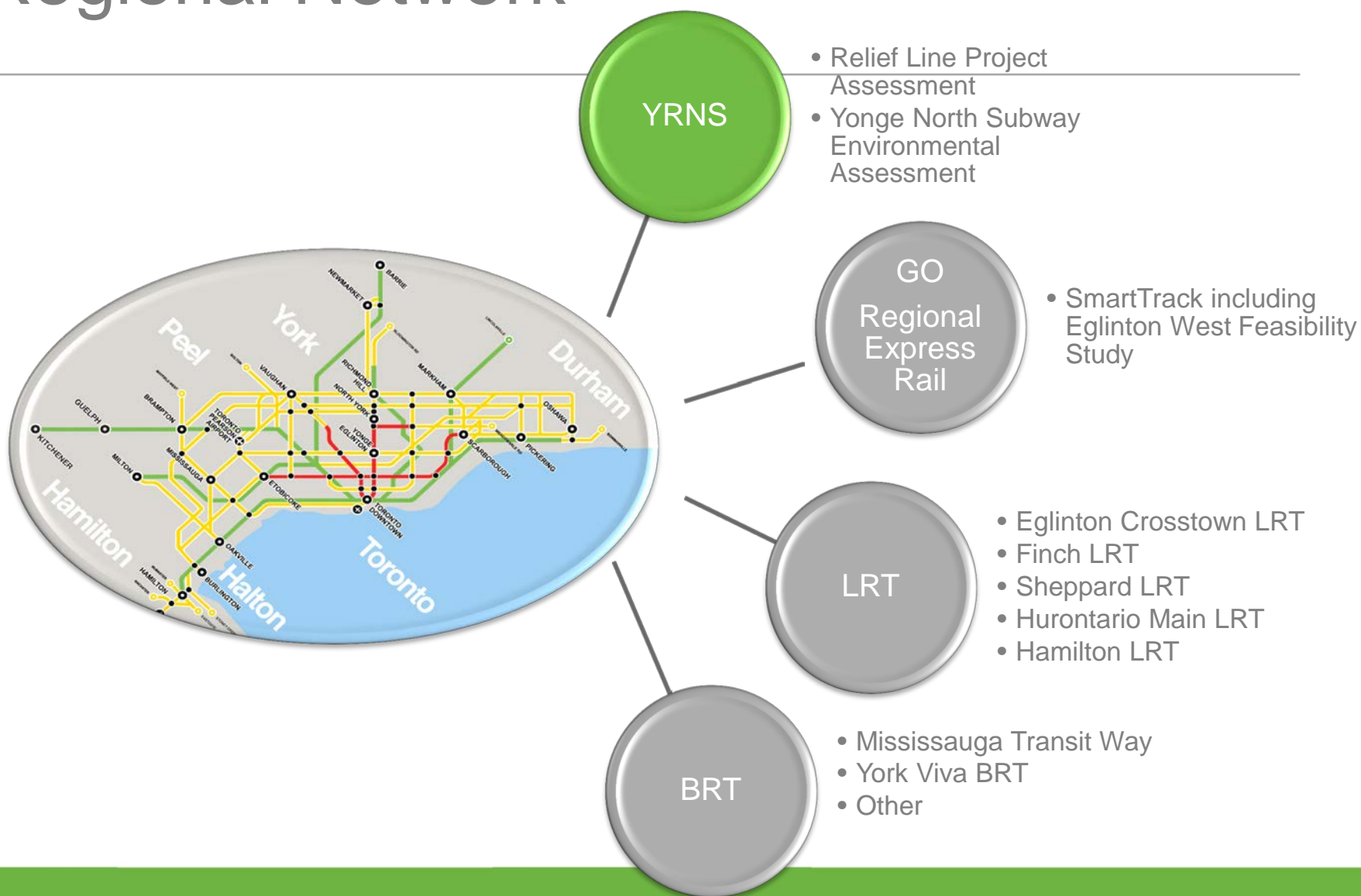
1. Background
2. Understanding the Problem
3. Future Scenarios
4. Findings

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# Background

- Capacity relief is a pressing local and regional issue. The Yonge subway is the busiest rapid transit line in the GTHA and GO Train service is currently operating at capacity during peak periods within the City of Toronto.
- The Yonge Relief Network Study involves developing regional, network-based solutions to address Yonge Subway crowding and lay the groundwork to address regional transportation challenges.
- Coordinated planning is being undertaken by Metrolinx, TTC, City of Toronto, and York Region.
- Since this Study commenced the commitment to GO Regional Express Rail and some of the early identified short and medium term options to create more capacity have been confirmed and are now embedded in the study base case.

# A Regional Network



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# YRNS Problem Statement and Vision

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## **Problem Statement**

The GTHA is experiencing unprecedented growth but is increasingly constrained by a limited transportation network. Many people use transit to access downtown Toronto and other employment areas; however, supply has not kept up with demand. In particular, the Yonge Subway, which serves both local and regional trips, is over-crowded today and, even with committed improvements, is projected to be over-crowded in the future.

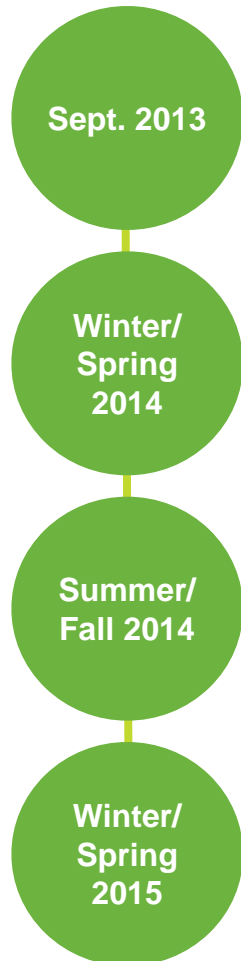
## **Vision**

Transforming the way people move throughout the region and providing needed congestion relief to the Yonge Subway by creating new local and regional travel opportunities and improving mobility across the GTHA.



# Timeline

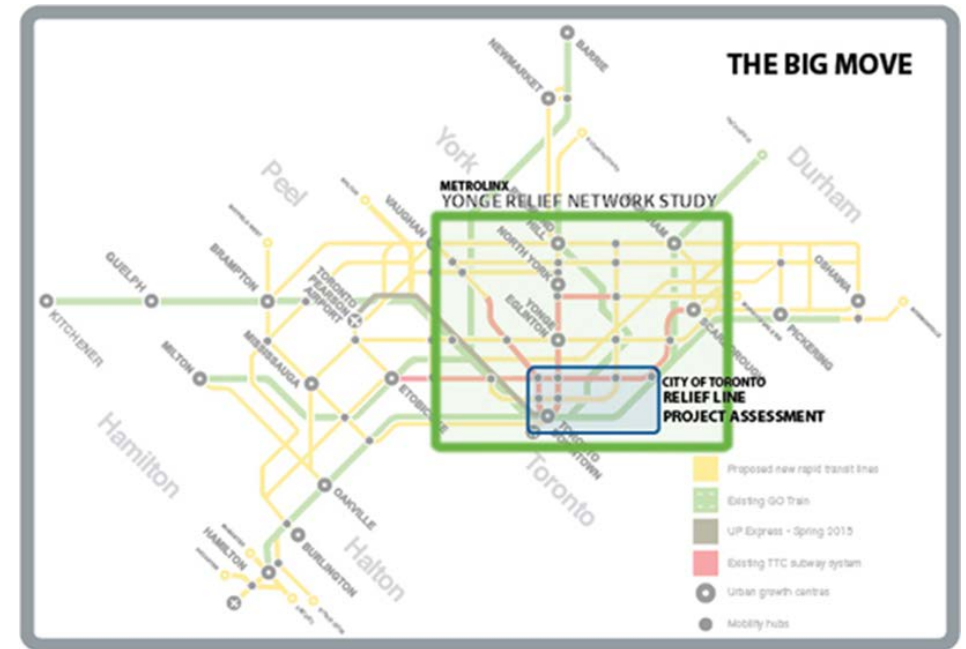
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- Yonge Relief Network Study initiated
- Problem Statement, Vision and Goals developed
- Long List of Ideas developed.
  - Presented to the Metrolinx Board, February 2014
  - Public Consultation, April 2014
- Long List of Ideas assessed against Problem Statement, Vision and Goals.
- RER Announced
- Base case revisited to include RER
- Higher performing long-term options identified
- Scenarios developed, testing and evaluation

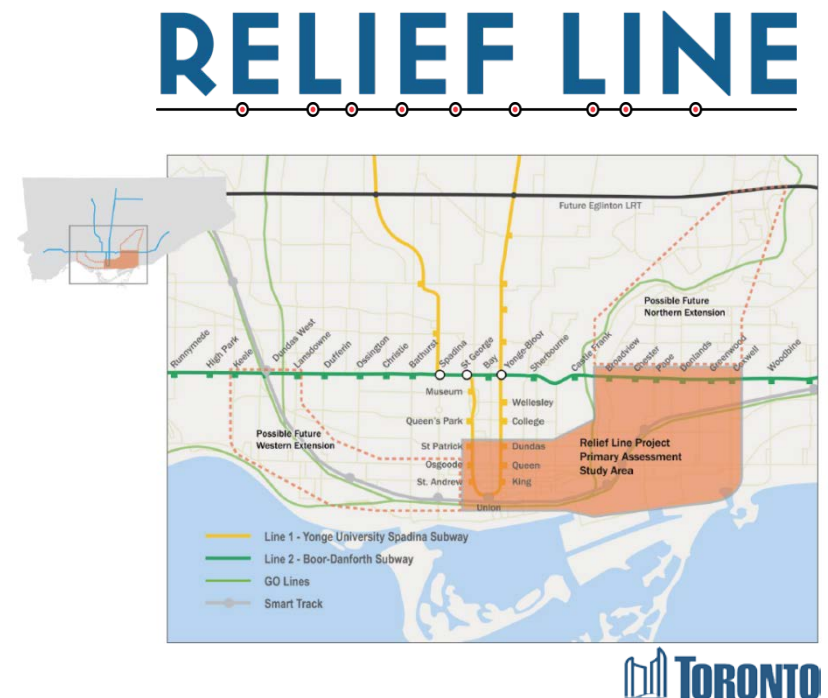
# Evolution of YRNS with RER

- Initially study was focused on understanding best intervention to relieve the Yonge Subway
- Many of the long list of suggestions included improvements to GO to deliver relief to the Yonge Subway
- In June 2014 Metrolinx Board receives RER report
- RER delivers many of the long list GO improvements
- With RER – which will provide medium term relief – the focus is now on *when* additional relief is needed for Yonge Line and then on the intervention
- YRNS is now based on RER



# City of Toronto Relief Line Project Assessment

- Determining preferred station locations and alignment for a future Relief Line
- Study area is focused between Downtown Toronto and the Danforth Subway with considerations for future extensions
- Extensive evaluation framework based on principles and criteria developed during 'Feeling Congested' Official Plan Review consultation and themed around city building
- Public consultation undertaken on terms of reference, evaluation framework and station areas
- Currently consulting on potential corridors and stations
- Expected to come forward with a recommended alignment option in early 2016



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# Study Relationships

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## Metrolinx YRNS Work

The Metrolinx work examines the whole GTHA network with committed projects including RER in place, to determine both timing of the Relief Line and various options to provide more capacity to the Yonge Subway

- Broad study area with regional network focus and analysis
- Deliverables: High-level options for Yonge Relief
- Focused evaluation criteria with emphasis on relieving Yonge Subway overcrowding

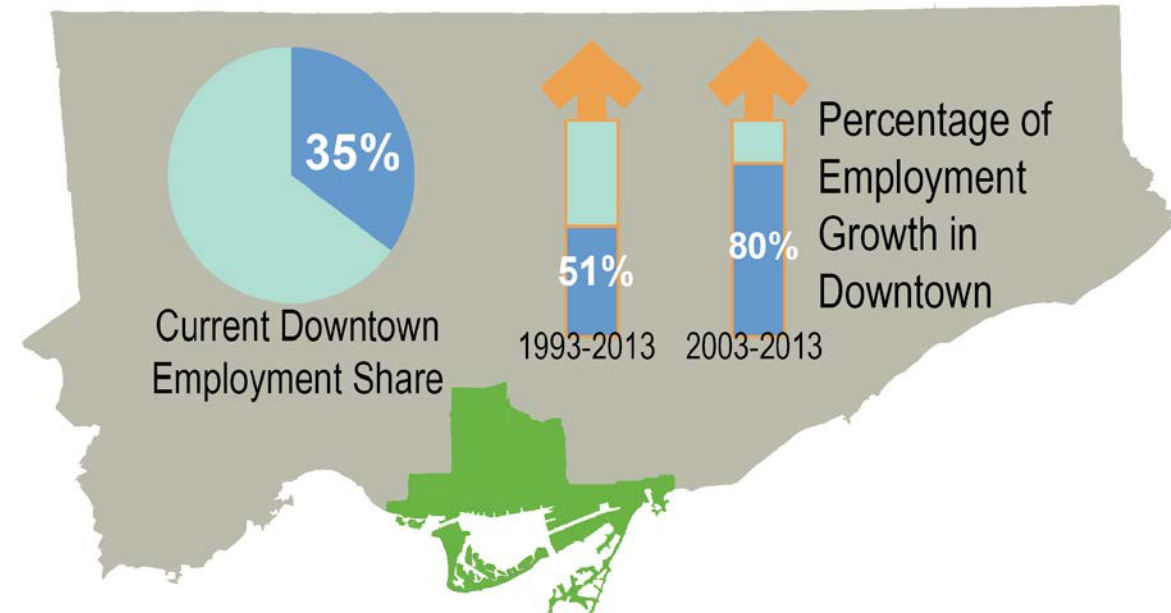
## City of Toronto Relief Line Project Assessment Work

Advancing the Relief Line concept by assessing station locations and corridors between Danforth and Downtown through a comprehensive evaluation framework

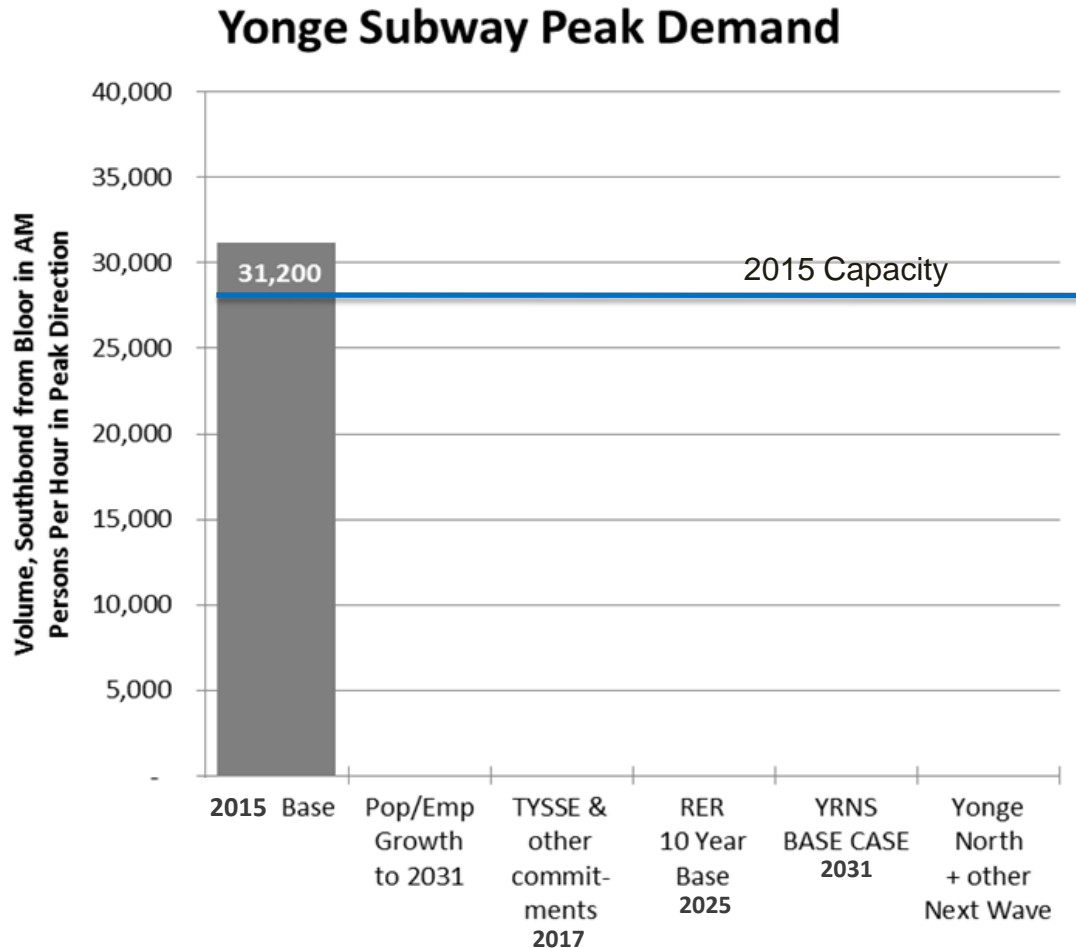
- Specific study area
- Deliverables: Alignment and Station Locations
- Comprehensive Evaluation Criteria with emphasis on City Building and intensification opportunities

# Understanding the Problem – Key Factors

- Downtown employment as a proportion of City employment is increasing.
- **The need for more transit capacity is dependent on the rate of growth in downtown**
- Modelling for YRNS used 2031 land-use from recent amendment to the City of Toronto's Official Plan (OPA 231) includes revisions to the City's 2031 population and employment forecasts



# Yonge Subway Peak Demand



- The Yonge Subway, south of Bloor is currently operating at least +11% **over** its **capacity** of 28,000 passengers per hour per direction (pphpd)

# Capacity and Committed TTC Improvements

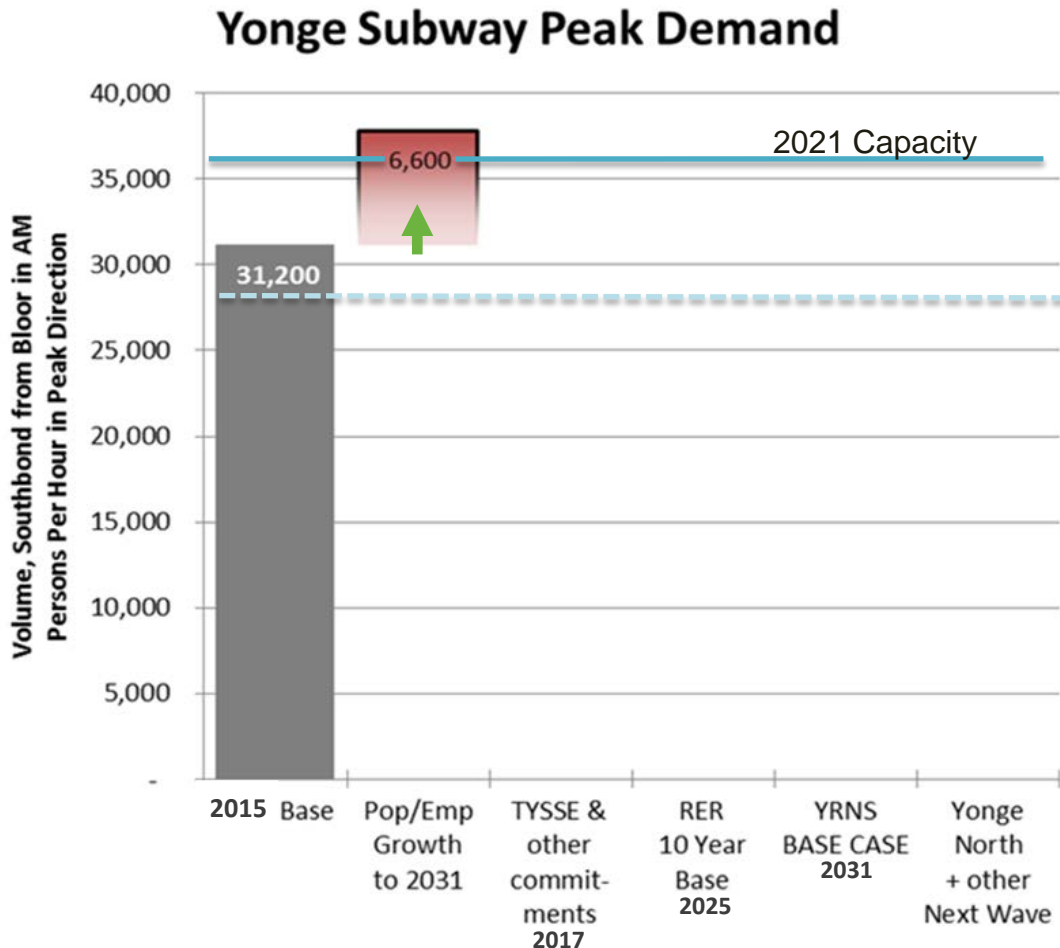
- Existing capacity = 28,000 passengers per hour per direction (pphpd)
- Committed improvements are already underway:
  - New Toronto Rocket Trains (2011)
  - Automatic Train Control (ATC)(2021)
  - Extension of University-Spadina Subway will attract customers away from Yonge (2017)
- The TTC's 2012 Downtown Rapid Transit Expansion Study (DRTES) based on Yonge Subway capacity at 38,000 pphpd with ATC and new vehicles.
- The TTC has recently updated Yonge Subway capacity with new trains and ATC to 36,000 pphpd by 2021



Image: TTC



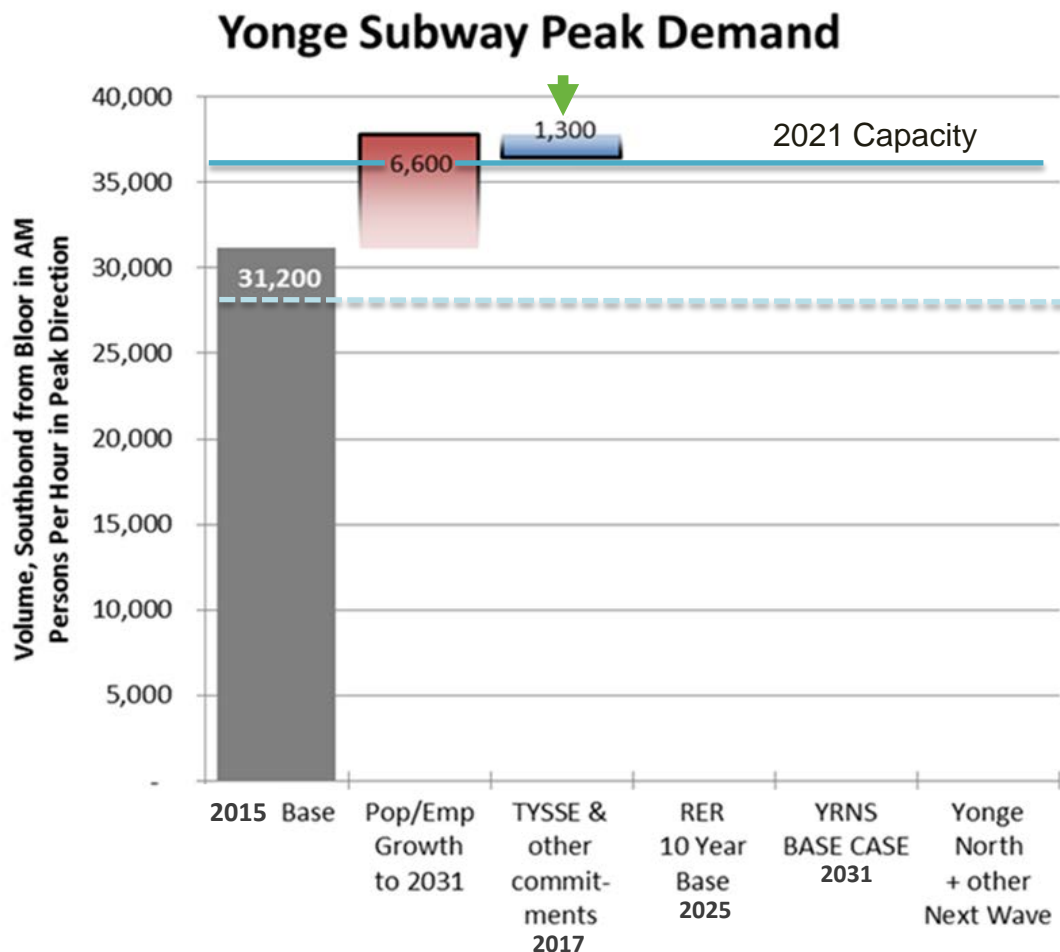
# The Challenge – Future Growth



- Population and Employment Growth to 2031 (City of Toronto projection Fall 2014)
- Two important factors:
  - Growth in PD1 employment
  - Growth in PD1 population who occupy PD1 jobs
- TTC expects that ATC will increase capacity on the Yonge Subway to 36,000 pphpd

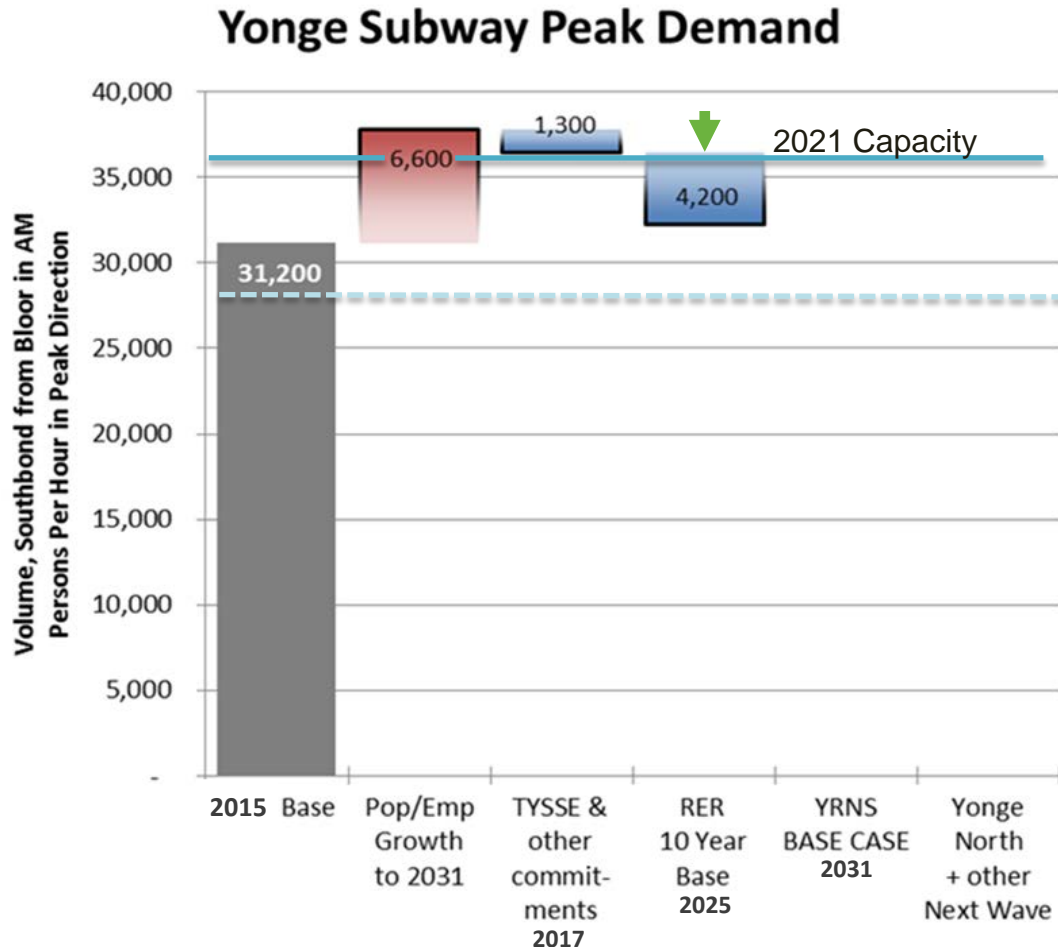


# Solutions Committed – TYSSE



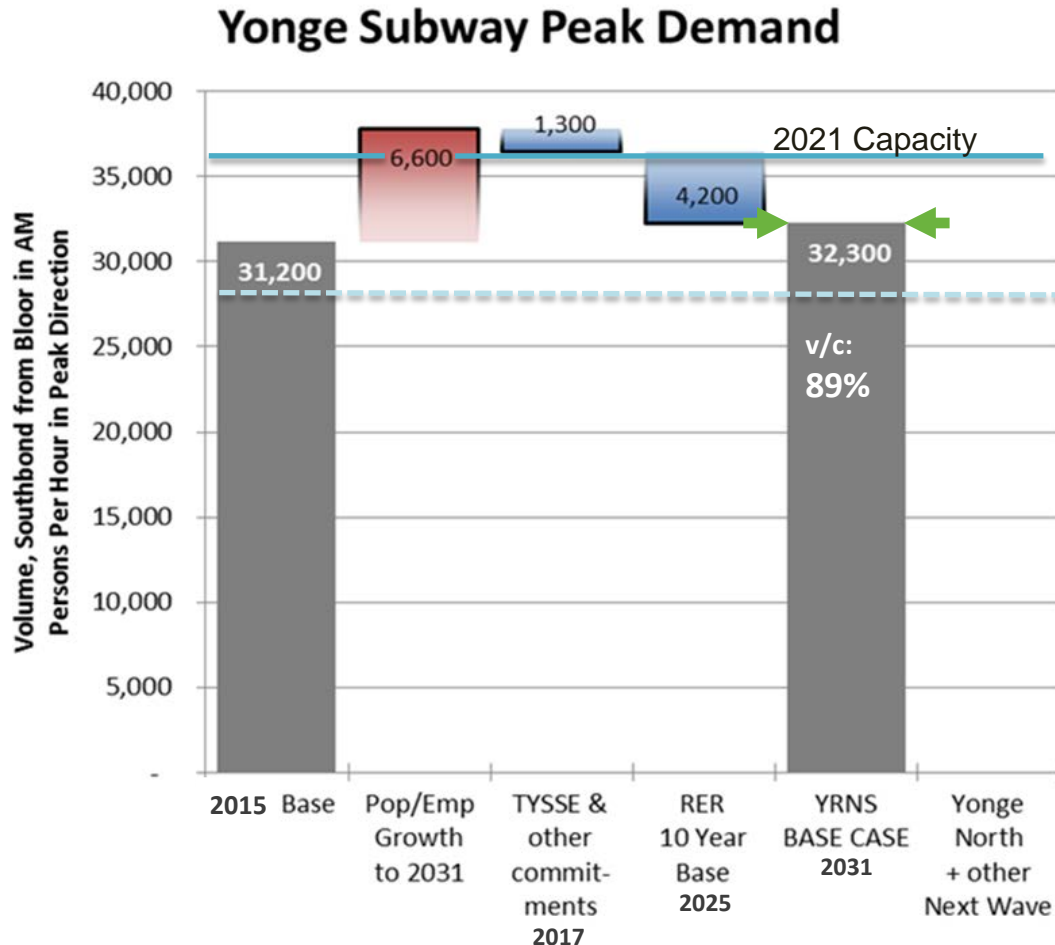
- Toronto-York Spadina Subway Extension (TYSSE) will attract some demand from Yonge Subway
- This number also includes other committed and funded projects
  - GO expansion since 2006
  - 403 Transitway
  - Scarborough Subway
  - Eglinton / Sheppard / Finch LRTs
  - VIVA expansion
  - Toronto east waterfront streetcars

# Solutions Committed – GO Regional Express Rail



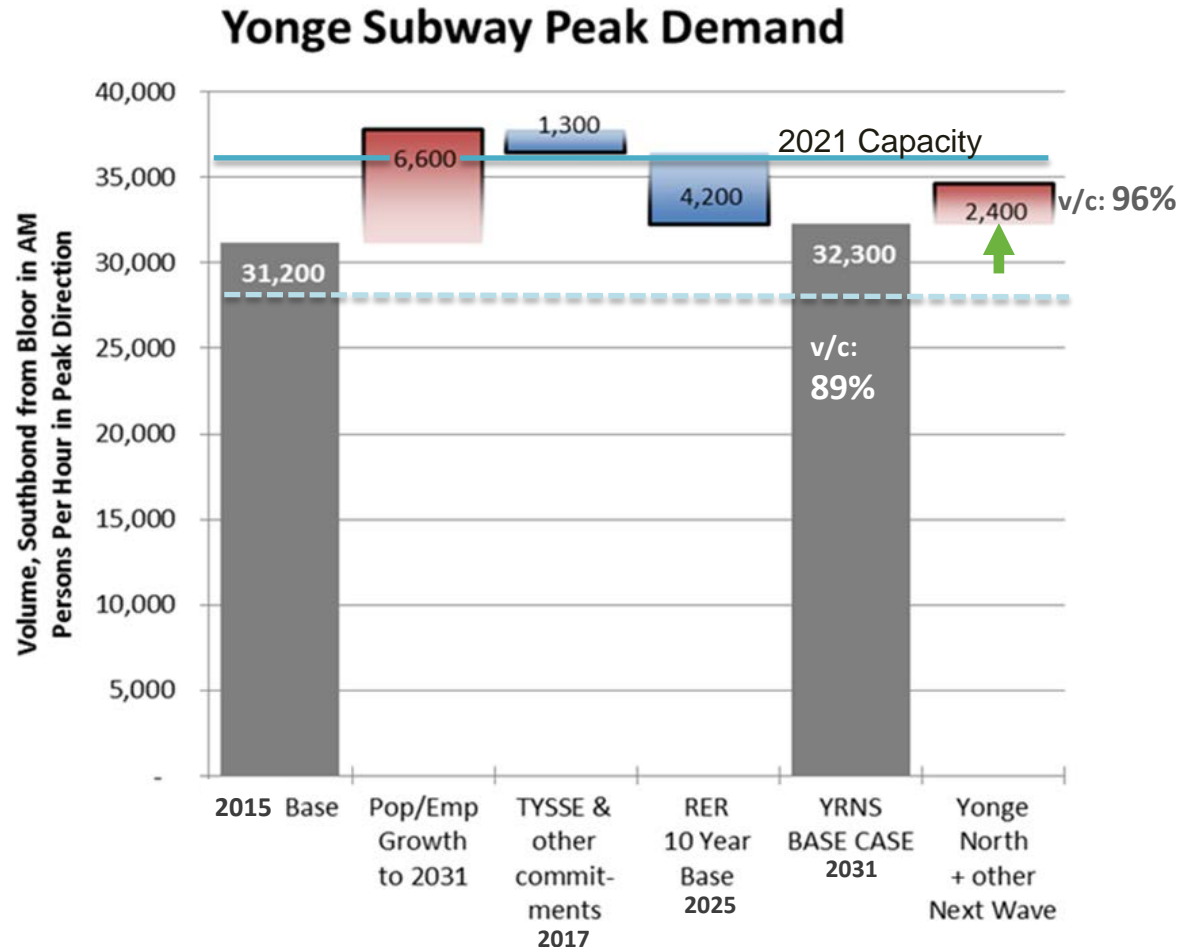
- RER concept continues to evolve
- Implementation of RER will attract significant demand from Yonge Subway
- This shows the difference between “do nothing” (GO 2013) and RER

# The YRNS Base Case



- Combining all this gives our 2031 base case: the combined effect of population & employment growth with committed and funded improvements
- The upward pressures (population and employment growth) are offset by larger downward pressures (network improvements) resulting in **about the same demand** for the Yonge Subway in 2031 as today but with higher capacity
- The volume to capacity ratio will be 89%

# Accommodating the Yonge North Subway Extension



- The Yonge North Subway Extension would increase demand on the Yonge Subway
- With the Yonge North Extension, the Yonge Subway will still be under capacity
- The volume to capacity ratio would become 96%

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# YRNS Future Scenarios

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- Scenarios are:
  - Scenario 1: Short Term (0-5 years)
  - Scenario 2: Medium Term (5-10 years)
  - Scenario 3: Longer Term: Base Case Plus
- **Scenarios aren't necessarily what one would build/implement – we are using them to determine and compare differences in performance**
- With RER providing significant relief in the short/medium term the initial findings from Scenario 1 and 2 work are being addressed by appropriate agencies
- **Focus is on longer term congestion relief**

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# Short and Medium Term

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- GO service modifications to be considered as part of RER development
  - Increased frequencies
  - New stopping patterns including shuttles
  - Longer service hours
  - New stations
- Fare Policy to be considered as part of fare and service integration study
  - Fare parity with TTC and GO
  - Co-Fare GO/TTC/York
  - Peak premium (or off-peak discount)
- Service integration
  - TTC/GO connections
  - Increased express bus routes, including to downtown
  - Transit priorities

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# Longer Term

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Longer term projects were developed, assessed and compared:

**Option 1 - RER Plus – Even More Improvements to the GO Network** - with more frequency and potentially new stations to provide a high quality service in the Yonge corridor

**Option 2 - Relief Line Options** - fully grade separated with route and phasing options that include

2A: Danforth to Downtown,

2B: Sheppard Subway to Downtown

2C: Danforth to Bloor (through downtown)

**Option 3: Surface Transit LRT** - A new rapid transit corridor to provide a high quality, attractive alternative to travel on the Yonge Subway line

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# Option 1: RER Plus Network

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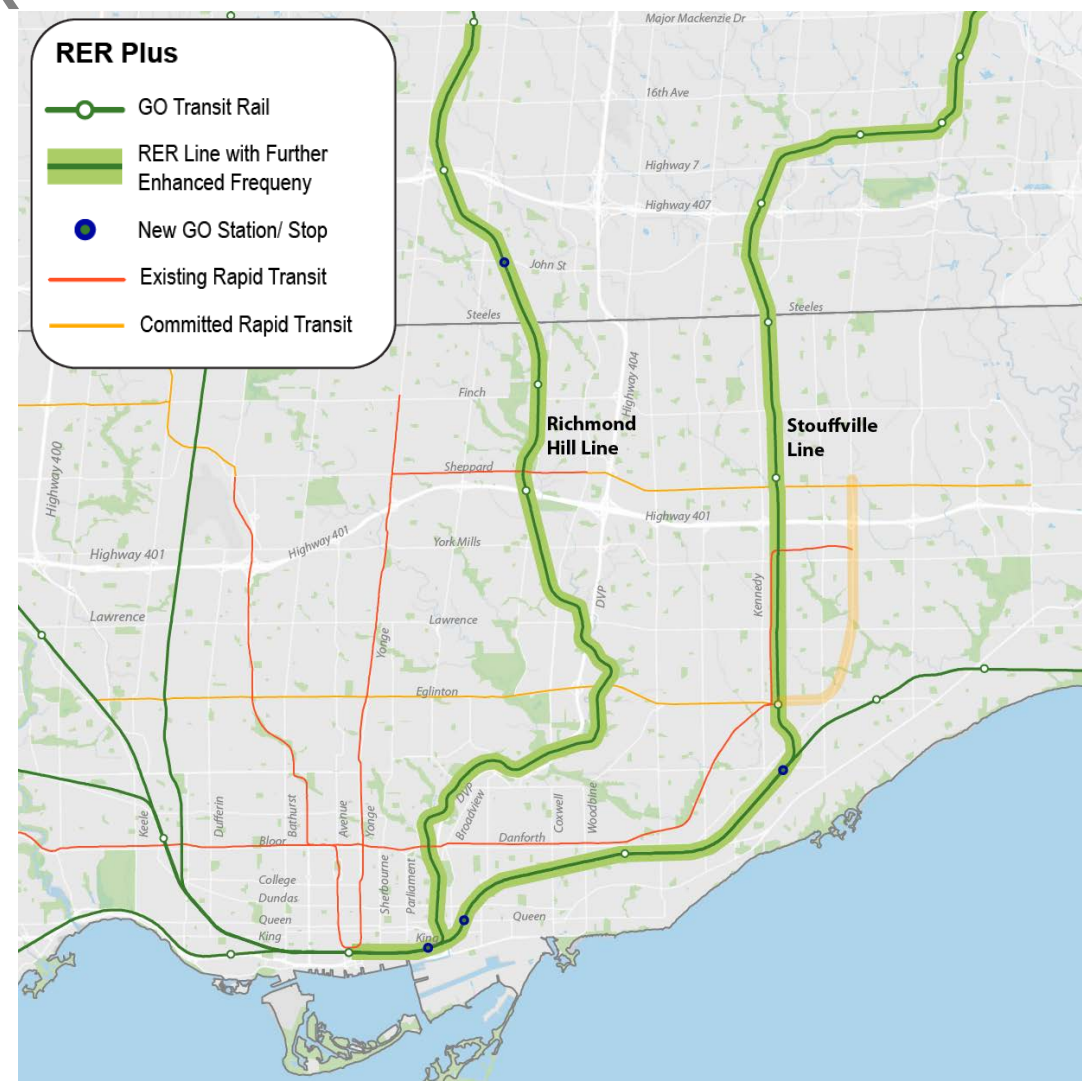
Could an RER “Plus” network provide greater congestion relief by providing:

- Higher frequency, peak period service (e.g. 5, 7½ or 10 mins) on Richmond Hill/Stouffville/Barrie corridors
- New stations
- (Further) Realignment of local transit to better serve GO stations
- Electrification/Rolling stock to provide travel time improvements



# Option 1: RER Plus Network

- Enhanced Service on Richmond Hill and Stouffville GO Lines
- Stouffville trains stopping at Scarborough Station



# Option 2 – Relief Line

**Option 2A - Relief Line SHORT-**  
Danforth to Downtown  
(Under study by City)



**Option 2B - Relief Line LONG -**  
Sheppard Subway to Downtown



**Option 2C - Relief Line U:**  
Danforth to Bloor  
(through Downtown)

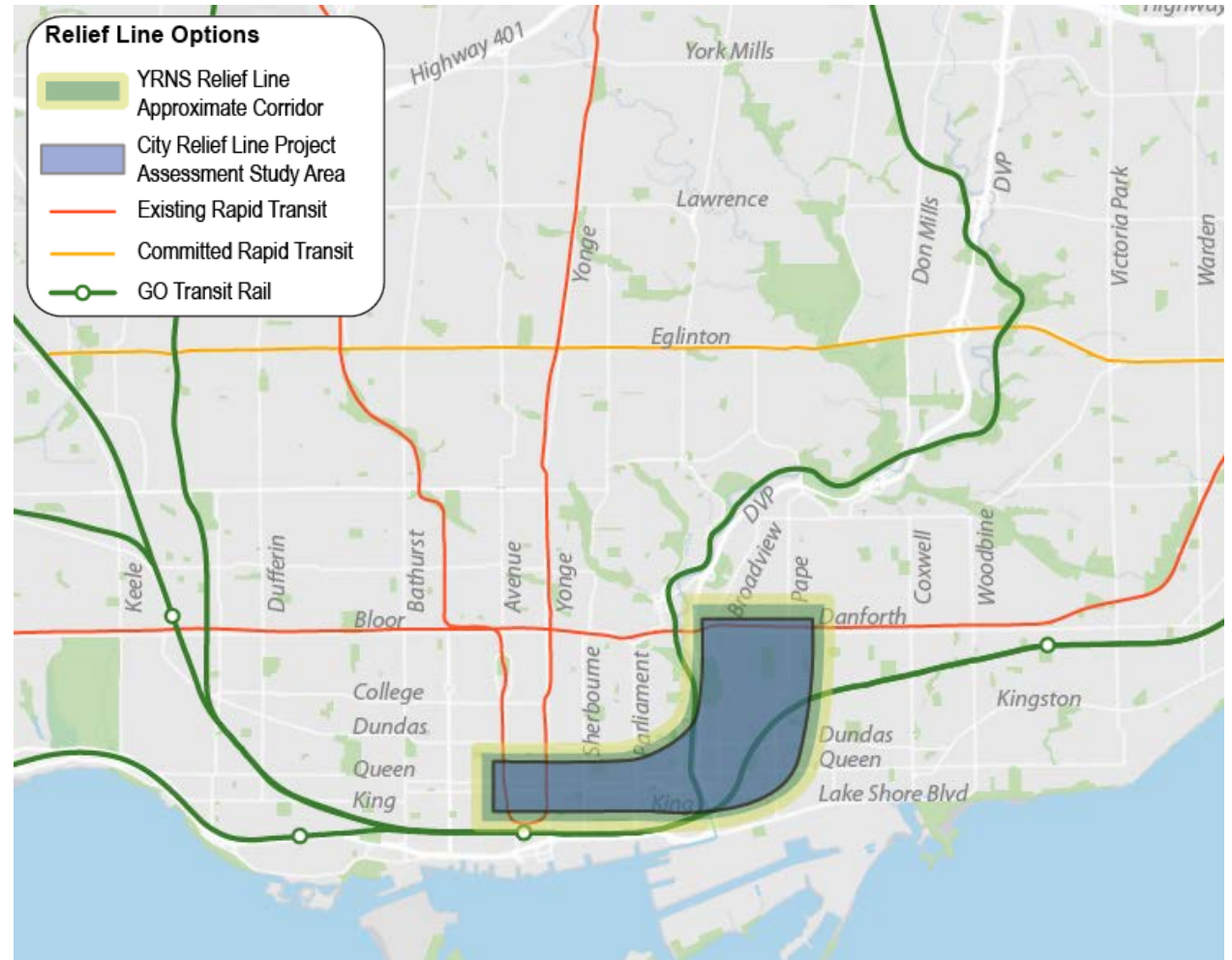


- Fully grade separated line
  - providing a similar configuration to the DRTES alignment while maximizing the priority areas served by each station
  - Assessment of GTA planning zones within the study area based on population, employment, and current Yonge ridership
  - Prioritizing each zone based on their 'potential' to enable the YRNS vision and goals (if served by a station)
- Long option has additional northeast stations in order to provide greater access for travellers, as well as enable more current Yonge Riders to utilize the new subway.

# Relief Line Options

## Option 2A: Relief Line Short

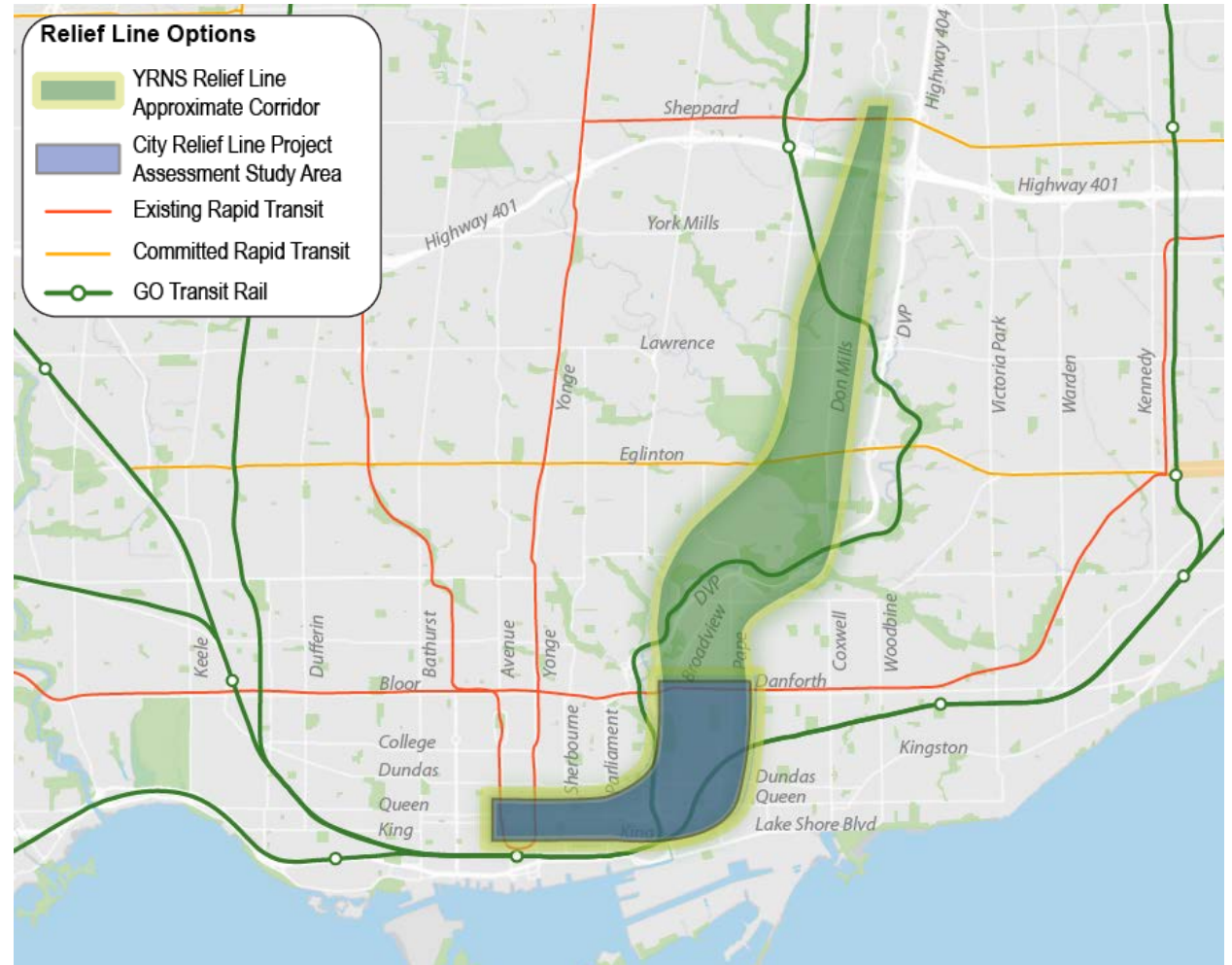
- Underground Pape Station to St Andrew
- Up to 7 Stations
- 5.6 km
- 8.8 min. travel time



# Relief Line Options

## Option 2B: Relief Line Long

- Underground Don Mills Station to St. Andrew
- Up to 14 stations
- 16.6 km
- 22.2 min. travel time Don Mills Station to King

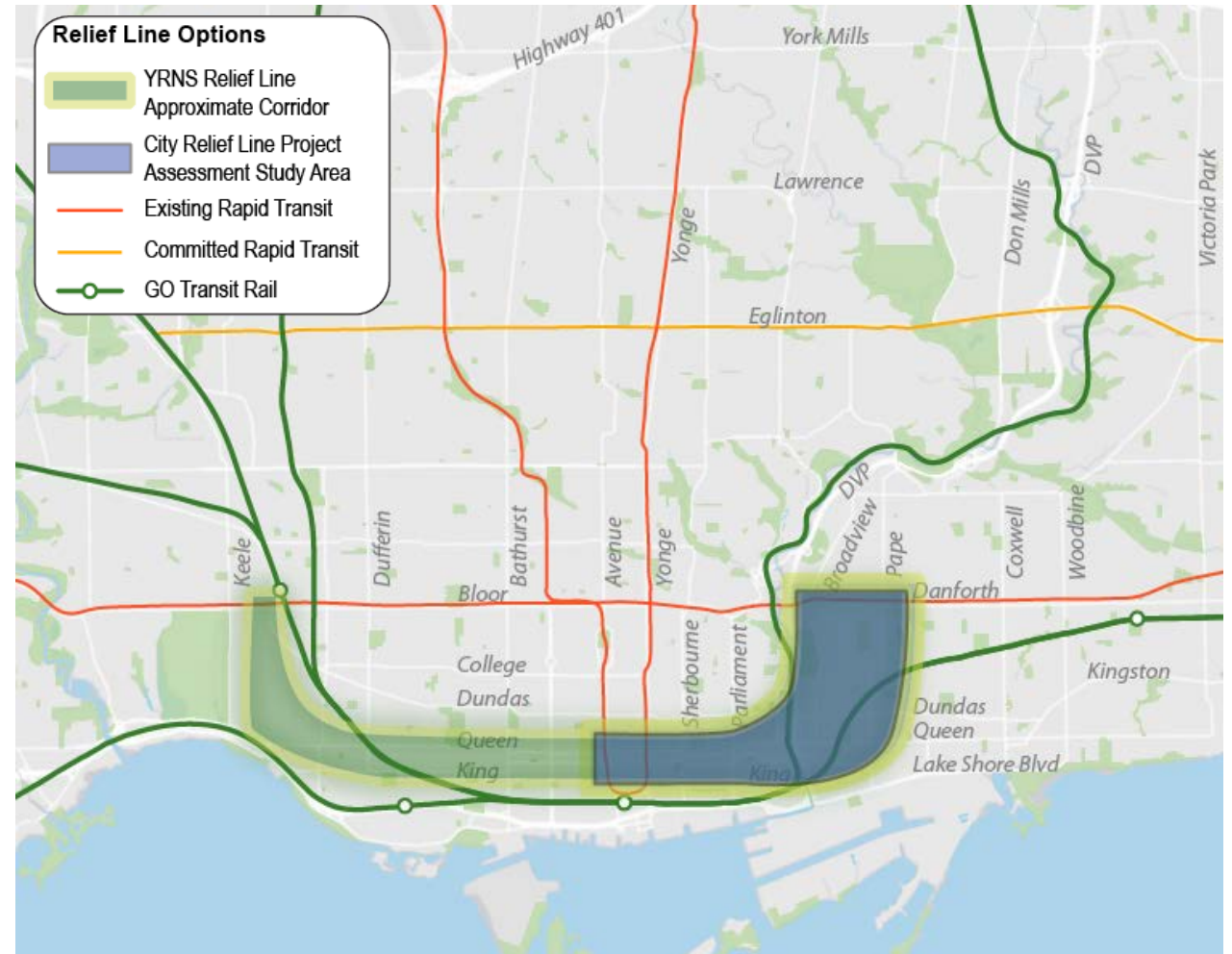




# Relief Line Options

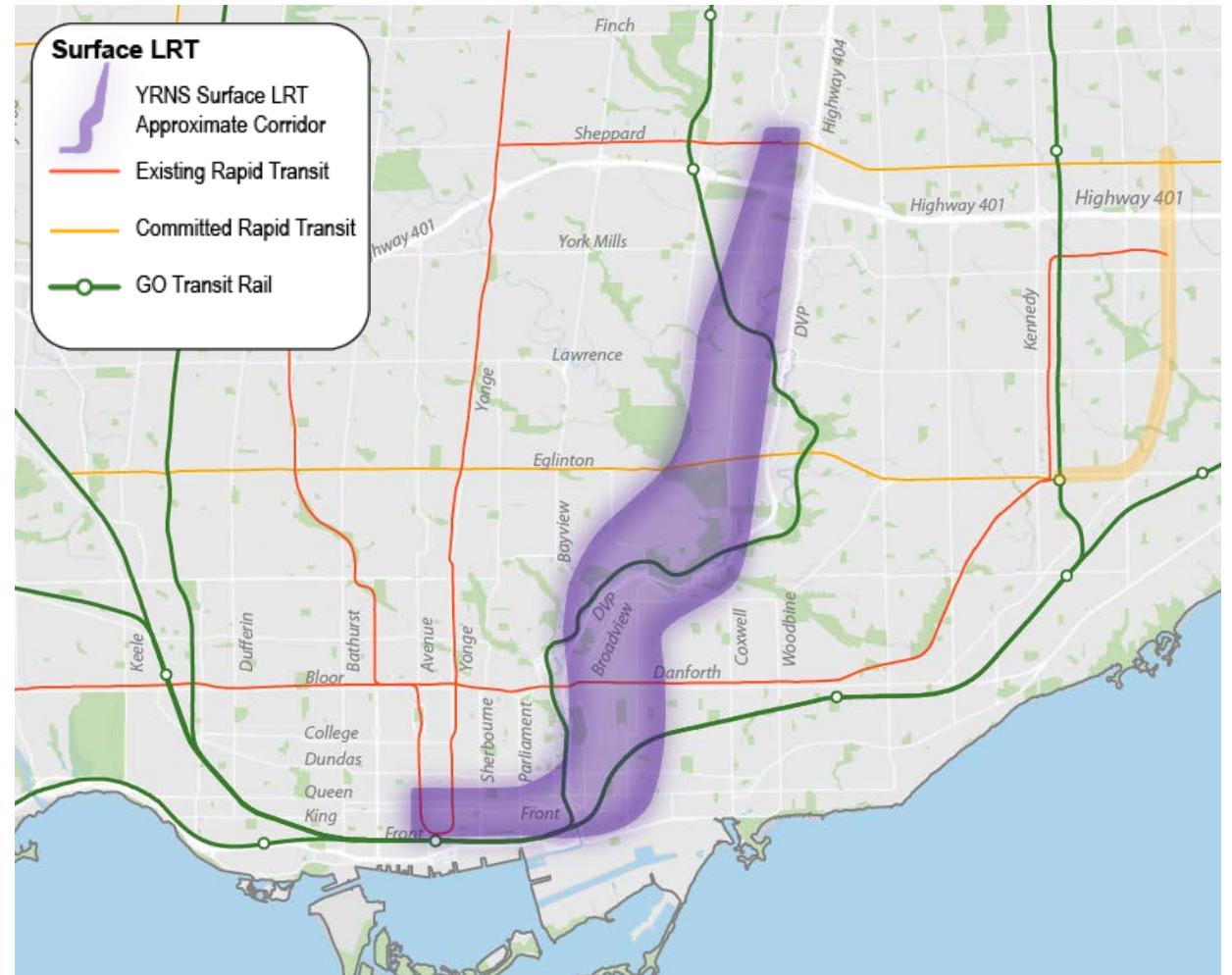
## Option 2C: Relief Line U

- Underground – Danforth to Bloor via Downtown
- Up to 13 stations
- 12.6 km
- 18.9 min. travel time



# Option 3 – Surface Transit LRT Line

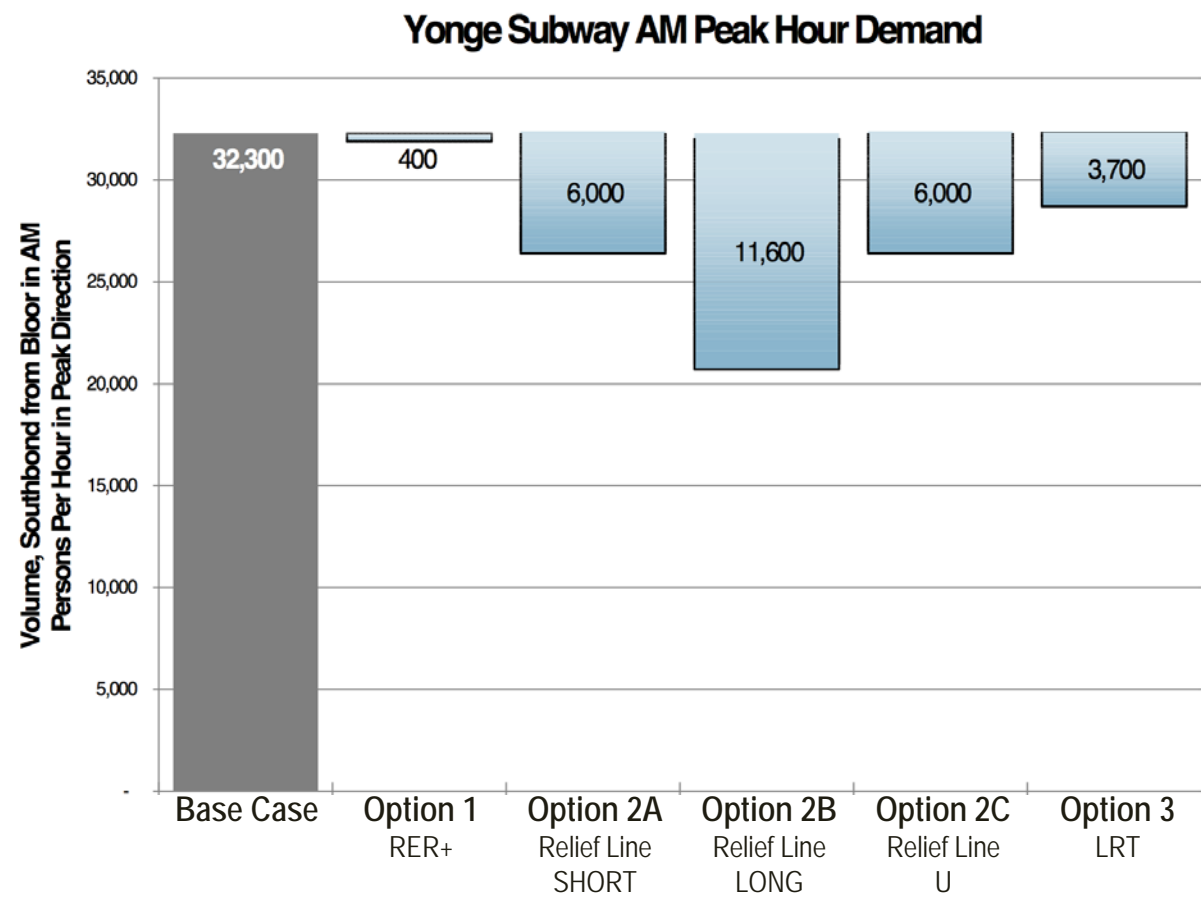
- Route fully segregated using existing corridors but runs on street in traffic in downtown
- Route suggests significant journey time benefits:
  - Journey time Don Mills to Union 20 mins
  - Quicker than Don Mills to Union (using Sheppard & Yonge subway) by 21 mins
  - Up to 8 Stations



# Emerging Results

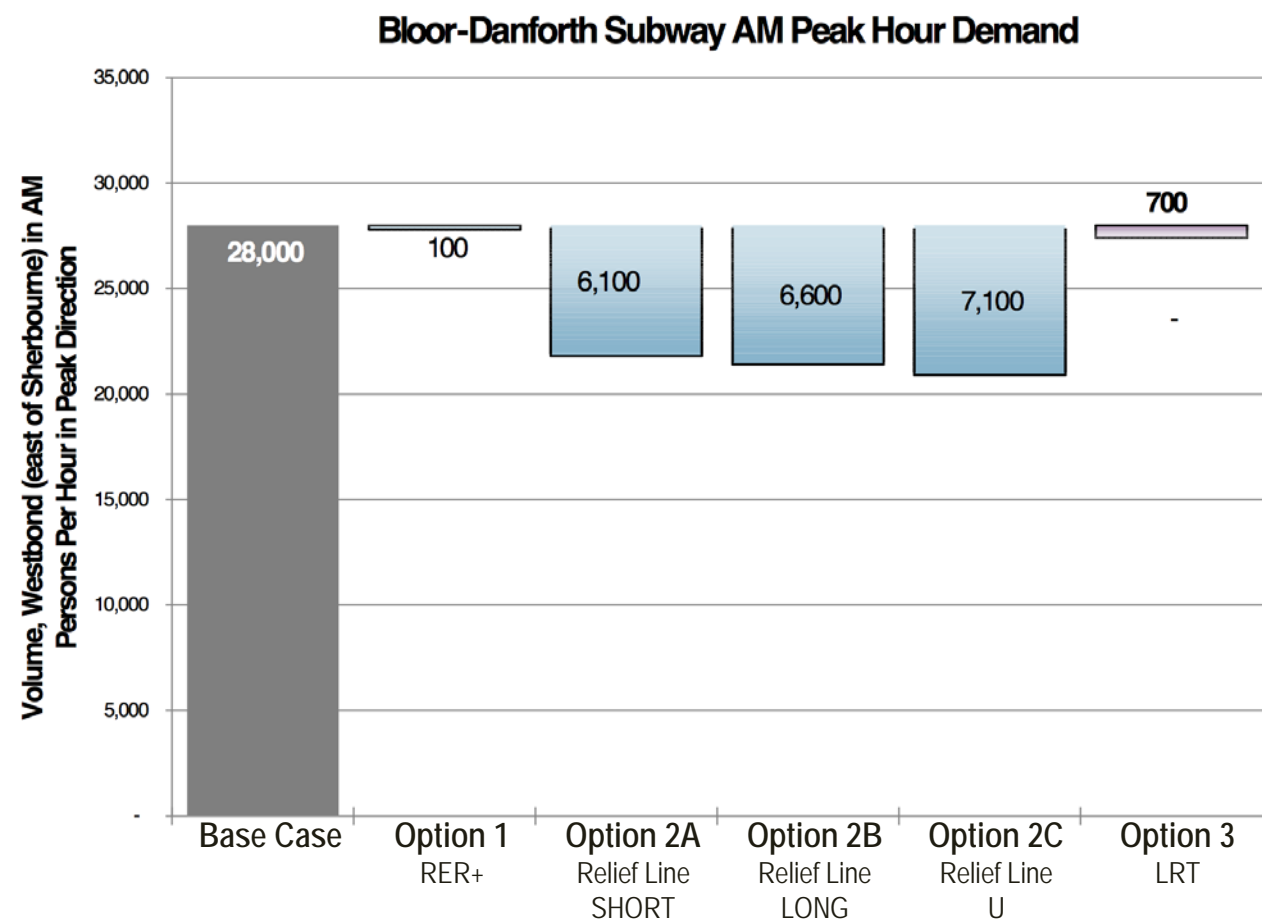
Volumes AM peak hour inbound	Base	Option 1	Option 2A	Option 2B	Option 2C	Option 3
	<i>Do Nothing</i>	<i>RER + Network</i>	<i>Relief Line SHORT</i> (Danforth to Downtown)	<i>Relief Line LONG</i> (Northeast to Downtown)	<i>Relief Line U</i> (Danforth to Bloor via Downtown)	<i>LRT</i>
<i>New Line Ridership</i>	-		10,800	19,200	11,100	6,800
<i>Yonge Subway Ridership</i>	32,300	31,900	26,400	20,700	26,400	28,700
<i>B-D Ridership (east of Yonge)</i>	28,000	27,800	21,800	21,400	20,900	28,600
<i>Reduction on Yonge</i>	-	-400	-6,000	-11,600	-6,000	-3,700
<i>Reduction on B-D</i>	-	-100	-6,100	-6,600	-7,100	+700
<i>Capital cost (2014\$)</i>	-	\$0.7bn	\$3.5bn	\$7.8bn	\$7.0bn	\$3.5bn

# Option Impact on Yonge Subway (Line 1)





# Option Impact on Bloor-Danforth Subway (Line 2)



# Initial Findings

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- **Option 1: RER+ option**
  - Very limited impact
  - Suggests RER 10 year maximizes the potential to attract demand from the Yonge Subway
  - **No further evaluation**
- **Option 2: Relief Line options**
  - Attracts significant demand from Yonge subway & Bloor Danforth subway
  - Bloor/Yonge station improvements may not be needed
  - **Progressed to full evaluation**
- **Option 3: LRT option**
  - Attracts demand from Yonge subway, but from further north
  - Limited attraction of demand from Bloor Danforth (so BY station improvements still needed)
  - **Progressed to full evaluation**

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# Evaluation

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## **Strategic Case**

- An assessment of how well the option supports Metrolinx policies and the YRNS' vision, goals, and objectives.

## **Economic Case**

- An assessment of the costs and benefits of the proposed project to society as a whole.

## **Financial Case**

- An assessment of how affordable the project is and what financial instruments will be required to successfully implement it.

## **Deliverability Case**

- An assessment of the project's commercial viability, procurement and implementation strategy, and risks associated with project development.

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# Evaluation

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- Assesses the options against the project goals, examining the direct and broader impacts
  - Transportation
  - Financial
  - Environment
  - Economic Development
  - Community
- Focus on the metrics in those areas that aid decision making to compare options

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# Findings

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## **1 RER Plus Option:**

- Attracts very little demand from Yonge Line and was not taken forward for full evaluation

## **2A Relief Line Short:**

- Delivers significant benefits to relieving the Yonge Subway and Danforth Subway
- May eliminate or defer the need for major change to Bloor/Yonge Station

## **2B Relief Line Long:**

- Increases the benefits by attracting more demand from the Yonge Subway
- High cost due to underground alignment and number of stations
- Further study of the Relief Line Long is required to identify a preferred project concept considering reduced underground construction and fewer stations

## **2C Relief Line U:**

- Delivers about the same benefits to Yonge Subway as the Relief Line (Short) at a much higher cost

## **3 Surface LRT:**

- Attracts the least demand from the Yonge Subway
- Adds demand to Danforth Subway

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# Conclusions

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- The YRNS provides a comprehensive network analysis taking into account the current RER service concept, the Spadina Subway extension, the Yonge North Subway extension and the Scarborough Subway.
- The Yonge Subway is currently operating at about 11% over capacity
- Even though population and employment growth will add new riders, at the same time new projects (including RER and the Toronto-York Spadina Subway extension) will attract riders from the Yonge Subway
- The net result is that demand on the Yonge Subway by 2031 would return to the same levels as today
- Fortunately relief will be created through current committed projects.
- More rapid transit service and capacity that is currently funded and being implemented will meet the future 15 year demand assuming the City's current forecasts on downtown employment growth and implementation of committed projects

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# Conclusions (cnt'd)

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- The City and TTC are conducting planning work on station locations and alignments for the Relief Line between the Danforth Subway and downtown.
- The YRNS study affirms the importance of the Relief Line project in reducing crowding on the Yonge Subway and at the Yonge-Bloor interchange station. The Relief Line Project Assessment work should continue to be guided by the findings of this study
- Metrolinx plans to conduct more network analysis, to inform Metrolinx, City of Toronto, York Region and the other GTHA municipal transportation planning initiatives, to refine analysis to include fare and service integration, and updated RER service concepts and plans.
- The Relief Line is a long term project that will not be needed immediately. The planning, design and construction of the Relief Line will require many years.
- The planning for the Relief Line should continue in order to determine the optimal project and potential phasing. This will include revisiting modelling work and ongoing business case evaluation in line with good project planning practices.

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# Recommendations

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  - b. Based on 1(a) above, more rapid transit service and capacity that is currently funded and being implemented will meet the future 15 year demand, assuming current forecasts on the growth rate of downtown employment and the implementation of TTC automatic train control on the Yonge Subway
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# METROLINX

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