

### LINE 2 EAST EXTENSION

#### Introduction

After more than 30 years of service, the vehicles that run on Line 3 Scarborough are reaching the end of their normal lifespan. An integrated and comprehensive rapid transit system is required to continue to provide transit that benefits users in Scarborough and across Toronto.

In October 2013, City Council approved a full funding commitment to a proposal to extend the TTC Line 2 subway along the McCowan Road corridor to Sheppard Avenue East. Since 2013, the Line 2 East Extension ("L2EE") project has advanced through the project lifecycle, and several reports have been brought forward to the TTC Board and City Council for consideration and approval to confirm the project scope, preferred alignment, procurement model, and integration with broader city planning objectives.

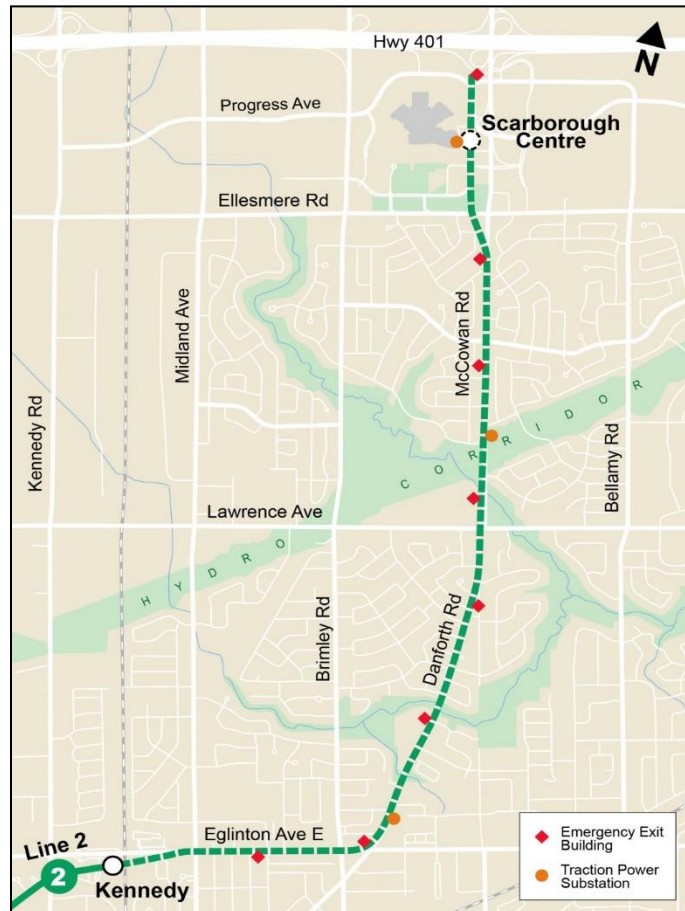


Figure 1. Line 2 East Extension Overview

The last report on the project was in March 2017<sup>1</sup> at which point City Council approved an extension from Kennedy Station to Scarborough Centre via the McCowan alignment. Per City Council direction, the project scope also includes coordination with future transit and road infrastructure projects as well as other city-building initiatives planned for Scarborough Centre.

The L2EE project is now ready to proceed to procurement and construction. A Class 3 cost estimate, Level 3 schedule and risk analysis have been prepared and the results are documented in this attachment. Consistent with the recommendations of the TTC Capital Program Delivery Review,<sup>2</sup> the project has conducted a formal detailed risk assessment, resulting in risk-adjusted estimates that better capture potential delays and costs.

<sup>1</sup> <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX23.1>

<sup>2</sup> <https://www.toronto.ca/legdocs/mmis/2017/ex/bgrd/backgroundfile-98219.pdf>

This attachment recommends City Council approve enhancements to the base scope that minimize interface risk and construction delay, and ensure that the project supports a vibrant public realm in Scarborough Centre. The cover report to this attachment recommends that City Council approve the updated project budget for the L2EE to advance the project to procurement and construction, subject to the Province of Ontario providing written support for the project as described and the City entering into contribution agreements for federal and provincial funding.

## **Decision History**

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In July 2013, City Council requested the Province of Ontario and Metrolinx to enter into discussions with respect to changing the light rail transit technology for the Scarborough RT replacement to a subway technology. In response, Metrolinx agreed to meet with the City to discuss parameters for moving forward. Metrolinx also agreed to remove the Scarborough LRT project from the joint procurement that was underway with the Eglinton Crosstown, subject to the City paying sunk costs for the project.

<https://www.toronto.ca/legdocs/mmis/2013/cc/bgrd/backgroundfile-62260.pdf>

On October 8, 2013, City Council considered the report *CC39.5 Scarborough Rapid Transit Options: Reporting on Council Terms and Conditions*, and confirmed support for an extension of Line 2 along the McCowan Road corridor to Sheppard Avenue East. Council directed staff to confirm the alignment and station locations through an environmental assessment process. City Council also authorized staff to amend the Master Agreement with Metrolinx to redirect \$1.48 billion (2010\$) to the Line 2 East Extension, and to negotiate a contribution agreement with the federal government for its commitment of \$660 million. An initial project budget of \$3.56 billion was developed and approved prior to the alignment or station concept being selected.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.CC39.5>

In July 2016, City Council considered the report *EX16.1 Developing Toronto's Transit Network Plan to 2031*, removed a three-stop subway extension from further consideration, and directed City and TTC Staff to develop a business case analysis for the Scarborough Transit Network solution, including the Scarborough Subway Extension and the Eglinton East LRT extension.

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

In March 2017, City Council considered the report *EX23.1 Next Steps on the Scarborough Subway Extension*, which included approval for the extension of Line 2 from Kennedy Station to Scarborough Centre via the McCowan alignment, including the station concept and tunnel at-grade facilities and the Triton bus terminal concept. The report included an update to the Initial Business Case for the Line 2 East Extension. City Council also authorized City and TTC to conduct the necessary Transit Project Assessment Process for the project.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX23.1>

## **Current Status of Project**

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The Line 2 East Extension project is ready to proceed to procurement and construction. A Class 3 cost estimate, Level 3 schedule and risk analysis have been prepared and

the results are documented in this attachment. The purpose of these deliverables is to establish the project cost and schedule baselines. Design has advanced to 60% completion for the tunnel and systems (e.g., communications, signalling, etc.) and to 50% completion for Scarborough Centre Station.

The project has also conducted a formal detailed risk assessment, resulting in risk-adjusted estimates that better capture potential delays and costs. In addition, the recommended project budget includes a public realm amount based on scope defined by City Planning to support the development of Scarborough Centre into a vibrant urban destination. These components are consistent with City Council direction as part of EX23.1 to incorporate a review of all possible options to design the bus terminal and adjacent developable lands in a manner that incentivizes and maximizes private sector involvement.

## **Comments/Analysis**

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### **1. Project Objectives and Benefits**

#### 1.1. Replacing Line 3 Scarborough

Line 3 Scarborough (formerly known as the Scarborough RT) operates between Kennedy Station – the eastern terminus of Line 2 – and McCowan Station. Major components of Line 3 have reached the end of their normal service life. The critical problem is that the vehicles are over 30 years old and are in need of replacement. A number of assessments have been conducted over the past 15 years of alternative methods to replace, extend or rehabilitate Line 3. At their meeting on October 8, 2013,<sup>3</sup> City Council approved replacing Line 3 with an extension of Line 2.

#### 1.2. Development of Scarborough Centre

One of the objectives of the Line 2 East Extension is to support the development of Scarborough Centre into a vibrant urban place. The extension to Scarborough Centre Station is envisioned as connecting an important regional gateway to the rest of the city. It will deliver improved and seamless transit service to Scarborough Centre and will help generate investment in the Centre as a whole. Scarborough Centre Station will be a once-in-a-generation investment in infrastructure that will enhance connectivity.

Over 23,000 weekday transit riders use the existing Scarborough Centre Station. Replacing the existing Line 3 with the subway extension will better connect an important growth centre to the rest of the city and region. The improved connectivity reduces travel time, improves access to jobs, schools and other destinations, and enables people who live there to reach destinations in other regional centres. The project also provides the opportunity to replace the inadequately-sized bus terminal at Scarborough Centre Station with a larger bus terminal that allows better connections for customers between bus and subway and allows for additional buses to be operated at the station.

Scarborough Centre Station will act as a catalyst and support development in the Centre. Investment in Scarborough Centre will encourage businesses and institutions to

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<sup>3</sup> <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.CC39.5>

locate there. There is a program of investment taking place in Scarborough Centre, including:

- The recently completed Toronto Public Library branch;
- The planned revitalization of Albert Campbell Square;
- Ongoing design and development of Station Plaza that includes extensive public space;
- The recommended enhancements to public realm as part of the Line 2 East Extension project; and
- Potential improvements to local streets as laid out in the Scarborough Centre Transportation Master Plan, including the normalization of McCowan Road and Progress Avenue.

City staff are also refining land use planning policy for Scarborough Centre to ensure that the planning framework for the area best supports growth and development encouraged by the Line 2 East Extension. The program of investment and improvement provides an opportunity to further engage the public and landowners on the vision for Scarborough Centre that builds on the investment in the subway extension.

## **2. Project Scope Update**

### **2.1. Base Project Scope**

The base project scope, approved by City Council in March 2017, includes three key elements:

- *Line 2 East Extension* – The 6.2 km extension of Line 2 from Kennedy Station to Scarborough Centre Station will include a single large diameter tunnel, eight emergency exits and two stand-alone traction power substations. The tunnel is mostly located under Eglinton Avenue East, Danforth Road, McCowan Road and Borough Drive within existing or planned City of Toronto roads. Scarborough Centre Station will include three station entrances and a 31-bay bus terminal for TTC, GO Transit and Durham Region Transit.
- *Scarborough RT Life Extension* – In order to provide continuous higher order transit service to Scarborough Centre until the Line 2 East Extension opens, certain works are required to maintain a state of good repair for the Line 3 Scarborough infrastructure and aging vehicles.
- *Scarborough RT Decommissioning* – After the Line 2 East Extension opens, and the Scarborough RT is out of service, the existing Line 3 Scarborough stations (Lawrence East, Midland, Scarborough Centre and McCowan) and elevated guideway (2.1 km) will be demolished and the McCowan Yard and systems (track, signals and communications) will be decommissioned.

## 2.2. Changes to the Base Project Scope

In accordance with City Council direction,<sup>4</sup> the TTC and City have conducted a holistic approach to project scoping, which recognizes broader project objectives and coordination with future transit and road infrastructure projects as well as other City-building initiatives planned for Scarborough Centre and the Line 2 East Extension corridor.

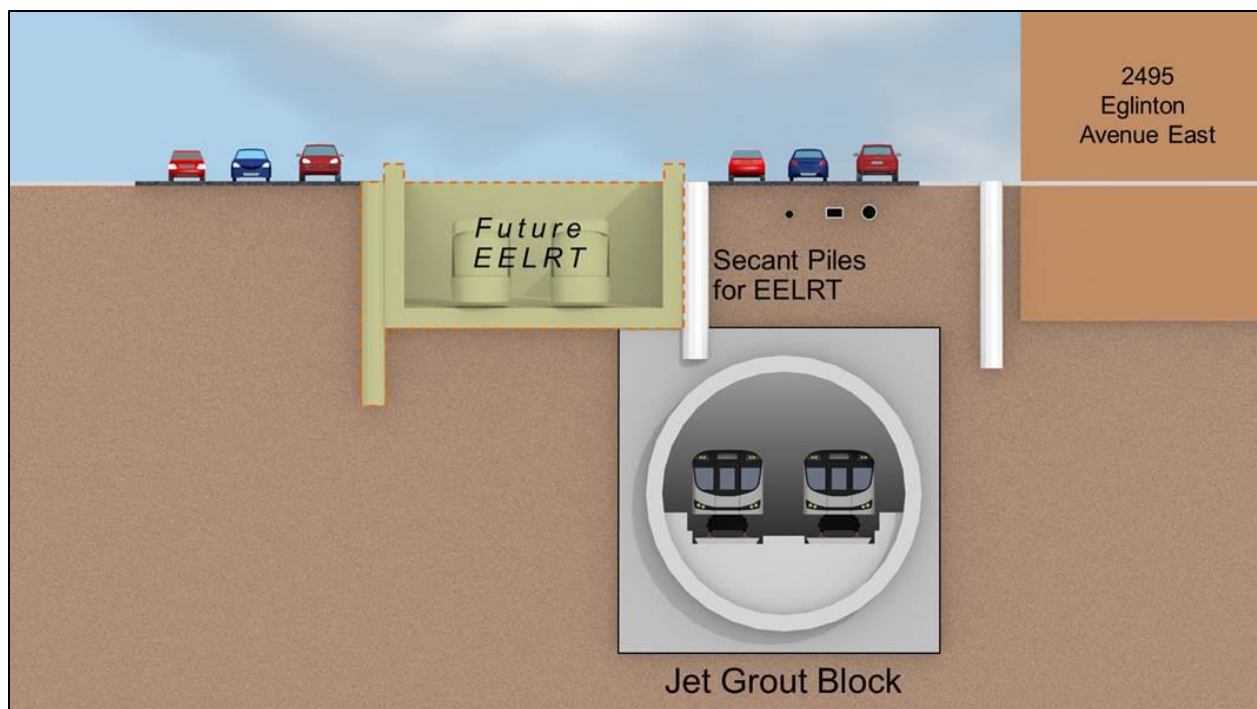
TTC has implemented a robust change control process which has identified and quantified changes related to project scope. The following are changes to the base project scope since March 2017:

- *Scarborough Centre Station Bridging Plaza* – A new civic plaza is proposed at the main entrance on Borough Drive to bridge the bus terminal trench to generate a compelling, convenient, safe, and intuitive experience for pedestrians, cyclists and other users accessing the transit facility; and to incent complementary investments by the private sector by establishing a supportive interface between the civic plaza and adjoining development parcels.
- *Scarborough Centre Station Toronto Green Development Standards* – In accordance with new Version 3.0 requirements that came into effect in May 2018, the project must comply with new or upgraded requirements, which include electric vehicle infrastructure, enhanced green and cool roof requirements, solar readiness, stormwater retention and re-use and efficient irrigation.
- *Enabling Works for Automatic Train Control (ATC)* – Provision of tunnel cable infrastructure and cabling rooms will allow for easier and faster installation, and will minimize service disruption when ATC is implemented on Line 2.
- *Eglinton East LRT Interface Design* – The Eglinton East LRT will transition from an underground alignment at Kennedy Station to a surface alignment on Eglinton Avenue East from Midland Avenue to the planned terminal stop at the University of Toronto Scarborough. The alignments of the future Eglinton East LRT and the Line 2 East Extension are located in close proximity under Eglinton Avenue East, immediately east of Kennedy Station. Without special measures to protect the Line 2 East Extension tunnel, the future Eglinton East LRT portal would need to be constructed north of the subway tunnel and would require widening Eglinton Avenue East by nine metres, resulting in depth-deficient land parcels, and reduced development potential on the north side of Eglinton Avenue East at Midland Avenue. TTC has modified the design for Line 2 East Extension structures to facilitate future construction of the Eglinton East LRT within three metres of the subway tunnel (Figure 2).

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<sup>4</sup> <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX21.14>





**Figure 2.** Proposed Eglinton East LRT/ Line 2 East Extension Interface – Eglinton Avenue Looking East

Further information regarding the Eglinton East LRT project is provided in Attachment 4.

### 2.3. Scope Enhancements

The recommended project scope also includes scope enhancements that have been included in the project design to improve connectivity, reduce interface risks, and/or minimize future construction disruption. The following scope enhancements are recommended for implementation:

#### *Eglinton East LRT Interface Construction*

In order to construct the future Eglinton East LRT portal directly above the Line 2 East Extension subway tunnel, TTC must install secant piles and conduct jet grouting prior to constructing the subway tunnel.

This work is required as part of the Line 2 East Extension construction to avoid the future Eglinton East LRT alignment shifting nine metres to the north, as described above. That separation would be required to provide sufficient separation to protect the tunnel structure and to provide safe and uninterrupted Line 2 subway service while the Eglinton East LRT portal structure is under construction.

#### *Public Realm Amount*

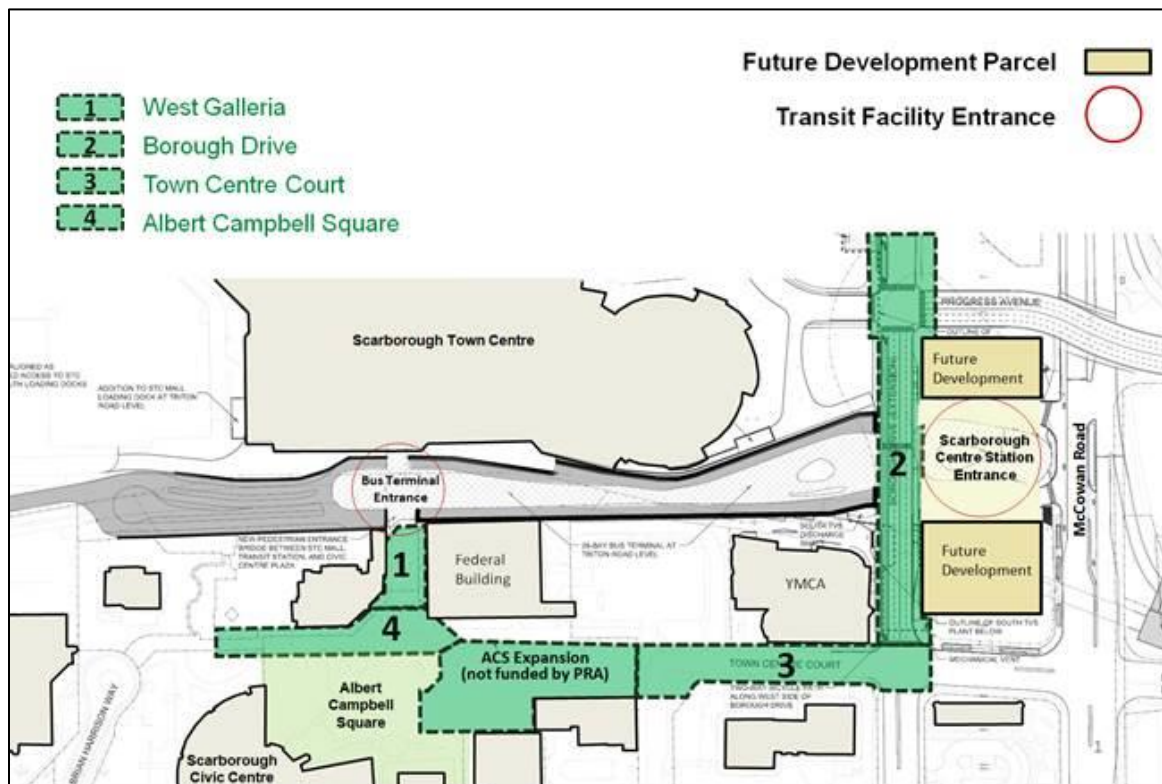
TTC has worked with City Planning staff to develop costed options for public realm improvements in the vicinity of Scarborough Centre Station to support the development of Scarborough Centre into a vibrant urban destination. Use of the Public Realm Amount is proposed to create Campbell’s Walk, a sequence of pedestrian-oriented enhancements intended to improve how the new Scarborough Centre Station connects people to Albert Campbell Square and surrounding destinations. Specifically, funding is

proposed to improve the appearance, quality and function of connecting streetscapes, paths and public spaces.

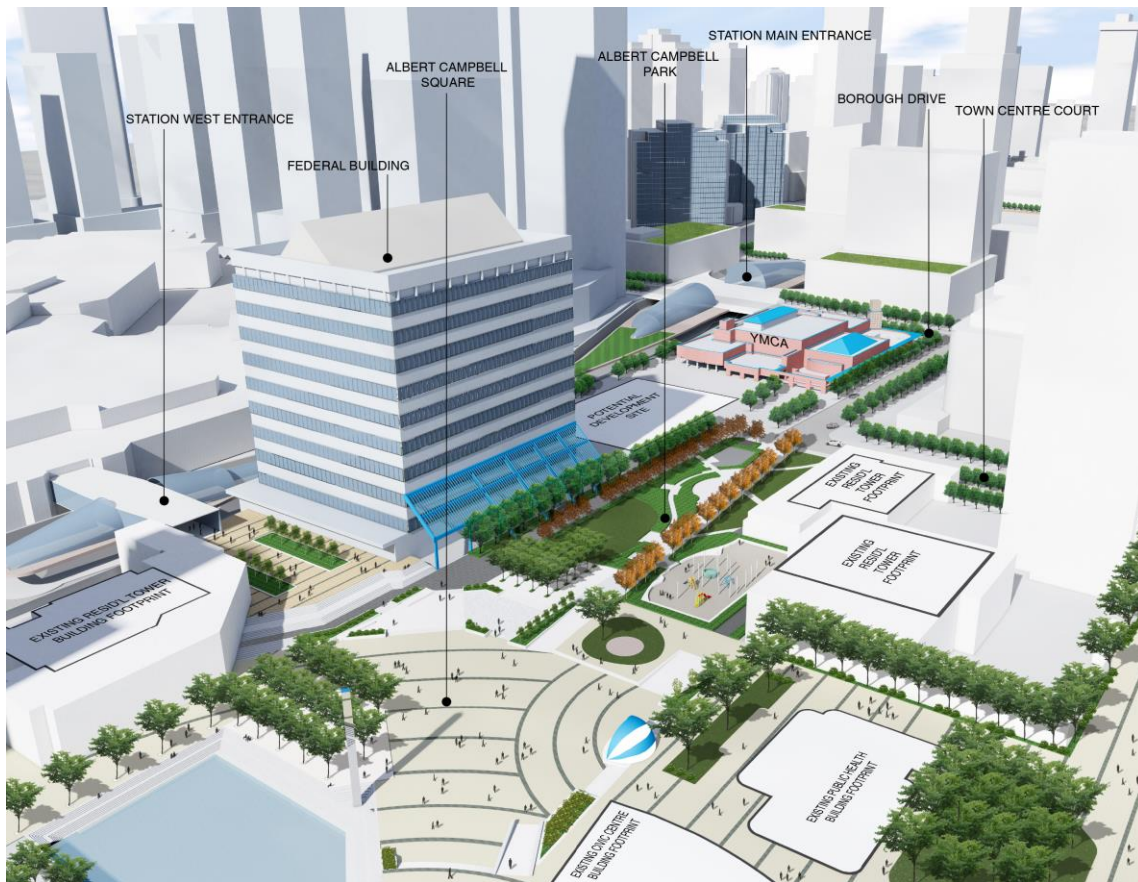
Without these improvements, only areas directly impacted by construction of the transit facility will be reinstated, and only to existing conditions. This outcome is not recommended because it would limit the opportunity to improve access, development and place-making objectives within a short walk of Scarborough Centre Station and Albert Campbell Square.

The recommended components of Campbell's Walk are as follows and as illustrated in Figures 3 and 4:

- *Galleria Plaza Enhancements* – new plaza treatment to enhance the connection between the station west entrance and Albert Campbell Square;
- *Borough Drive Enhancements* – above-City-standard public right-of-way finishes and furnishings;
- *Town Centre Court Enhancements* – above-City-standard public right-of-way finishes and furnishings; and
- *Albert Campbell Square Enhancements* – above-City-standard streetscaping and furnishings along the public corridor connecting Brian Harrison Way, Albert Campbell Square and the Galleria.



**Figure 3.** Recommended Use of the Public Realm Amount: Campbell's Walk



**Figure 4.** Scarborough Centre Station, north-east view (illustrative concept only)

### *Platform Edge Doors*

The recommended Scarborough Centre Station design concept includes necessary provisions to allow for the future implementation of platform edge doors with minimum disruption to Station operations. These provisions include a control room, emergency power supply, and structural reinforcement at platform level. TTC is currently conducting a feasibility study to determine the costs to implement platform edge doors throughout the TTC subway system. The study will be presented to the TTC Board for its consideration in 2020.

### 2.4. Scarborough Centre Station Concept

The architectural concept for the Station is based on the principle of providing open, free-flowing spaces interconnected between levels with maximized ceiling heights, access to abundant daylight and public art that is integrated into the fabric of the Station. Robust materials and assemblies are proposed to reduce lifecycle costs and Station systems have been designed for maintainability. Sustainable design principles and Crime Prevention through Environment Design (CPTED) features have been applied throughout the design. A prime consideration in the design development has been the access requirements and the provision of facilities for persons with mobility challenges and special needs in compliance with the Ontario Building Code (OBC) and Accessibility for Ontarians with Disabilities Act (AODA) and, where appropriate, referencing international best practices for accessibility.

Key station features include:



- Three entrance buildings (main, west and McCowan) and a knock-out panel for a future north entrance;
- A 31-bay bus terminal serving TTC, GO Transit and Durham Region Transit buses;
- Protection for future TTC bus fleet conversion to electric vehicles;
- Taxi and passenger-drop off facilities;
- On-street bicycle lanes and indoor and outdoor bicycle storage;
- A bridging plaza to enhance pedestrian connections, maximize development of adjacent sites, and create attractive and functional amenity areas above the open and busy bus terminal trench; and
- A green roof and other sustainable design features (such as low-emission vehicles and active transportation modes infrastructure, energy and water efficiency measures, increased native and bio-diverse plant species, bird collision deterrence, light pollution reduction, etc.) in accordance with current City of Toronto Green Development Standards (Version 3.0).



**Figure 5.** Scarborough Centre Station Site Plan Concept

The Station is subject to site plan control and has been reviewed by the City of Toronto’s Design Review Panel in June 2017 and July 2018.

The form of the Station emphasizes the vision of a contemporary multi-modal interchange that allows passengers to seamlessly transfer between modes. The “smooth cloud” bus terminal roof concept was conceived as a unifying element in the urban context to connect the various parts of the Station. The cloud canopies bracket the west entrance (Scarborough Town Centre shopping mall and galleria bridge), the main entrance and bridging plaza, and the east entrance at McCowan Road. The three entrances to the Station are through the gabled ends of the cloud canopies, which form grand entries through the rib arches and curtain walls of point-supported glass.



Figure 6. View of main entrance and bridging plaza looking north-east



Figure 7. View of main entrance with future development concept looking north-east





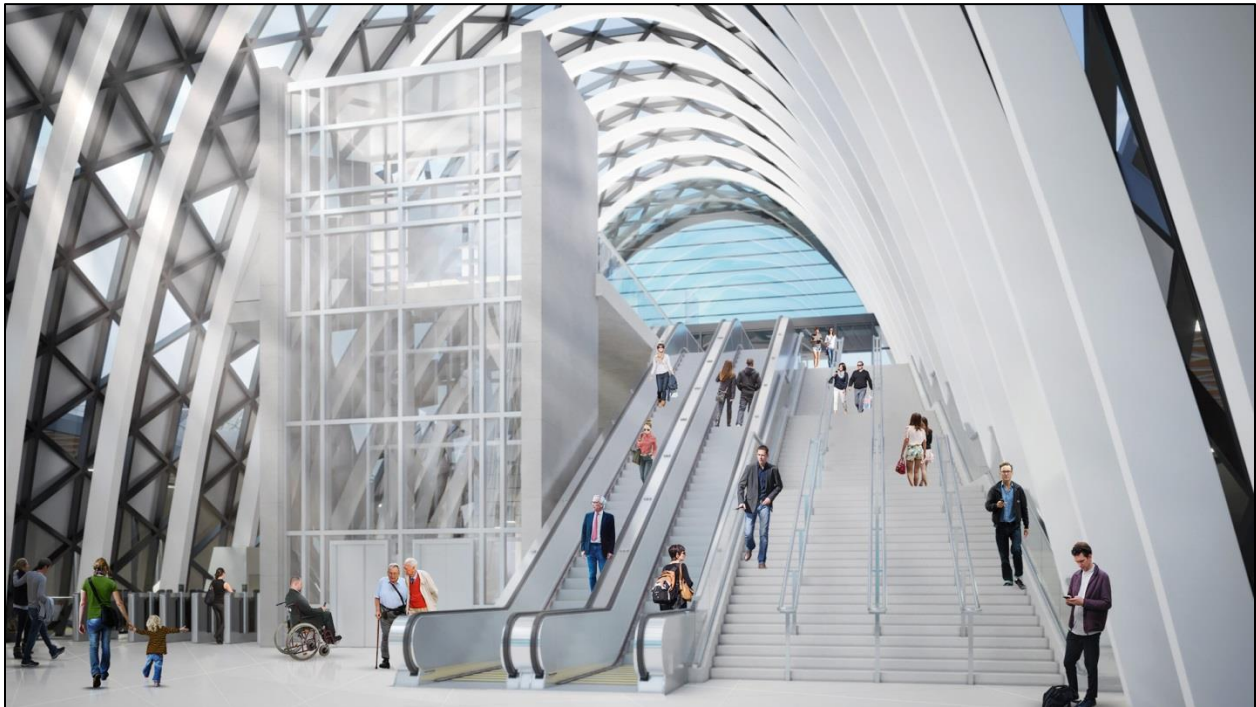
**Figure 8.** Scarborough Centre Station, south-east view (illustrative concept only)



**Figure 9.** View of west entrance and galleria looking north



**Figure 10.** View of bus terminal interior looking east



**Figure 11.** View of Station concourse interior looking west to main entrance

The western section of the new bus terminal and west Station entrance require demolition of a section of the Line 3 guideway and the existing Scarborough Centre SRT Station. Because Line 3 will continue operating until the Line 2 East Extension opens, construction of Scarborough Centre Station must be implemented in two phases:



- **Phase 1** (leading up to Line 2 East Extension revenue service) will include the construction of the Station platform and concourse levels, main and east entrance buildings and the eastern section of the bus terminal.
- **Phase 2** (following the start of Line 2 East Extension revenue service) will include construction of the western section of the bus terminal and west station entrance.

### 3. Environmental Assessment

The Notice of Commencement for the Line 2 East Extension Project was issued on April 27, 2017.<sup>5</sup> The Environmental Project Report was submitted to the Minister of Environment and Climate Change on August 24, 2017<sup>6</sup> and the Minister's Notice to Proceed was received in October 2017.<sup>7</sup>

During fall 2018, community consultation meetings were held to solicit public input on the design and construction of the emergency exits and traction power substations located between Kennedy Station and Ellesmere Road. Community meetings are planned for Scarborough Centre Station during Q2 2019.

### 4. Property Acquisition

The location of the permanent tunnel, traction power substations, emergency exit structures and Scarborough Centre Station was determined through the Transit Project Assessment Process for the Line 2 East Extension, which included public consultations and one-on-one meetings with affected property owners. Temporary property requirements have been defined through the design development process. All permanent and temporary private property requirements are described in the Property Requirements in Appendix A and illustrated in the Property Sketches in Appendix B (collectively the "Project Requirements"). The Project Requirements are needed for the following:

- **Fee simple acquisitions** are required for Scarborough Centre Station, including the bus terminal and emergency exits and include a three-metre setback from the structures for maintenance purposes;
- **Subsurface fee simple interests** are required for the permanent tunnel structure and include a three-metre setback for maintenance purposes;
- **Permanent easements** are required directly above the tunnel from earth to sky for the support and safe operation of the subway; and
- **Temporary easements** are required for construction purposes to conduct temporary utility and road relocations, install tie-backs, excavate and construct various elements of the project.

Real Estate Services have been in discussions with many of the owners of the properties in an effort to reach mutually acceptable terms. In order to avoid jeopardizing the project timelines and to ensure delivery of the required properties to the contractor

<sup>5</sup> <http://www.scarboroughsubwayextension.ca/notice-of-commencement.html>

<sup>6</sup> [https://www.ttc.ca/PDF/Transit\\_expansion\\_PDFs/2017-08-19\\_SSE\\_TPAP\\_Final%20EPR\\_Hardcopy-Volume1%282017-11-17%20Up.pdf](https://www.ttc.ca/PDF/Transit_expansion_PDFs/2017-08-19_SSE_TPAP_Final%20EPR_Hardcopy-Volume1%282017-11-17%20Up.pdf)

<sup>7</sup> <http://www.scarboroughsubwayextension.ca/notice-to-proceed.html>

by Q4 2020, acquisition of these properties by expropriation may be necessary. Accordingly, expropriation is recommended by staff if a negotiated settlement cannot be reached with any of the property owners.

Real Estate Services has also submitted a report to Executive Committee entitled “Proposed Settlement of Various Claims at 300 Borough Drive, 530 Progress Avenue and 580 Progress Avenue – Line 2 East Extension” that seeks authority to enter into and execute Minutes of Settlement with the relevant property owners pursuant to Section 24 of the Expropriations Act.

## **5. Noise By-Law Amendment**

The existing City of Toronto Noise By-Law (City of Toronto Municipal Code, Chapter 591, Noise) was amended in 2010 to include specific exemptions for Major Transit Projects, including the Toronto-York Spadina Subway Extension and the former Transit City Light Rail Transit Projects. The specific exemptions provide the TTC the ability to:

- Undertake all civil construction activities from 7 am to 11 pm, seven days per week;
- Tunnel using Tunnel Boring Machines ("TBMs"), and related activities, 24 hours per day, seven days per week; and
- Weld and install track, 24 hours per day, seven days per week.

Because the 2010 amendment is for specific projects, these amendments did not apply to the Line 2 East Extension project, which was approved by City Council in 2013. The Line 2 East Extension schedule has been developed assuming these or similar amendments would be in effect for the project.

City of Toronto Municipal Licensing and Standards Division has reviewed the Noise By-Law, including a blanket exemption for “Necessary Municipal Work”, which would include all future Major Transit Projects.

Of the overall alignment (6.2 km) for the Line 2 East Extension, 5.9 km will be constructed by bored tunnel using a TBM. Tunnelling is an important aspect of the Line 2 East Extension project, and must be undertaken in a manner that enables the project to be delivered safely and according to budget and schedule.

Tunnelling is a 24/7 operation typically involving two 10-hour shifts and four hours for maintenance per day. Tunnelling must be continuous to maximize the efficiency of the TBM and to minimize any potential risk of settlement or damage to buildings and utilities located above the tunnel.

The main noise impact of tunnelling will be at the tunnel mobilization sites (located at Highway 401 and Town Centre Court) from tunnelling operations, including transportation of concrete tunnel liners and removal of excavated soil on a 24/7 basis. The Highway 401 launch shaft is located in a commercial parking lot. As well, high background noise levels from Highway 401 are expected to mask the impact of the launch shaft site on the surrounding office and commercial buildings. The Town Centre Court tunnelling site is located south of the existing Line 3 Scarborough elevated guideway, in the vicinity of the YMCA and a townhouse and high rise condominium

complex. TTC has committed to providing noise barriers surrounding the construction site to minimize the impact of noise. Other noise mitigation strategies are currently under development.

The requirement for 24/7 tunnelling was documented in the Environmental Project Report and has been presented to the public and property owners during the Transit Project Assessment and in community meetings held in fall 2018.

As with previous subway expansion projects, TTC commits to the following to minimize potential impacts of construction-related noise impacts:

- Developing and implementing protocols and guidelines on sensitive construction activities;
- Using the recommended By-Law amendment on a judicious basis and only where warranted and cost-effective;
- Construction contracts will include detailed specifications with respect to monitoring and minimizing construction noise;
- Continuing community outreach as described below; and
- Ensuring compliance with Transit Project Assessment commitments.

An extensive public consultation and community outreach program is being implemented for the project, consisting of:

- Continued engagement with the public and property owners on noise impacts and mitigation at future public consultation events;
- Advance notice to the community and local City Councillors of construction activities (e.g. transmitted by mail, email, hand delivery as required and posted on the project website and social media);
- Provide a broad range of methods of the community to report on disruptive construction activities (e.g., staffed community liaison office in the field, 24-hour telephone hotline, posting TTC Community Liaison contact information at all construction sites); and
- Working with the construction contractor to mitigate disruptive construction activities in a timely manner.

In order to mitigate risks to the Line 2 East Extension project, this report includes a recommendation to add the project to the list of Major Transit Projects as defined under the existing City of Toronto Noise By-Law.

## **6. Risk, Schedule and Costs**

The 2016 KPMG Capital Program Delivery Review<sup>8</sup> emphasized the implementation of a structured and documented risk management process as a fundamental cornerstone of capital project management practice. The study further advocated risk management as a concept that permeates all project decision-making throughout the project lifecycle. Schedule and cost contingency allocations should be an output of the risk management process and should be managed alongside the analyzed risks: when a risk is realized

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<sup>8</sup> <https://www.toronto.ca/legdocs/mmis/2017/ex/bgrd/backgroundfile-98219.pdf>

the contingency is drawn down. When a risk is expired, the contingency is returned to the project budget.

In 2017, TTC performed a risk assessment and developed a preliminary risk register with approximately 200 risks, which included an initial, pre-mitigated assessment of the likelihood and impact of risks materializing. This analysis identified a schedule risk allowance of 22 months, which was documented in the March 2017 Council Report.

In 2018, an integrated cost-schedule quantitative risk analysis was completed on the Line 2 East Extension to determine the project capital cost and schedule risk profiles and the contingency for the current level of project definition. The analysis included the following components:

- A schedule risk model to capture duration uncertainty and schedule risk events. The schedule is also used to assess the impact of time variable costs that will change in line with schedule variations from the plan.
- A cost risk model to understand the potential variability in the base cost estimate, as well as discrete risk events from the project risk register.

The analysis assessed the known scope of the project, and did not take into account the introduction of new or unknown scope.

TTC's risk model was assessed by the Predict! Risk Analyser software provider, Risk Decisions, who concluded that the final analysis is: "thorough, comprehensive, and well thought-out and constructed" (see Appendix C). As well, the Predict! risk model results were compared with the results using different software (Primavera Risk Analysis for schedule risk analysis and @Risk for cost risk analysis), and the results of the analyses were very close.

## 6.1. Schedule

The March 2017 Council report included a preliminary schedule reflecting an in-service date (excluding risk) of Q2 2026 with construction taking approximately six years (2020-2026) and based on March 2017 approval to proceed. The report also identified a 22-month schedule risk, which would result in an in-service date of Q4 2027 and project completion (i.e., completion of Phase 2 – western section of bus terminal) in Q1 2029.

TTC has developed a detailed schedule based on 30% design completion. The current in-service date (excluding risk) is Q4 2026 due to:

- Extended design duration to add the Scarborough Centre Station bridging plaza;
- Extended construction to address tunnel ventilation requirements; and
- Refinements to construction sequencing at Scarborough Centre Station.

Based on schedule risk analysis, it is recommended that the project schedule risk allowance be set at 11.4 months for Phase 1, which corresponds to an in-service date of Q4 2027 and 3.1 months for Phase 2, resulting in a project completion date of Q2 2030. The breakdown of the project schedule risk by project milestone is summarized in Table 1.



**Table 1.** Schedule risk allowance by project milestone

Project Milestone	2017 Council Submission			April 2019 Council Submission (30% Estimate)		
	Without Risk Allowance	With Risk Allowance		Without Risk Allowance	With Risk Allowance	
	Milestone Date	Months	Milestone Date	Milestone Date	Months	Milestone Date
Line 2 East Extension In Service (Phase 1)	Q2 2026	18.5	Q4 2027	Q4 2026	11.4	Q4 2027
Scarborough Centre Station Bus Terminal Complete (Phase 2)	Q4 2027	3.5	Q4 2029	Q2 2029	3.1	Q2 2030
<b>Total</b>		<b>22.0</b>			<b>14.5</b>	

In January 2019, TTC requested Turner and Townsend to undertake a peer review of the construction schedule. Turner and Townsend reported as follows (Appendix C):

- The construction schedule has been developed in accordance with the 30% design;
- All activities are well defined, sequentially and logically linked; and
- The durations allocated to work activities are reasonable and total duration is comparable with other similar projects in Canada.

Although the schedule was developed in-house by TTC project team and verified by Turner and Townsend, the final project schedule will be determined by the marketplace following receipt of the Request for Proposals and subsequent evaluation.

## 6.2. Class 3 Cost Estimate

The March 2017 capital cost estimate was based on less than 5% design and was considered to be a Class 4 estimate per the Association for the Advancement of Cost Engineering ("AACE") scale, with accuracy of -30% to +50%. The report also identified a potential risk to the cost of construction of \$115 million and a potential risk of schedule delays of \$190 million.

As design has advanced to 30%, a Class 3 cost estimate, with an expected accuracy range of -20% to +30%, has been achieved. Per best practice guidelines, a Class 3 estimate is required in order to establish the project budget baseline.

Turner and Townsend conducted an independent third party review of the Class 3 estimate and estimate basis. Turner and Townsend's findings (Appendix C) are summarized below:

- TTC's estimate exceeds AACE guidance Class 3 requirements;

- TTC's estimating process is robust and thorough;
- TTC's process for developing the estimate baseline was generally successful in advancing the maturity of the work; and
- The cost estimate is aligned with Turner and Townsend's experience for Greater Toronto Area mega transit projects.

Table 2 summarizes the costs for key elements of the base project scope, changes to the base scope and scope enhancements.

### 6.3. Management Reserve

The TTC Capital Program Delivery Review conducted by KPMG recommended a separate budget allocation, known as a Management Reserve, to address post-approval scope changes in project budgets. The management reserve is not the same as contingency or risk, which are already priced into the project budget. A management reserve addresses new or unknown scope that comprises additions to the project requested after scope has been approved. The updated Line 2 East Extension project budget includes a management reserve of \$20 million (see Table 3).

**Table 2.** Class 3 cost estimate and comparison to March 2017 Council budget

	A	B	(B-A)
Item	2017 Council Submission Budget	2019 Council Submission Budget (Class 3 Cost Estimate)	Variance
<b>1. Base Project Scope (approved by Council March 2017)</b>			
1.1. Line 2 East Extension	\$3,610.0 M <sup>1</sup>	\$3,474.9 M	(\$135.1 M)
1.2. SRT Decommissioning and Demolition	\$123.0 M	\$102.1 M	(\$20.9 M)
1.3. SRT Life Extension	\$132.0 M	\$158.0 M	\$26.0 M
<b>Subtotal (1.1 + 1.2 + 1.3)</b>	<b>\$3,865.0 M</b>	<b>\$3,735.0 M</b>	<b>(\$130.0 M)</b>
<b>2. Changes to the Base Project Scope</b>			
2.1. Bridging Plaza	---	\$57.3 M	\$57.3 M
2.2. Toronto Green Development Standards – Version 3.0	---	\$1.3 M	\$1.3 M
2.3. Enabling Works for Automatic Train Control	---	\$2.1 M	\$2.1 M
2.4. Eglinton East LRT Interface Design	---	\$0.7 M	\$0.7 M
<b>Subtotal (2.1 + 2.2 + 2.3 + 2.4)</b>	<b>---</b>	<b>\$61.4 M</b>	<b>\$61.4 M</b>
<b>Cumulative (1. + 2.)</b>	<b>\$3,865.0 M</b>	<b>\$3,796.4 M</b>	<b>(\$68.6 M)</b>
<b>3. Scope Enhancements</b>			
3.1. Eglinton East LRT Interface Construction	---	\$54.7 M	\$54.7 M
3.2. Public Realm	\$11.0 M	\$16.4 M	\$5.4 M
3.3. Platform Edge Doors	\$14.0 M	---	(\$14.0 M)
<b>Subtotal (3.1 + 3.2 + 3.3)</b>	<b>\$25.0 M</b>	<b>\$71.1 M</b>	<b>\$46.1 M</b>
<b>4. Total (1. + 2. + 3.)</b>	<b>\$3,890.0 M</b>	<b>\$3,867.5 M</b>	<b>(\$22.5 M)</b>
Notes:			
<ul style="list-style-type: none"> <li>• (1) Includes \$3,305.0 M budget, \$115.0 M risk to cost of construction, and \$190.0 M potential risk of schedule delays</li> <li>• All costs in 2018\$</li> <li>• All costs include indirect costs, contingency, HST impact and escalation</li> </ul>			

## 7. Procurement

In 2017, City Council approved the procurement model for the project as Design-Build-Finance, subject to successful negotiations leading to an agreement with Infrastructure Ontario (IO). In the event an agreement was not reached with IO, Council further directed staff to proceed with a Design-Bid-Build (DBB) procurement based on a single construction contract. City and TTC staff engaged in discussions with IO, but were not able to agree on satisfactory terms. In June 2017, and reconfirmed in October 2017, IO advised the City and TTC that they would be unable to provide services in support of the project. Therefore, in accordance with Council direction, City and TTC have proceeded on the basis that the project will be delivered through a DBB procurement based on a single construction contract. As such, costs which were previously identified for IO services associated with Design-Build-Finance project delivery will no longer be incurred.

In December 2018, TTC received 13 submissions responding to a Request for Expressions of Interest. TTC has retained a Fairness Monitor to support the DBB procurement process.

## 8. Project Budget

**Table 3.** Recommended Line 2 East Extension Project Budget

	<b>A</b>	<b>B</b>	<b>(B-A)</b>
<b>Item</b>	<b>2017 Council Submission Budget</b>	<b>30% Estimate</b>	<b>Variance</b>
4. Total (recommended project scope from Table 2)	\$3,890.0 M	\$3,867.5 M	(\$22.5 M)
5. Management Reserve	\$100.0 M	\$20.0M	(\$80.0M)
6. Project Delivery			
6.1. Design-Build-Finance – Infrastructure Ontario Costs	\$15.0M	\$0.0 M*	(\$15.0 M)
6.2. Design-Build-Finance – Financing Costs	\$110.0 M	\$0.0 M*	(\$110.0 M)
Subtotal (6.1 + 6.2)	\$125.0 M	\$0.0 M	(\$125.0 M)
<b>7. Grand Total</b>	<b>\$4,115.0 M</b>	<b>\$3,887.5 M</b>	<b>(\$227.5 M)</b>
Notes:			
<ul style="list-style-type: none"> <li>* Costs not required due to design-bid-build project delivery</li> <li>All costs in 2018\$</li> <li>All costs include indirect costs, contingency, HST impact and escalation</li> </ul>			



## 9. Funding

This Financial Impact section of the cover report provides an update on the funding and financing strategy for the project now that the required Class 3 cost estimate and Level 3 schedule have been developed and a budget baseline can now be set for the project.

## 10. Next Steps

Subject to City Council approval, written support for the project from the Province of Ontario, and finalization of contribution agreements for federal and provincial funding, TTC will proceed with the following:

- Complete the design of the station, tunnel and systems;
- Conduct ongoing public consultation for the final designs and construction impacts;
- Issue and evaluate Request for Qualifications for construction contractors; and
- Tender and award the construction contract.

## 11. Conclusion

This report recommends City Council approve the budget for the Line 2 East Extension, based on the Class 3 Cost estimate, best project management practices (e.g., holistic scoping, risk-adjusted budget, etc.) and following extensive due diligence and peer review.

A series of reports have been considered by City Council over the last several years to advance the Line 2 East Extension. This report marks a milestone for the project – seeking full funding commitment to the project and authority to advance to procurement and construction.

## Contact

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## Appendices

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Appendix A – Property Requirements

Appendix B – Property Sketches

Appendix C – Executive Summaries of Peer Reviews

Updated Scarborough Transit Network Business Case available at:

[https://www.ttc.ca/About\\_the\\_TTC/Projects/Scarborough\\_Subway\\_P/index.jsp](https://www.ttc.ca/About_the_TTC/Projects/Scarborough_Subway_P/index.jsp)