

Attachment 1: Relief Line Local Segment

1. Introduction

In July 2016, City Council considered the report *EX16.1 Developing Toronto's Transit Network Plan to 2031*, which included an initial business case for the Relief Line South (Attachment 6 to EX16.1). See the following links for further information:

EX 16.1 Developing Toronto's Transit Network Plan to 2031

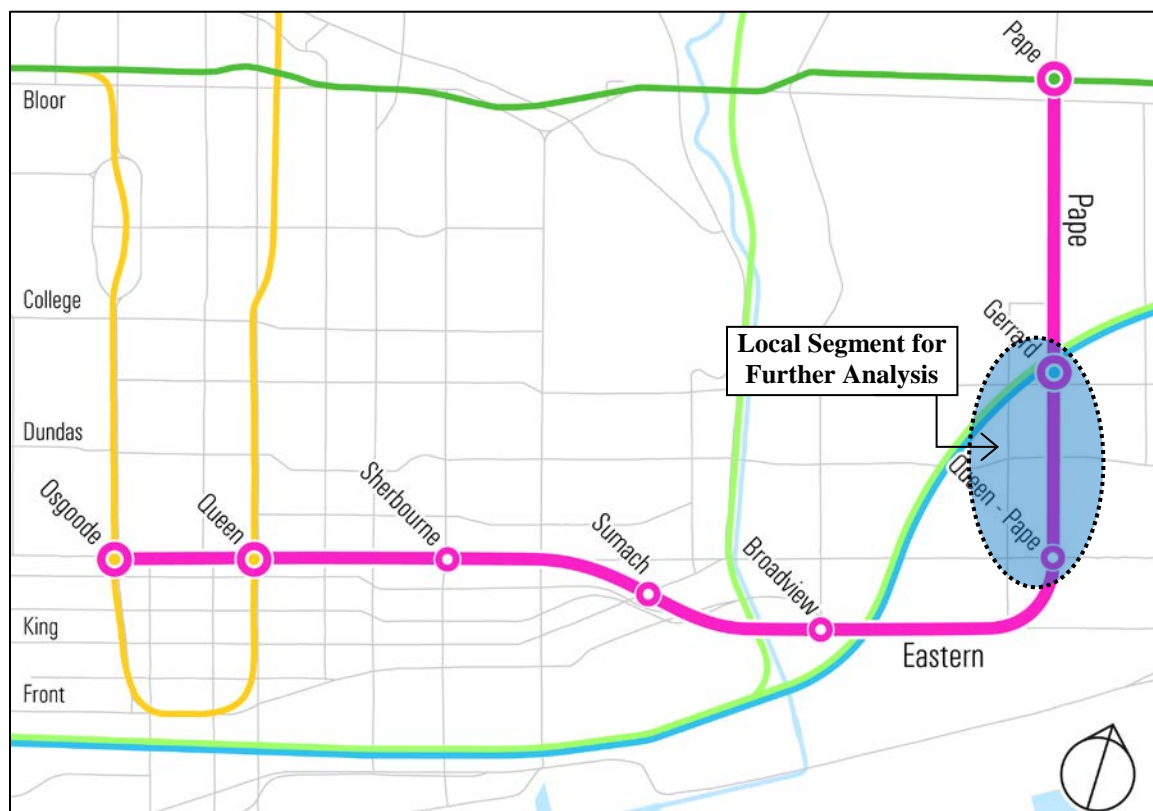
<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.1>

Attachment 6- Relief Line Initial Business Case

<http://www.toronto.ca/legdocs/mmis/2016/ex/bgrd/backgroundfile-94624.pdf>

At that meeting, City Council considered the Initial Business Case and approved a preferred alignment for the Relief Line from Pape to Downtown via Queen/Eastern, subject to assessment of an additional alignment west of Pape within a local segment from immediately north of the GO tracks on Pape Avenue to south of Queen Street, as illustrated in Figure 1.

Figure 1: Relief Line South as Approved by Council July 2016



City Council also authorized the Chief Planner and Executive Director, City Planning and the Chief Executive Officer, Toronto Transit Commission to:

- a) work in partnership with Metrolinx to confirm station locations for optimal connections between the Relief Line and SmartTrack/Regional Express Rail, including future extensions of the Relief Line; and
- b) undertake an additional assessment of an alignment west of Pape Avenue, starting immediately north of the GO tracks on Pape Avenue to south of Queen Street, with a station box at Queen Street and Carlaw Avenue, and:
 1. prepare an outreach plan in consultation with the local Councillor to review these option(s) with stakeholders, including the General Manager, Economic Development and Culture, and the public, including local residents; and
 2. bring back a recommendation to City Council, through the Executive Committee, prior to commencing the formal Transit Project Assessment Process; and
- c) prepare the Environmental Project Report for the Relief Line and issue the Notice of Commencement for the Transit Project Assessment Process once ready to proceed.

City and TTC staff have undertaken an evaluation of two alignment options for the local segment area depicted in Figure 1, per City Council's direction in July 2016.

This attachment includes a description of the options that were developed, technical work that was carried out specifically for the local segment, and a summary of the evaluation of the options. As directed by City Council, the evaluation of the options considered opportunities to provide for a good interchange between the Relief Line and SmartTrack. Work is underway with Metrolinx to plan for an optimal connection between the Relief Line station and the SmartTrack station at Gerrard.

Based on the technical evaluation of the options, this report recommends that City Council approve the Carlaw alignment for the local segment of the Relief Line South.

2. Local Segment Options

Two alignment options were developed for the local segment along Pape and Carlaw which are described below and illustrated in Figure 2

1. Subway running under Pape from Queen to Danforth, with stations near Queen and Gerrard; and
2. Subway running under Carlaw from Queen to the GO Rail corridor, then running diagonally under commercial and residential properties to connect to Pape near Riverdale Avenue, with stations near Queen and Gerrard.

Figure 2: Local Segment Alignment Options



Note: Work is underway with Metrolinx to plan for an optimal connection between the Relief Line station and the SmartTrack station at Gerrard.

3. Local Segment Technical Analysis

Additional technical analysis specific to the local segment was conducted to support a fuller understanding of local conditions and to respond to concerns that were raised by

local residents. The following provides an overview of the results of that work. These results feed into the comparative evaluation of the two alignment options outlined in Sections 4 and 5 below.

Underground Building Constraints Investigation

Potential underground constraints were identified by examining building permit drawings. The approximate area where the future underground subway would be constructed was cross referenced for potential conflicts (e.g. deep foundations, underground parking).

Summary of findings:

- Tunnels will be deep enough to avoid conflicts with building and bridge foundations for either Pape or Carlaw options.
- There are a few underground parking garages near stations for both options that would need to be considered during the design process.

Utility Constraints Investigation

A detailed investigation of underground utilities was completed to identify potential constraints of existing and planned underground services and utilities (e.g. water, sewer, hydro).

Summary of findings:

- A 3m (10') Combined Sewer is located along Gerrard approximately 20 metres underground and it cannot be moved.
 - Pape option: Possible to tunnel above the sewer, allowing for a potentially shallower station.
 - Carlaw option: Due to the rail bridge foundations at Carlaw and Gerrard, it may only be possible to tunnel below which would result in station needing to be deeper; however, further investigation through more detailed design may find that a shallower station is possible.
- A 1.8m (6') Combined Sewer is located along Carlaw.
 - With the Carlaw option, reconstruction would be required prior to/as part of Relief Line construction.

Geotechnical / Seismic Analysis

Field analysis was completed to map geological conditions (e.g. soils, bedrock). The geotechnical analysis was done using boreholes which were drilled along Pape and Carlaw in the fall of 2016. More precise indications were produced and showed top

bedrock locations and soil composition. This information feeds into the design and analysis work related to such considerations as noise and vibration, tunneling options and methodology and utility plan.

Summary of findings:

- Bedrock location between Gerrard and Queen confirmed:
 - 14m - 24m below Pape
 - 12m - 18m below Carlaw

Existing Subway Noise and Vibration Testing

Vibration levels for Sheppard Subway and Bloor-Danforth Subway were measured to compare differences. The Sheppard Subway is more comparable to Relief Line since it is deeper than the Bloor-Danforth Subway, and employs more modern technology

Summary of findings:

- The deeper the tunnel, the greater the reduction in noise and vibration.
- Bedrock absorbs vibration better than soft soils. Running the subway tunnel in bedrock results in lower levels of vibration.
- Contemporary track design results in reductions.
- Implications for the Relief Line:
 - The Relief Line will meet or exceed TTC and Ministry of Environment and Climate Change's stringent noise and vibration standards.
 - The Relief Line is more comparable to the Sheppard Subway as it will be deeper than Danforth, and possible even deeper than the Sheppard line (approximately 18-25 metres).
 - Tunnel will be mostly in bedrock.
 - Relief Line will be built with state-of-the art tunnel design (floating slab).
 - Depth combined with geotechnical conditions and newer technologies will help to reduce potential for vibration/noise.

Potential Real Estate Impacts Study

A [real estate study](#) was conducted by N. Barry Lyon Consultants to consider potential real estate impacts on existing residential properties of construction and operation of the Relief Line along Pape Avenue and Carlaw Avenue, focussing in the area from Queen to Gerrard.

Summary of findings:

- In general, transit has a positive impact on real estate markets in terms of demand and pricing.
- After construction of the Relief Line is complete:

- Both a Carlaw and Pape options likely to experience net positive real estate impacts within the area in general
- Net positive real estate impacts expected for most low-density property values, especially within walking distance of a station
- Some homes immediately adjacent to a station may have limited negative impacts, which could include a lower value or weaker price appreciation. Through more detailed station design, techniques would be explored to mitigate potential impacts.
- Apartments/condos can expect to display a strong value premium
- During construction of the Relief Line:
 - Potential for temporary negative impacts to the value of a property and to the ability to sell a property during construction
 - Living conditions may be more stressful
 - Real estate market is still expected to display strong demand characteristics

4. Evaluation of Local Segment Options

An evaluation of the local segment options was undertaken using City Planning's comprehensive rapid transit evaluation framework as illustrated in Figure 3. Transit projects being planned within the City of Toronto are evaluated using this framework.

Figure 3 City Planning's Comprehensive Evaluation Framework for Transit Projects

SERVING PEOPLE



STRENGTHENING PLACES



SUPPORTING PROSPERITY



A summary of the evaluation of local segment options using the rapid transit evaluation framework is provided in Table 1. More detailed information on the evaluation is available on the [project website](#).

Table 1 Summary of Evaluation of Local Segment Options

	Pape	Carlaw
SERVING PEOPLE		
Choice <i>Connectivity to Surface Transit Routes</i>	<ul style="list-style-type: none"> Unable to connect at Queen existing north-south transit demand (bus 72) 	<ul style="list-style-type: none"> Follows the existing movement of people, transit, autos Coincides with high ridership on high-frequency bus 72
	<ul style="list-style-type: none"> Both options offer high quality interchange possibilities with a SmartTrack station at Gerrard. Coordination with Metrolinx is underway to provide for an optimal solution. 	
Experience <i>Travel Time</i>	<ul style="list-style-type: none"> Both alignment options offer nearly identical travel times and analysis of ridership did not differentiate between the two options 	
Social Equity <i>Improving Service to Neighbourhood Improvement Areas</i> <i>Supporting Equity in Mobility by Gender, Income, Family Status, and Age Class</i>	<ul style="list-style-type: none"> Social equity benefits are almost the same for both options. 	
STRENGTHENING PLACES		
Shaping The City <i>Serving Areas of Planned Population Growth</i> <i>Compatibility with City Planning Policies</i> <i>Supporting City-Building Opportunities</i> <i>Partnership Opportunities for Transit-Oriented Development</i>	<ul style="list-style-type: none"> Good city-building opportunities at Gerrard station Limited opportunity to support city-building opportunities at Queen-Pape 	<ul style="list-style-type: none"> Good city-building opportunities at Gerrard station Additional city-building opportunities at Queen-Carlaw, offering a station close to the growing Carlaw and Dundas area.
Healthy Neighbourhoods <i>Compatibility with Existing Neighbourhoods</i> <i>Opportunities for Context Sensitive Integration of Station Facilities with Surrounding Neighbourhoods</i> <i>Impacts on Cultural/Heritage/Archeological Features</i>	<ul style="list-style-type: none"> Main disadvantage is the impact to the neighbourhood around Pape-Queen Station at Queen-Pape to bring a high level of activity to a tight, low-scale residential environment 	<ul style="list-style-type: none"> Main advantage is the compatibility of both stations to be integrated into the existing urban fabric Station at Queen-Carlaw would invite a high level of activity that would support the emerging higher density, mixed-use Carlaw and Dundas area

	Pape	Carlaw
<i>Eliminating Barriers within Neighbourhoods</i>		
Public Health and Environment <i>Noise and Vibration Impacts during Construction</i> <i>Noise and Vibration Impacts during Operation</i>	After construction is complete: <ul style="list-style-type: none"> Subway operation is not anticipated to result in noise and vibration impacts. All TTC subway projects are now being designed to meet or exceed TTC and Ministry of Environment and Climate Change’s stringent noise and vibration standards. During construction: <ul style="list-style-type: none"> Normal temporary noise and vibration impacts associated with excavation and tunneling to be expected near station areas, tunnel boring machine launch and extraction sites, and over top of the tunnel boring machine. 	
	<ul style="list-style-type: none"> The presence of more ground-related low-rise residential uses along this alignment will increase impact felt by residents. 	<ul style="list-style-type: none"> Generally, commercial, industrial, and non-ground related residential (condos) that characterize Carlaw between Queen and Gerrard are less susceptible to noise and vibration impacts during construction.
SUPPORTING PROSPERITY		
Affordability <i>Engineering Feasibility</i> <i>Minimize Property Acquisition Costs</i> <i>Construction Impacts (vehicle, transit, access)</i> <i>Utility Impacts</i>	<ul style="list-style-type: none"> Potential cost risk associated with complexity of station construction at Gerrard/ Pape beneath rail corridor Potential cost savings resulting from fewer utility conflicts Less potential for traffic/transit impacts during construction 	<ul style="list-style-type: none"> Potential cost risks associated with need for relocation/ reinforcement of 1.8m sewer on Carlaw and deeper station at Gerrard to avoid mid-Toronto interceptor sewer Potential cost savings resulting from fewer easements and property requirements at Queen
	<p>The preliminary project cost estimates provided to City Council in the Initial Business Case in July 2016 will be updated with Class 3 cost estimates at the next Stage Gate in late 2019. The Carlaw option for the Local Segment has greater cost risks, and is estimated to cost approximately \$150 million (\$2017) more than the Pape alignment. Opportunities to mitigate these and other issues and minimize impacts will be explored as the Relief Line project as a whole proceeds through the design process.</p>	
Supports Growth <i>Serving Areas of Planned Employment Growth</i>	<ul style="list-style-type: none"> Station at Gerrard supports potential redevelopment of Gerrard Square and Riverdale Shopping Centre 	
	<ul style="list-style-type: none"> Station at Queen serves a lower concentration of 	<ul style="list-style-type: none"> Station at Queen serves a higher concentration of

	Pape	Carlaw
<i>Supporting and Strengthening Existing Businesses and Industry</i>	projected future employment with less direct support of existing businesses	projected future employment and better supports existing businesses

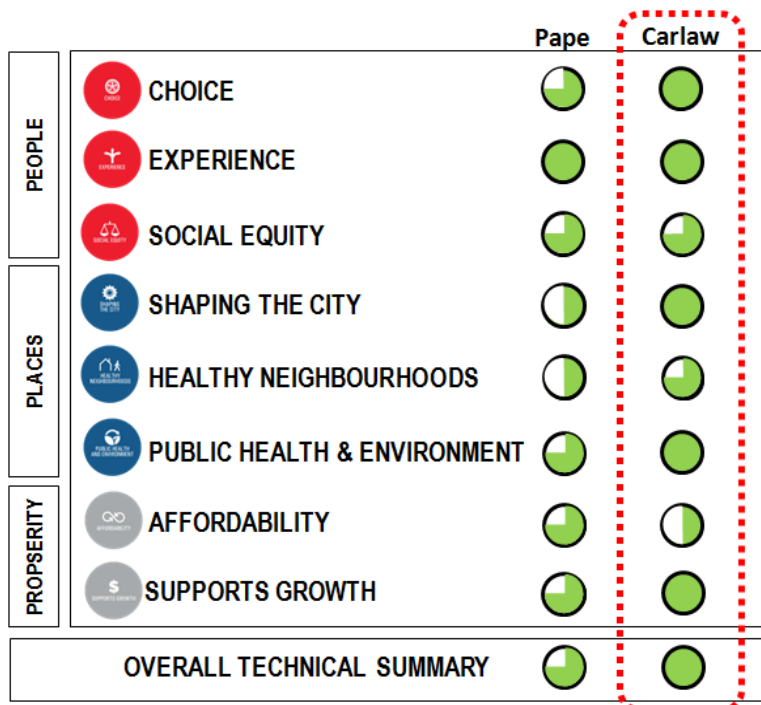
5. Technically Preferred Option

While the evaluation did not provide a great deal of differentiation between the two options, Carlaw did emerge as being technically preferred, largely because it better achieves the following objectives:

- Maximizing city-building opportunities around stations:
 - Ability to integrate stations into the existing urban fabric
 - Serve the areas with the most people and jobs, today and in the future
 - Compatibility with existing neighbourhoods and support for local businesses
 - Potential opportunities for public/private partnership
- Providing people with the best ways to make transfers between the Relief Line and local buses/streetcars.
- Minimizing potential negative impacts on the local area, both during and after construction

Figure 4 illustrates a summary of the results based on the evaluation framework.

Figure 4: Summary of Evaluation Results for Local Segment Options



6. Public and Stakeholder Consultation

Meetings of the Local Segment Stakeholder Advisory Committee, which was established to provide input for this phase of work, were held on three occasions: November 15, 2016, February 23, 2017 and March 21, 2017. The primary purpose of this Committee was to provide advice to the project team in the preparation of materials for the public meeting.

A public meeting was held on April 5, 2017 at Morse Street Public School. More than 225 people attended the meeting. Overall, members of the local community who attended the meeting and provided comments expressed their support for the recommended option.

The presentation and project materials from the public meeting are available [here](#).

7. Next Steps

Once the local segment alignment has been approved by City Council, the Relief Line will be able to advance to the Transit Project Assessment Process (TPAP).

The next steps towards developing the project include:

- Refining the station locations and preparing station concept plans
- Developing the functional design for the preferred alignment
- Determining potential impacts and mitigation measures
- Preparing the Draft Environmental Project Report (EPR)
- Launching the formal TPAP
- Submitting the draft EPR to the Ministry of the Environment and Climate Change

Further public and stakeholder consultation will be held as part of the TPAP.