Tonight’s Meeting

PURPOSE
To provide an update on the Relief Line project and next steps.

AGENDA
5:30  Open House
6:00  Welcome and Introductions
6:10  Relief Line Update / Discussion
7:45  Next Steps / Wrap-up
Recap from SAG #4 (May 2016)

- Purpose of the last meeting: review results of alignment evaluation, preferred alignment (Pape-Eastern-Queen) and station locations.
- Group was overall supportive of the preferred alignment and station locations.
- Key discussion points:
  - Rationale for selecting the preferred alignment
  - Subway design and operational questions
  - Creating pedestrian connections to surrounding communities and destinations
  - Supporting development potential around stations
  - Timing and process for next steps / TPAP
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>City Council approves Yonge North Extension EA, contingent on Relief Line and City/TTC commence study to determine need for the Relief Line.</td>
</tr>
<tr>
<td>2012</td>
<td>Downtown Rapid Transit Expansion Study concludes that initial phase of Relief Line and GO Transit improvements would help ease crowding on the transit network.</td>
</tr>
<tr>
<td>2012</td>
<td>Relief Line identified as part of the “Next Wave” of transit projects in the Metrolinx Big Move plan and is identified by Metrolinx as a priority for future transit investment.</td>
</tr>
<tr>
<td>2014</td>
<td>Relief Line Project Assessment launched. City/TTC commence planning for the preferred route alignment and station locations for the Relief Line, to deliver planning approvals in mid-2016. The relationship between SmartTrack and the Relief Line is being reviewed as part of this work.</td>
</tr>
<tr>
<td>2015</td>
<td>Yonge Relief Network Study recommendations approved by Metrolinx Board. Allows project development for the Yonge North Subway Extension. Affirms that the Relief Line Project Assessment should continue, to ensure that a project is ready for when needed in 2031.</td>
</tr>
<tr>
<td>March 2016</td>
<td>City Council approves preferred corridor for Relief Line: Pape to Downtown via Queen/Richmond.</td>
</tr>
<tr>
<td>July 2016</td>
<td>City Council approves Relief Line Initial Business Case and Preferred Alignment for Relief Line (Pape to Downtown via Queen/Richmond) subject to assessment of an additional alignment west of Pape, within a local segment between Gerrard and Queen.</td>
</tr>
</tbody>
</table>
City Council approved a general alignment from downtown to Danforth and directed City and TTC staff to assess an additional alignment in this LOCAL SEGMENT.
City Council approved the Pape-Eastern-Queen alignment, subject to the determination of a specific alignment as described below, and authorized the Chief Planner and Executive Director, City Planning and the Chief Executive Officer, Toronto Transit Commission to:

- 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

- 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:
  - 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
  - bring back a recommendation to Council, through Executive Committee, prior to commencing the formal Transit Project Assessment Process; and

- 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.
Local Segment

Options Evaluated

1. Subway running under **Pape** from Queen to Danforth, with stations near Queen and Gerrard

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

*Planning and design for the Relief Line and SmartTrack is being coordinated to provide for a good interchange connection. Discussions with Metrolinx are underway.*
Technical Work Completed to Support Evaluation of Local Segment Options

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Underground Building Constraints Investigation</strong></td>
<td>Examination of building permit drawings to identify potential underground constraints for subway construction (i.e. deep foundations, underground parking)</td>
</tr>
<tr>
<td><strong>Utility Constraints Investigation</strong></td>
<td>Detailed investigation to identify potential constraints of existing and planned underground services and utilities (e.g. water, sewer, hydro)</td>
</tr>
<tr>
<td><strong>Geotechnical/Seismic Analysis</strong></td>
<td>Field analysis to map geological conditions (e.g. soils, bedrock) will be used as input for noise and vibration analysis</td>
</tr>
<tr>
<td><strong>Existing Subway Noise and Vibration Testing</strong></td>
<td>Noise and vibration data from the Bloor-Danforth Subway was compared to data from the Sheppard Subway to confirm significant reduction in vibration has been achieved with newer track design.</td>
</tr>
<tr>
<td><strong>Analysis of Potential Real Estate Impacts</strong></td>
<td>Study potential real estate impacts on existing residential properties of construction and operation of the Relief Line along Pape or Carlaw, focussing in the area from Queen to Gerrard.</td>
</tr>
<tr>
<td><strong>Evaluation of Local Segment Options</strong></td>
<td>Comprehensive evaluation based on wide variety of technical data and information</td>
</tr>
</tbody>
</table>

*Note: An additional noise and vibration study will be carried out during the Transit Project Assessment for the Relief Line to confirm that the line will operate within accepted thresholds.*
Underground Building Constraints Investigation

- 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 that would need to be considered during the design process.
Utility conflicts have been identified:

- **3m (10’)** Combined Sewer along Gerrard
  - Located approximately 20 metres underground and 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.

- **1.8m (6’)** Combined Sewer along Carlaw
  - With the Carlaw option, reconstruction would be required prior to/as part of Relief Line construction.
Geotechnical analysis has been completed:

• Boreholes drilled along Pape and Carlaw in Fall 2016

• Results give a more precise indication of top of bedrock location and soil composition

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

• This information feeds into the design and analysis work (e.g., noise and vibration, tunneling methodology, utility plan, etc.)
Sample outputs of the geotechnical investigation:

**Geotechnical/Seismic Analysis**

Pape Ave:
- Surface
- Soils
- Bedrock
- Top of Bedrock
- Typical Two-story House
- Elevation above Sea Level: 22m

Carlaw Ave:
- Surface
- Soils
- Bedrock
- Top of Bedrock
- Typical Two-story House
- Elevation above Sea Level: 17m
Existing Subway Noise & Vibration Testing

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

Conclusions:
• The deeper the tunnel, the greater the reduction in noise and vibration.
• Bedrock absorbs vibration better than soft soils.
• Contemporary track design results in reductions.

Implications for the Relief Line:
• Relief Line will be built with state-of-the-art tunnel design (floating slab).
• Relief Line is more comparable to the Sheppard Subway as it will be deeper than Danforth, and possible even deeper than the Sheppard line (~18-25 metres).
• Tunnel will be mostly in bedrock.
• Depth combined with geotechnical conditions and newer technologies will help to reduce potential for vibration/noise.
• The Relief Line will meet or exceed TTC and Ministry of Environment and Climate Change’s stringent noise and vibration standards.
Study of Potential Real Estate Impacts

Real Estate Study by NBLC has been completed:

• 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
Evaluation of Alignment Options

Comprehensive Evaluation Framework

SERVING PEOPLE

CHOICE
Develop an integrated network that connects different modes to provide for more travel options.

EXPERIENCE
Capacity to ease crowding/congestion; reduce travel times; make travel more reliable, safe and enjoyable.

SOCIAL EQUITY
Do not favour any group over others; allow everyone good access to work, school, and other activities.

STRENGTHENING PLACES

SHAPING THE CITY
Use the transportation network as a tool to shape the residential development of the City.

HEALTHY NEIGHBOURHOODS
Changes in the transportation network should strengthen & enhance existing neighbourhoods; promote safe walking & cycling.

PUBLIC HEALTH AND ENVIRONMENT
Support and enhance natural areas; encourage people to reduce how far they drive.

SUPPORTING PROSPERITY

SUPPORTS GROWTH
Investment in public transportation should support economic development; allow workers to get to jobs more easily; allow goods to get to markets more efficiently.

AFFORDABILITY
Improvements to the transportation system should be affordable to build, maintain and operate.
Evaluation of Alignment Options

Evaluation results support Carlaw as a feasible option:

• Capitalizes on emerging growth areas along Carlaw
• Better connectivity with surface transit
• Better opportunity to integrate stations within local context and support new development
• Less potential for impacts to stable residential area
• Minimizes potential impact of constructing underneath CN mainline and thereby potential disruption to CN, GO, and SmartTrack services

Tradeoffs

• Gerrard Station for Carlaw alignment may need to be deeper (approx. 25 metres) to avoid the 3 metre diameter Mid-Toronto Interceptor
• Queen Station for Carlaw alignment conflicts with a 1.8 m diameter sewer; however, reconstruction within Carlaw right-of-way is feasible
• Increased potential to disrupt traffic and transit operations during construction
### Summary

**Criterion:**

**Connectivity to Surface Transit Routes**

<table>
<thead>
<tr>
<th>Pape</th>
<th>Carlaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to connect with existing north-south transit demand (bus 72)</td>
<td>Follows the existing movement of people, transit, autos</td>
</tr>
<tr>
<td></td>
<td>Coincides with high ridership on high-frequency bus 72</td>
</tr>
</tbody>
</table>

![Checkmark]
### Experience

#### Summary

<table>
<thead>
<tr>
<th>Criterion: Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pape</strong></td>
</tr>
<tr>
<td>Both alignment options offer nearly identical travel times</td>
</tr>
</tbody>
</table>
Social Equity

Summary

<table>
<thead>
<tr>
<th>Criteria:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving Service to Neighbourhood Improvement Areas</td>
</tr>
<tr>
<td>Supporting Equity in Mobility by Gender, Income, Family Status, and Age Class</td>
</tr>
</tbody>
</table>

Social equity benefits are almost the same for both options.
Shaping the City

Summary

<table>
<thead>
<tr>
<th>Criteria:</th>
<th>Pape</th>
<th>Carlaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving Areas of Planned Population Growth</td>
<td>▪ Good city-building opportunities at Gerrard station</td>
<td>▪ Good city-building opportunities at Gerrard station</td>
</tr>
<tr>
<td>Compatibility with City Planning Policies</td>
<td>▪ Limited opportunity to support city-building opportunities at Queen-Pape</td>
<td>▪ Additional city-building opportunities at Queen-Carlaw, offering a station in the growing Carlaw+Dundas area (SASP 154)</td>
</tr>
</tbody>
</table>
Healthy Neighbourhoods

Summary

<table>
<thead>
<tr>
<th>Criteria:</th>
<th>Compatibility with Existing Neighbourhoods</th>
<th>Opportunities for Context Sensitive Integration of Station Facilities with Surrounding Neighbourhoods</th>
<th>Impacts on Cultural/Heritage/Archeological Features</th>
<th>Eliminating Barriers within Neighbourhoods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pape</td>
<td>Main disadvantage is the impact to the neighbourhood around Pape-Queen</td>
<td>Station at Queen-Pape to bring a high level of activity to a tight, low-scale residential environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carlaw</td>
<td>Main advantage is the compatibility of both stations to be integrated into the existing urban fabric</td>
<td>Station at Queen-Carlaw would invite a high level of activity that would support the emerging higher density, mixed-use Carlaw+Dundas area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RELIEF LINE
### Public Health and Environment

#### Summary

<table>
<thead>
<tr>
<th>Criteria: Noise and Vibration Impacts during Construction</th>
<th>Pape</th>
<th>Carlaw</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>After Construction is Complete</strong></td>
<td>Subway operation is not anticipated to result in noise and vibration impacts. All TTC subway projects are now be designed to meet or exceed TTC and Ministry of Environment and Climate Change’s stringent noise and vibration standards.</td>
<td></td>
</tr>
<tr>
<td><strong>During Construction</strong></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The presence of more ground-related low-rise residential uses along this alignment will increase impact felt by residents.</td>
<td>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.</td>
</tr>
</tbody>
</table>

---

**RELIEF LINE**

22
### Affordability

#### Summary

<table>
<thead>
<tr>
<th>Criteria:</th>
<th>Pape</th>
<th>Carlaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Feasibility</td>
<td>- Main cost risk is the complex station construction at Gerrard/Pape beneath rail corridor</td>
<td>- Relocation/reinforcement of 1.8m sanitary sewer on Carlaw will be required which will increase costs</td>
</tr>
<tr>
<td>Minimize Property Acquisition Costs</td>
<td>- Main cost savings are fewer utility conflicts, reduced construction traffic/transit impacts</td>
<td>- Potential increased cost associated with construction of a deeper station at Gerrard to avoid mid-Toronto interceptor sewer</td>
</tr>
<tr>
<td>Construction Impacts (vehicle, transit, access)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Utility Impacts</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Main cost savings are fewer easements and property requirements at Queen

---

23
Supports Growth

Summary

<table>
<thead>
<tr>
<th>Criteria:</th>
<th>Pape</th>
<th>Carlaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving Areas of Planned Employment Growth</td>
<td>Station at Gerrard supports redevelopment of Gerrard Square and Riverdale Shopping Centre</td>
<td>Station at Queen serves a higher concentration of projected future employment and better supports existing businesses</td>
</tr>
<tr>
<td>Supporting and Strengthening Existing Businesses and Industry</td>
<td>Station at Queen serves a lower concentration of projected future employment with less direct support of existing businesses</td>
<td></td>
</tr>
</tbody>
</table>

---

Criteria:

- Serving Areas of Planned Employment Growth
- Supporting and Strengthening Existing Businesses and Industry
Potential Future Station Location: Pape and Gerrard
Potential Future Station Location: Carlaw and Gerrard
Potential Future Station Location: Pape and Queen
Potential Future Station Location: Carlaw and Queen
## Next Steps

<table>
<thead>
<tr>
<th>Period</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>March 2017</strong></td>
<td>Public and stakeholder consultation</td>
</tr>
<tr>
<td><strong>April 2017</strong></td>
<td>Report to Executive Committee and Council</td>
</tr>
<tr>
<td><strong>Summer 2017</strong></td>
<td>Refine station locations and prepare station concept plans</td>
</tr>
<tr>
<td></td>
<td>Develop functional design for preferred alignment</td>
</tr>
<tr>
<td></td>
<td>Determine potential impacts and mitigation measures</td>
</tr>
<tr>
<td></td>
<td>Prepare Environmental Project Report (EPR)</td>
</tr>
<tr>
<td><strong>Fall 2017</strong></td>
<td>Launch formal Transit Project Assessment Process and submit EPR to MOECC</td>
</tr>
<tr>
<td></td>
<td>Public and stakeholder consultation</td>
</tr>
</tbody>
</table>