For Action

City of Toronto Report – EX4.1: Toronto's Transit Expansion Program – Update and Next Steps

Date: April 11, 2019
To: TTC Board

Summary

EX4.1: Toronto's Transit Expansion Program – Update and Next Steps will be considered by the City of Toronto Executive Committee on April 9, 2019. Subject to the actions of the Executive Committee the item will be considered by City Council on April 16, 2019.

Recommendations

It is recommended that the TTC Board:

1. Receive this report for information.

Contact

Kevin Lee
Head of Commission Services
416-393-3744
kevin.lee@ttc.ca

REPORT FOR ACTION

Toronto's Transit Expansion Program - Update and Next Steps

Date: April 3, 2019
To: Executive Committee
From: City Manager
Wards: All

SUMMARY

In 2016 City Council approved a transit network plan that identified projects required to address capacity constraints on the existing subway network (specifically Line 1), support future growth and city building objectives, and provide rapid transit service to underserved areas of Toronto. Over the last several years, $224 million has been invested to advance City Council's priority projects. As a result, several projects will be ready to go to procurement and construction in 2019/2020, including the SmartTrack Stations Program, the Line 2 East Extension Project ("L2EE"), the Exhibition Loop-Dufferin Loop Streetcar Connection (a priority segment of the Waterfront Transit Network Plan), and the Relief Line South. Other key projects still in early planning phases continue to progress as well, such as Bloor-Yonge Capacity Improvement, Eglinton East and West LRT extensions, and the Waterfront Transit Network Plan.

This is a critical moment to build transit, and to leverage the investment to date in planning, design and engineering work to achieve that objective. This report provides a comprehensive overview of the current status of Toronto's transit expansion program, and seeks City Council direction to advance progress on building the network.

In 2018, the Government of Canada and the Province of Ontario announced an agreement on Phase 2 of the Investing in Canada Infrastructure Program ("ICIP"), which included $4.897 billion in federal funding and $4.040 billion in provincial funding for public transit infrastructure projects in Toronto. The Public Transit Infrastructure Fund Phase 2 ("PTIF2") is a ten year program (2018-2028) under the ICIP designed specifically for projects that build the transit network. The PTIF2 program is focused on delivering the following outcomes:

- Improved capacity of public transit infrastructure;
- Improved quality and/or safety of existing or future transit systems; and
- Improved access to a public transit system.

Funding under PTIF2 has been allocated to Toronto based on ridership. Under the PTIF2 program, both the provincial and federal government must approve projects submitted by the City in order to receive funding.

The City is well positioned to leverage this intergovernmental funding opportunity and invest in projects that will address a key City and TTC priority: ensuring the safety and reliability of the TTC system. This report provides City Council with recommended priorities for the City of Toronto's federal funding allocation under the PTIF2 program.

A total of $1.245 billion in federal funding has already been prioritized by City Council:

- $0.660 billion to the **Line 2 East Extension** project (as approved in 2013); and
- $0.585 billion to the **SmartTrack Stations Program** (as approved in 2018).

The L2EE project is required to replace the Line 3 system that has been in service for over 30 years. The L2EE project addresses broader city-building objectives, but is also critical for the purpose of replacing an asset at the end of its useful life. The SmartTrack Stations Program leverages the provincial investment in GO Expansion to address both growth and city-building objectives and also helps to provide additional transit choice to downtown.

This report recommends that City Council confirm the Relief Line South and Bloor-Yonge Capacity Improvement as priority projects for the remaining $3.651 billion of the City's federal funding allocation under the PTIF2 program. Specifically:

- $3.151 billion in federal funding for the **Relief Line South**; and
- $0.500 billion in federal funding for the **Bloor-Yonge Capacity Improvement** project.

Today, Line 1 has an average daily weekday ridership of over 730,000 riders, making it one of the busiest lines in North America. The Relief Line South, Bloor-Yonge Capacity Improvement project and other related capital enhancements included in the Line 1 Capacity Requirements Program, are critical to reducing overcrowding and congestion on the Line 1 subway, and are necessary to ensure the system is able to safely accommodate future network demand as a result of both population growth and expansion.

The federal funding contributions requested for the four projects comprise the City of Toronto's total federal funding allocation of $4.897 billion under the PTIF2 program.

The recommendations for allocating federal funding are based on the urgent need to address Line 1 capacity and safety as a first priority. Advancing projects that are procurement and construction-ready is also an important consideration in order to ensure investments in planning, design and engineering are utilized, and currently resourced project teams can be leveraged to continue momentum in building transit.

The City is continuing to hold discussions with the Province on the proposed realignment of transit responsibilities between the parties (i.e., "Upload"). The outcomes of this discussion will inform provincial and municipal cost sharing for subway infrastructure projects identified above for federal funding. It is important to note that recommendations in this report are agnostic of asset ownership and are based on what is required to best serve the transit network and the safety of riders.

In order to take advantage of future intergovernmental funding opportunities, the City must continue to advance projects through the early planning and design phases of the project lifecycle in order to have projects that are "shovel ready". The Waterfront Transit Network and Eglinton LRT extension projects support the City's long-term city building objectives as outlined in the Toronto Official Plan.

This report makes the following recommendations on key city building projects:

- Advance preliminary design and engineering ("PDE") of the Streetcar Loop option for the **Union Station-Queens Quay Link and East Bayfront LRT**, an important component of the Waterfront Transit Network; and
- Request Metrolinx to partner with the City to develop a plan to undertake PDE for two phases of the **Eglinton East LRT**: (i) an easterly extension of Line 5 (Eglinton Crosstown) from Kennedy Station to University of Toronto Scarborough ("UTSC"); and (ii) an extension to Malvern Centre.

Staff will be reporting in the fall of 2019, prior to the 2020 budget process, on updated funding and financing strategies for projects that are not currently contemplated for funding under the PTIF2 program. The outcome of ongoing discussions with the Province will inform that strategy.

The Province of Ontario communicated to the City on March 22nd and March 26th, 2019 in letters from the Deputy Minister of Transportation, and the Special Advisor to Cabinet – Transit Upload, new plans for Toronto's transit network, and identified proposed changes to the Relief Line South and Line 2 East Extension – two projects ready to advance to procurement and construction in 2019/2020 based on current plans. This report identifies additional information required from the Province, as well as due diligence that will need to be undertaken to assess the potential cost, schedule and other impacts associated with the new transit proposals. The Province and/or Metrolinx have shared limited information to date.

The City remains committed to building the transit network and entering into a constructive dialogue with the Province. To assist in ongoing discussions with the Province, it is important to establish Toronto's key interests and objectives – a safe and reliable transit service for Toronto transit riders. This report lays out clear priorities for City Council's consideration with respect to the expansion of Toronto's transit network. Given the Province's role in identifying projects for submission to the federal government under the PTIF2 program, further discussion with the Province will be required.

This report was prepared in consultation with the Chief Executive Officer, Toronto Transit Commission.

RECOMMENDATIONS

The City Manager recommends:

Public Transit Infrastructure Fund Phase 2 Federal Funding Allocation

1. City Council direct the City Manager to advise the Government of Canada and the Province of Ontario of the City of Toronto's priority transit expansion projects for its allocation of $4.897 billion in federal funding under the Investing in Canada Infrastructure Program Public Transit Infrastructure Fund Phase 2 program as follows:

    a. $0.660 billion as previously approved by City Council in October 2013 (CC39.5) for the Line 2 East Extension project as described in Attachment 2;

    b. $0.585 billion as previously approved by City Council in April 2018 (EX33.1) for the SmartTrack Stations Program;

    c. $3.151 billion for the Relief Line South as described in the October 2018 Environmental Project Report as approved by the Minister of Environment, Conservation and Parks; and

    d. $0.500 billion for the Bloor-Yonge Capacity Improvement project as described in Attachment 1.

2. City Council direct the City Manager to advise the Government of Canada that cost-matching requirements of the Province of Ontario and the City of Toronto under the Investing in Canada Infrastructure Program Public Transit Infrastructure Fund Phase 2 program will be determined through ongoing discussions as part of the Toronto-Ontario Transit Responsibilities Realignment Review.

3. City Council authorize the Mayor and the City Manager to negotiate and enter into agreements and amendments as may be required with the Province of Ontario and the Government of Canada for the Investing in Canada Infrastructure Program Public Transit Infrastructure Fund Phase 2, in accordance with these recommendations and upon such terms satisfactory to them in consultation with the City Solicitor.

Line 2 East Extension Project

4. City Council approve $3.887 billion, which includes $3.796 billion for the base project scope, $0.071 billion for scope enhancements and $0.020 billion for a management reserve, for the one-stop Line 2 East Extension project as described in Attachment 2, and request the Chief Executive Officer, Toronto Transit Commission to proceed with procurement and construction of the project, subject to:

a. the Province of Ontario providing written support for the Line 2 East Extension Project as outlined in Attachment 2 and confirmation of the Province of Ontario's previous funding commitment by May 15, 2019; and

b. the Mayor and the City Manager entering into contribution agreements for the receipt of federal and provincial funding by November 30, 2019, on terms and conditions satisfactory to them in consultation with the City Solicitor.

5. Subject to fulfillment of the conditions set out in Recommendation 4, City Council:

a. amend the Council Approved 2019-2028 Capital Budget and Plan for the Line 2 East Extension project to commit total project costs of $3.705 billion with cash flows of: $0.117 billion in 2019, $0.241 billion in 2020, $0.280 billion in 2021, $0.588 billion in 2022, $0.578 billion in 2023, $0.694 billion in 2024, $0.610 billion in 2025, $0.200 billion in 2026, $0.174 billion in 2027 and $0.223 billion in 2028; and

b. approve the project to be funded from $0.660 billion Investing in Canada Infrastructure Program Public Transit Infrastructure Fund Phase 2, $1.990 billion in provincial funding, $0.258 billion in recoverable debt from XR2125 Development Charge Reserve Fund SSE Transit and $0.797 billion in recoverable debt from XR1725 Scarborough Transit Reserve Fund.

c. authorize the Director, Real Estate Services to:

i. continue negotiations to acquire the Project Requirements, and if unsuccessful, City Council authorize the initiation of expropriation proceedings for the Property Requirements as set out in Appendix "A" to Attachment 2 and as illustrated on the Property Sketches attached as Appendix "B" to Attachment 2 (collectively the "Project Requirements") for the purposes of the construction, operation and maintenance of the Line 2 East Extension and all works and uses ancillary thereto; and

ii. execute, serve and publish Notices of Application for Approval to Expropriate Land for the Project Requirements, to forward to the Chief Inquiry Officer any requests for inquiries received, to attend the hearing to present the City's position and to report the Inquiry Officer's recommendations to City Council for its consideration.

6. City Council amend Section 591-2.1 of Chapter 591, Noise, of The City of Toronto Municipal Code to add the Line 2 East Extension to the list of Major Transit Projects provided that the exemption for government work contained in item EC3.6 is not adopted by City Council.

7. City Council request the following should part a. or b. of recommendation 4 not be met:

a. request the Province of Ontario to provide written confirmation of the station locations and the terminus of the proposed three-stop subway extension referenced in the March 22 and 26, 2019 letters from the Special Advisor to Cabinet – Transit Upload and the Deputy Minister, Ministry of Transportation to the City Manager and Chief Executive Officer, Toronto Transit Commission, included as Attachment 1 and 2 to the supplementary report from the City Manager on *Engagement with the Province on Toronto's Transit System - Q1 2019 Status Report* (EX3.1a); and

b. direct the City Manager in consultation with the Chief Executive Officer, Toronto Transit Commission and the Chief Transit Expansion Officer, Toronto Transit Commission to report to City Council on an assessment of the cost, schedule, and operational impacts to the Toronto Transit Commission network (e.g., Line 3 Scarborough and bus operations) associated with changing the scope and/or delivery model of the Line 2 East Extension project, and principles to guide future discussions with the Province of Ontario.

Waterfront Transit - Queens Quay Link and East Bayfront Light Rail Transit

8. City Council approve the Streetcar Option as the preferred technology for the Union Station-Queens Quay Link as described in Attachment 3, thereby concluding the initiation and development phase of the project.

9. City Council request the Deputy City Manager, Infrastructure and Development Services, in partnership with the Chief Executive Officer, Toronto Transit Commission and Waterfront Toronto, to commence the preliminary design and engineering phase of the Union Station-Queens Quay Link and the extension of the Light Rail Transit to East Bayfront in 2020, and report back to City Council when a Class 3 cost estimate and Level 3 schedule have been developed.

Eglinton East Light Rail Transit

10. City Council request Metrolinx to work with the City to develop a plan to address the following matters:

a. the phasing for the Eglinton East Light Rail Transit extension of Line 5 (Eglinton Crosstown), including a first phase to University of Toronto Scarborough as described in Attachment 4 and a second phase to Malvern Centre;

b. the location and construction timing of the Maintenance and Storage Facility as discussed in Attachment 4;

c. commencing the preliminary design and engineering phase of the Eglinton East Light Rail Transit project; and

request the Deputy City Manager, Infrastructure and Development Services to report back to City Council with recommended plan, schedule, cost and funding requirements for consideration in the City's 2020 budget process.

Eglinton West Light Rail Transit

11. City Council direct the Deputy City Manager, Infrastructure and Development Services to report back to Executive Committee on next steps for the Eglinton West Light Rail Transit project once Metrolinx and the Greater Toronto Airports Authority have completed the planning and analysis of the full extension from Mount Dennis Station to Pearson International Airport.

12. City Council request the Chief Planner and Executive Director, City Planning and the General Manager, Transportation Services, in partnership with the Ministry of Transportation, to study potential solutions to existing and future traffic congestion on Eglinton Avenue West and other streets in central Etobicoke and report back by the third quarter of 2020.

General

13. City Council request the City Manager and the Chief Financial Officer and Treasurer to report back in the fall of 2019 prior to the launch of the 2020 Budget process, when project cost estimates have achieved higher levels of refinement and a potential decision relating to the subway upload has been made, on funding and financing options for the Relief Line South, Bloor-Yonge Capacity Improvement and the balance of the Transit Expansion prioritized projects including but not limited to:

    a. the preliminary design and engineering phase of:

        i. Waterfront Transit Network – Union Station-Queens Quay Link and the extension of the Light Rail Transit to East Bayfront; and

        ii. the Eglinton East Light Rail Transit; and

    b. the procurement and construction phase of the Waterfront Transit Network – Exhibition Place (Exhibition Loop to Dufferin Gate Loop).

14. City Council forward this report to the Toronto Transit Commission Board, the Province of Ontario, Metrolinx, the Greater Toronto Airports Authority, York Region, York Region Rapid Transit Corporation, the City of Mississauga, and Infrastructure Canada for information.

FINANCIAL IMPACT

Public Transit Infrastructure Fund Phase 2 (PTIF2)

The City of Toronto has been allocated $4.897 billion in federal funding under PTIF2. This includes the federal government's prior commitment of $660 million to the Line 2

East Extension project. Under the program, the federal government will contribute up to 40% of eligible costs. The Province is required to contribute a minimum of 33% of the project costs, with the balance to be funded by municipalities.

Under the PTIF2 program, the Province is to contribute no less than $4.040 billion (33%) in new funding.[1] The Province's prior commitment to the L2EE project is not included. Assuming the Province contributes only the minimum 33%, the balance of up to $3.305 billion (27%) will be the City's responsibility in order to fully leverage the intergovernmental funding available to Toronto under the program (Table 1).

Table 1. Funding Scenario under PTIF2 (40-33-27 Scenario)[2]

	Funding Share ($M)	% of Total
Federal	4,896.6	40%
Provincial	4,039.7	33%
City Share	3,305.2	27%
Total	12,241.4	100%

The information and funding details provided in this report are based on the existing alignment of responsibilities including ownership status of the projects. Any change resulting from ongoing discussions with the Province related to the "upload" of subway infrastructure may alter the funding and financing details for the City's transit expansion program.

This report recommends that City Council request the City Manager to advise the Federal and Provincial governments of the City's priorities under the program. The recommended priorities for federal PTIF 2 funding are as follows:

- **$0.660 billion** as previously approved by City Council in October 2013 (CC39.5) for the Line 2 East Extension project as described in Attachment 2;
- **$0.585 billion** as previously approved by City Council in April 2018 (EX33.1) for the SmartTrack Stations Program;
- **$3.151 billion** for the Relief Line South as described in the October 2018 Environmental Project Report and described in Attachment 1; and
- **$0.500 billion** for the Bloor-Yonge Capacity Improvement project, as described in Attachment 1.

These four projects will maximize the City of Toronto's $4.897 billion federal funding allocation under PTIF2.

City Council approved a funding and financing strategy for the L2EE and SmartTrack Stations Program that assumed federal funding from the PTIF2 Program. A total of

[1] https://news.ontario.ca/moi/en/2018/03/under-the-180-billioninvesting-in.html#
[2] Ibid.

$1.245 billion in federal funding under the PTIF2 program has already been confirmed by City Council for these two projects.

The Relief Line South and Bloor-Yonge Capacity Improvement project have not completed the preliminary design and engineering phase ("PDE"), and therefore have Class 5 cost estimates. The federal funding amount requested for each is based on the following:

- The remaining $3.652 billion in PTIF2 federal funding for the City of Toronto; and
- The best practice to include a provision for projects that have a Class 5 estimate, with an expected accuracy range of -50% to +100%.

Table 2 shows the total project cost estimates for the four projects recommended for inclusion in the PTIF2 program.

Table 2. Total Project Cost Estimates ($ millions)

Project	Class Estimate[5]	Total Project Cost	2018 LTD Actuals/PDE	PDE	Procurement and Construction
Line 2 East Extension[1]	3	3,887.5	182.5		3,705.0
SmartTrack Stations Program[2]	3	1,491.9	22.0		1,469.9
Bloor-Yonge Capacity Improvements[3]	5	1,071.3	4.4	17.6	1,049.3
Relief Line South[4]	5	7,224.4	15.4	409.7	6,799.3
TOTAL PTIF2 PROJECT		**13,675.1**	**224.2**	**427.3**	**13,023.5**

Notes:
1. L2EE cost estimates in $YoE and escalation factors prepared by TTC – does not include lifecycle and operations / maintenance costs. Estimate peer reviewed. See Attachment 2 for details.
2 SmartTrack Stations Program Procurement and Construction costs include a capped contribution of $1,463 million to Metrolinx. Cost estimate prepared by Metrolinx (see EX33.1).
3. Bloor-Yonge Capacity Improvements cost estimates in $YoE and escalation factors prepared by TTC – does not include lifecycle and operations / maintenance costs.
4. Relief Line South cost estimates in $YoE and escalation factors prepared by TTC – does not include lifecycle and operations / maintenance costs.
5. Class 5 Estimates up to 0-2% design, with expected accuracy range of -50% to + 100%. Class 3 Estimates have a design range of 10-40% and accuracy range of -20 to +30%. Class 3 estimates are required for budgeting.

Provincial and municipal cost-matching requirements under the PTIF2 program will be determined through ongoing discussions as part of the Toronto-Ontario Transit Responsibilities Realignment Review. Table 3 shows the funding assumed by the three orders of government under the PTIF2 program.

To date, the City has committed funding of $885 million for the SmartTrack Stations Program out of the City's assumed share of $3.305 billion under the PTIF2 program. The balance of the City's share of $2.420 billion is currently unfunded. This report recommends that the Chief Financial Officer and Treasurer report back prior to the 2020 Budget process on the funding and financing strategies for the PTIF2 priority projects

once costs have been refined and the results of the upload discussions are better known.

Table 3. Funding Estimates ($ millions)

	PTIF2 Program Funding (40-33-27 Scenario)				Other Funding			
Project	**Federal**	**Province**	**City**	**Total**	**Federal**	**Province**	**City**	**Total Funding**
Line 2 East Extension[1]	660.0			660.0		1,990.0	1,237.5	3,887.5
SmartTrack Stations Program[2]	585.0		884.9	1,469.9	11		11	1,491.9
Bloor-Yonge Capacity	419.7	337.8	313.8	1,071.3				1,071.3
Relief Line South[3]	2,719.7	2,666.3	1,413.3	6,799.3	27.5	207.5	190.1	7,224.4
Sub-Total Prior to Provisions	4,384.4	3,004.1	2,612.0	**10,000.5**	**38.5**	**2,197.5**	**1,438.6**	**13,675.1**
Bloor-Yonge Provision[4]	80.7	195.6		276.2				276.2
Relief Line Provision[4]	431.5	840.0	693.2	1,964.7				1,964.7
Sub-Total Provision	**512.1**	**1,035.6**	**693.2**	**2,240.9**				**2,240.9**
Total	**4,896.6**	**4,039.7**	**3,305.2**	**12,241.4**	**38.5**	**2,197.5**	**1,438.6**	**15,915.9**
As % Total PTIF2	**40%**	**33%**	**27%**	**100%**				

Notes:
1. Other assumed funding includes Provincial LRT funding ($1,990M or $1,480M in 2010$), City share includes recoverable debt funded from Scarborough Tax Reserve and Development Charges.
2. Committed funding includes Federal PTIF1 and City PTIF1 co-payment.
3. Committed funding includes Federal PTIF1, City PTIF1 co-payment, and Provincial/Metrolinx Relief Line PDE work; includes $325 million in added funding to implement a schedule improvement strategy/early work opportunities. The City has identified $162.5 million; remaining 50% is required from partners.
4. Bloor-Yonge provision (26% of costs) and Relief Line provision (29% of costs) are included to maximize federal funding and to account for the fact that each has a Class 5 cost estimate.

The following provides a summary of the current funding and financing strategy by priority project.

SmartTrack Stations Program

In April 2018 City Council approved funding of $1.469 billion for the procurement and construction of the incremental infrastructure associated with the SmartTrack Stations Program. The financial strategy included an assumed PTIF2 federal allocation of $585 million and a City contribution of $885 million (see 2018.EX33.1 for details). The provincial contribution to the SmartTrack Stations Program is the investment in the GO Expansion program along the Kitchener and Stouffville/Lakeshore East GO corridors in order to support the service concept for the SmartTrack Stations Program. The project

is ready to be procured for construction by Metrolinx, who will own the assets, pending the execution of an amended Agreement in Principle with the Province (see Attachment 1). The City has been requesting confirmation from the Province and has yet to receive a formal response. A non-binding Memorandum of Understanding ("MOU") to enter into a final agreement was signed between the parties in May 2018.

Line 2 East Extension Project

City Council approved a $3.56 billion funding and financing strategy for the Line 2 East Extension project in 2013 that included a federal commitment of $660 million. These funds are included in the federal share of the PTIF2 program. The Province committed to fund $1.48 billion (2010$, or escalated to $1.99 billion). The City funded the balance of $910 million through development charges and the SSE tax levy. The City is responsible for any future cost overruns.

The PDE phase of the project is complete, and the project is ready to proceed to procurement and construction, subject to concurrence from intergovernmental partners and securing definitive contribution agreements.

The Class 3 estimate for the project is $3.887 billion (see Attachment 2). The Class 3 estimate includes cost and schedule risk analysis elements, additional scope requirements to address City Council direction, and optional elements such as public realm. The project is to be procured through a traditional design-bid-build approach. See Attachment 2 for a detailed breakdown on the estimate. A third party international consultancy firm – Turner and Townsend – has peer reviewed the estimate and concluded that it is sound (see Appendix C to Attachment 2).

The updated City share – $1.237 billion (see Table 4), an increment of $327 million – will be financed through recoverable debt. The updated financial analysis indicates the debt service costs can be accommodated within the previously approved funding strategy of the 1.6% dedicated SSE tax levy and through development charges.

This accommodation is possible because the funding capacities of development charges for the project and the SSE tax levy available to service the debt have grown in the six years since the project and original funding plan was approved by City Council; the updated Development Charges By-law adopted by City Council in 2018 recovers a much higher amount than was previously forecast; the cost of debt is lower now than it was in 2013; the timing of expenditures is further in the future than was originally forecast; and interest revenue earned from the SSE tax levy is to be allocated to the reserve fund established for this project (as presented in Table 4). Further, updates of the City's Development Charges By-law to account for the updated cost estimate will potentially raise up to $90 million in additional funding to meet the City's funding obligations for the project.

The increase in available funding is summarized in Table 4. This report recommends amendments to the Council Approved 2019-2028 Capital Budget and Plan for this project for the balance of cash flows.

Table 4. Updated L2EE Funding Assumptions ($ millions)

	2013 Funding Plan	2019 Funding Plan	
Cost allocation			**Change**
Federal	660	660	0
Provincial	1,990	1,990	0
City share	910	1,237	327
Total estimated cost	3,560	3,887	327
Funding Assumptions of City Share:	Original Assumptions	Updated Assumptions	Additional Debt Supported
Development Charges	165	270	105
SSE Tax Levy (1.6%) Revenue	38 annually	41 annually	55
Cost of Borrowing	4.3%	3.5%(1)	65
SSE Reserve Fund Interest Earnings	0	2 average annually	40
Total			265
Note: (1) While the current cost of borrowing is 3.1%, the above table uses a 15% allowance for higher rates in the future to be conservative.			

Other Transit Priority Projects

Pending completion of discussions with the Province on the potential realignment of transit responsibilities, staff will be reporting in the fall of 2019 prior to the 2020 Budget process on updated financing and funding strategies for the PTIF2 priorities discussed above. This report will also address funding for other transit expansion projects, including but not limited to:

- The PDE phase of the Waterfront Transit Network – Union Station-Queens Quay Link and East Bayfront LRT and the Eglinton East LRT; and
- The procurement and construction phase of the Waterfront Transit Network – Exhibition Loop to Dufferin Gate Loop.

See Attachments 1 through 5 for further information.

Potential Risks

Approximately $224 million has been spent to date to advance Toronto's transit priorities. Changes in direction, be it in scope, technology, project delivery or funding create uncertainty and risk. These risks have the potential for delays in the delivery of much-needed public infrastructure and additional costs. The risks are not confined to financial consequences but also relate to reputational risks in public confidence in government.

The Chief Financial Officer and Treasurer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

The following summarizes key City Council decisions related to the program. Each project attachment contains detailed decision history specific to each project.

In July 2016, City Council considered the report *EX16.1 Developing Toronto's Network Plan to 2031* and advanced key projects that comprise the network plan, including SmartTrack Stations Program, Eglinton West and East LRT extensions, Line 2 East Extension, Waterfront Transit Network, and the Relief Line.
Link: *http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.1*

In November 2016, City Council considered the report *EX19.1 Transit Network Plan Update and Financial Strategy,* and endorsed a Summary Term Sheet that established principles for cost-sharing on a number transit expansion initiatives, including the SmartTrack Stations Program, Eglinton West LRT, Toronto LRT Program, etc.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX19.1

In December 2016, City Council considered the report *EX20.4 Federal Infrastructure Funding – Phase 1 and 2*, and confirmed key priorities for consideration under Phase 2 Federal Infrastructure Funding, including a number of transit projects under the public transit stream: SmartTrack (including Eglinton West LRT), Relief Line South, Eglinton East LRT, and Waterfront Transit Network.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX20.4

In March 2017, City Council considered *EX 23.1, 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, tunnel at-grade facilities and the Triton bus terminal. Council requested staff to report back with a Class 3 cost estimate to proceed to procurement and construction.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX23.1

In May 2017, City Council considered *EX25.1 Advancing Planning and Design for the Relief Line and Yonge Subway Extension* and authorized staff to enter into Memoranda of Understanding with Metrolinx to advance the PDE phase of the Relief Line South and Yonge Subway Extension (YSE). City Council directed further study on Line 1 demand, and reaffirmed the position that the YSE cannot proceed unless construction of the Relief Line South, plus improvements to the Bloor-Yonge station, have been fully funded with a firm schedule for completion; if both projects proceed concurrently, the Relief Line South must be in operation first. The Bloor-Yonge station was also identified as a priority for intergovernmental funding.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX25.1

In April 2018, City Council considered *EX33.1 Implementation of the SmartTrack Stations Program and the Metrolinx Regional Express Rail Program* and approved a project budget of $1.470 billion, including a contribution of up to $1.463 billion to Metrolinx, for the SmartTrack Stations Program subject to the terms and conditions described in Attachment 1 of the report. The approved funding and financing strategy includes $0.585 billion in federal funding under PTIF2.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX33.1

In December 2018, City Council considered *CC1.6 Engagement with the Province on Toronto's Transit System*, which authorized the City Manager to negotiate a joint Terms of Reference for a discussion with the Province on the realignment of transit responsibilities between the parties. City Council further authorized the City Manager to engage in the discussion with the Province based upon the joint Terms of Reference.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.CC1.6
Attachment 2 - Guiding Principles:
https://www.toronto.ca/legdocs/mmis/2019/cc/bgrd/backgroundfile-122443.pdf

On March 27, 2019 City Council considered *EX3.1 Engagement with the Province on Toronto's Transit System – Q1 2019 Status Report*, and allocated funding for resources required to support engagement with the Province. City Council also directed staff to report back to the Executive Committee on the four transit priorities identified by the Province of Ontario in its letters dated March 22, 2019 and reiterate to the Province of Ontario City Council's firm commitment to delivering the Relief Line South as an urgent priority investment and that the Yonge Subway Extension not lead to delaying the Relief Line beyond the accelerated 2029 anticipated completion date.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.EX3.1

ISSUE BACKGROUND

Importance of the Transit Network to Toronto

The City and TTC have a key role in determining Toronto's transit network priorities. The TTC provides the critical service of connecting the diverse communities of Toronto to economic and social opportunities through an integrated network of subway, bus, streetcar and Wheel-Trans services. The TTC serves approximately 530 million riders annually; accounting for roughly 85 per cent of the Greater Toronto and Hamilton Area ("GTHA") Region’s transit riders. The TTC network complements a regional commuter rail network, GO Transit, as well as intersects with other local transit service providers to serve cross-municipal boundary trips.

Toronto has the second highest public transit commuter mode share in North America. Approximately 37 per cent of Toronto residents rely on transit infrastructure to make important connections to employment, school and community and social services. Demand on the TTC network will continue to increase given anticipated growth in the City and region over the coming decades, particularly in Toronto’s downtown core.

As Canada’s largest and busiest transit agency, the TTC operates an extensive service network that includes:

- Four rapid transit lines, with 75 stations and more than 870 rapid transit cars;
- 10 streetcar routes serving the busiest downtown surface corridors;
- more than 150 bus routes, all but three of which serve subway stations; and
- Wheel-trans – a comprehensive paratransit service.

Approximately two-thirds of the 1.7 million trips made each weekday on the TTC system are made with at least one ride on the subway system, with other parts of the trip made by TTC bus or streetcar. Further, 89 per cent of the 1.7 million daily trips are made entirely within Toronto, comprising more than two-thirds of all daily transit riders in the GTHA.

The TTC system is a critical service in Toronto today, supporting the City's economic vitality, employment growth, and social cohesion. Further development of the transit network is important for the City to achieve a broad range of city-building objectives – economic, social and environmental. There is a strong reliance on the transit network in Toronto, with approximately 46 per cent of trips in the downtown and 28 per cent of all trips citywide made by transit. This compares with mode shares of 4-8 per cent in nearby regions of Durham, York, Peel, Halton, and Hamilton.[3]

An expanded, connected transit network is central to the City being able to respond to current growth and development, and to plan for the expected 500,000+ new residents[4] of Toronto over the coming decades.

Toronto's Transit Network Plan

In March 2016, City Council adopted Toronto's Transit Network Plan: Phase 1, which contained a 2031 transit network plan developed using the City's Rapid Transit Evaluation Framework. Since that time, Council has advanced the development of the City's network through a number of Council reports, directions, funding decisions, and provincial agreements. These projects include the Line 2 East Extension Project, Relief Line South, SmartTrack Stations Program, Waterfront Transit, and Eglinton East and West LRT Extensions. The City and TTC are also working with York Region and Metrolinx to advance the PDE phase of the Yonge Subway Extension (Line 1 North Extension).

A longer-term transit network plan is also being developed to identify infrastructure required to serve future needs, including improving the overall transportation network (i.e., roadways and transit). Future growth within Toronto (both residential and employment) will be steered to areas which are well served by transit. The City and TTC also continue to work closely with Metrolinx to implement the 2041 Regional Transportation Plan ("RTP") for the GTHA, which was adopted by the Metrolinx Board in March 2018.

Project Lifecycle and Stage-Gating

As noted above, City Council identified priority projects to advance through the project lifecycle. The project lifecycle can generally be described in three phases:

- Initiation and Development (i.e., concept screening and early planning);
- Preliminary Design and Engineering (i.e., design preferred option); and

[3] 2016 Transportation Tomorrow Survey. http://dmg.utoronto.ca/transportation-tomorrow-survey/tts-reports

[4] Growth Plan for the Greater Golden Horseshoe. http://placestogrow.ca/index.php?Itemid=14&id=430&option=com_content&task=view

- Procurement and Construction (i.e., delivery).

As a project moves through the three phases, project definition becomes more refined and the information used as the basis for developing a cost estimate is more mature.

- A *Class 5* cost estimate is typical when starting the initiation and development phase, where the project is conceptual (0-2% design level). This an order of magnitude estimate to inform the decision of whether or not to continue to study an option.
- A *Class 3* cost estimate is based on PDE work (10-40% design level), and is the estimate class recommended when establishing a project budget for procurement and construction. A Class 3 estimate should be used to inform full funding commitment decisions.

As a result of investment made to date, a number of transit expansion projects will be ready to move to procurement and construction in the next year. The following projects will complete the PDE phase and have a Class 3 cost estimate:

- SmartTrack Stations Program – completed April 2018;
- Line 2 East Extension Project (one stop) – completed April 2019;
- Exhibition Loop – Dufferin Loop Streetcar Connection (Waterfront Transit Network) – expected in Q4 2019; and
- Relief Line South (current plan) – expected in Q1 2020.

Attachment 1 of this report includes an update on the status of transit expansion projects and programs currently underway to expand Toronto's transit network. Attachment 1 also provides further details on the various phases of the project lifecycle including description of cost estimate classifications.

The purpose of the report is to provide a comprehensive update on all projects currently in development. This report also contains recommendations to continue to advance projects through the project lifecycle. The following projects have reached a decision gate in this report and are described in more detail below, and in the following attachments:

- Attachment 2 – Line 2 East Extension
- Attachment 3 – Waterfront Transit Network – Union Station-Queens Quay Link and East Bayfront LRT
- Attachment 4 – Eglinton East LRT
- Attachment 5 – Eglinton West LRT

Figure 1 shows Toronto's Transit Network plan map. Figure 2 describes where current transit expansion projects and programs are in the project lifecycle.

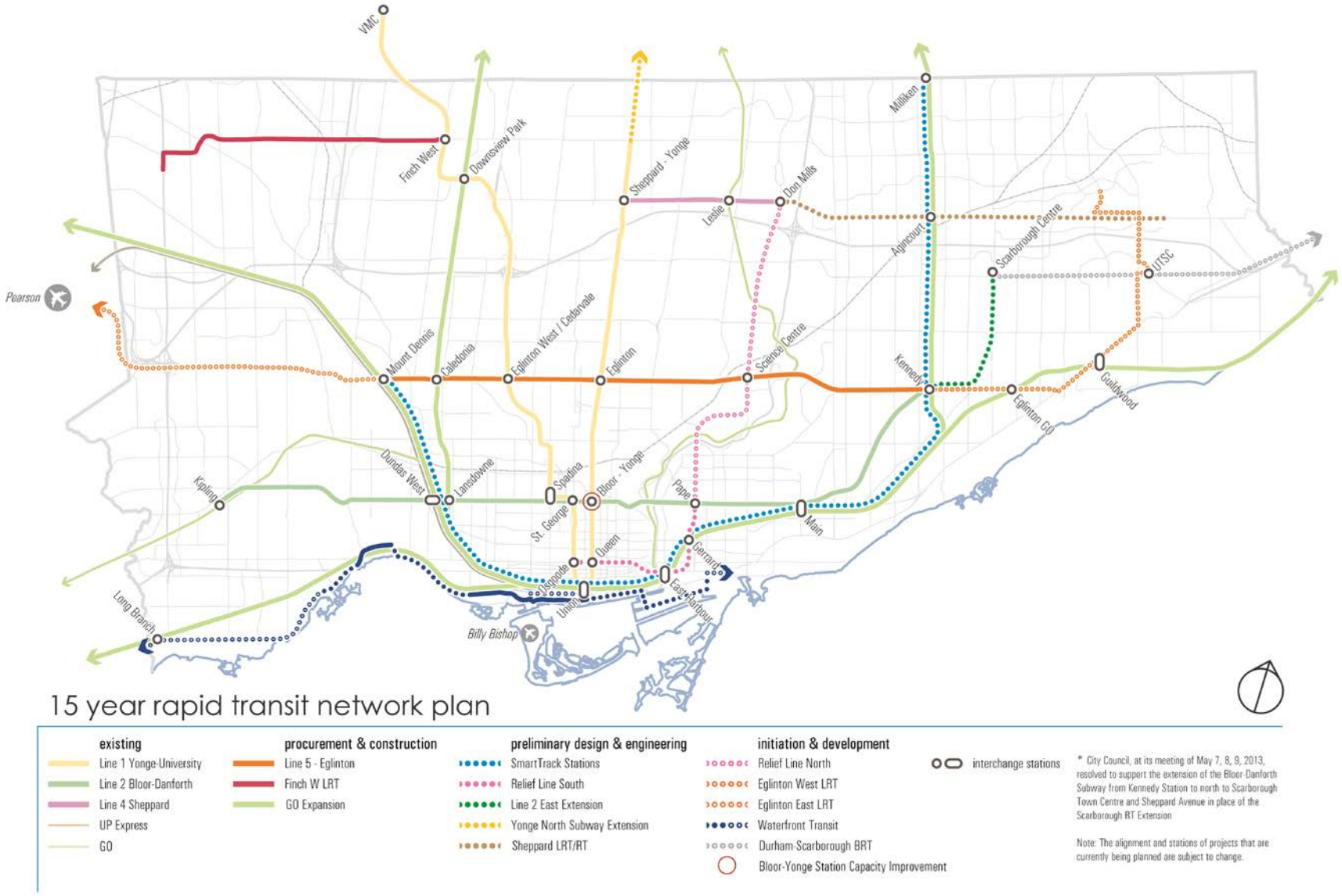

Figure 1. Toronto's Transit Network Plan

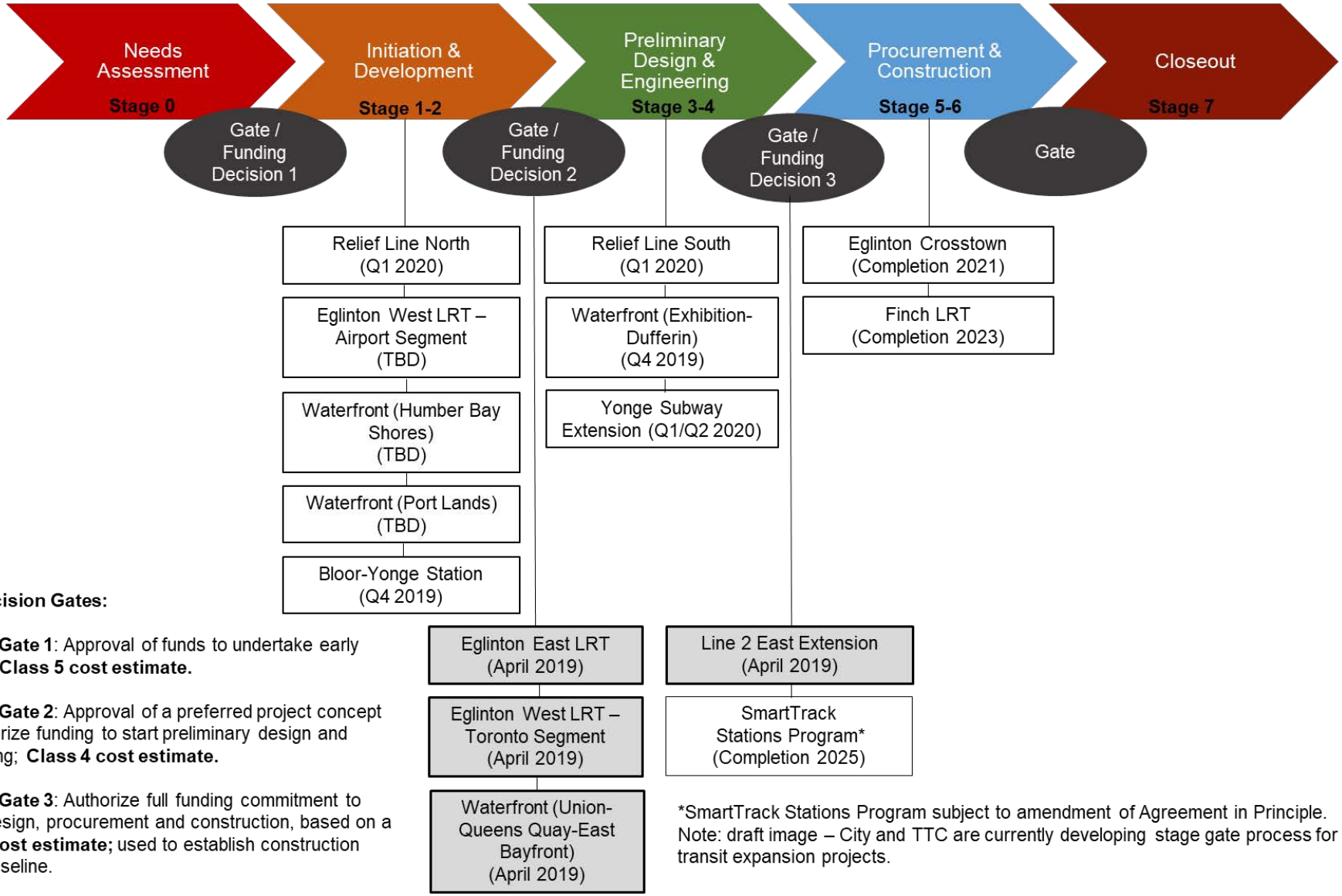

Figure 2. Status of Projects in the Project Lifecycle

COMMENTS

1. Priority Projects for the Investing in Canada Infrastructure Program

Public Transit Infrastructure Fund Phase 2

In 2018, the Government of Canada and the Province of Ontario entered into an agreement for the Investing in Canada Infrastructure Program ("ICIP") to deliver Phase 2 Public Transit Infrastructure Funds ("PTIF2").[5] Provincial and territorial allocation is determined by a formula based on ridership (70%) and population (30%). Provincial allocations are further sub-allocated to municipalities based on transit ridership.[6]

Under PTIF2, the City of Toronto was allocated $4.897 billion in federal funding. The program stipulates the following cost sharing requirements:

- The federal government will contribute up to a maximum of 40% of eligible expenditures;
- The Province must contribute a minimum of 33%, equivalent to $4.040 billion, to leverage the full federal funding envelope; and
- The City is required to contribute the remainder.

In March 2018, the previous provincial government committed to providing new provincial funding of $4.040 billion[7] for public transit to the City of Toronto, in order to meet the minimum 33% matching requirement of the program. The Province's prior commitment to the Line 2 East Extension project is not included in this allocation.

PTIF2 is focused on providing funding to build new transit networks and service extensions. The program is not designed for state of good repair projects,[8] because this was the focus of the PTIF1 program. Key federal outcome targets for the PTIF2 program include:

- Improved **capacity** of public transit infrastructure;
- Improved **quality and/or safety** of existing or future transit systems; and
- Improved **access** to a public transit system.

Under the PTIF2 program, projects are required to be substantially complete by October 31, 2027. Projects that go beyond the completion date of the ICIP will require approvals for an extension.

Under the ICIP agreement, the Province is responsible for identifying and prioritizing eligible projects through engagement with municipalities, and for submitting eligible

[5] http://www.infrastructure.gc.ca/alt-format/pdf/agreements-ententes/2018/2018-ON-Bilateral-Agreement-EN.pdf
[6] Section A.2 Public Transit Stream: under the ICIP agreement Ontario agreed to allocate Canada's public transit stream contribution funding to each Ultimate Recipient (i.e. municipalities) based on ridership
[7] https://news.ontario.ca/moi/en/2018/03/under-the-180-billioninvesting-in.html#
[8] PTIF2 has a 15% national cap on allocation to rehabilitation projects.

projects to the federal government. All provincially nominated projects are subject to federal review and approvals.

On March 26, 2019, the Province announced the official launch of the intake process for PTIF2 for all municipalities outside the GTHA. Application intake began on April 2, 2019 and will close on May 28, 2019. The Province did not indicate when intake would open for GTHA municipalities, but that details would be provided soon.[9]

The intake process for non-GTHA municipalities is described as follows in the program guidelines:[10]

- Step 1: Applicants (i.e., municipalities and Metrolinx) submit an application to the Province;
- Step 2: Projects submitted for funding will be evaluated. Projects approved by the Province will be nominated to Infrastructure Canada for approval.
- Step 3: Projects submitted for federal approval will be assessed.
- Step 4: The Province will enter into a Transfer Payment Agreement ("TPA") with each recipient for projects that are successfully approved by both the provincial and federal government.

Applications will be accepted through multiple program intakes. Scheduled intakes will be launched based on the balance of remaining allocation that has not been requested/approved. The federal government expects to have all final approvals in place for funding under the PTIF2 program no later than March 31, 2025.

The Canada-Ontario Integrated Bilateral Agreement for ICIP is available at: https://www.infrastructure.gc.ca/alt-format/pdf/agreements-ententes/2018/2018-ON-Bilateral-Agreement-EN.pdf

Recommended Priority Projects for PTIF2

In December 2016, City Council identified a number of transit expansion projects for consideration under the PTIF2 program.[11] The projects identified include the SmartTrack Stations Program, Relief Line South, Waterfront Transit, and the Eglinton East and West LRT extensions. In 2017, City Council further identified Bloor-Yonge Station Capacity Improvement as another priority project for consideration.

Each of these projects are at different stages in the project lifecycle, serve different objectives in terms of the expansion of the network, and have different governance models and funding arrangements. The City and TTC have been working in partnership with Metrolinx to advance many of these projects over the last several years. All the projects under consideration address one or more of the PTIF2 federal program outcomes described above.

[9] https://news.ontario.ca/moi/en/2019/03/government-for-the-people-improving-public-transit-across-ontario.html
[10] http://www.grants.gov.on.ca/prodconsum/groups/grants_web_contents/documents/grants_web_contents/prdr019556.pdf
[11] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX20.4

The following considerations were taken into account in order to identify recommended projects for the PTIF2 funding program:

- City Council Direction:
  - City Council identified the project as a priority for PTIF2;[12] and
  - City Council previously approved a financial strategy and allocated federal funding from PTIF2.
- Projects that address both safety and growth-related objectives: projects required for the continued effective and safe operation of the transit network, while also supporting broader city building objectives.
- Procurement and construction readiness: projects that have completed the PDE phase or have considerable design work completed.

Table 5. Assessment of Projects for Public Transit Infrastructure Phase 2

City Council Identified PTIF2 Priorities	City Council Direction	Safety and Reliability	Growth and City Building	Current Phase in Project Lifecycle	Cost Estimate Class
Line 2 East Extension	✓		✓	PDE – Complete	Class 3
SmartTrack Stations Program	✓		✓	PDE – Complete	Class 3[13]
Bloor-Yonge Capacity Improvement		✓	✓	Initiation & Development	Class 5
Relief Line South		✓	✓	PDE	Class 5
WT – Exhibition Loop-Dufferin Loop – Streetcar Connection			✓	PDE	Class 5
WT – Union Station-Queens Quay Link-East Bayfront LRT			✓	Initiation & Development	Class 4
Eglinton East LRT			✓	Initiation & Development	Class 4
Eglinton West LRT			✓	Initiation & Development	Class 4/5

Previous City Council Direction

The Federal Government has indicated that the City of Toronto's $4.897 billion allocation includes $660 million for the Line 2 East Extension project. These funds were previously committed as part of the New Building Canada Fund and have be re-profiled into the ICIP PTIF2 Program. In addition, City Council made a full funding commitment to the SmartTrack Stations Program in April 2018. At that time, the funding strategy for the Program assumed $585 million of federal funding under PTIF2.

[12] See EX20.4 and EX25.1
[13] The City's contribution to SmartTrack Stations Program is capped (see EX33.1)

Both of these projects have advanced through the project lifecycle and have completed the necessary due diligence for City Council to make a full funding commitment to the project budget. In line with the outcomes of the program, these projects are procurement and construction ready, and improve both capacity and access to public transit. Both of these projects also support future growth and longer term city-building objectives.

Priority Group #1: Safety and Reliability of the System

The Relief Line South and Bloor-Yonge Capacity Improvement projects are critical to reducing overcrowding and congestion on the Line 1 subway, and are necessary to ensure the system is able to safely accommodate future network demand as a result of population growth and expansion.

The TTC's Line 1 Yonge-University is the busiest rapid transit line in Canada. With more than 730,000 riders each day the line plays a crucial role in moving people in Toronto and in the Greater Toronto region. It is closely integrated into the TTC network of surface routes, making more than 100 connections and interchanges seamlessly with regional services at 13 stations.

Ridership on Line 1 has been growing consistently over the last 15 years, all along the line. At the busiest point on the line, south of Bloor-Yonge Station, morning peak ridership has reached maximums of 28,000 to 30,000 people per hour in the peak direction.

Increases in ridership are mainly a result of population and employment growth. Continued growth, along with planned transit expansion projects, is driving forecasted future ridership demand even higher. Current projects will permit modest increases in capacity over the next few years, until approximately 2026. After that point, the continued increase in ridership demand will introduce serious risks to the continued safe, reliable, and effective ability of Line 1 to serve transit customers.

In order to address these risks, the TTC is undertaking a Line 1 Capacity Requirements study, in collaboration with municipal and regional partners. The study is a comprehensive assessment of future expected demand and the changes to subway trains, stations and facilities, signals, electrical power, maintenance procedures, and operating strategies, including staffing, that will be required to meet these demands. The work takes a system-wide approach, and is focused on delivering upgrades in four horizon years between 2021 and 2031. A report will be before the TTC Board in April 2019.

A failure to deliver the necessary capacity on Line 1 will have serious effects on the transit system throughout Toronto. If the line regularly exceeds capacity, the quality of the transit service will decline. Delays will be become longer and more common. Customers at some stations will be unable to board trains at busy times. Crowding in stations and on trains will increase. Without increasingly proactive operational measures, such as temporarily closing stations to passenger entry, and bypassing of crowded stations by trains, the safety of customers could be compromised by the mid-

2020s. Ridership will decline, trust in the transit system will be damaged, and the wider economic benefits of a well-functioning transit service will not be fully achieved.

As part of EX25.1, City staff reported that the Relief Line South project is required by 2031 to reduce demand on Line 1 and provide needed additional transit capacity and choice to downtown Toronto. From a TTC operational perspective, the Relief Line South project provides significant benefit in line with the ICIP program outcomes, including:

- Relieving crowding on Line 2 immediately east of downtown, and on Line 1 south of Line 2;
- Providing greatly increased transit capacity and faster travel time for customers along the Pape/Carlaw and Queen Street East corridors;
- Providing excellent connections between existing TTC bus and streetcar routes and the proposed new stations, increasing convenience and journey opportunities for transit customers;
- Providing excellent connections between TTC subway and GO Trains at two new stations, increasing convenience and journey opportunities for transit customers;
- Freeing up capacity for new riders on existing Queen and King streetcar routes in developing areas east of downtown; and
- Providing additional resiliency and redundancy in the TTC subway system.

The Bloor-Yonge Capacity Improvement project is a key component of improving Line 1 capacity. Currently more than 200,000 passengers use the station each day. In the coming years, regional growth and transit expansion will bring more people into the station and add to rush hour crowding. It is critical that the station can safely and accessibly support the increased flow of passengers. From a TTC operational perspective, the project provides benefits in line with the ICIP outcomes, including:

- Reducing crowding in station, allowing customers to transfer more easily between trains and to reach their platforms in the station; and
- Reducing dwell time of trains at the platforms, improving the overall service reliability of the lines.

The last reported cost estimates for both the Relief Line South and the Bloor-Yonge Station were Class 5 estimates, based on a low level of design as part of early conceptual studies. A Class 5 cost estimate typically has an accuracy range of -50% to +100% and is not recommended for budgeting purposes. City staff are recommending that both these projects be submitted as part of PTIF2 with a provision to reflect potential budget changes as staff develop a Class 3 estimate.

This report recommends that City Council request the City Manager to advise the federal and provincial governments of the City's priorities under the ICIP program. Based on the above considerations, the recommended priorities for federal PTIF2 funding are as follows:

- **$**660 million for the Line 2 East Extension project;
- $585 million for the SmartTrack Stations Program;
- $3.151 billion for the Relief Line South project; and

- $500 million for the Bloor-Yonge Capacity Improvement project.

2. Highlights on Key Transit Projects

Line 2 East Extension – Scarborough Subway

In 2013, the City and Province agreed to move forward with an extension of the Line 2 subway in order to replace Line 3. Since 2013, several reports have been brought forward to confirm the project scope, alignment, procurement model and integration with city planning objectives and broader network planning considerations. The project is a TTC project with capped funding contributions from the provincial and federal government.

The Line 2 East Extension project has completed the PDE phase and is ready to proceed to procurement and construction. A Class 3 cost estimate, Level 3 schedule and risk analysis have been prepared. The Class 3 cost estimate for the project is $3.887 billion. The project is scheduled to be complete by 2027 for Phase 1, with Phase 2 (completion of the Scarborough Centre Station Bus Terminal) anticipated to be complete by 2030. The results are documented in detail in Attachment 2. Consistent with the recommendations of the TTC Capital Program Delivery Review, the project has conducted a formal detailed risk assessment, resulting in risk-adjusted estimates that better capture potential delays and costs.

Following the approval of the project scope and budget, the project would proceed to the following milestones:

- Request for Qualification – May 2019
- Complete 60% design – July 2019
- Complete 100% design – December 2019
- Request for Price – January / February 2020
- Contract Award – September 2020

This is the final decision gate for approval to procure and construct the Line 2 East Extension project as currently planned and designed.

City and TTC have staff been seeking clarification from the Province with respect to their interest in changing the scope of the project since the provincial election last spring. The March 22, 2019 letter[14] to the City from the Province confirmed in writing the Province's intent to change the project scope from a one-stop to a three-stop subway. Further clarification from the Province is required on the locations of the two additional stations and the terminus of the line. Planning and design on a three-stop L2EE subway option stopped in 2016.

If the Province is committed to pursuing a three-stop subway option, an assessment of cost, schedule, and operational implications to the TTC network, including both the Line 3 Scarborough and bus operations, will need to be undertaken. A key consideration is that the vehicles on Line 3 are over 30 years old and need to be replaced.

[14] https://www.toronto.ca/legdocs/mmis/2019/cc/bgrd/backgroundfile-131252.pdf

Further discussion with the Province is required regarding their interest in changing the scope of the project. This report seeks City Council approval to proceed to procurement and construction subject to agreement from the Province and finalizing required contribution agreements. Should the Province of Ontario provide support for the one-stop subway as currently scoped, this report also requests City Council approve amendments to the City's Capital Budget and Plan for the project.

If the Province does not support the project as currently scoped, the report recommends City and TTC report back on the impacts associated with changing the scope and/or delivery model of the project given that the project is ready to proceed to procurement and construction. City staff would also need to report on principles to guide further discussions with the Province on cost sharing.

In 2013, The Province of Ontario agreed to a capped funding contribution of $1.48 billion (2010$)[15] to the project. The City became responsible for incremental costs associated with the change in scope of the project, including sunk costs for the cancellation of the Scarborough LRT. The principles for cost-sharing would need to be reviewed in this context.

More detailed analysis on this project is included in Attachment 2.

Relief Line South

The Relief Line South is a priority project for the City and TTC and is required by 2031 to reduce crowding and congestion on the Line 1 subway (south of Bloor-Yonge Station), improve the resiliency of the subway network, provide development opportunities, connect with major TTC streetcar and bus routes, and support future network extensions (e.g., Relief Line North and Yonge Subway Extension).

The Relief Line is planned to operate as a separate subway line, but will be integrated with the existing subway. The trains, stations, and other infrastructure will be designed to the latest subway standards permitting a high-capacity service to meet the projected passenger demand over the next 30 years at minimum. Provision is being made for automatic train operation, platform edge doors, and longer trains to allow the most flexibility for future increases in ridership demand. The line will be entirely tunnelled, and will be isolated from the weather-related delays that can affect service on Lines 1, 2, and 3. There will be convenient interchange connections for passengers at Pape, Queen, and Osgoode subway stations, and at the proposed Gerrard-Carlaw and East Harbour SmartTrack stations. A separate, short tunnel will allow Relief Line trains to be driven to the TTC's existing Greenwood Yard for necessary maintenance and repairs, thus allowing efficient use of existing subway system resources. For maximum service resilience and redundancy, the connection to the wider subway system would allow for trains from Line 1 or Line 2 to be operated on the Relief Line, if necessary.

Given the importance of this project to the network, in March 2019 City Council approved the TTC's 10-year transit expansion capital plan that included funding to

[15] https://www.toronto.ca/legdocs/mmis/2013/cc/bgrd/backgroundfile-62260.pdf

support a schedule improvement strategy for the project. This new funding will allow for early work opportunities such as property acquisition, utility relocation and procurement of tunnel boring machines. The outcomes of this work will be reported to City Council in Q1 2020.

This report recommends that City Council submit the Relief Line South as a priority project for PTIF2 funding, based on the current plans for the project as described in Attachment 1.

The capital construction cost estimate for the Relief Line South is a Class 5 estimate. A Class 3 cost estimate will be reported in Q1 2020. The Class 3 estimate will be informed by a review of build methodology, scope requirements, procurement approach and completion of the PDE work.

The Relief Line South project is governed by an MOU between the City, TTC and Metrolinx that outlines the parties' commitment to advance PDE, including undertaking a procurement options analysis.[16] All parties have been at the table throughout the PDE phase of work to date. Metrolinx and the City were also co-proponents on the Transit Project Assessment Process for the project, which was approved by the Province in October 2018.[17] The PDE phase is expected to be complete in Q1 2020, at which point the project will be ready to proceed to procurement and construction.

The Province of Ontario has recently suggested the possibility of using a different technology for the Relief Line South, details for which have not been shared with the City and TTC. An evaluation of the technical or commercial merits of the proposal versus the current design is required. Given the investment in the PDE phase by the City, Province, and Federal government (through PTIF1), further information, including any analysis and evaluation conducted thus far, is required from the Province.

More detail on the Relief Line South Project is included in Attachment 1.

Waterfront Transit Network – Union Station-Queens Quay Link

In January 2018, City Council approved the Waterfront Transit Network Plan, including identification of priority segments.[18] As part of EX30.1, City staff were directed to complete a focused feasibility study of light rail and automated funicular technology options for connecting transit below grade between Union Station and Queens Quay ("Union Station-Queens Quay Link"). The existing underground streetcar loop at Union Station and the connecting 540 metre long tunnel to Queens Quay are currently overtaxed with existing demand and are inadequate to serve future ridership needs.

The Union Station-Queens Quay Link has now completed the initiation and development phase of work, including updated Class 4 cost estimates. The project is ready to seek approval of the preferred technology option to proceed to the PDE phase of the project.

[16] http://reliefline.ca/south/the-project/coordinated-transit-planning/memorandum-of-understanding
[17] http://reliefline.ca/south/the-project/transit-project-assessment-process/environmental-project-report
[18] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX30.1

This report recommends that City Council approve the Streetcar Option as the preferred technology for the Union-Queens Quay Link. The Streetcar Option expands the TTC's network capacity at the critical Union Station hub, allowing substantial flexibility for future waterfront streetcar service and operations. The Streetcar Option also provides a more convenient, moderately faster, and more accessible connection because no additional transfers would be required. Attachment 3 outlines the updated options analysis associated with the Union Station-Queens Quay Link as a component of the East Bayfront LRT Project.

Funding for the next phase of work will be considered as part of the 2020 budget process. Approximately $38 million is required to undertake the PDE phase of work for the project.

More detailed analysis on this project is included in Attachment 3.

Eglinton East LRT

The Eglinton East LRT would provide transit to underserved communities in the City. The full build out of the LRT would travel through or adjacent to seven Neighbourhood Improvement Areas, and would bring higher-order transit to within walking distance of an additional 49,000 people, including an equity-weighted population of 30,000.

In May 2018, City Council approved a project scope for the Eglinton East LRT and directed staff to report back on the project's updated cost estimate.[19] City and TTC staff, in consultation with Metrolinx, have completed the requirements for the initiation and development phase of work. This phase included completion of conceptual design of the alignment to a proposed Malvern Centre Station and a Maintenance and Storage Facility (MSF) south of Highway 401 and east of Morningside Avenue, and the development of an updated Class 4 cost estimate.

Based on the analysis, this report recommends that the first phase of the Eglinton East LRT be defined as an eastern extension of Line 5 (Eglinton Crosstown) from Kennedy Station to University of Toronto Scarborough ("UTSC"), and a second phase to Malvern Centre.

The Eglinton East LRT will be owned by Metrolinx as an extension of the Eglinton Crosstown LRT. As such, it is necessary to work in partnership with Metrolinx on the next phase of work, including determining the location and construction timing of the MSF and identifying procurement options for an extension of their existing asset. This report recommends City Council request Metrolinx to work with the City to develop a plan to commence the PDE phase of the project. City staff will report back to City Council with a recommended plan, schedule, cost and funding requirements for consideration in the City's 2020 budget process.

More detailed analysis on the Eglinton East LRT project is included in Attachment 4.

[19] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX34.1

Eglinton West LRT

In December 2017, City Council directed staff to continue planning the Eglinton West LRT transit extension concept for the Toronto Segment between Mount Dennis Station and Renforth Station ("Toronto Segment"), with ten stops as described in Attachment 2 to the report EX29.1. City Council also requested staff to form a working group of community stakeholders, in consultation with local Councillors, to investigate further grade separation and/or tunnelling options.[20]

Attachment 5 provides an update on the analysis requested by City Council for the Toronto Segment, which includes outputs resulting from a Community Working Group. The additional analysis on the options for the Toronto Segment of the project continue to demonstrate that the at-grade LRT option with 10 stops, as recommended by staff in December 2017, best serves the City's planning and transit service objectives, while taking into consideration cost.

Metrolinx continues to undertake early planning work on the Airport Segment of the Eglinton West LRT extension, which is currently less advanced than the Toronto Segment. Metrolinx has also advised it has an interest in further reviewing the options for the Toronto Segment in the context of the overall extension of the Eglinton West LRT to Pearson Airport and potential regional benefits of a tunnelled option. Metrolinx's additional analysis is not available at this time.

As a result of the current status of Metrolinx's analysis, the Toronto Segment of the Eglinton West LRT is not ready to move through the Stage Gate Process agreed to by the City and Province/Metrolinx under the 2016 Toronto-Ontario Agreement in Principle (see Attachment 5). Further direction will be sought from City Council once Metrolinx and the Greater Toronto Airport Authority (GTAA) have completed their analysis on the full extension from Mount Dennis Station to Pearson International Airport, including Regional Transportation Passenger Centre requirements.

More detailed analysis on this project is available in Attachment 5.

SmartTrack Stations Program

In April 2018, City Council approved a capped funding contribution of $1.463 billion towards the SmartTrack Stations Program, subject to terms and conditions negotiated with the Province.[21] In May 2018, the City and the Province entered into a non-binding Memorandum of Understanding to formally indicate the intention of the two parties to amend the Agreement in Principle ("AIP") to reflect the terms and conditions of the SmartTrack Stations Program.

In a letter dated November 29, 2018, Metrolinx notified the City that it is developing a "market-driven approach" to delivering new stations. As a result of adopting this approach, Metrolinx indicated that the in-market Request for Qualifications for five of the six SmartTrack Stations (Finch-Kennedy, Lawrence-Kennedy, Gerrard-Carlow, King-

[20] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX29.1
[21] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX33.1

Liberty and St. Clair-Old Weston) and the Bloor-Lansdowne GO station will be removed from the procurement process.

The City has requested the Province confirm their commitment to the SmartTrack Stations Program as well as amending the AIP. City Council has confirmed a full funding commitment to the project and the project is ready to advance to procurement and construction. The Province has not yet responded to the City.

In the interim, the City and Metrolinx are continuing discussions to identify if there are transit-oriented development opportunities at each location of the SmartTrack Stations Program.

3. Next Steps

The City remains committed to building the transit network and entering into a constructive dialogue with the Province. To assist in these discussions, it is important to establish Toronto's key interests and objectives: a safe and reliable transit service for Toronto transit riders. This report lays out clear priorities for City Council's consideration with respect to the expansion of Toronto's transit network, and Toronto's federal funding allocation under the PTIF2 program.

Subject to the required approvals, City staff will also continue to advance expansion projects currently in an earlier phase of the project lifecycle. This includes the Waterfront Transit Network Union-Queens Quay Link, the Eglinton East LRT, and Eglinton West LRT. Each of these projects has an integral role in the City of Toronto's Transit Network Plan.

Staff will be reporting in the fall of 2019, prior to the 2020 budget process, on updated funding and financing strategies for projects that are not currently contemplated for funding under the PTIF2 program. The outcome of ongoing discussions with the Province will inform that strategy.

CONTACT

Gregg Lintern, Chief Planner and Executive Director, City Planning
Email: Gregg.Lintern@toronto.ca, Tel: 416-392-8772

Gary Downie, Chief Transit Expansion Officer, TTC
Email: gary.downie@ttc.ca, Tel: 416-590-6218

Joe Farag, Executive Director, Corporate Finance
Email: Joe.Farag@toronto.ca, Tel: 416-392-8108

James Perttula, Director, Transportation Planning, City Planning
Email: James.Perttula@toronto.ca, Tel: 416-392-4744

Karen Thorburn, Project Director, Corporate Initiatives, Strategic and Corporate Policy
Email: Karen.Thorburn@toronto.ca, Tel: 416-392-2720

SIGNATURE

Chris Murray
City Manager

ATTACHMENTS

Attachment 1 – Transit Expansion Program – Status Update
Attachment 2 – Line 2 East Extension
Attachment 3 – Waterfront Transit Network – Union Station-Queens Quay Link and East Bayfront LRT
Attachment 4 – Eglinton East LRT
Attachment 5 – Eglinton West LRT

ATTACHMENT 1

TRANSIT EXPANSION PROGRAM – STATUS UPDATE

This attachment provides an update on the status of each project currently underway to expand Toronto's transit network, including the next major milestone for each project. Projects are in different stages of the project lifecycle, as depicted in Figure 1 below.

Attachments 2-5 in this report provide more detailed analysis on the following projects, each of which is at a decision gate in this report:

- Line 2 East Extension;
- Waterfront Transit Network – Union Station-Queens Quay Link;
- Eglinton East LRT; and
- Eglinton West LRT.

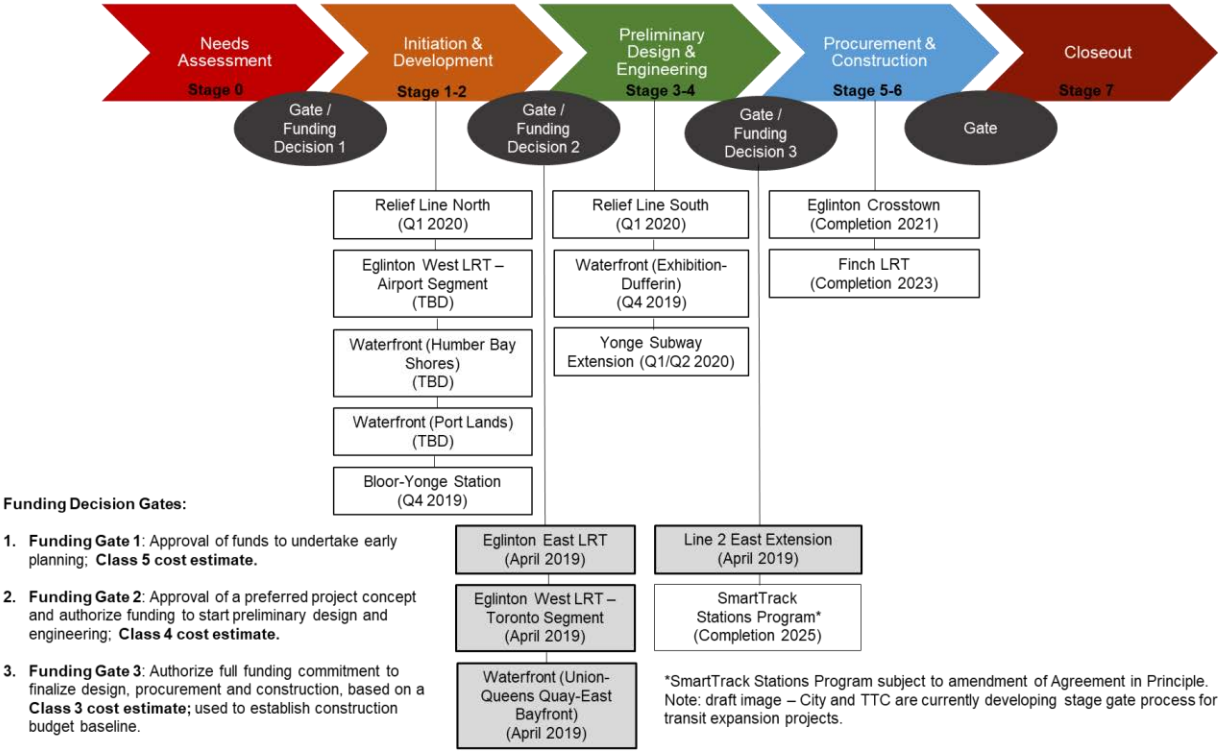

Figure 1. Status of Transit Expansion Projects in the Project Lifecycle

The transit expansion project lifecycle generally comprises three major phases of work, and three key funding decisions, described as follows:

- **Initiation and Development Phase:** a problem or need is identified and options are developed and refined to recommend a specific project concept (e.g., station locations and alignment) for preliminary design and engineering. During this phase, pre-environmental assessment/Transit Project Assessment Process (TPAP) work

and planning studies are undertaken. At the end of this phase, a Class 5/4 cost estimate is developed based on a low level of project design. Public consultation during this phase is focused on the options (including technology, corridor and station options) to address the transit need. By the end of this phase, a preferred project concept alternative would be ready to move into preliminary design and engineering, subject to funding.

- **Preliminary Design and Engineering Phase**: the preferred project concept alternative is further refined to develop the project to a state of procurement readiness. This would include going through the formal environmental approvals process/TPAP, undertaking an assessment of procurement options, further planning studies, and engineering and design to mature the project definition. The design work is then used as an input to develop a cost estimate suitable for budgeting purposes (i.e., Class 3 cost estimate). Public consultation during this phase is focused on refining the preferred concept and identifying potential impacts on property. The project's level of design at the end of the phase would depend on the recommended procurement method (10-30%). By the end of this phase, the project is ready to move into detailed design, procurement and construction, subject to funding.

- **Procurement and Construction Phase**: all activities and tasks related to project procurement and construction. This includes issuing the request for proposals (RFP), awarding the contract, and project implementation/construction. Strong community relations and communications throughout the project delivery phase are key components to minimize community and stakeholder impacts and to undertake property acquisition. Reporting back to City Council/TTC Board during this phase would consist of periodic status updates and as-needed reports if there are major changes to the original project budget, scope, and schedule (e.g., if the procurement process results in market price higher than estimated, schedule slippage, or cost overruns).

Prior to each phase of the project, a decision must be made on whether to allocate funding needed to undertake the associated work. At the conclusion of each phase, Council would be presented with recommendations based on the most current information (e.g., cost estimates based on current design). Staged decision-making allows the City and TTC to make more informed decisions as projects advance through the lifecycle.

City and TTC staff are currently refining existing decision-support tools. A report back to City Council on these decision-support tools will be provided.

See Appendix A to this Attachment for further information on cost estimate classifications.

The following projects are included in this attachment:

Bloor-Yonge Capacity Improvement

Current Phase: Initiation and Development

Description

The Bloor-Yonge Capacity Improvement is a TTC project that includes:

- Building an additional platform at Line 2 Yonge Station;
- Modifications to the Line 1 Bloor Station platform;
- Increasing vertical circulation elements and fire ventilation upgrades to the station; and
- Constructing a new substation.

Currently more than 200,000 passengers use Bloor-Yonge Station each day. Expanding capacity and improving circulation is required to safely accommodate future transit expansion and projected growth in demand. Other benefits of the project include less frequent overcrowding, reduced train dwell time (customers get on and off more quickly), and more frequent trains on Line 1 and Line 2.

TTC and City staff are developing forecast demand projections for TTC's Line 1 that incorporate expected population and employment growth, along with future transit expansion projects and other initiatives. This work indicates that capacity improvements are required to Line 1 to accommodate the forecast demand.

TTC has commenced analysis of the capacity constraints for Line 1 and identified 19 key elements and associated requirements to achieve the required service capacity targets. The improvements have been aligned to target horizon years (i.e., 2021, 2023, 2028, 2031 and beyond 2031) in order to keep pace with demand and provide the required trains per hour on the subway line.

The expansion of Bloor-Yonge Station has been identified as one of the 19 key elements because this location frequently experiences overcrowding and has extended dwell times for trains affecting the throughput of the line. Modelling of the station indicates that this work is required before 2028. Considering the time required to complete construction of a second platform type project (similar to Union Station), and the complex staging with its inherent impact on passenger flows, design should continue unimpeded so that construction could commence as soon as possible. This will minimize the number of customers impacted by the work and constraints on Line 1 capacity as ridership grows.

The Line 1 Capacity needs have been reflected in the TTC's 15-year Capital Investment Plan.

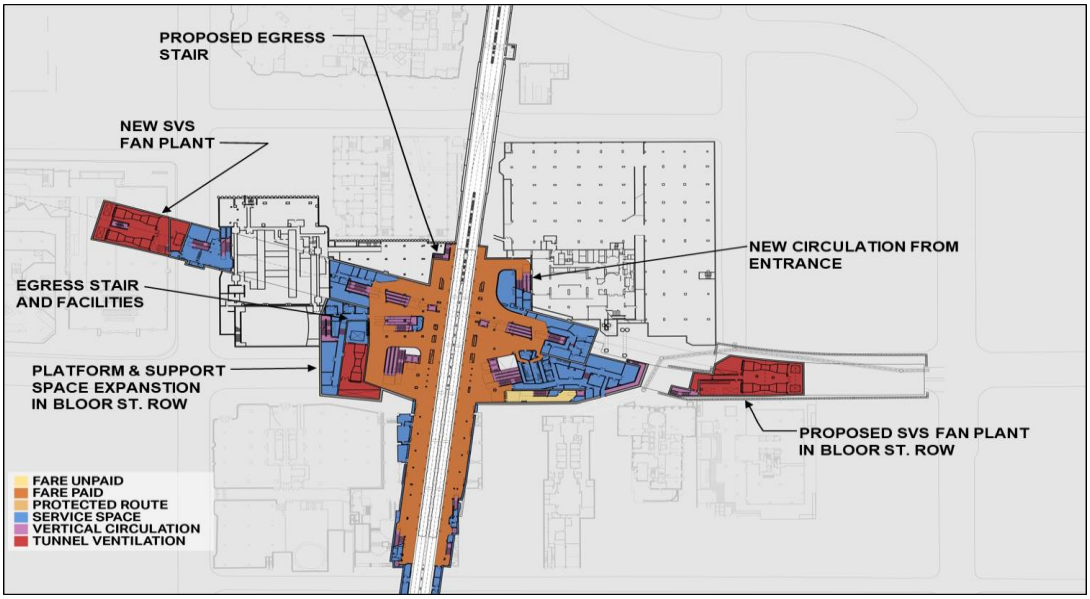

Figure 2. Line 1 Platform Improvements

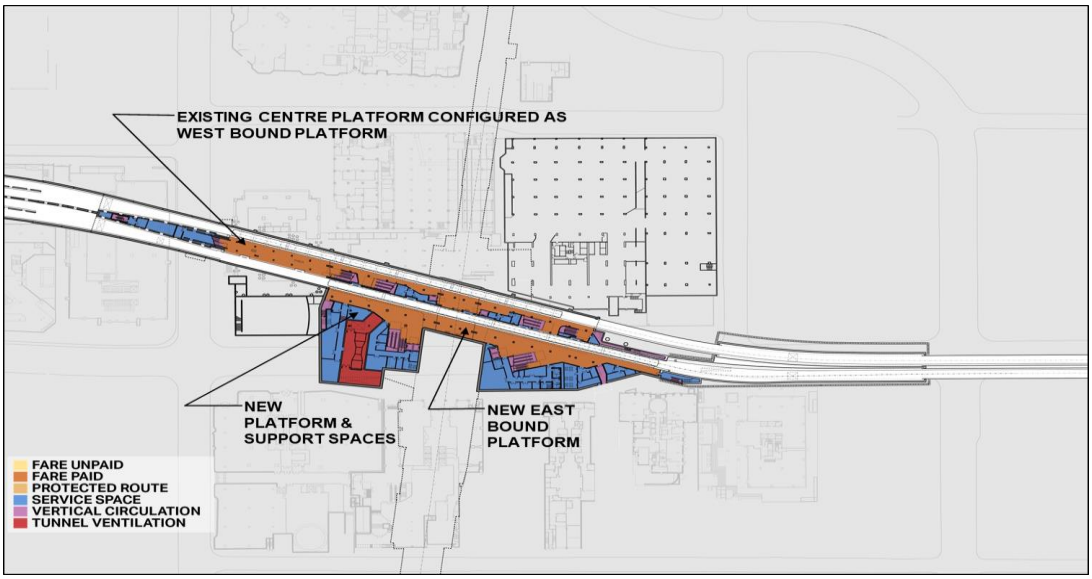

Figure 3. Line 2 Second Platform and Improvements

Recent History

In May 2017, City Council requested the TTC to report on the status of plans to expand Bloor-Yonge interchange station, including estimated costs, timelines and potential capacity added to Line 1.[1] At that time, City Council also confirmed the expansion of the station as a priority project for City Council and for Provincial and Federal Funding.

[1] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX25.1

Status

Finalization of the preferred concept design (10% design) continues to be on target for completion in 2019 with a Class 4 cost estimate, updated schedule and procurement options analysis.

Key Facts	Current Available Information
Project Governance	**Asset Owner**: TTC **Project Manager**: TTC **Operator:** TTC
Delivery Model	To be determined – Procurement Options Analysis Required
Environmental Assessment/TPAP	To be determined
Current Phase in Project Lifecycle	Initiation and Development – to be completed in Q4 2019

Current Cost and Schedule Estimates

	Capital Cost Estimate
Schedule	2026 – To be confirmed by Level 2 schedule
Cost	$1.05 B[1] (Less than Class 5; not for budgeting)
Note: (1) Order of Magnitude Estimate is provided for discussion purposes only, not for budget, and is not reflecting a full risk evaluation of schedule or costs. Forecast completion date and budget will be confirmed in a Stage Gate 3 report to City Council factoring in delivery strategy, property acquisition and schedule risk analysis.	

Contact

Susan Reed Tanaka, Chief Capital Officer, TTC
Email: susan.reedtanaka@ttc.ca, Tel: 416-393-6530

Malcolm MacKay, Project Director, TTC
Email: malcolm.mackay@ttc.ca, Tel: 416-590-6777

Eglinton Crosstown Light Rail Transit (LRT)

Figure 4. Eglinton Crosstown Project Map

Current Phase: Construction

Description

The Eglinton Crosstown is a 19-kilometre light rail transit line that will run along Eglinton Avenue between Mount Dennis (Weston Road) and Kennedy Station. The 19-kilometre corridor includes a 10-kilometre underground portion between Keele Street and Laird Drive. The project is currently under construction and will be known as Line 5 Eglinton when it opens.

The Crosstown will provide fast, reliable transit by carrying more passengers in a dedicated right-of-way separate from traffic. The LRT will connect to 54 bus routes, three subway stations (Kennedy, Eglinton and Eglinton West [Cedarvale]), and three GO stations (Mount Dennis, Caledonia, and Kennedy), providing an important east-west link. Service levels and hours of operation are anticipated to be similar to existing TTC subway lines.

Recent History

On November 28, 2012, Metrolinx, the City of Toronto and the TTC signed a Master Agreement for the implementation of the Metrolinx Toronto Light Rail Transit Program.[2] The agreement formalizes the construction and future operation of the Eglinton Crosstown, Finch West and Sheppard East LRTs. Metrolinx will own and deliver the LRT lines and the TTC will operate.

[2] http://www.metrolinx.com/en/projectsandprograms/transitexpansionprojects/Master_Agreement_Nov_28_2012.pdf

In April 2014, City Council requested Metrolinx to include a Public Realm Amount for the Eglinton, Sheppard and Finch rapid transit lines in order to plan, design and construct improvements to the streetscape requested by the City.[3]

In July 2015, Metrolinx and Infrastructure Ontario selected Crosslinx Transit Solutions (CTS), a consortium of SNC-Lavalin, EllisDon, AECON, and ACS Infrastructure Canada to complete the Crosstown project. CTS has been awarded a contract by Metrolinx to:

- Design, construct and finance an integrated transit system consisting of 25 stations/stops, track work, signaling, communications and other required infrastructure; and
- Maintain the LRT system for 30 years, including lifecycle repair and renewal of building and system components.

In November 2016, City Council considered the report *2016.EX19.1 Transit Network Plan Update and Financing Strategy*,[4] and approved principles associated with cost-sharing and future roles and responsibilities on the Eglinton Crosstown, Finch West and Sheppard East LRTs. An Agreement in Principle[5] ("AIP") was entered into that specified the following:

- The TTC will operate the LRTs located in the City of Toronto on behalf of Metrolinx;
- The City and the TTC will establish service levels and set fares;
- The City and TTC will be responsible for operating and regular maintenance costs of the LRTs, as well as retain farebox revenue and non-fare box revenue; and
- Metrolinx will continue to retain asset ownership and control of LRTs in the City of Toronto, and will be responsible for lifecycle maintenance costs.

Status

Construction of the Crosstown began in 2011 with advance utility work and tunnel construction works. The line is anticipated to be open by 2021. The City and TTC continue to work closely with Metrolinx on all aspects of the delivery of the LRT projects in Toronto, including construction mitigation and business support. A report on business supports being implemented along Eglinton will be brought forward to Council in Q2 2019.

The TTC and Metrolinx are currently undertaking work to finalize an operating agreement for the Crosstown LRT prior to the line being ready to move into revenue service.

[3] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2014.EX41.2
[4] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX19.1
[5] http://smarttrack.to/agreement-in-principle/

Key Facts	Current Available Information
Project Governance	**Asset Owner**: Metrolinx **Project Manager**: Metrolinx and Crosstown Transit Solutions (CTS) **Operator:** TTC **Capital Funding**: Province of Ontario
Delivery Model	Alternative Financing and Procurement – Design, Build, Finance and Maintain (DBFM)
Environmental Assessment/TPAP	Complete – 2010[6] ; EPR Addendum 2013[7]
Current Phase in Project Lifecycle	Construction – to be completed in 2021
Project Website	http://www.thecrosstown.ca/

The Crosstown is a $5.3 billion (2010$) investment from the Province of Ontario.

Contact

Jeffrey Climans, Director, Major Capital Infrastructure Coordination
Email: Jeffrey.Climans@toronto.ca , Tel: 416-397-4649

Emily Chang, Project Director, Major Capital Infrastructure Coordination, City of Toronto
Email: Emily.Chang@toronto.ca, Tel: 416.397.7618

[6] http://thecrosstown.ca/the-project/reports/EglintonCrosstownLRTEnvironmentalProjectReport
[7] http://www.thecrosstown.ca/the-project/reports/epr-addendum-report

Finch West Light Rail Transit (LRT)

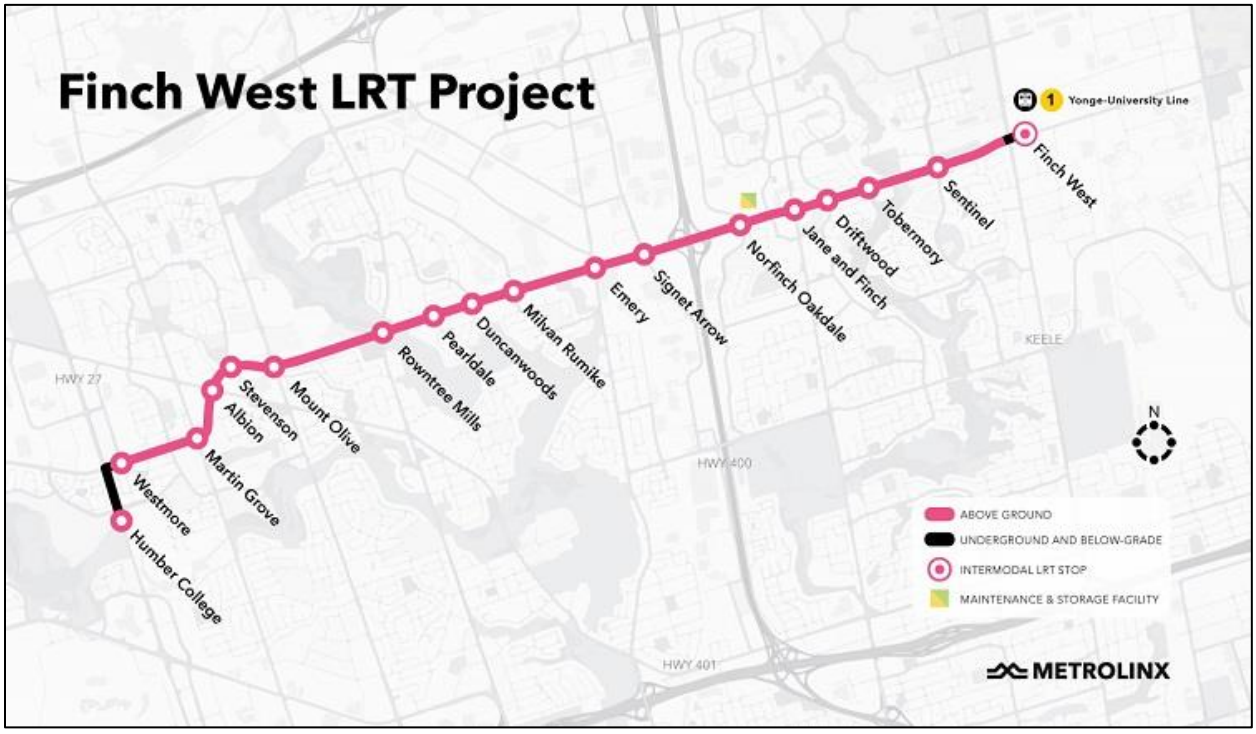

Figure 5. Finch West LRT Project Map

Current Phase: Procurement and Construction

Description

The Finch West LRT is an 11-kilometre light rail transit line along Finch Avenue West between Keele Street and Humber College. The Finch West LRT provides transit service to Northwest Toronto with connections to TTC, GO, Miway, YRT, and Züm (Brampton) transit services, as well as providing an important link to Humber College. It will be known as the Line 6 Finch West when it opens. Service levels and hours of operation are anticipated to be similar to existing TTC subway lines.

Recent History

On November 28, 2012, Metrolinx, the City of Toronto and the TTC signed a Master Agreement for the implementation of the Metrolinx Toronto Light Rail Transit Program.[8] The agreement formalizes the construction and future operation of the Finch West LRT. Metrolinx will own and deliver the LRT lines and the TTC will operate.

In February 2016, City Council approved a list and ranking of public realm improvements along Finch Avenue West that should be obtained using the Public Realm Amount allocated to the project.[9]

[8] http://www.metrolinx.com/en/projectsandprograms/transitexpansionprojects/Master_Agreement_Nov_28_2012.pdf
[9] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX13.9

In November 2016, City Council considered the report *2016.EX19.1 Transit Network Plan Update and Financing Strategy*,[10] and approved principles associated with cost-sharing and future roles and responsibilities on the Eglinton Crosstown, Finch West and Sheppard East LRTs. An Agreement in Principle[11] ("AIP") was entered into that specified the following:

- The TTC will operate the LRTs located in the City of Toronto on behalf of Metrolinx;
- The City and the TTC will establish service levels and set fares;
- The City and TTC will be responsible for operating and regular maintenance costs of the LRTs, as well as retain farebox revenue and non-fare box revenue; and
- Metrolinx will continue to retain asset ownership and control of LRTs in the City of Toronto, and will be responsible for lifecycle maintenance costs.

In May 2018, Metrolinx and Infrastructure Ontario selected Mosaic Transit Group (MTG), a consortium of ACS Infrastructure Canada, Aecon, and others, to complete the Finch West LRT project. MTG has been awarded a contract by Metrolinx to:

- Design, construct and finance an integrated transit system consisting of 17 stops and one station, track work, signaling, communications and other required infrastructure; and
- Maintain the LRT system for 30 years, including lifecycle repair and renewal of building and system components.

Status

Major construction will begin in spring 2019 with substantial completion expected in 2023. The City and TTC continue to work closely with Metrolinx on all aspects of the delivery of the LRT projects in Toronto, including construction mitigation and business support.

Key Facts	Current Available Information
Project Governance	**Asset Owner**: Metrolinx **Project Manager**: Metrolinx and Mosaic Transit Group (MTG) **Operator:** TTC **Capital Funding:** Province of Ontario and Government of Canada
Delivery Model	Alternative Financing and Procurement – Design, Build, Finance and Maintain (DBFM)
Environmental Assessment/TPAP	Complete – 2010[12]
Current Phase in Project Lifecycle	Construction – to be completed in 2023
Project Website	http://www.metrolinx.com/en/greaterregion/projects/finchwest-lrt.aspx

[10] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX19.1
[11] http://smarttrack.to/agreement-in-principle/
[12] http://www.metrolinx.com/en/docs/pdf/finch_west_ea/executive_summary.pdf

The Finch West LRT is a $1.5 billion (2014$) commitment by the Ontario government, and includes $333 million from the Government of Canada's Building Canada Fund. This is the last available cost estimate for the project.

Contact

Jeffrey Climans, Director, Major Capital Infrastructure Coordination
Email: Jeffrey.Climans@toronto.ca , Tel: 416-397-4649

GO Expansion Program

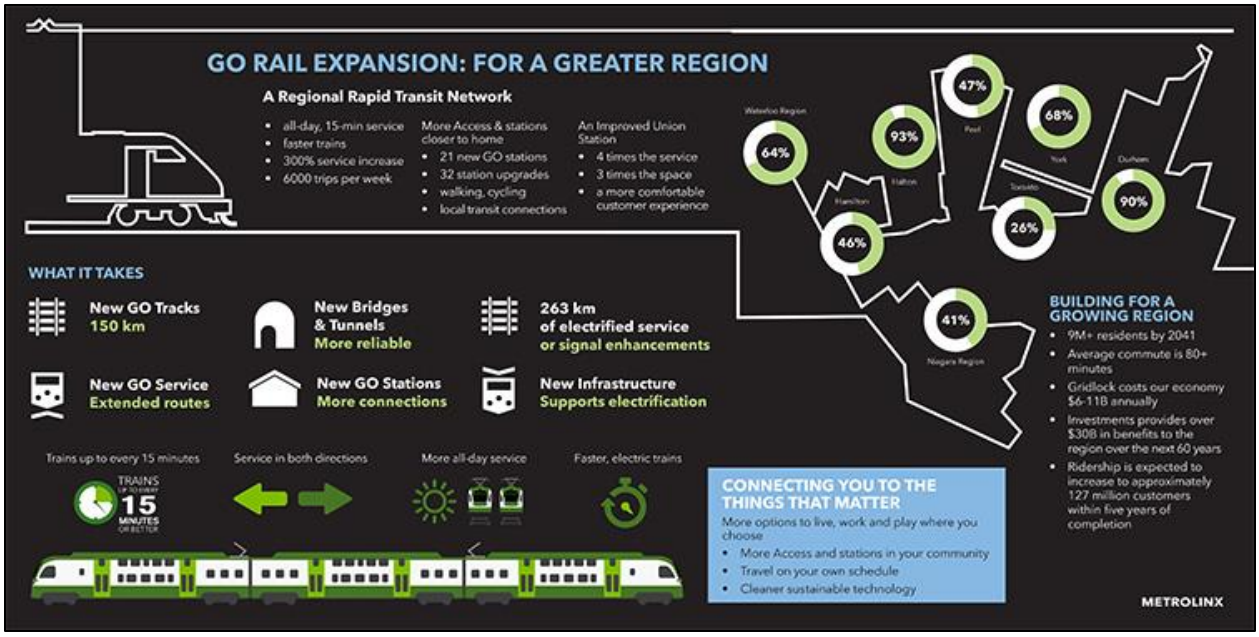

Figure 6. GO Expansion infographic

Description

GO Expansion (formerly Regional Express Rail) is a multi-year investment by the Provincial Government in GO Rail service improvements, which will feature two-way, all-day service with 15-minute frequencies on core portions of the GO Rail network by 2024/25, generating an increase in GO service from 1,500 to 6,000 trains per week. GO Expansion includes the electrification of six GO corridors (Union Station, Barrie, Stouffville, Lakeshore East, Lakeshore West and Kitchener), enhancements to Union Station, grade separations, new stations and upgrades to existing stations.

Status

Metrolinx is proceeding with work required to implement the Program, which will be delivered through a number of procurement packages involving many projects over the period of 2020 to 2025. There will be numerous impacts on existing City infrastructure (e.g., City bridges) and certain projects initiated by Metrolinx will give rise to cost-sharing in accordance with previous agreements (e.g., new grade separations). Finally, there will be construction disruption caused by the Program that the City and Metrolinx will work together to minimize and mitigate.

City staff will report to Executive Committee in 2019 on the municipal and financial implications of new grade separations on several GO corridors sponsored by Metrolinx. The Director, Major Capital Infrastructure Coordination Office will also bring forward staff reports on other matters in which the City and Metrolinx will cooperate to improve transit and transportation within the City that result from the GO Expansion Program.

Key Facts	Current Available Information
Project Governance	**Asset Owner**: Metrolinx **Project Manager**: Metrolinx **Operator:** Metrolinx
Delivery Model	Alternative Financing and Procurement – Design, Build, Finance, Operate and Maintain
Environmental Assessment/TPAP	Complete – 2017[13]
Current Phase in Project Lifecycle	Per Metrolinx Benefits Management process, project is in Design and Procurement Preparation Phase[14]
Project Website	http://www.metrolinx.com/en/greaterregion/projects/go-expansion.aspx

Contact

Jeffrey Climans, Director, Major Capital Infrastructure Coordination, City of Toronto
Email: Jeffrey.Climans@toronto.ca, Tel: 416-397-4649

Shalin Yeboah, Project Director, Major Capital Infrastructure Coordination, City of Toronto
Email: Shalin.Yeboah@toronto.ca, Tel: 416-397-7358

[13] http://www.metrolinx.com/en/electrification/electric.aspx
[14] http://www.metrolinx.com/en/docs/pdf/board_agenda/20181206/20181206_BoardMtg_GO_Expansion_Deck.pdf

Relief Line South

Current Phase: Preliminary Design and Engineering

Description

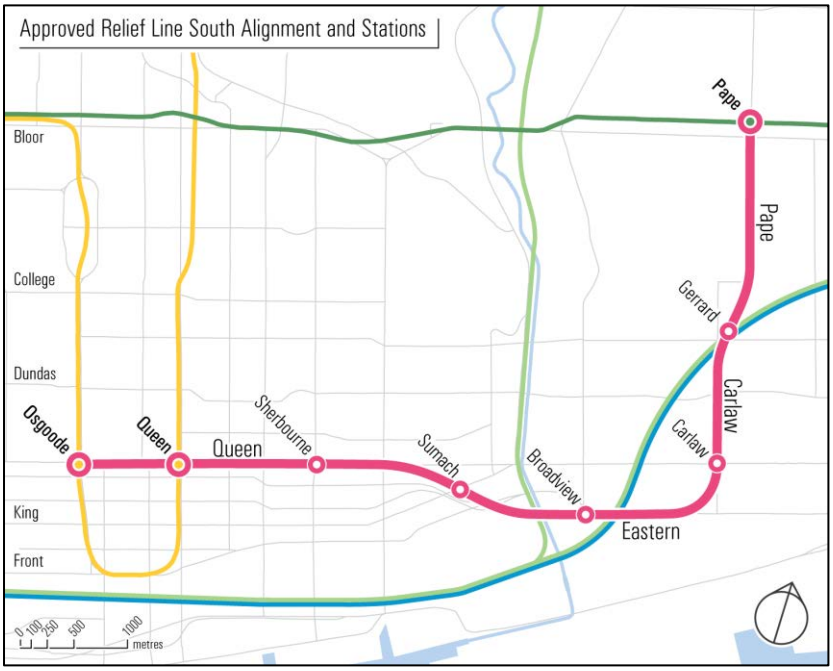

Figure 7. Relief Line South Project Map

The Relief Line South is a new eight station subway connecting Line 2 at Pape Station to Line 1 at Queen Station and Osgoode Station. It is a priority project for the City and TTC and is required by 2031 to reduce crowding and congestion on Line 1 (south of Bloor-Yonge Station), improve the resiliency of the subway network, provide development opportunities, connect with major TTC streetcar and bus routes, and support future network extensions (e.g., Relief Line North and Yonge Subway Extension). “Relief Line South” is a temporary working title for the project, and the completed line will be designated by a number, name, and colour, like all other TTC rapid transit lines.

The Relief Line will operate as a separate subway line, but will be integrated into the TTC subway system. Service levels and the hours of operation will be similar to existing TTC subway lines. There will be convenient interchange connections for passengers at Pape, Queen, and Osgoode subway stations, and at the Gerrard-Carlaw and East Harbour SmartTrack stations. The trains, stations, and other infrastructure will be designed to the latest subway standards, and will permit a high-capacity service to be operated to meet the projected passenger demand over at least the next 30 years. Provision is being made for automatic train operation, platform edge doors, and longer trains, to allow the most flexibility for future increases in ridership demand. The line will be entirely tunnelled, and will be isolated from the weather-related delays that can affect service on Lines 1, 2, and 3. A separate, short tunnel will allow Relief Line trains to be driven to the TTC's existing Greenwood Yard for necessary maintenance and repairs, thus allowing efficient use of existing subway system resources. The same tunnel will also allow the TTC’s existing fleet of maintenance trains to reach the Relief Line for overnight work. For maximum service resilience and redundancy, the connection to the wider subway system would allow for trains from Line 1 or Line 2 to be operated on the Relief Line, if necessary.

Recent History

In July 2016, City Council approved the Relief Line South alignment and station locations, subject to further assessment of a local segment between Gerrard Street and Queen Street.[15]

In May 2017, City Council considered the report *EX25.1 Advancing Planning and Design for the Relief Line and Yonge Subway Extension.*[16] City Council approved the Carlaw alignment for the local segment, authorized commencement of the Transit Project Assessment Process ("TPAP") and requested the City, TTC, and Metrolinx to advance project planning and design to develop a Class 3 cost estimate and Level 3 schedule.

Per City Council direction, the City, TTC and Metrolinx entered into a Memorandum of Understanding ("MOU")[17] to guide planning and design of the project. Based on the MOU, the TTC is the project manager for the current preliminary design and engineering phase of the project.

Given the importance of the Relief Line South in providing additional transit capacity and choice to downtown, City Council and the TTC Board have identified the Relief Line as a top priority project for the City of Toronto:

- 2017.EX.25.1(19): "*City Council direct staff to prioritize their work moving forward in accordance with Toronto's number one transit priority, the Relief Line*."
- 2018.CC.1.6(3): "*get the Relief Line subway built as a priority and as quickly as possible."*

Beyond the current preliminary design and engineering phase, there is no agreement between the City and Province in place with respect to roles, responsibilities and funding for the procurement and construction phase of the project. In 2017, City Council authorized the Mayor and City Manager to negotiate funding agreements with the Province of Ontario and Government of Canada for the capital construction of the Relief Line South and report back to City Council.

Status

The City, TTC and Metrolinx were co-proponents for the Transit Project Assessment Process for the Relief Line South, which was completed in October 2018.[18]

As part of the TPAP, an Environmental Project Report ("EPR") was prepared to document details about the project, including: the transit technology options that were considered; a description of the alignment, stations, and construction plan; the study process (including public engagement); existing and future environmental conditions; detailed assessment of impacts, proposed mitigation strategies and monitoring measures; and commitments to future work.

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[15] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.1
[16] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX25.1
[17] http://reliefline.ca/south/the-project/coordinated-transit-planning/memorandum-of-understanding
[18] http://www.metrolinx.com/en/docs/pdf/relief-line-epr/Statement-of-Completion_signed.pdf

As part of the planning and design work for the Relief Line South, ridership projections are being reviewed and updated by the City/TTC in partnership with Metrolinx. During the early planning work leading to the TPAP, an assessment of transit technologies was undertaken and is documented in the EPR. This assessment recommended a subway as the preferred rapid transit technology because it has a greater range in capacity to accommodate increases in demand and can connect with existing subway lines and leverage existing equipment, infrastructure and facilities. Current projections continue to support the selection of subway technology as the most appropriate technology for the Relief Line South project.

Further planning, design and engineering is currently underway to advance design to 15-30%. This phase of work, which includes further geotechnical investigations, development of utility relocation and property acquisition plans, analysis of project risks and project delivery/ procurement options, continues to be on target for completion in Q4 2019. Metrolinx is a party to the preliminary design and engineering work, per the MOU.

As part of the current phase of the project, a detailed review of project components is underway to seek opportunities for positively impacting costs and implementation. This includes exploring options for construction methods, optimizing the number and location of stations as part of the overall transit network, and considering property requirements in light of opportunities for land value capture and transit-oriented development. A value engineering exercise is also underway to analyze the design and cost effectiveness of the project and identify potential methods of reducing costs while maintaining key project objectives. A procurement options analysis is underway to consider the best approach to delivering the design and construction of the project.

Staff plan to report to TTC Board and City Council with a Class 3 cost estimate and Level 3 schedule in Q1 2020. The project will then be ready to proceed to the detailed design, procurement and construction phases, subject to required approvals. An interim staff report may be brought forward should significant changes to the project emerge as a result of the on-going cost optimization efforts.

TTC is also analyzing opportunities to accelerate this project, components of which include:

- Advancing design of enabling works;
- Property acquisition and utility relocation;
- Tunnel boring machine (TBM) launch shaft design;
- Specifications, prequalification and procurement of the TBMs and tunnel liners; and
- Prequalification and procurement of the tunnel contractor.

The outcomes of the TTC's analysis on acceleration will be part of the Q1 2020 report. The City and TTC have also invited Metrolinx and Infrastructure Ontario to provide

advice and support to identify opportunities to accelerate the project, per Council direction (2019.CC1.6).[19]

Key Facts	Current Available Information
Project Governance	**Asset Owner**: TBD **Project Manager**: TTC (PDE Phase) **Operator:** TTC
Delivery Model	TBD – Procurement Options Analysis Underway
Environmental Assessment/TPAP	Completed – October 2018
Current Phase in Project Lifecycle	Preliminary Design and Engineering (PDE) – to be completed by Q4 2019
Project Website	http://reliefline.ca/south/the-project

Current Cost and Schedule Estimates

	Capital Cost Estimate
Schedule	2020-2031 (1)
Cost	$6.8 B (Class 5; not for budgeting)
Notes: (1) TTC is currently developing accelerated schedule based on additional funds provided for by City of Toronto.	

To complete the current preliminary design and engineering phase, the City of Toronto committed $55.5 million and the Province of Ontario, through Metrolinx, committed $45 million. The City's capital budget includes an additional $325 million for 2019 / 2020 to identify tactics to accelerate the schedule. The City is currently seeking partnership funding of $162.5 million to support the $325 million program identified by TTC for this work. The budget requirements for subsequent years are in development and will be included in the report to City Council and the TTC Board in Q1 2020.

It is important to note that the $6.8 billion capital cost estimate presented for the Relief Line South as part of EX25.1 is a Class 5 estimate, based on a low level of design. This order of magnitude estimate, developed as part of early conceptual studies, is not suitable for budgeting purposes. It does not reflect a full risk evaluation of schedule or costs. The estimate was based on the following sets of assumptions:

- Pape-Eastern-Queen alignment (not the final approved Pape-Carlaw-Eastern-Queen alignment);
- Estimate is in 2016$, including HST rebate, escalated to mid-point of construction in 2027;

[19] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.CC1.6

- All stations assumed "cut-and-cover" construction, mainly within public road rights-of-way;
- Based on Relief Line South ridership only, and nine 4-car revenue train sets; and
- Excludes platform edge doors, transit control upgrades, and impacted soil conditions.

A Class 5 estimate typically has an accuracy range of -50% to +100%.

Contact

Gary Downie, A/Chief Transit Expansion Officer, TTC
Email: gary.downie@ttc.ca, Tel: 416-590-6218

Malcolm MacKay, Project Head, TTC
Email: malcolm.mackay@ttc.ca, Tel: 416-590-6777

Relief Line North

Current Phase: Initiation and Development

Description

The Relief Line North is a proposed extension of the planned Relief Line South to continue rapid transit service north from Line 2 at Pape Station, with the goal of connecting to existing/future rapid transit such as Line 5 Eglinton and Line 4 Sheppard.

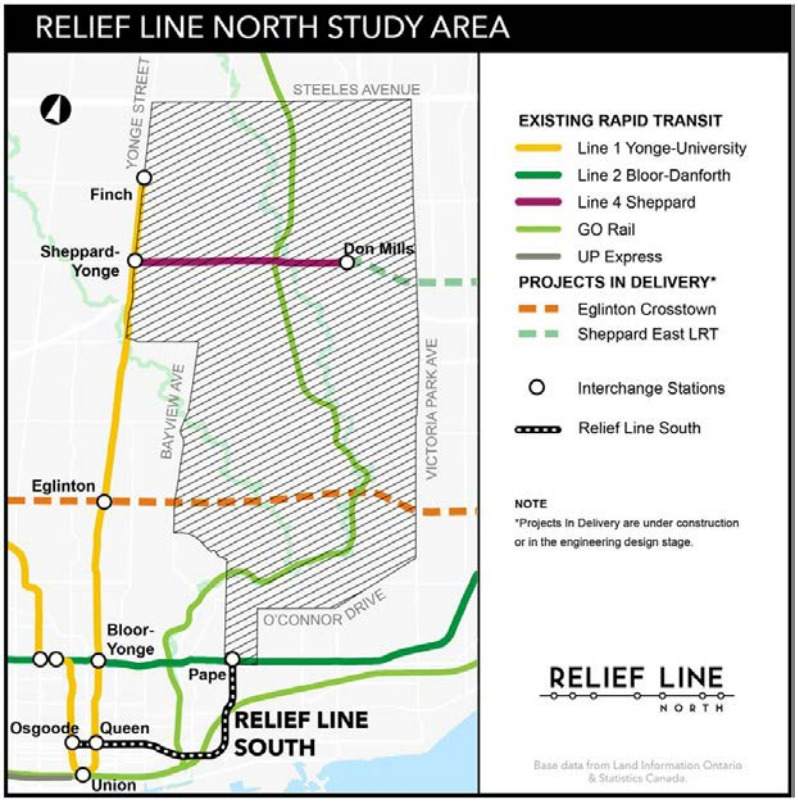


Figure 8. Relief Line North Project Map

A continuation of the Relief Line north from Line 2 will provide more capacity and reduce overcrowding on Line 1 and at Bloor-Yonge Station; improve transit access to more communities not yet served by rapid transit; and provide an alternative rapid transit route that will help meet future travel demand. "Relief Line North" is a temporary working title for the project, and the completed line will be designated by a number, name, and colour, like all other TTC rapid transit lines.

The Relief Line North would operate as a continuation of the Relief Line South project. The longer, continuous Relief Line South and North would be integrated into the TTC subway system. Service levels and hours of operation over the entire line would be similar to existing TTC subway lines. The trains, stations, and other infrastructure will be designed to the latest subway standards, and will permit a high-capacity service to be operated to meet the projected passenger demand over at least the next 30 years. The line would be designed to use advanced features such as automatic train operation, platform edge doors, and longer trains. Maintenance and storage facility requirements for the longer Relief Line South and North will be considered as part of a larger review of TTC subway yard requirements, thus allowing efficient use of subway resources on a system-wide level.

Recent History

In May 2017, City Council authorized staff to work in partnership with Metrolinx and TTC to develop an initial business case for the Relief Line North.[20] The project is governed

[20] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX25.1

by the same Memorandum of Understanding[21] as the Relief Line South and is being led by Metrolinx. Provincial funding for the project is currently in place to advance the planning through to the TPAP.

Status

The Relief Line North is now in the initiation and development phase, including development of an Initial Business Case and recommended route and station locations, targeted for completion in Q4 2019 and will be reported to City Council and the TTC Board in Q1 2020. Six corridor options were presented for public comment in April 2018; the options generally follow Bayview, Leslie, Don Mills (three variations) and Victoria Park. Analysis of options and development of an initial business case is currently underway. Further public consultation is being planned for later this year prior to reporting to City Council.

Key Facts	Current Available Information
Project Governance	**Asset Owner**: TBD **Project Manager**: Metrolinx (Initiation and Development Phase) **Operator:** TTC (to be confirmed)
Delivery Model	TBD – Procurement Options Analysis Required
Environmental Assessment/TPAP	Incomplete – TBD – Initial Business Case Required
Current Phase in Project Lifecycle	Initiation and Development – to be completed by Q4 2019
Project Website	http://www.relieflinenorth.ca/background/background-materials/

A cost estimate has not yet been developed as the planning work is still at an early stage.

Contact

Gary Downie, A/Chief Transit Expansion Officer, TTC
Email: gary.downie@ttc.ca, Tel: 416-590-6218

Malcolm MacKay, Project Head, TTC
Email: malcolm.mackay@ttc.ca, Tel: 416-590-6777

[21] http://reliefline.ca/south/the-project/coordinated-transit-planning/memorandum-of-understanding

SmartTrack Stations Program

Current Phase: Procurement and Construction[22]

Description

The SmartTrack Stations Program is a package of six new stations on the Stouffville, Lakeshore East and Kitchener GO corridors. The Program also entails a service concept of 6-10 minutes during peak periods and 15 minutes during off-peak periods, along with a fare policy that address the following City Council requests:

Figure 9. SmartTrack Stations Program Project Map

- Reduce GO Transit's base fare component and increase the distance component; and
- Provide riders using transit in Toronto, with the same GO Transit co-fare option on the TTC as riders starting trips in other Greater Toronto and Hamilton Area (GTHA) municipalities have.

The SmartTrack Stations Program leverages existing heavy rail infrastructure and the GO Expansion Program in Toronto to increase local service and expand transit options for residents traveling within and beyond the City of Toronto.

Recent History

In 2016, City Council approved a Summary Term Sheet and authorized the City of Toronto to enter into an Agreement in Principle ("AIP") with the Province of Ontario with respect to the SmartTrack Stations Program. A "Stage Gate Process" was developed by the City and the Province that allows for key decisions at defined stages of the project, and principles with respect to the funding and delivery of SmartTrack. The AIP also established a series of conditions for the City and Province to assess whether or not both parties are satisfied in order to proceed through the next decision gate of the SmartTrack Stage Gate Process.

In April 2018, City Council approved a funding contribution of up to $1.463 B and requested Metrolinx to proceed with the procurement of the SmartTrack Stations Program, subject to amending the AIP in order to satisfy the terms and conditions required to move to the next phase of the project.[23] An MOU was signed by the City and

[22] Subject to Province finalizing agreement with City per May 2018 Memorandum of Understanding.
[23] https://www.toronto.ca/legdocs/mmis/2018/ex/bgrd/backgroundfile-113940.pdf

Province in May 2018, expressing the intention of the Province and City to formally amend the AIP. See EX33.1 Attachment 1 for further details.

Status

At its meeting on December 6, 2018, the Metrolinx Board of Directors adopted a Market Driven Strategy to Delivering Transit Infrastructure, which has the stated intention to (i) leverage third-party investment to reduce the funding required from the Province for transit expansion, (ii) leverage existing real estate assets to increase ridership and revenue, and (iii) enhance the GO customer experience through dense, mixed-use, integrated development at GO stations.[24] Metrolinx is currently developing an implementation plan for this strategy and is engaging the City in this process. Metrolinx will act directly with any third-party developers. Once the Market Driven Strategy has been developed and the AIP is amended, procurement and delivery of the SmartTrack Stations will proceed.

Key Facts	Current Available Information
Project Governance	**Asset Owner**: Metrolinx **Project Manager**: Metrolinx **Operator:** Metrolinx
Delivery Model	Design-Build-Finance AFP contract by Metrolinx/IO; may be impacted by Metrolinx's Market Driven Strategy
Environmental Assessment/TPAP	TPAP Statement of Completion in September 2018[25]
Current Phase in Project Lifecycle	Procurement and Construction[26] – in-service date planned for 2025
Project Website	http://smarttrack.to/

Current Cost and Schedule Estimates

	Capital Cost Estimate
Schedule	2018-2025
Cost	$1.470 B[1]
Notes: (1) Includes $6.9 M for staff resources 2019-2021.	

[24] http://www.metrolinx.com/en/docs/pdf/board_agenda/20181206/20181206_BoardMtg_TOD_Strategy.pdf
[25] http://www.metrolinx.com/en/greaterregion/regions/docs/newstations/epr/Final_SmartTrack-Statement-of-Completion_signed.pdf
[26] Subject to Province finalizing agreement with City per May 2018 Memorandum of Understanding.

Contact

James Perttula, Director, Transit and Transportation Planning, City of Toronto
Email: James.Perttula@toronto.ca, Tel: 416-392-4744

Shalin Yeboah, Project Director, Major Capital Infrastructure Coordination, City of Toronto
Email: Shalin.Yeboah@toronto.ca, Tel: 416-397-7358

Waterfront Transit Network

Figure 10. Waterfront Transit Network Map

Description

The Waterfront Transit Network area extends between Long Branch and Lake Shore Blvd W in the west to Queen Street and Woodbine Avenue in the east. The 2041 plan identifies a dedicated LRT (streetcar in an exclusive right-of-way) from Park Lawn Rd and Lake Shore Blvd to Leslie St and Commissioners St. The network comprise a number of streetcar infrastructure projects and traffic improvements, all at varying stages of design. In January 2018, City Council approved the Waterfront Transit Network Plan, including identification of priority segments. The segments, as shown in Figure 10, are:

1. Humber Bay (Humber Loop to Park Lawn/Legion Rd)
2. Exhibition Place (Exhibition Loop to Dufferin Gate Loop)
3. Union Station to Queens Quay Link (and extension to Parliament St)
4. Port Lands (Parliament St to Leslie St)

The two most significant projects in the network are the westerly extension of the existing streetcar from the Exhibition Loop to the Dufferin Gate Loop (Segment 2), and improving the underground transit link from Union Station to Queens Quay (Segment 3). The Union Station Link also includes the approved East Bayfront LRT on Queens Quay to the Parliament St area. Without these two components of the network, the benefits of further transit improvements to the west and the east cannot be fully realized.

The completion of the Waterfront Transit Network is critical to serving current and future population and employment growth in the area, as well as major cultural, sports, entertainment, special events, and recreational uses that are concentrated in this area of the city.

Recent History

In January 2018, City Council endorsed the overall Waterfront Transit Network Plan, including identification of priority segments.[27]

[27] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX30.1

Status

Segment 1

The City and TTC are working on opportunities to improve priority for streetcar customers from the Humber Loop to Park Lawn Rd, in conjunction with the on-going Transportation Master Plan study for the area.

Segment 2

The Exhibition Loop – Dufferin Gate Loop section area is on track to complete preliminary design and engineering in Q3 2019. Staff will report to City Council and TTC Board with an updated Class 3 cost estimate and a Level 3 schedule in Q4 2019. The initiation of the planning for the western portion of the Humber Bay Link from Dufferin St to the Queensway and Colborne Lodge Dr is currently in the initiation and development phase, and will proceed based on advancing the extension to Dufferin St.

Segment 3

The Union Station-Queens Quay Link project has completed initiation and development, including updated Class 4 cost estimates, and is seeking approval of the preferred technology option to proceed to preliminary design and engineering. The section of Queens Quay from Bay Street to Parliament Street has been included in the design and costing work for the Union Station-Queens Quay Link.

Segment 4

The Port Lands area is in various stages of planning and design, ranging from detailed design (Villiers Island area around Cherry St), to final stages of the Environmental Assessment process (Broadview Ave extension and LRT from Queen to Commissioners St, and Commissioners St LRT from Broadview Ave to Leslie St).

Key Facts	Current Available Information
Project Governance	**Asset Owner**: TTC **Project Manager**: TTC, City of Toronto, Waterfront Toronto **Operator:** TTC
Delivery Model	To be determined
Environmental Assessment/TPAP	Various – see EX30.1 Waterfront Transit Network Plan
Current Phase in Project Lifecycle	Various – see EX30.1 Waterfront Transit Network Plan
Project Website	www.toronto.ca/waterfronttransit

Current Cost and Schedule Estimates

Class 5 cost estimates for completion of the entire Waterfront Transit Network are in the range of $1.98 billion to $2.31 billion in 2017 dollars. These costs are primarily based on

1% or less level of design, and do not include rolling stock. This estimate is subject to further design work and third party cost estimate validation. This estimate does not include escalation, financing costs or the pricing of risk.

Contact

James Perttula, Director, Transit and Transportation Planning, City of Toronto
Email: James.Perttula@toronto.ca, Tel : 416-392-4744

Waterfront Transit Network

Exhibition Loop – Dufferin Gate Loop Streetcar Connection

Current Phase: Preliminary Design and Engineering

Description

This project would construct a new streetcar connection, approximately 800 metres in length, along the north side of Exhibition Place, connecting the existing Exhibition Loop with the existing Dufferin Gate Loop. The project is part of the Waterfront Transit network program.

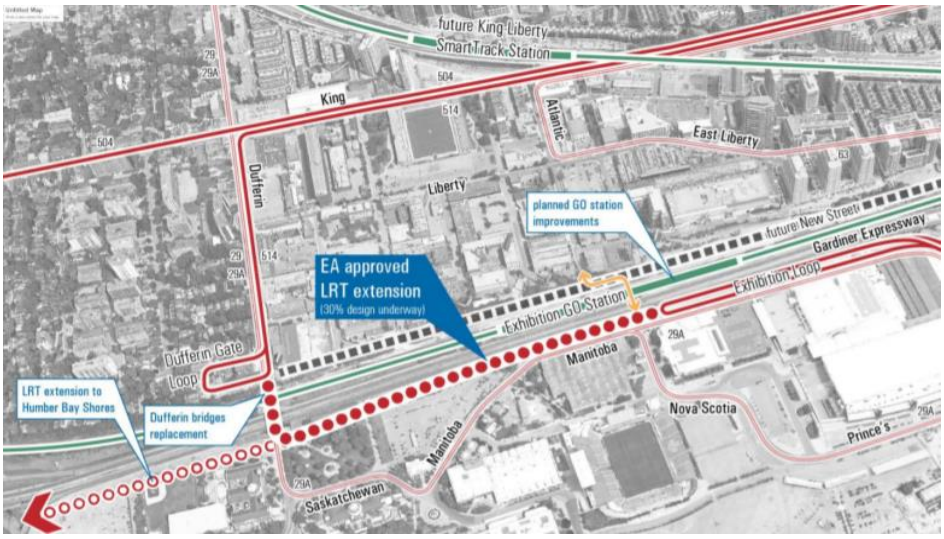


Figure 11. Exhibition Loop – Dufferin Loop Project Map

The new streetcar connection would allow the extension of existing TTC streetcar service west from Exhibition Place to Dufferin Street, and north and west from there on Dufferin Street, King Street, the Queensway, and Lake Shore Boulevard. This service would increase transit capacity and provide new direct TTC journey opportunities in Parkdale, The Queensway, and Humber Bay Shores. The connection would operate in a year-round dedicated right of way, and not be affected by events at Exhibition Place. The streetcar connection would replace the existing 29 Dufferin bus service that operates into Exhibition Place, and often must be suspended because of closure of the grounds for events. The new streetcar connection would also provide significantly improved connections and resiliency in the TTC's streetcar network, and would be designed to serve every-day transit trips as well as periods of high ridership and service demands during events at Exhibition Place.

This project is closely co-ordinated with other nearby projects. This project:

- Will minimise changes to the existing tracks at Exhibition Loop, which were renewed in 2016/2017;
- Is co-ordinated with Metrolinx's planned improvements to Exhibition GO Station;
- Is co-ordinated with the City's Dufferin Bridge replacement work;
- Will include a renewal and upgrade of the existing TTC Dufferin Gate streetcar and bus loop; and
- Will permit a future connection south of Dufferin Street to the Humber Bay Link, an additional westward streetcar connection that has been contemplated as part of the Waterfront Transit network.

Recent History

In July 2016, City Council considered the report *EX16.17 Waterfront Transit Network Vision*[28] and directed City staff to initiate the preliminary design and engineering of the extension of streetcar service from Exhibition Loop to the Dufferin Gate Loop.

In January 2018, City Council considered the report *EX30.1 Waterfront Transit Network Plan*,[29] and endorsed the overall Waterfront Transit Network Plan, including identification of priority segments. City staff also directed staff to report back on the next steps for design and construction on the extension between the Exhibition Loop and the Dufferin Gate Loop.

Status

An Environmental Assessment for this project was originally completed in 1995, and was updated in 2008 and 2011. A preliminary design report for the connection between Exhibition Loop and Dufferin Gate Loop was completed in 2010.

In response to the 2018 Waterfront Transit Network Plan (EX30.1), TTC staff initiated a new Preliminary Design Report study in 2018. This study will update the 2010 study considering changes to the area, including Metrolinx's new work on the Exhibition GO Station and increased pedestrian activity in Exhibition Place and in Liberty Village, and develop a 30% design for the connection. The results of the pedestrian modelling study, expected in Q3 2019, will be used to inform any further changes to the preliminary design. Public consultations will be held in Q2 or Q3 of 2019, and a report to Council and to the TTC Board in Q4 will include a 30% design for the connection, detailed cost estimates, and recommendations on how to proceed with construction.

Key Facts	Current Available Information
Project Governance	**Asset Owner**: TTC **Project Manager**: TTC **Operator:** TTC
Delivery Model	To be determined
Environmental Assessment/TPAP	EA modification completed 2008 for streetcar connection. EA updated in 2011.
Current Phase in Project Lifecycle	Preliminary Design and Engineering (PDE) – to be completed by Q3 2019

[28] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.17
[29] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX30.1

Current Cost and Schedule Estimates

	Capital Cost Estimate
Schedule	2020-2025
Cost	$109.5 M[1] (Class 5; not for budgeting)
Note: (1) To be updated in Q4 2019.	

Contact

Scott Haskill, Manager – Project Development & Coordination, Toronto Transit Commission
Email: scott.haskill@ttc.ca, Tel: 416-39-4497

Yonge Subway Extension

Current Phase: Preliminary Design and Engineering

Description

The Yonge Subway Extension ("YSE") is a 7.4-kilometre extension of the TTC's Line 1 from Finch Station in Toronto to the Richmond Hill/Langstaff Gateway Urban Growth Centre at Highway 7 in Richmond Hill with connections to York Region Transit and GO buses at Steeles and Richmond Hill Station. The project is required to relieve crowding and delays on bus services on Yonge Street; to improve connections with the busy TTC bus services on Cummer Avenue, Drewry Avenue, and Steeles Avenue; and to support growth in North York and York Region, while providing further integrated rapid transit in the Greater Toronto and Hamilton Area.

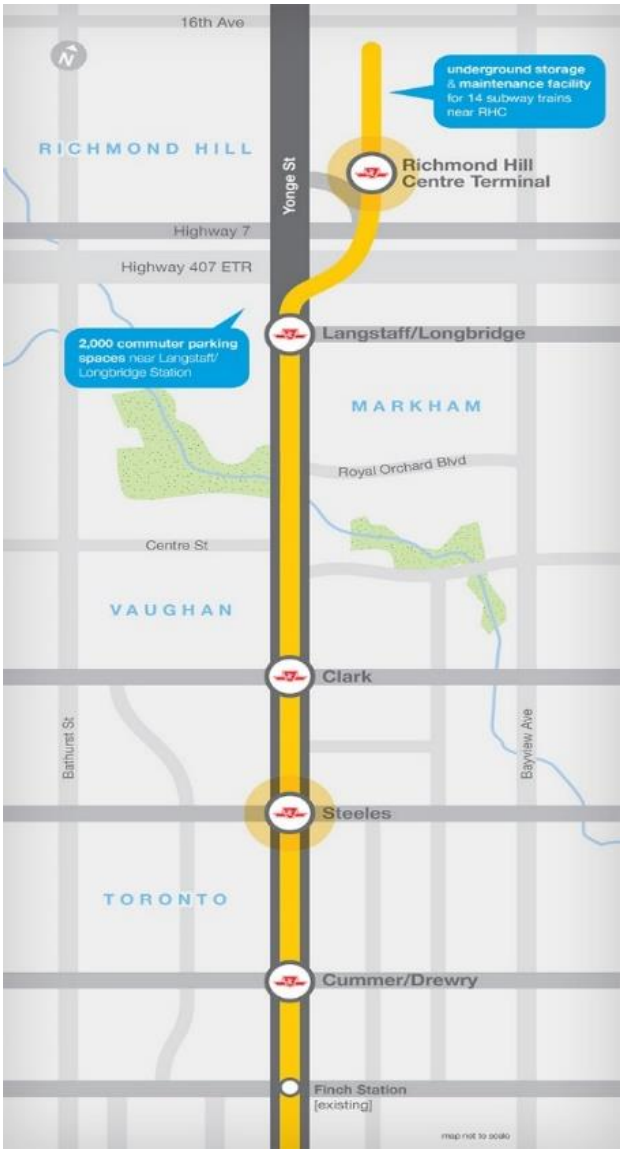


Figure 12. Yonge Subway Extension Project Map

Recent History

In May 2017 City Council authorized the City and TTC, in partnership with York Region and Metrolinx, to advance the preliminary design and engineering work to develop a Class 3 cost estimate and Level 3 schedule at no financial cost to the City, subject to the following conditions:

- City/TTC will own, operate and maintain the future Line 1 extension subject to satisfactory cost-sharing agreements with York Region and/or the Province;
- TTC is the project manager for the PDE phase;
- York Region and Metrolinx are responsible for costs associated with PDE; and
- TTC will deliver the YSE project.[30]

Per City Council direction in 2017, the City, TTC and Metrolinx entered into a Memorandum of Understanding to guide the PDE phase of the work on the YSE. The PDE phase is generally intended to include all necessary work to finalize preliminary

[30] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX25.1

design and engineering to between approximately 15% and 30% in preparation for a decision on full funding and project readiness for procurement and delivery.

Analysis shows that the Relief Line South, improvements to Bloor-Yonge station and other Line 1 capacity enhancements are required to support the YSE. The Relief Line South must also be in operation prior to the opening of the YSE if both projects proceed concurrently.[31]

Status

The PDE phase of the YSE is currently underway and expected to be completed by Q4 2019. Staff will report to City Council and TTC Board with a Class 3 cost estimate, Level 3 schedule and risk analyses in Q1/Q2 2020. The report will also include further analysis on Line 1 capacity and demand to inform the appropriate sequencing of projects.

Key Facts	Current Available Information
Project Governance	**Asset Owner**: TTC **Project Manager**: TTC (PDE Phase) **Operator:** TTC
Delivery Model	TBD – Procurement Options Analysis Required
Environmental Assessment/TPAP	MOE approved the YSE EPR in April 2009 and an addendum to add the train storage facility in November 2014.[32]
Current Phase in Project Lifecycle	Preliminary Design and Engineering (PDE)
Project Website	http://www.yongesubwayext.com/

Current Cost and Schedule Estimates

	Capital Cost Estimate
Schedule	TBD
Cost	$5.6 B (Class 5; not for budgeting)

To complete the PDE phase for the YSE, the Government of Canada, through York Region, committed $36 million and the Province of Ontario, through Metrolinx, committed $55 million. A long-term funding commitment for capital construction for the YSE project is still required.

[31] Recommendation 14: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX25.1
[32] http://www.vivanext.com/epraddendum
http://www.vivanext.com/PDFs/YSE/2009_ReportEnvironmentalProject.pdf

Contact

Gary Downie, A/Chief Transit Expansion Officer, TTC
Email: Gary.Downie@ttc.ca, Tel: 416 590 6218

Silvano Florindi, Project Head, TTC
Email: Silvano.Florindi@ttc.ca, Tel: 416 590 6881

Appendix A – Cost Estimate Classifications

Cost estimate classification systems are used throughout the estimating industry to categorize cost estimates based on the maturity level of project definition. As project development proceeds, estimate accuracy ranges narrow because more is known about the project and there is a corresponding reduction in risk and uncertainty in the cost estimate.

The Association for Advancement of Cost Engineering ("AACE") provides the most generally accepted industry guidelines for cost estimate classification systems. The Ministry of Transportation and Infrastructure (MOTI), Government of British Columbia,[33] also has detailed cost estimating guidelines[34] that build on the AACE framework for transportation projects.

Table A1 depicts AACE's Cost Estimate Classification system which provides general principles for using cost estimates to evaluate, approve and/or fund projects.[35] Table A1 illustrates typical ranges of accuracy based on level of project definition. The +/- represents typical variation of actual costs from the cost estimate after application of contingency for given scope. In addition to the degree of project definition, estimate accuracy is also driven by other systemic risks such as familiarity with the technology in the project; complexity; quality of reference cost estimating data; unique nature of the project; other political and environmental risks, etc. The greater the complexity of the project, the greater the uncertainty of early project estimates.

Table A1. AACE International Recommended Practice- Cost Estimate Classification Matrix

Estimate Class	Maturity of Project Definition *Expressed as % of complete definition*	End Usage *Typical purpose of estimate*	Methodology *Typical estimating method*	AACE Classification Expected Accuracy Range *Typical variation in low and high ranges*
Class 5	0% to 2%	Concept Screening.	Parametric models; judgement, analogy	L: -20% to - 50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility.	Parametric; Elemental factored	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization	Semi-detailed unit costs	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender.	Detailed costing	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender.	Detailed costing	L: -3% to -10% H: +3% to +15%

[33] https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/transportation-planning/cost-estimating
[34] https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/planning/guidelines/cost_estimating_guidance.pdf
[35] The Association for the Advancement of Cost Engineering (AACE), (2018) http://web.aacei.org/docs/default-source/rps/10s-90.pdf?sfvrsn=28

The classification of cost estimate needs to be taken into consideration when used for decision-making purposes. Specifically, the class levels reflect the level of scope definition at which the cost uncertainty (typically expressed as an accuracy range) is reduced to a point that decision-makers can make a project investment decision. The estimate level will be important in terms of when it is appropriate to establish the project budget. The MOTI, Government of British Columbia has an established guideline that indicates at minimum 10 to 40% design should be complete (Class 3, AACE Estimate) in order for the estimate to become the basis for developing the project budget. This is also consistent with AACE Cost Classification Standards.

The following provides a more detailed summary of the difference in project definition and the methodology employed to develop a cost estimate at various levels on the scale:

- A **Class 5** cost estimate is based on the lowest degree of project definition, and is used in early conceptual studies. Class 5 estimates are used for project option screening, assessment of viability, and long range capital planning. In the context of the project lifecycle, a Class 5 estimate is typical as part of early planning work on a project. A Class 5 estimate is an order of magnitude[36] estimate, prepared when there is little or no design information available for the project. The types of techniques or methodologies employed for developing an estimate this early in the project lifecycle include factor estimating (i.e., taking the known cost of a similar facility and factoring the cost for size); historical values; rules of thumb; and simple mathematical calculations. Cost estimates developed using the above methodologies should not be used as the basis for approving a project budget.[37]

- A **Class 4** cost estimate is generally prepared based on limited information and subsequently has a fairly wide accuracy range. Class 4 estimates are typically used for project screening, determination of feasibility, concept evaluation, and preliminary (but generally not final) budget approval. They are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and approval to proceed to the next stage.

- A **Class 3** estimate is a budget estimate[38] based on the completion of the preliminary design and engineering phase of the project. These types of estimates are used for budget authorization, and full funding. "A Class 3 estimate is recommended to support full project funding requests, and become the first of the project phase 'control estimates' against which all actual costs and resources will be monitored for variations to the budget."[39] A Class 3 estimate is used as the project budget until replaced by more detailed estimates. The methodology to develop a Class 3 estimate usually involves more deterministic estimating

[36] ANSI Standard Reference Z94.2-1989 Name: Order of Magnitude Estimate
[37] https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/planning/guidelines/cost_estimating_guidance.pdf
[38] ANSI Standard Reference Z94.2-1989 Name: Budget Estimate
[39] AACE International Recommended Practice NO. 18R-97, 1998.

methods that involve semi-detailed unit-costing and occasionally less detailed estimation (i.e., factoring estimates) on less significant areas of the project. This type of costing is possible at this stage in the lifecycle of project due to the availability of detailed design drawing, greater maturity in the project plan, and level of detail on the project work-breakdown structure.

It is important to note that if a project is using an Alternative Financing and Procurement (AFP) model as opposed to a traditional design-bid-build (DBB) model, the level of design for a project being delivered as an AFP in the preliminary design phase may be lower (closer to 15% of project definition) than typically seen in a DBB delivery model (closer to 30% of project definition).

- **Class 2** cost estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value.

- A **Class 1** cost estimate is based on the highest maturity of project definition (full project definition), and is a definitive estimate.[40] These types of estimates are typically prepared for discrete components of the project, as opposed to generating an estimate for the entire project at this level of detail. Class 1 estimates may be used to evaluate bid checking, support vendor/contractor negotiations, or for claims evaluations and dispute resolution.[41] Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. For instance, detailed cost estimating involves each cost item to be broken down to the unit level, quantified and priced. This method can only be used when design definition has advanced to the point where quantification of units of work is possible (or can reasonably be assumed).[42] Detailed cost estimating is possible where there is a high degree of maturity in project definition.

[40] ANSI Standard Reference Z94.2-1989 Name: Definitive Estimate
[41] http://web.aacei.org/docs/default-source/rps/10s-90.pdf?sfvrsn=28
[42] https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/planning/guidelines/cost_estimating_guidance.pdf

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.

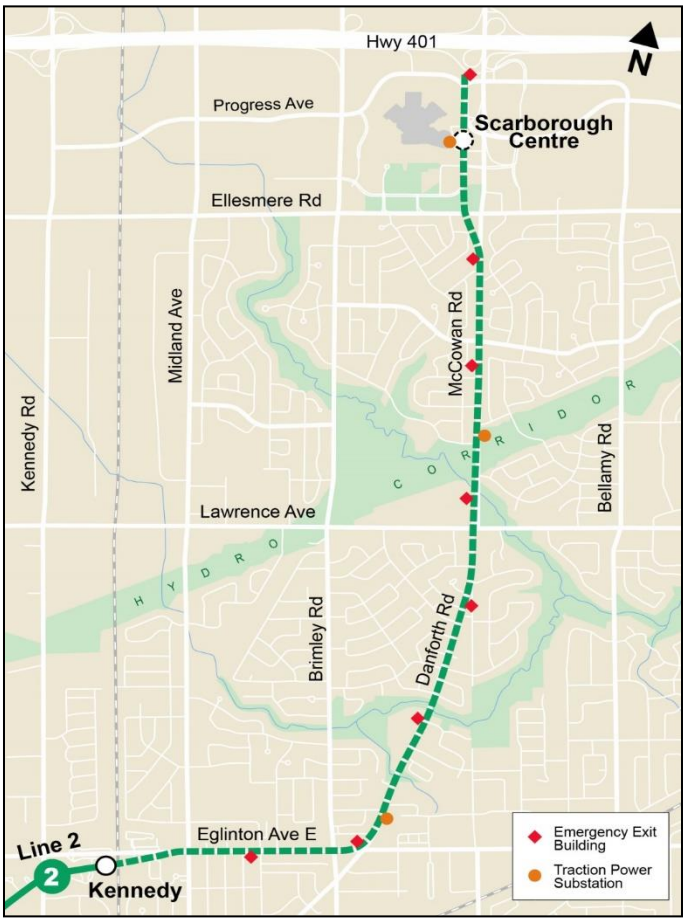


Figure 1. Line 2 East Extension Overview

The last report on the project was in March 2017[1] 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,[2] the project has conducted a formal detailed risk assessment, resulting in risk-adjusted estimates that better capture potential delays and costs.

[1] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX23.1
[2] 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

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

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

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,[3] 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

[3] 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,[4] 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).

[4] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX21.14

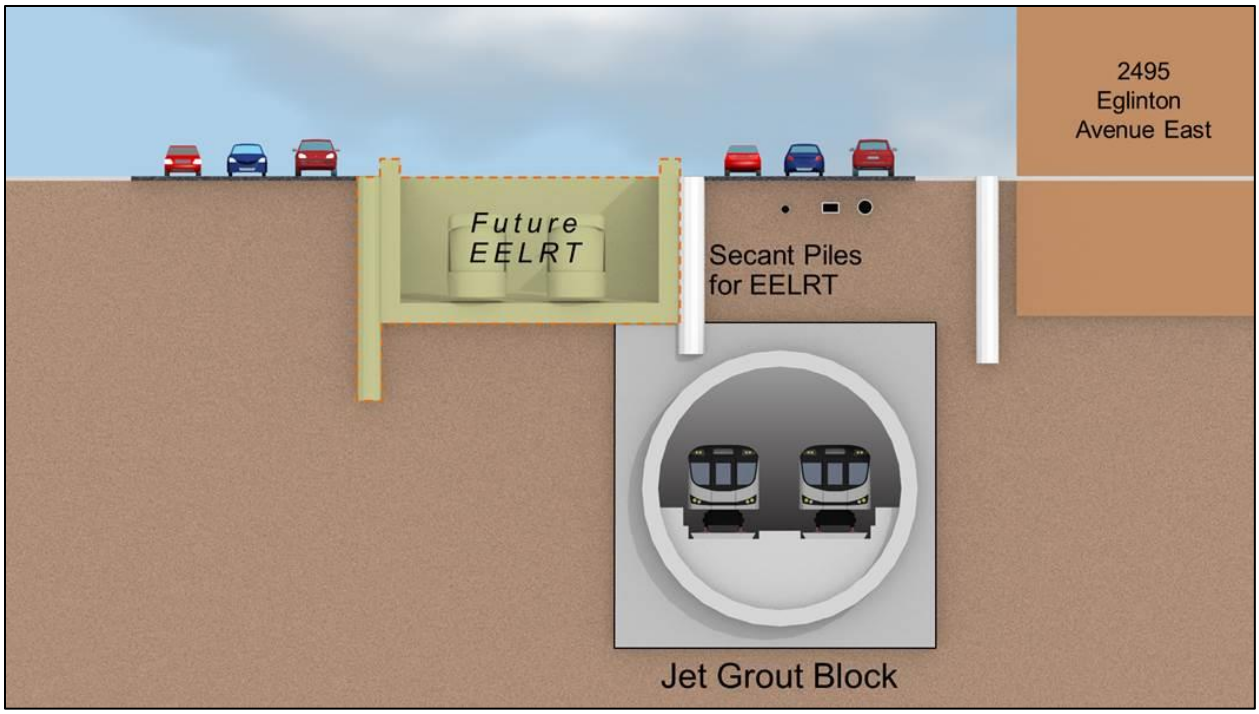


Figure 2. Proposed Eglinton East LRT/ Line 2 East Extension Interface – Eglinton Avenue Looking East

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.

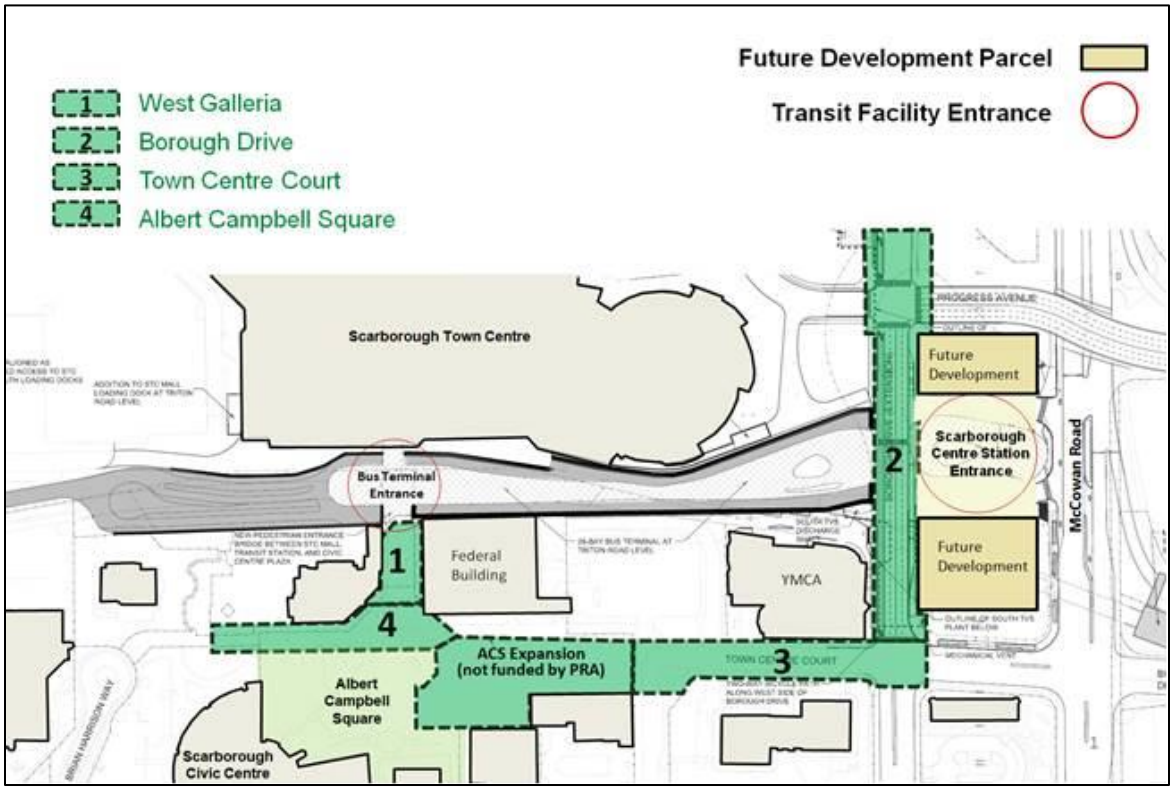


Figure 3. Recommended Use of the Public Realm Amount: Campbell's Walk

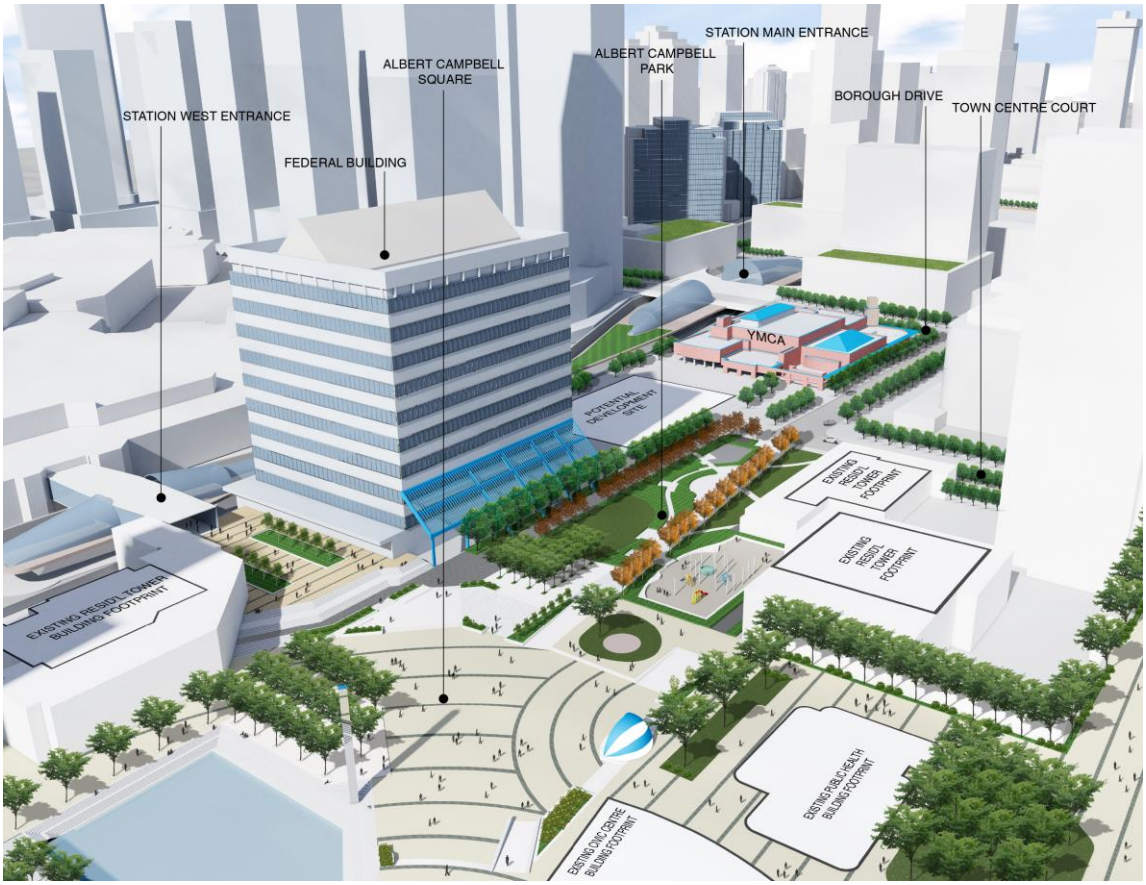


Figure 4. Scarborough Centre Station, north-east view (illustrative concept only)

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

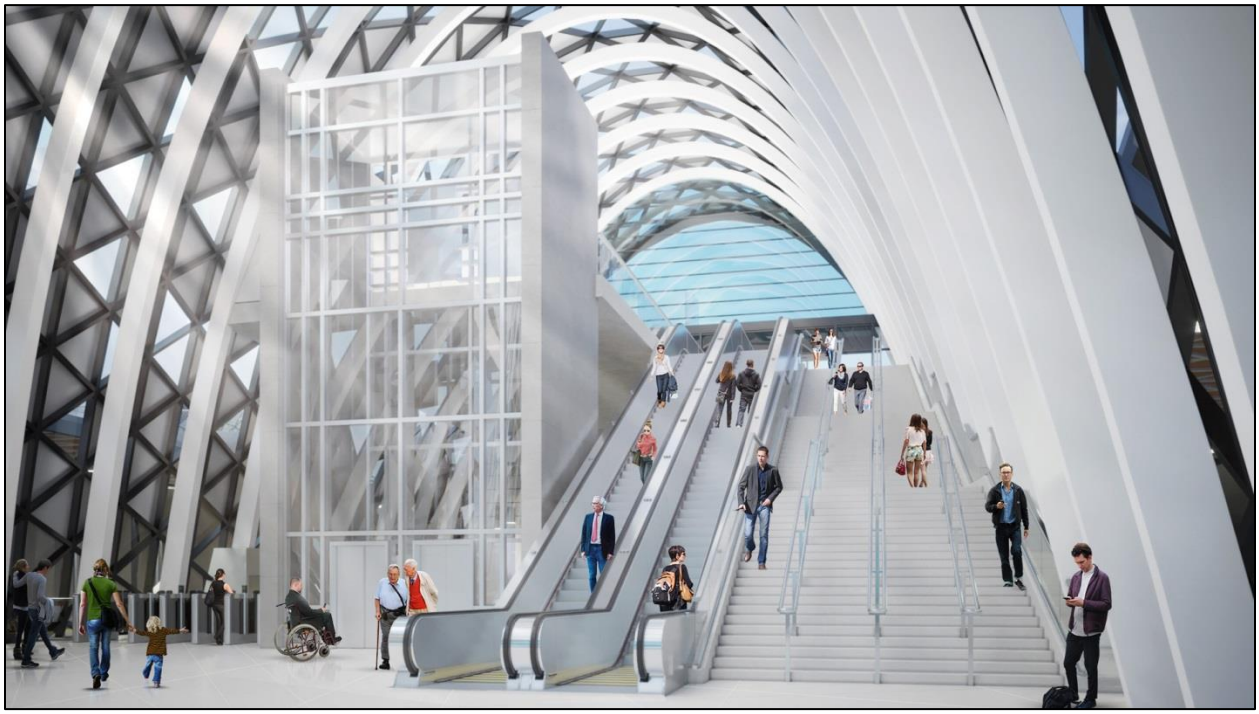


Figure 11. View of Station concourse interior looking west to main entrance

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.[5] The Environmental Project Report was submitted to the Minister of Environment and Climate Change on August 24, 2017[6] and the Minister's Notice to Proceed was received in October 2017.[7]

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

[5] http://www.scarboroughsubwayextension.ca/notice-of-commencement.html
[6] https://www.ttc.ca/PDF/Transit_expansion_PDFs/2017-08-19_SSE_TPAP_Final%20EPR_Hardcopy-Volume1%282017-11-17%20Up.pdf
[7] 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[8] 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

[8] 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
Total	**22.0**			**14.5**		

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**
1. Base Project Scope (approved by Council March 2017)			
1.1. Line 2 East Extension	$3,610.0 M[1]	$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
Subtotal (1.1 + 1.2 + 1.3)	**$3,865.0 M**	**$3,735.0 M**	**($130.0 M)**
2. Changes to the Base Project Scope			
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
Subtotal (2.1 + 2.2 + 2.3 + 2.4)	**---**	**$61.4 M**	**$61.4 M**
Cumulative (1. + 2.)	**$3,865.0 M**	**$3,796.4 M**	**($68.6 M)**
3. Scope Enhancements			
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)
Subtotal (3.1 + 3.2 + 3.3)	**$25.0 M**	**$71.1 M**	**$46.1 M**
4. Total (1. + 2. + 3.)	**$3,890.0 M**	**$3,867.5 M**	**($22.5 M)**

Notes:
- (1) Includes $3,305.0 M budget, $115.0 M risk to cost of construction, and $190.0 M potential risk of schedule delays
- All costs in 2018$
- All costs include indirect costs, contingency, HST impact and escalation

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

	A	B	(B-A)
Item	**2017 Council Submission Budget**	**30% Estimate**	**Variance**
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)
7. Grand Total	**$4,115.0 M**	**$3,887.5 M**	**($227.5 M)**

Notes:
- * Costs not required due to design-bid-build project delivery
- All costs in 2018$
- All costs include indirect costs, contingency, HST impact and escalation

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

Gary Downie, Chief Transit Expansion Officer
Toronto Transit Commission
Tel: 416-590-6218
Email: gary.downie@ttc.ca

Appendices

Appendix A – Property Requirements

Appendix B – Property Sketches

Appendix C – Executive Summaries of Peer Reviews

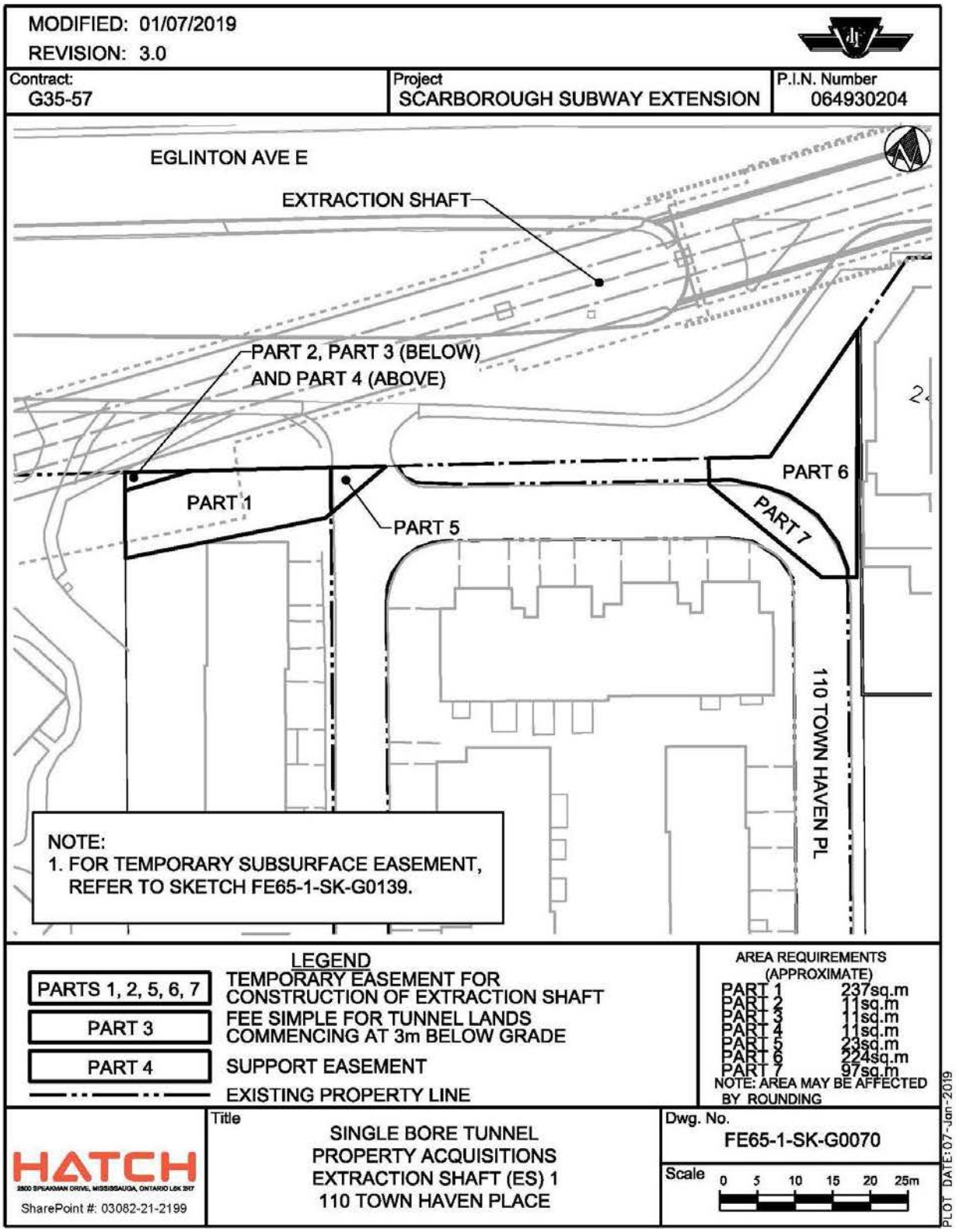
Updated Scarborough Transit Network Business Case available at:
https://www.ttc.ca/About_the_TTC/Projects/Scarborough_Subway_P/index.jsp

EX4.1

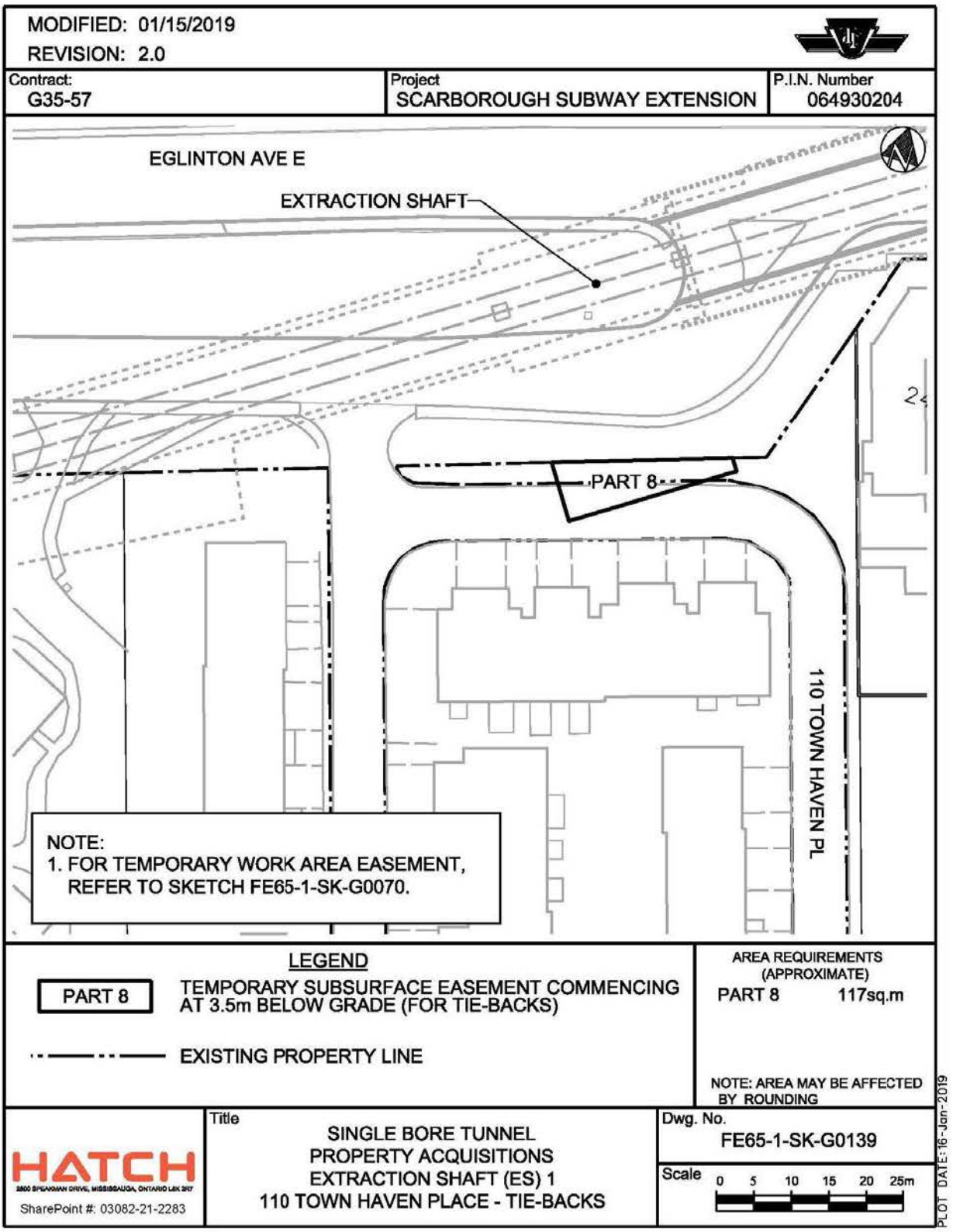
Appendix B.1

PROPERTY SKETCHES

Property No. 1



Property No. 1



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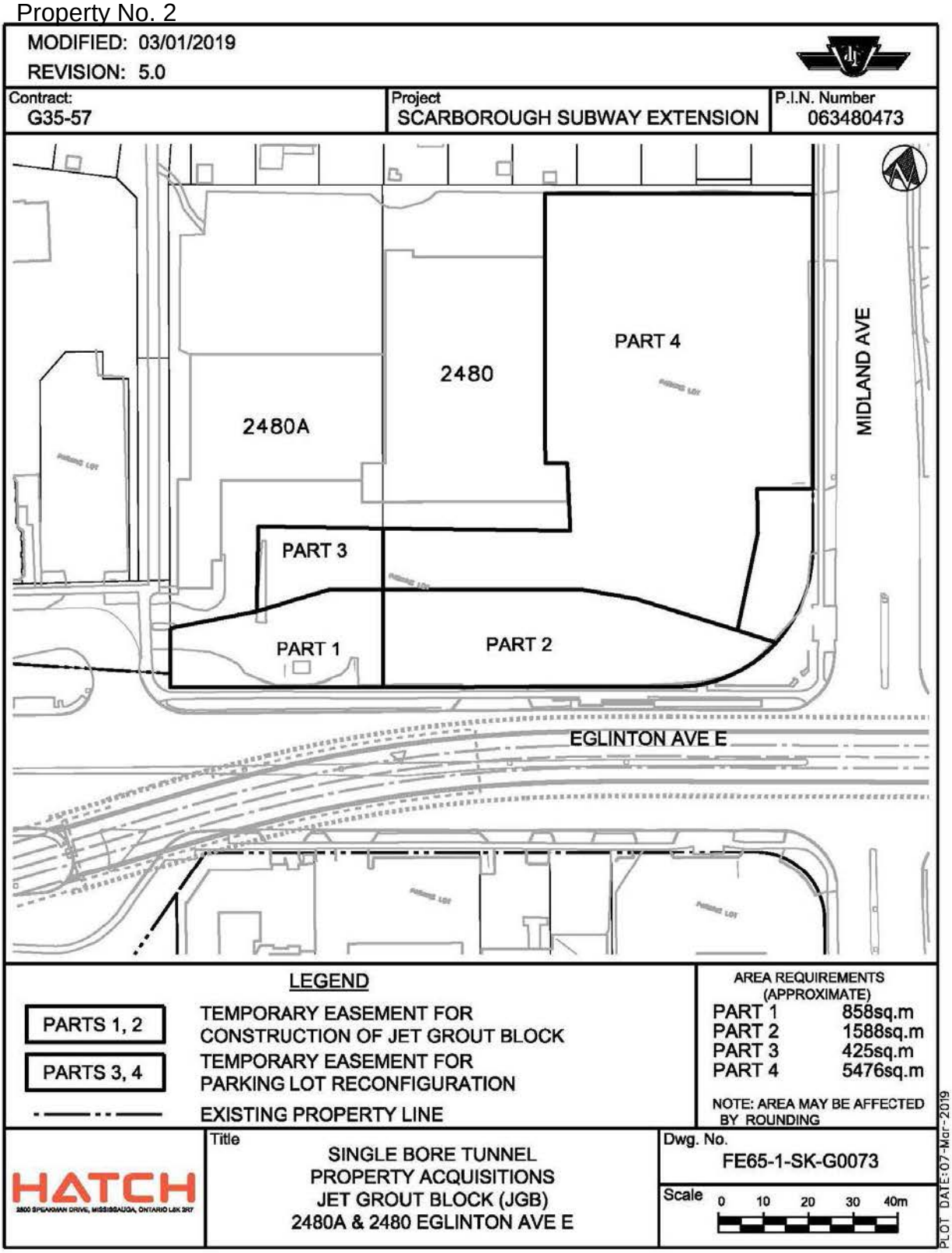
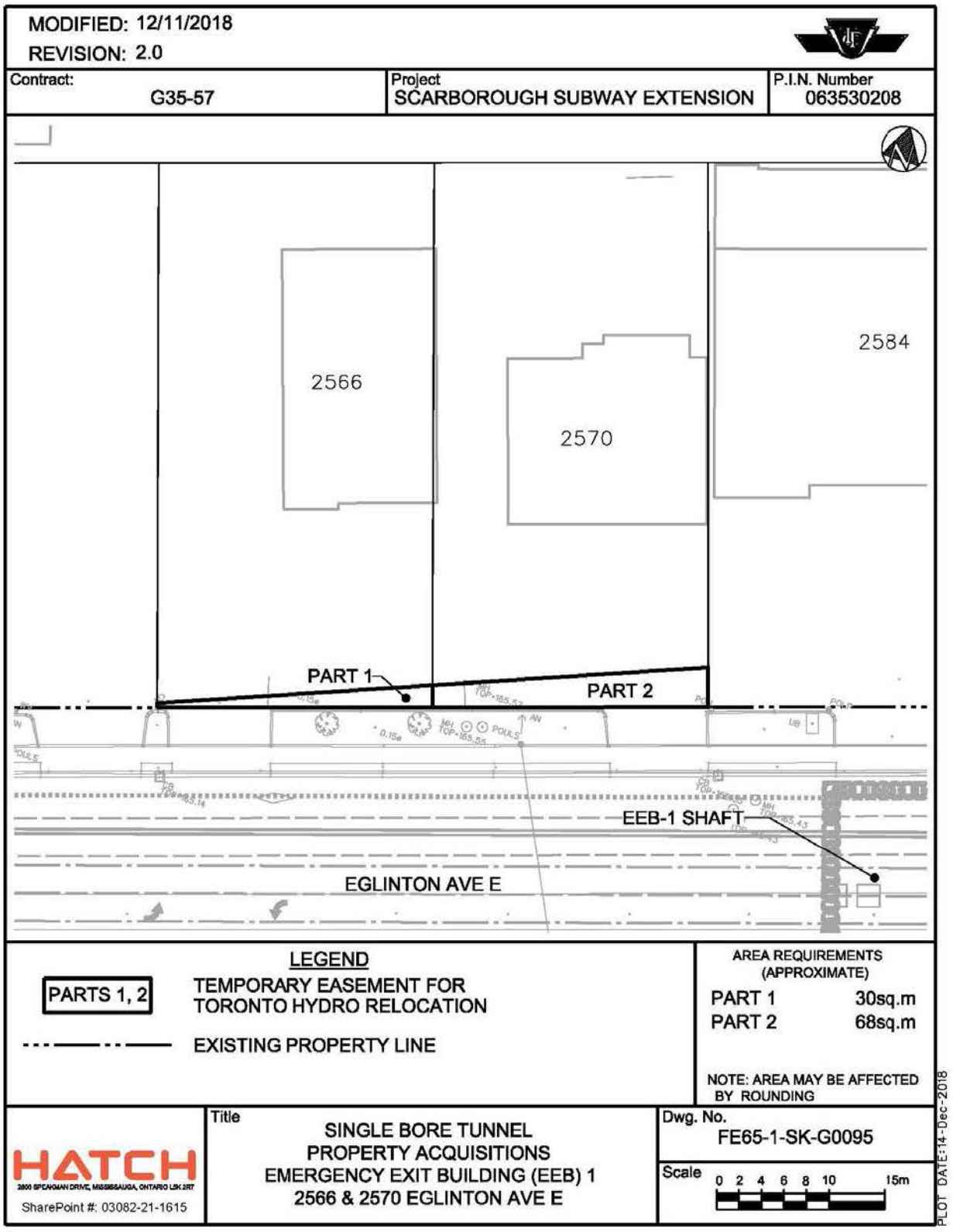


Property No. 3 and 4



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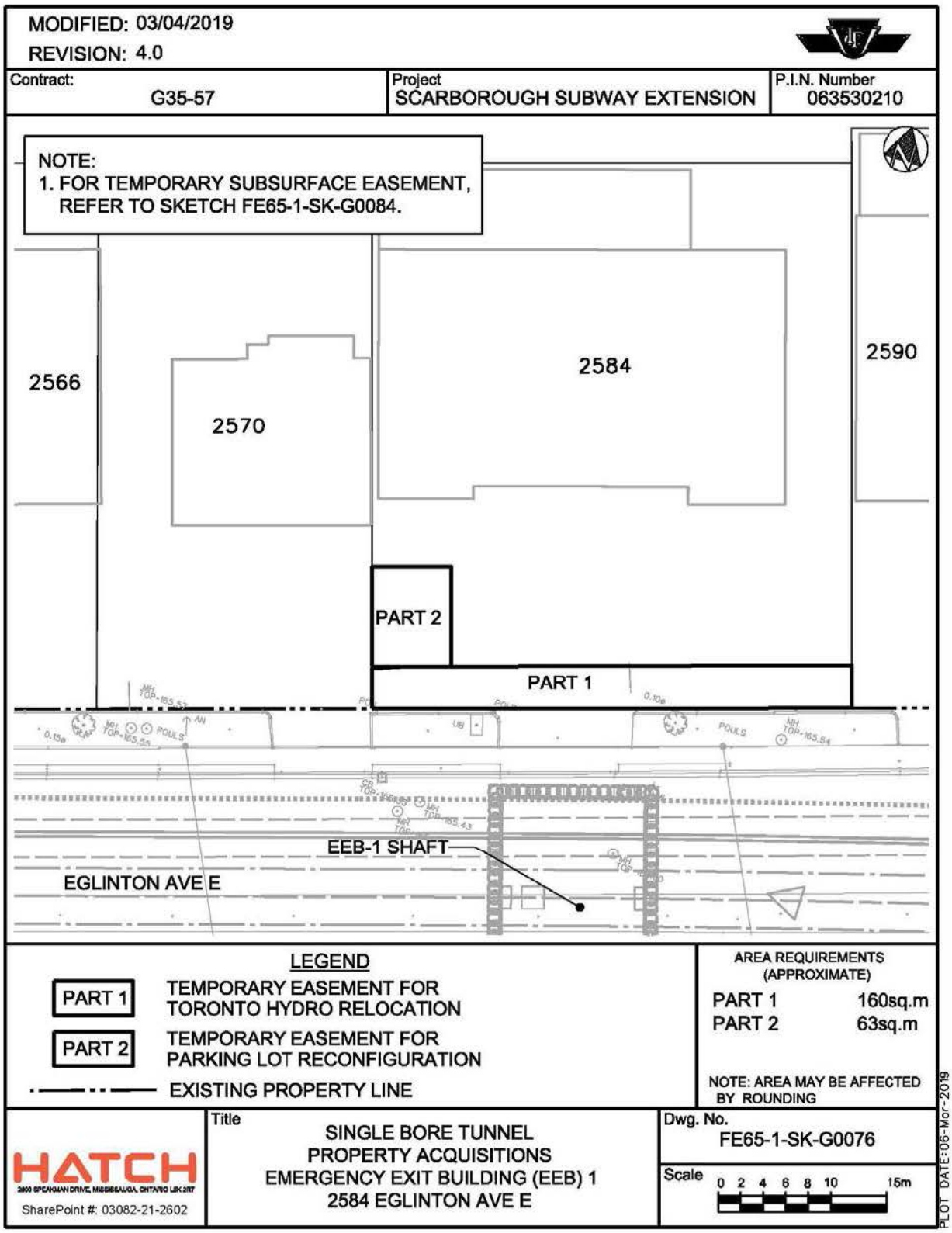

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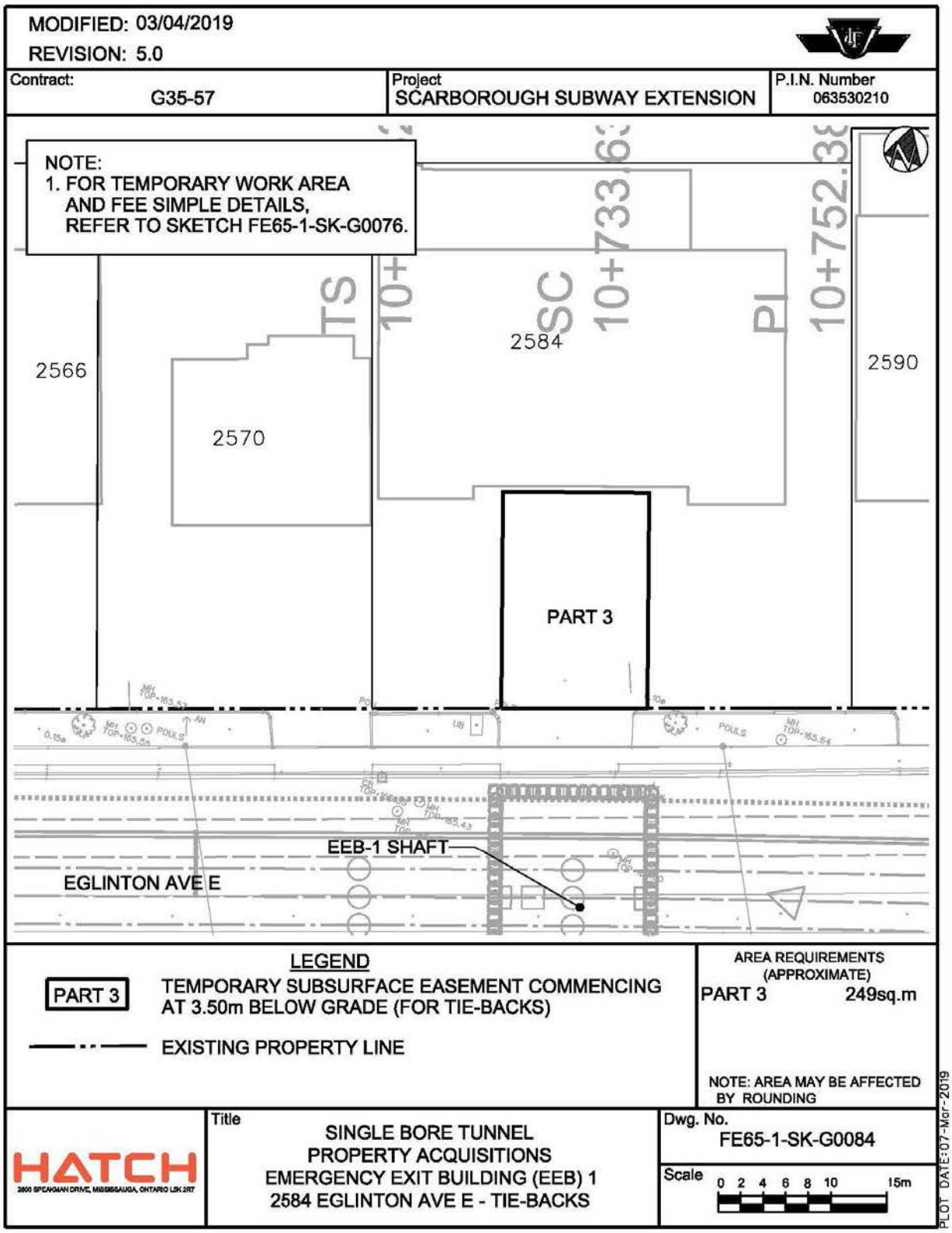
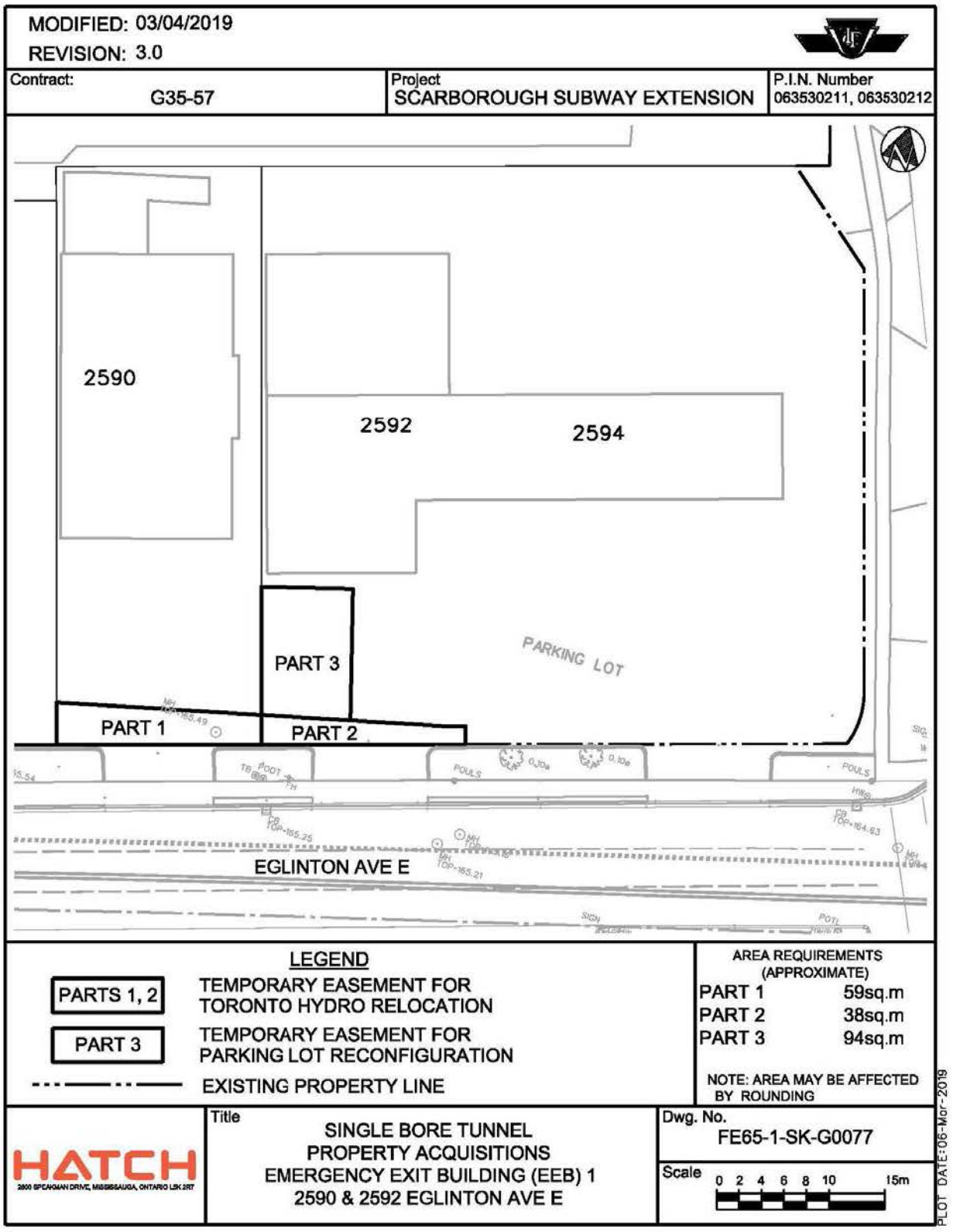


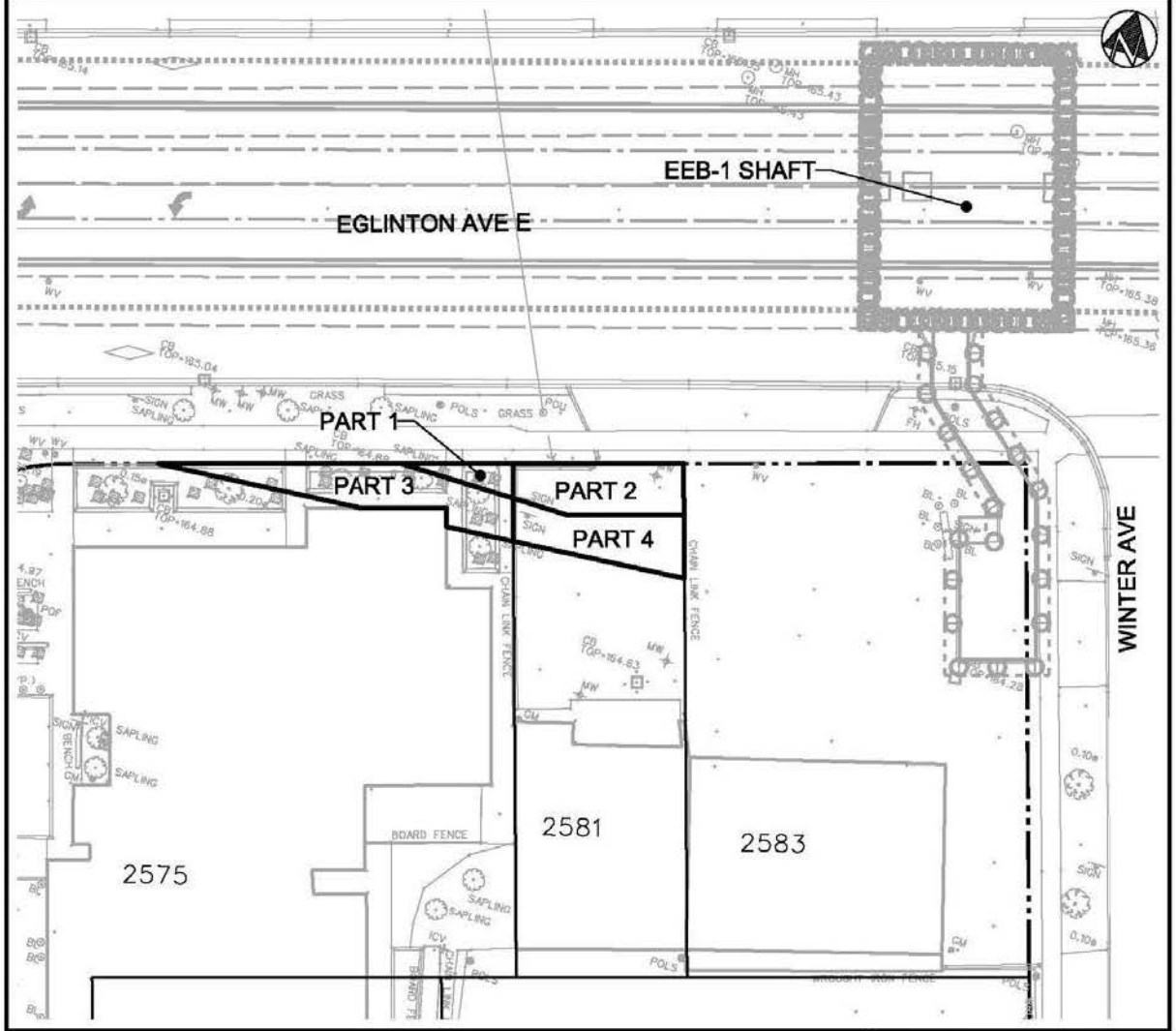
Property No. 6 and 7



Property No. 8

MODIFIED: 12/11/2018
REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	064250051, 064250077



LEGEND

PARTS 1, 2	TEMPORARY EASEMENT FOR CONSTRUCTION OF EEB
PARTS 3, 4	TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION
	EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	10sq.m
PART 2	43sq.m
PART 3	56sq.m
PART 4	42sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 1
2575 & 2581 EGLINTON AVE E

Dwg. No.
FE65-1-SK-G0038

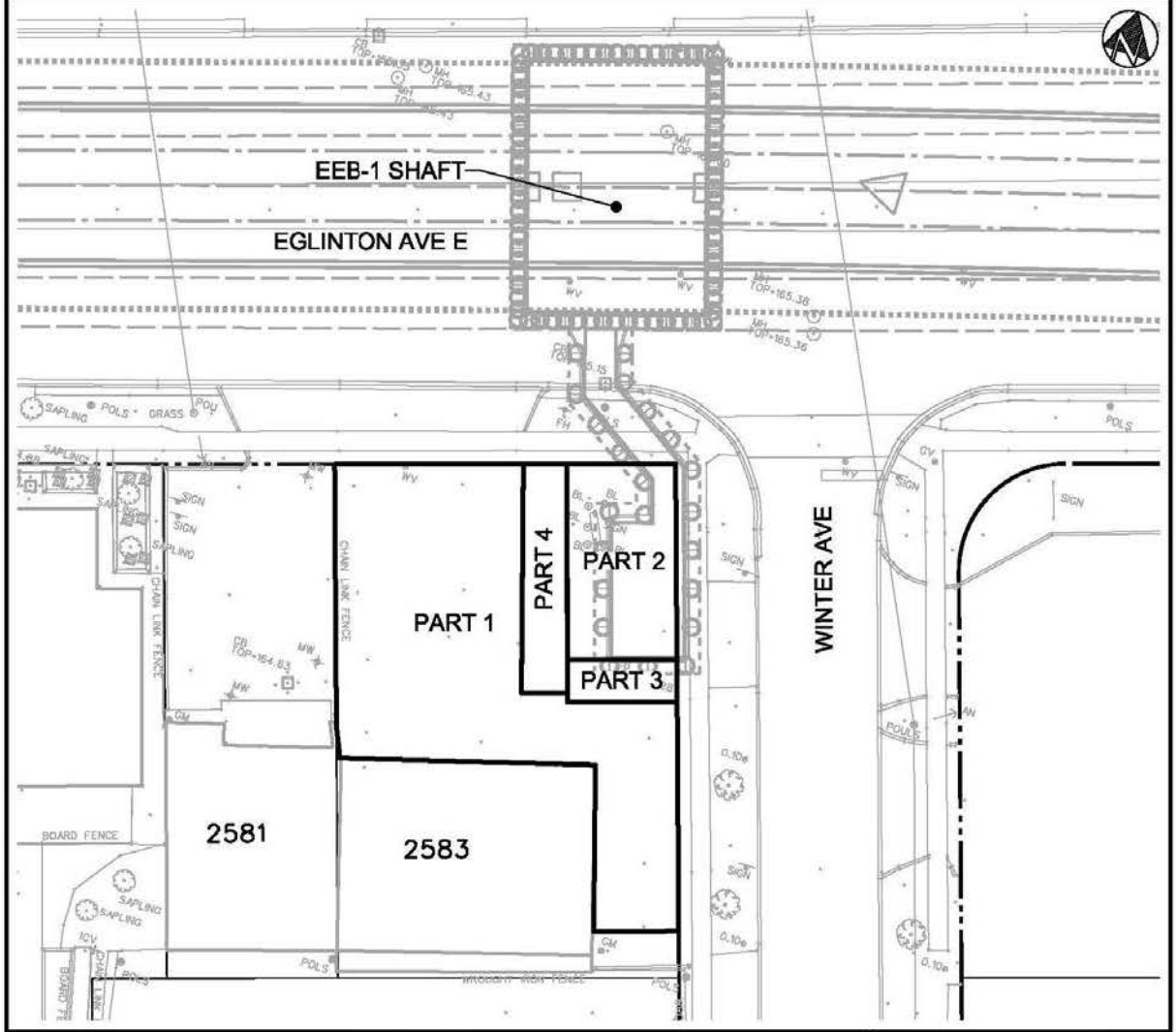
Scale 0 2 4 6 8 10 15m

PLOT DATE:14-Dec-2018

Property No. 9

MODIFIED: 02/12/2019
REVISION: 6.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	064250076



LEGEND

- PART 1 — TEMPORARY EASEMENT FOR CONSTRUCTION OF EEB
- PART 2 — FEE SIMPLE FOR EEB LANDS
- PART 3 — FEE SIMPLE FOR EEB LANDS (WITH A LICENSE FOR THE OWNER)
- PART 4 — TEMPORARY SUBSURFACE EASEMENTCOMMENCING AT 4.00m BELOW GRADE(FOR TIE-BACKS)
- EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	404sq.m
PART 2	108sq.m
PART 3	24sq.m
PART 4	52sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 1
2583 EGLINTON AVE E

Dwg. No.
FE65-1-SK-G0036

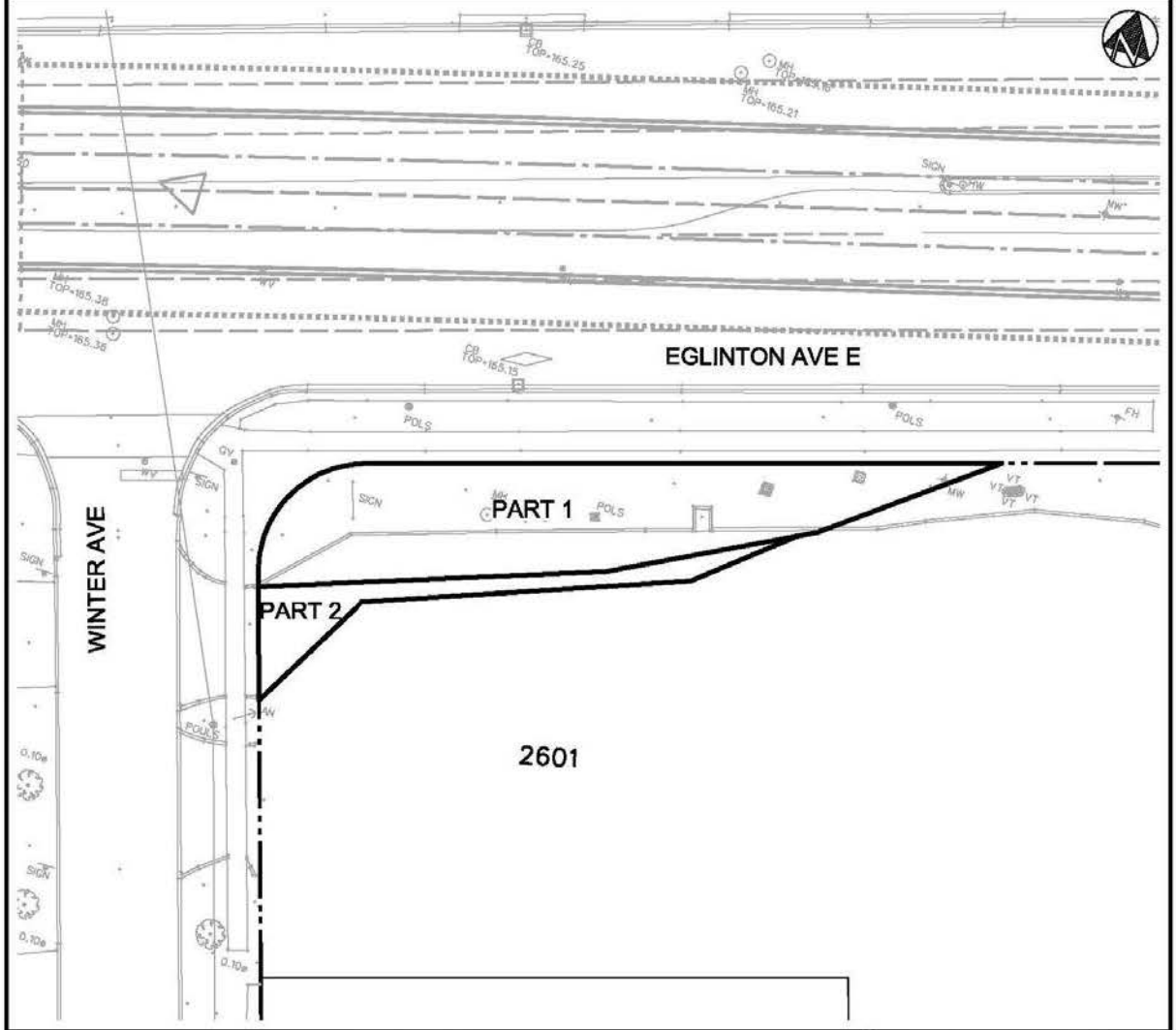
Scale 0 2 4 6 8 10 15m

PLOT DATE:13-Feb-2019

Property No. 10

MODIFIED: 03/04/2019
REVISION: 3.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	064250078



LEGEND

PART 1	TEMPORARY EASEMENT FOR CONSTRUCTION OF EEB
PART 2	TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION
—·—·—	EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	318sq.m
PART 2	72sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

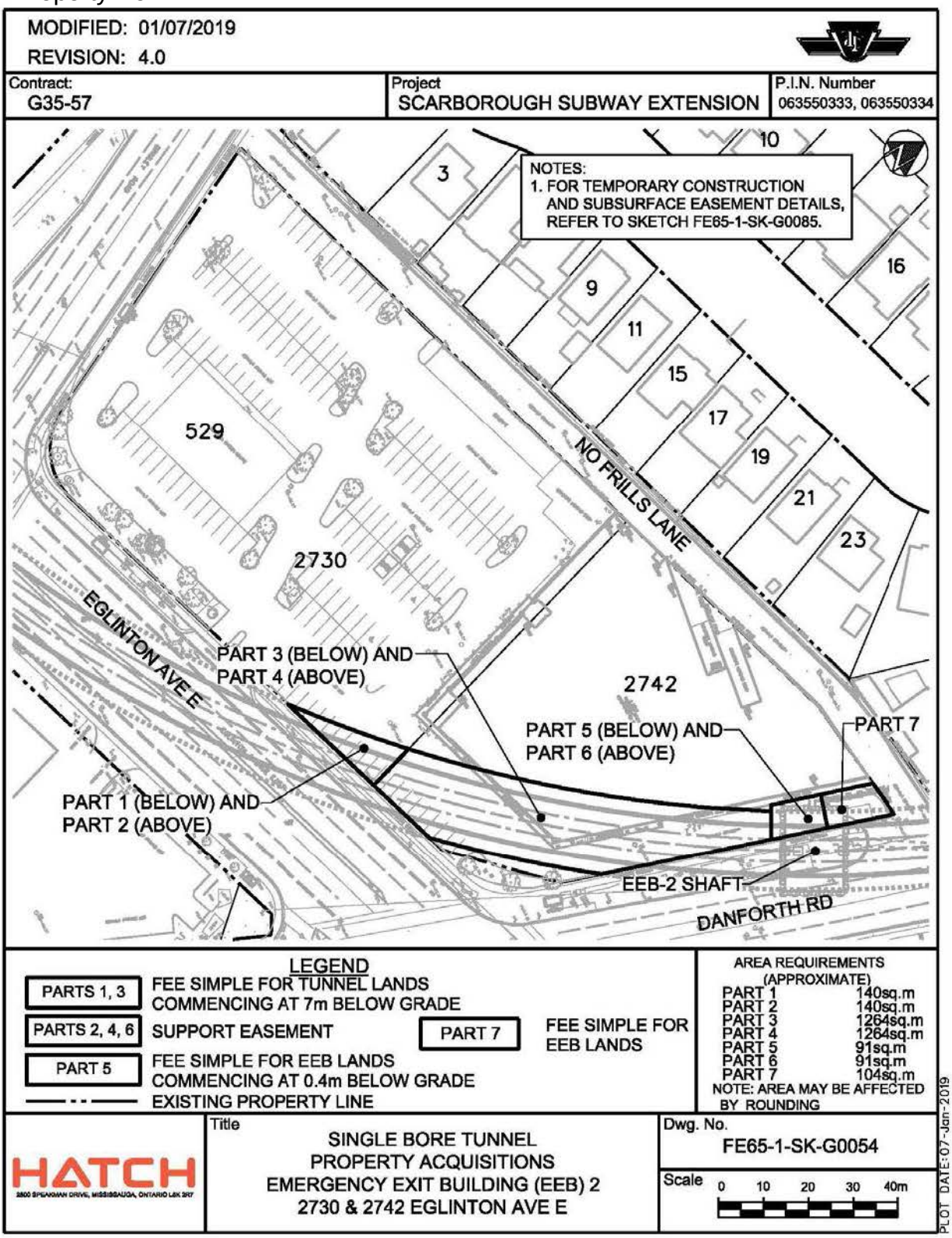
Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 1
2601 EGLINTON AVE E

Dwg. No.
FE65-1-SK-G0039

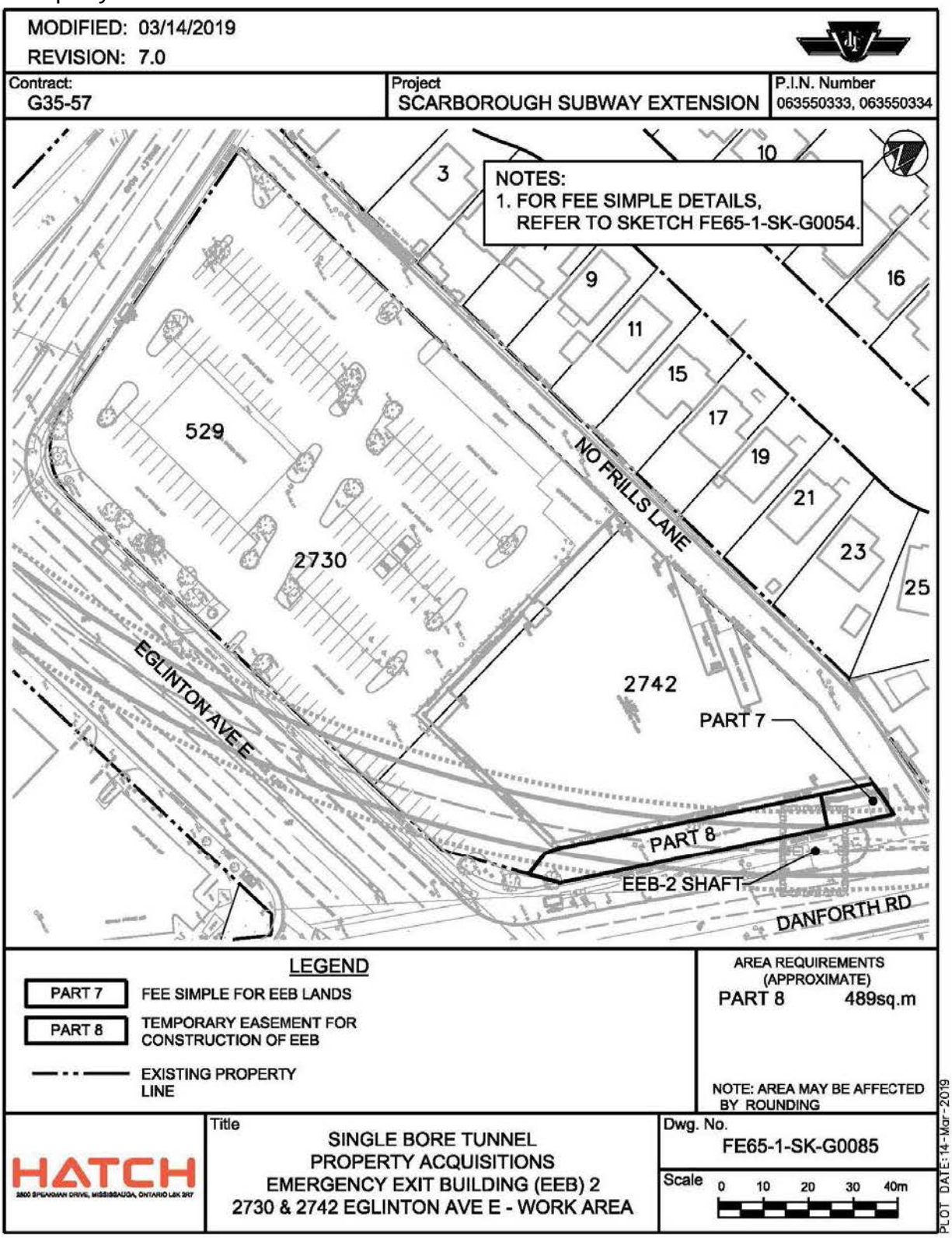
Scale 0 2 4 6 8 10 15m

PLOT DATE: 06-Mar-2019

Property No. 11



Property No. 11



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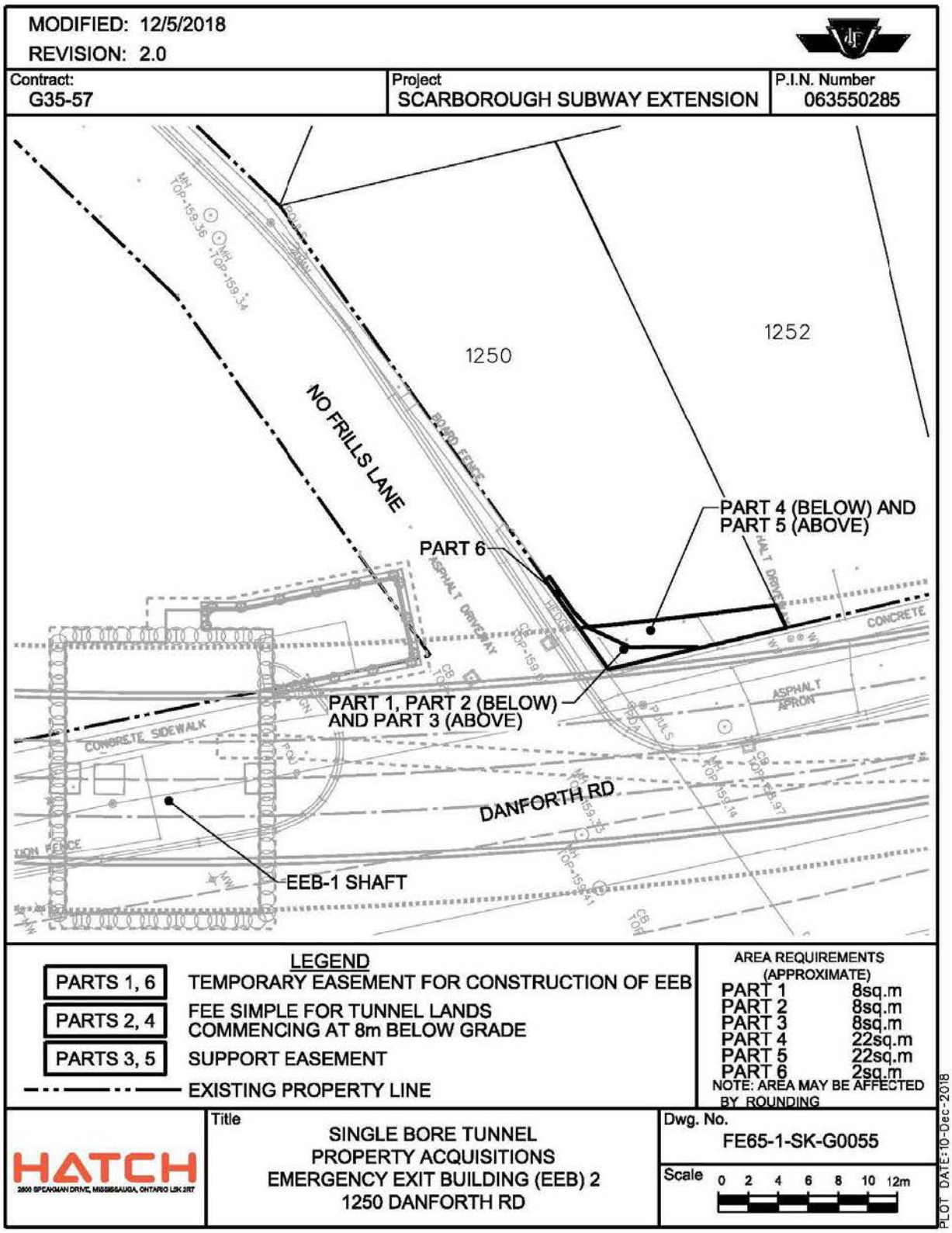
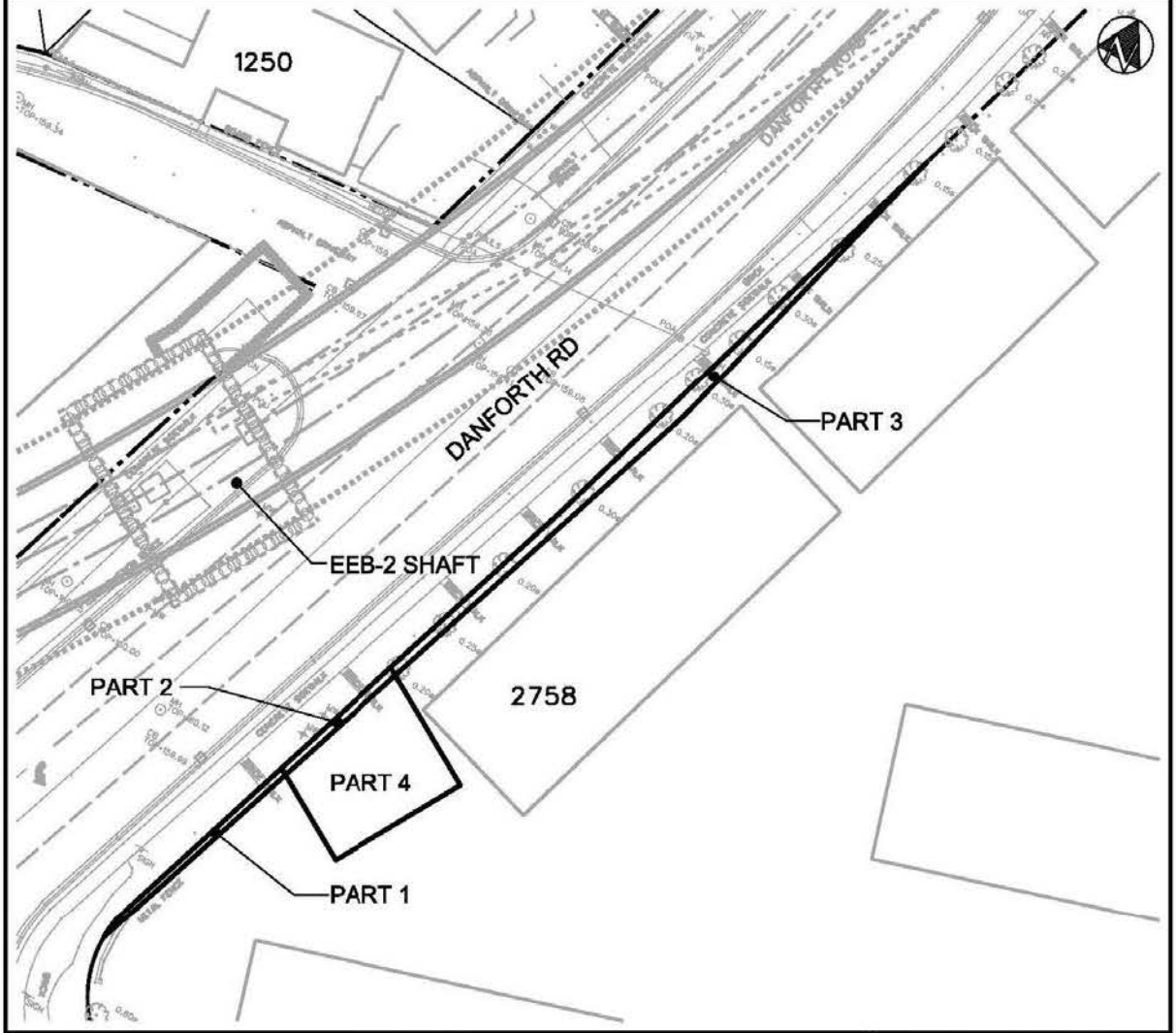


Property No. 13

MODIFIED: 02/12/2019
REVISION: 5.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	



LEGEND

PARTS 1, 2, 3	TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION
PARTS 2, 4	TEMPORARY SUBSURFACE EASEMENT COMMENCING AT 6m BELOW GRADE (FOR TIE-BACKS)
	EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	13sq.m
PART 2	10sq.m
PART 3	57sq.m
PART 4	131sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

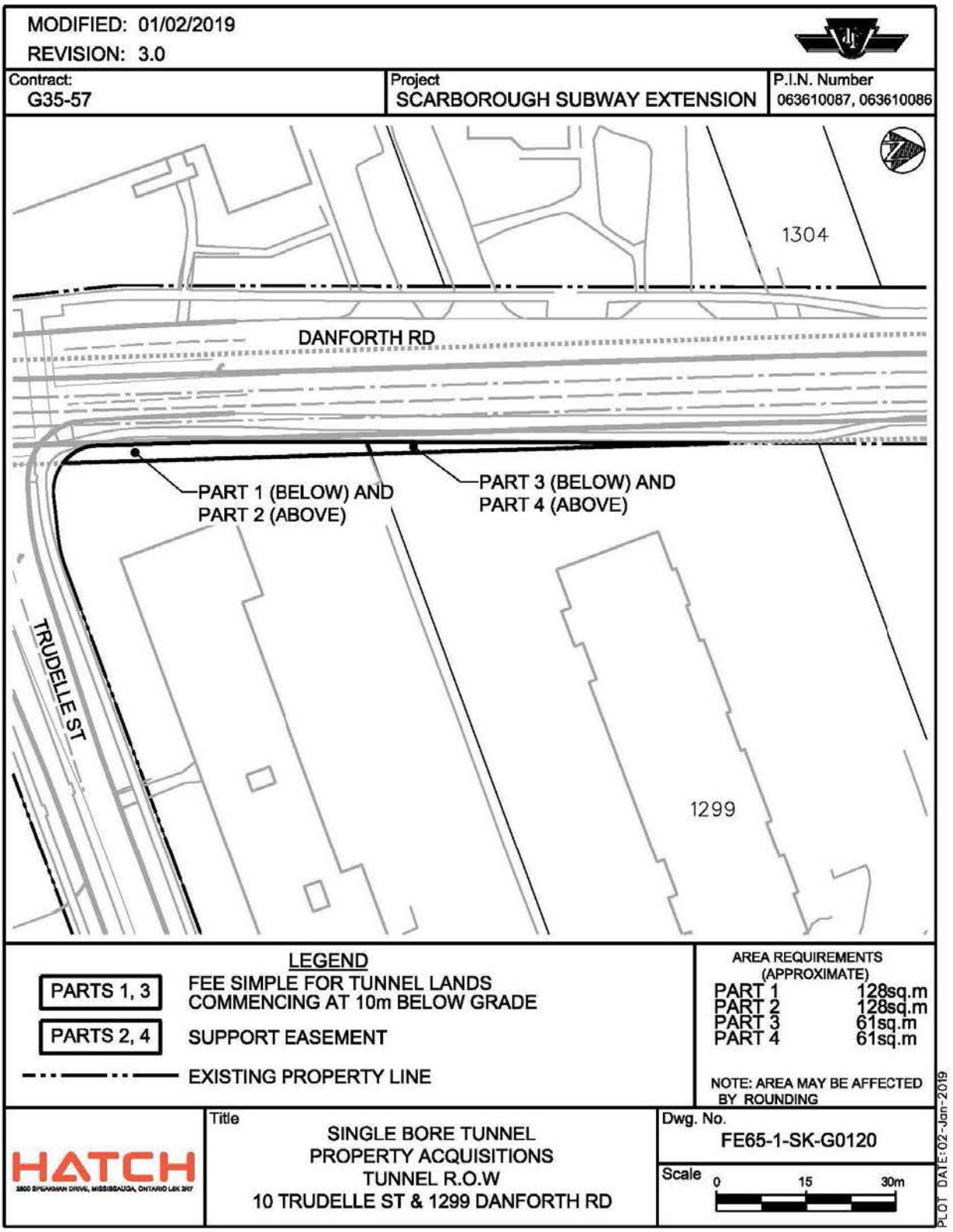
Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 2
2758 EGLINTON AVE E

Dwg. No.
FE65-1-SK-G0088

Scale 0 5 10 15 20m

PLOT DATE:13-Feb-2019

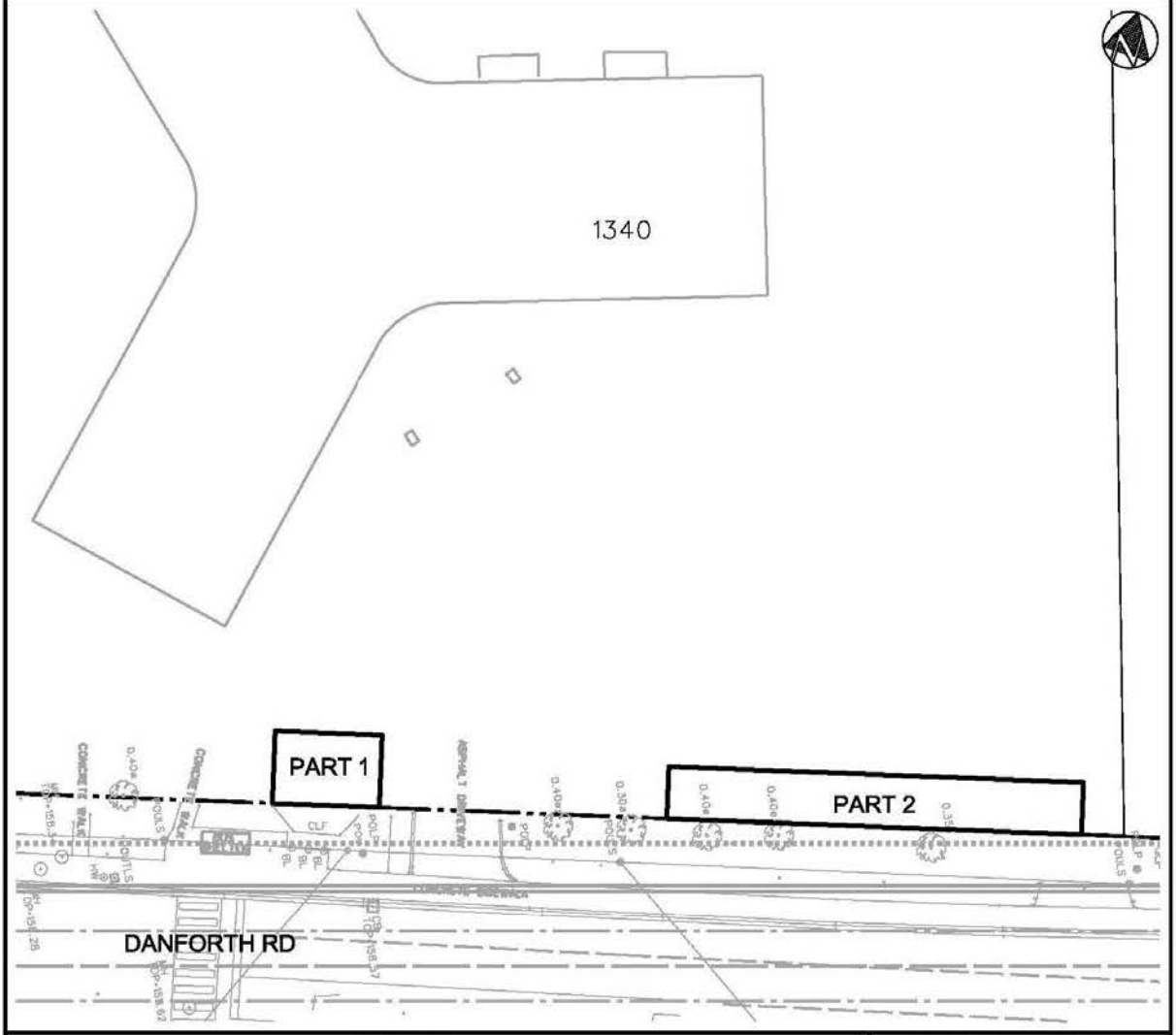
Property No. 14



Property No. 15

MODIFIED: 12/18/2018
REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	063550343



LEGEND

PARTS 1, 2 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	40sq.m
PART 2	110sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title: SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EEB-3 / ESB-1
1340 DANFORTH RD

Dwg. No. FE65-1-SK-G0113

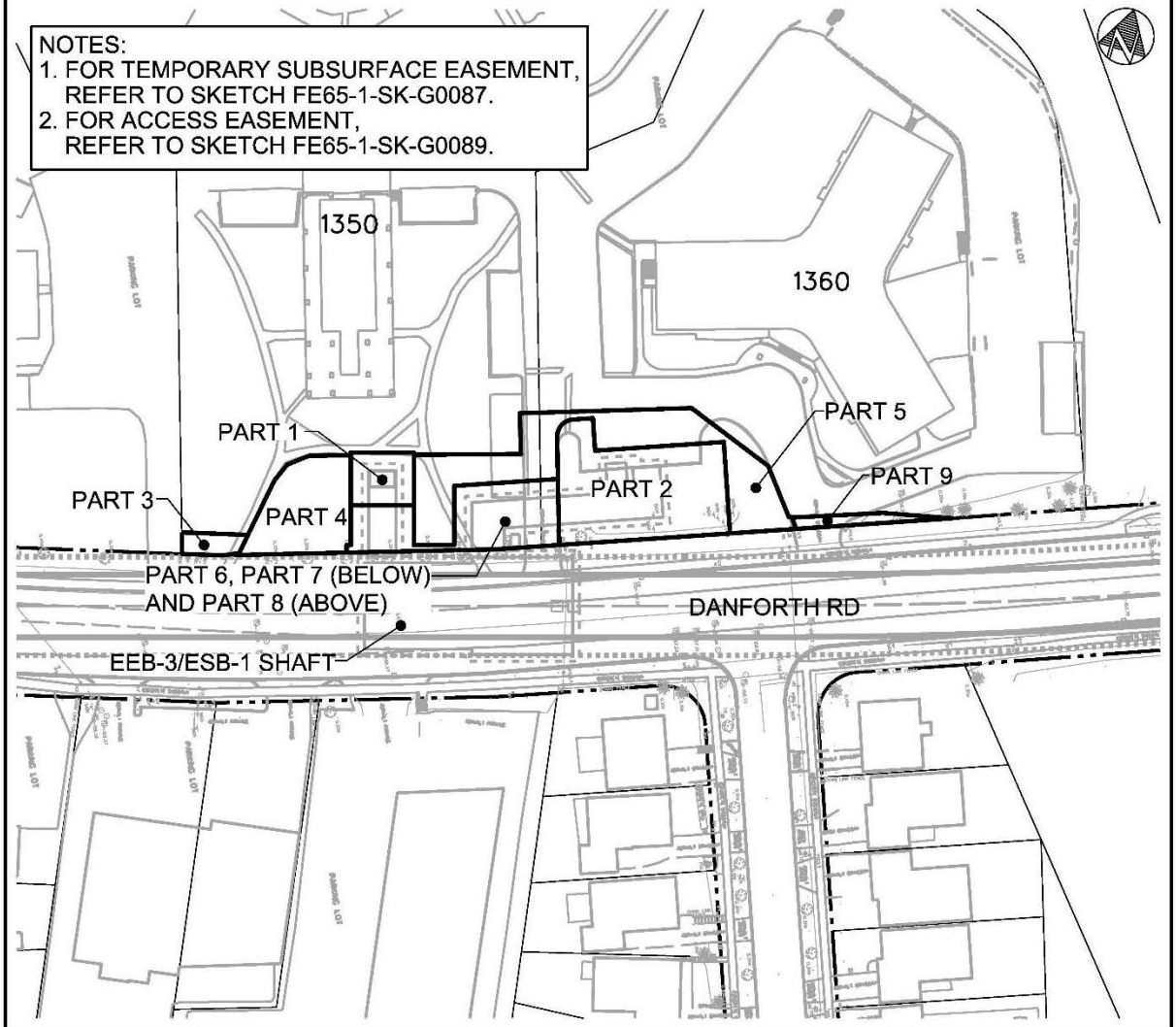
Scale 0 2 4 6 8 10 15m

PLOT DATE: 19-Dec-2018

Property No. 15

MODIFIED: 03/26/2019
REVISION: 7.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	063550343



LEGEND

PART 1	FEE SIMPLE FOR HVAC LANDS	PART 2	FEE SIMPLE FOR EEB LANDS
PARTS 3, 9	TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION	PART 8	SUPPORT EASEMENT
PARTS 4, 5, 6	TEMPORARY EASEMENT FOR CONSTRUCTION OF EEB		EXISTING PROPERTY LINE
PART 7	FEE SIMPLE FOR TUNNEL LANDS COMMENCING AT 0.5m BELOW GRADE		

AREA REQUIREMENTS (APPROXIMATE)

PART 1	106sq.m
PART 2	528sq.m
PART 3	41sq.m
PART 4	269sq.m
PART 5	544sq.m
PART 6	319sq.m
PART 7	319sq.m
PART 8	319sq.m
PART 9	42sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EEB-3 / ESB-1
1350 & 1360 DANFORTH RD

Dwg. No.
FE65-1-SK-G0041

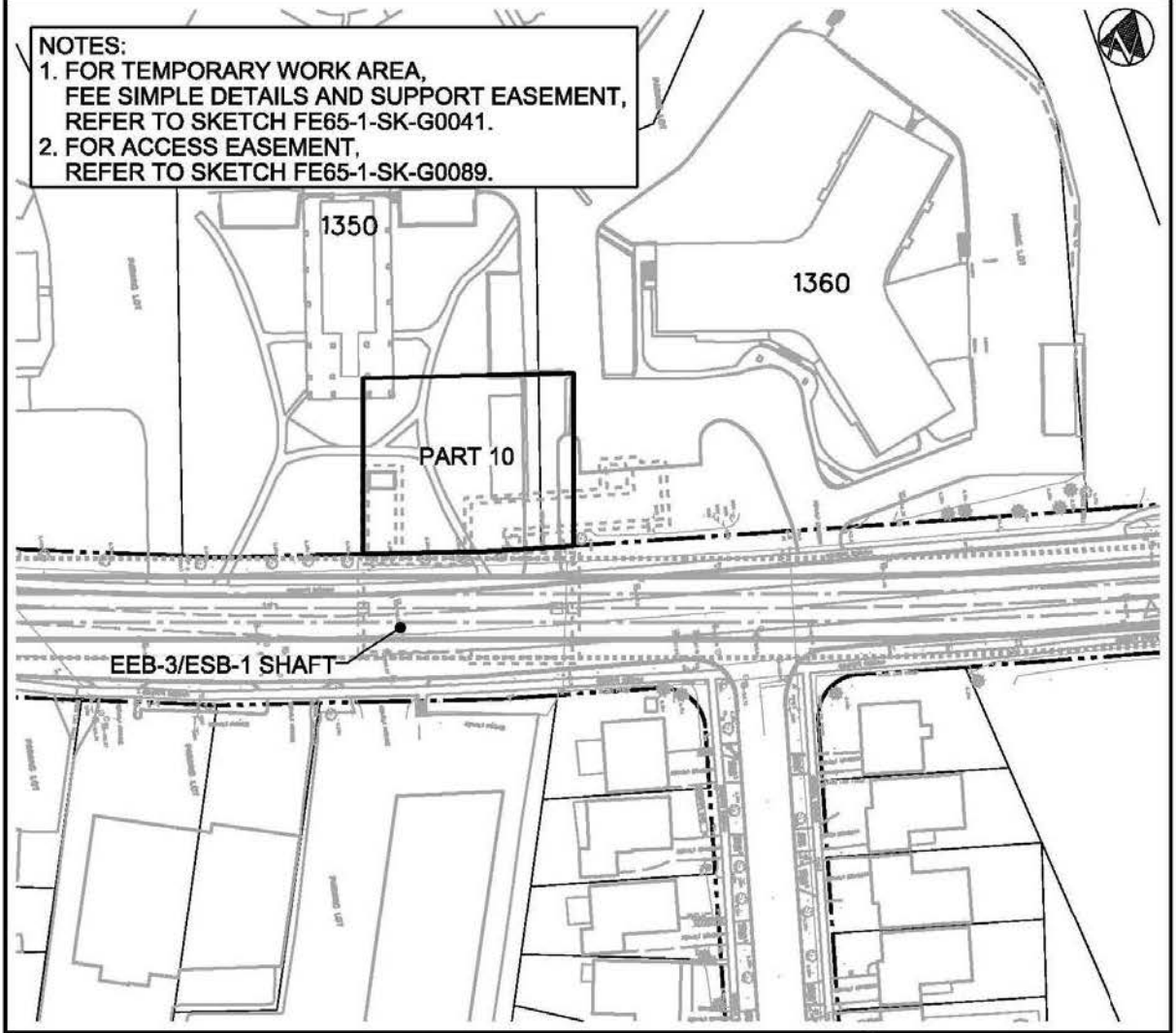
Scale 0 10 20 30 40m

PLOT DATE: 26-Mar-2019

Property No. 15

MODIFIED: 02/12/2019
REVISION: 4.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	063550343



LEGEND

PART 10 — TEMPORARY SUBSURFACE EASEMENT COMMENCING AT 1.50m BELOW GRADE (FOR TIE-BACKS)

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)
PART 10 1170sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EEB-3 / ESB-1
1350 & 1360 DANFORTH RD

Dwg. No.
FE65-1-SK-G0087

Scale 0 10 20 30 40m

PLOT DATE:13-Feb-2019

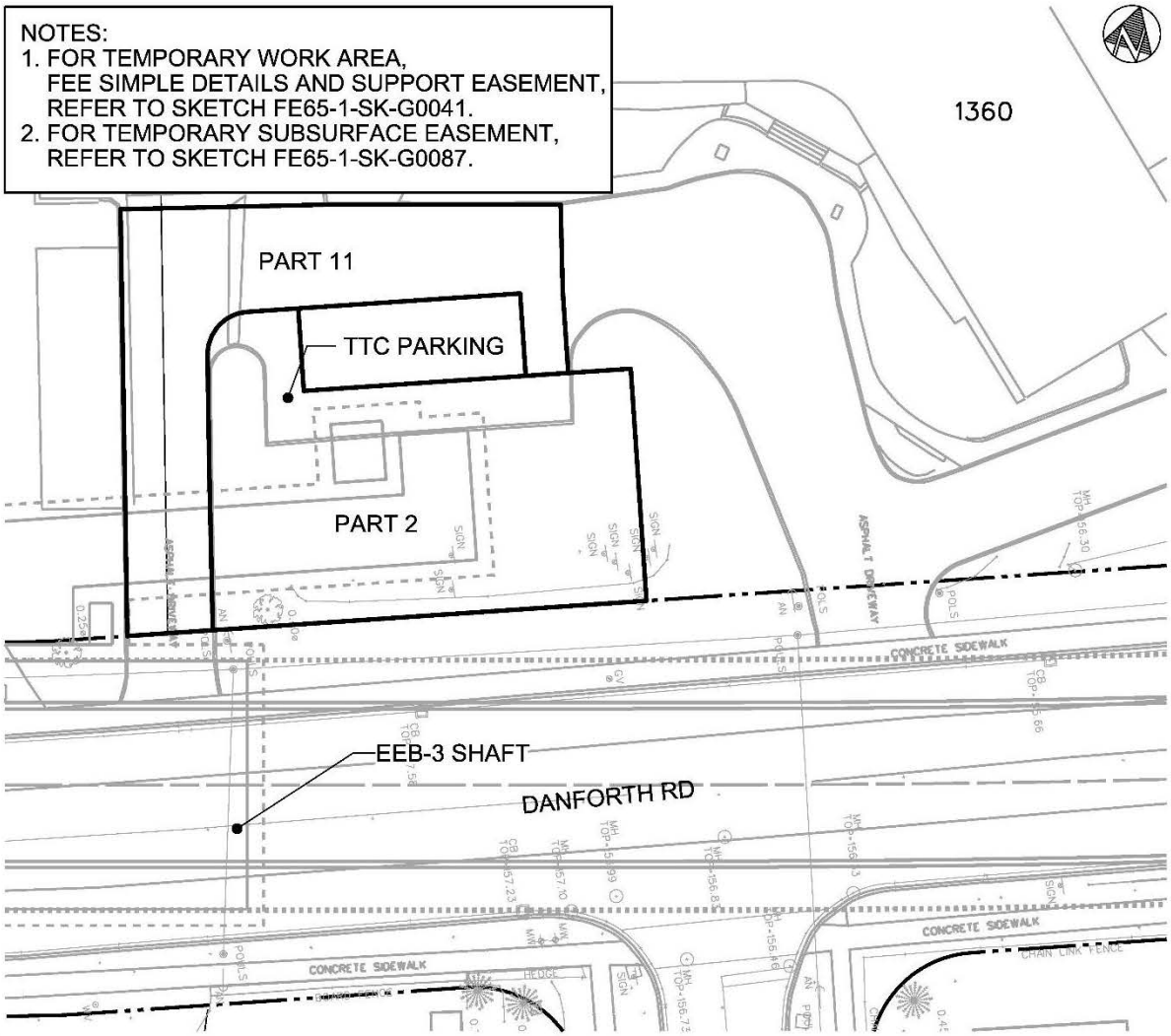
Property No. 15

MODIFIED: 03/26/2019

REVISION: 7.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	063550343

NOTES:
1. FOR TEMPORARY WORK AREA, FEE SIMPLE DETAILS AND SUPPORT EASEMENT, REFER TO SKETCH FE65-1-SK-G0041.
2. FOR TEMPORARY SUBSURFACE EASEMENT, REFER TO SKETCH FE65-1-SK-G0087.



LEGEND

PART 11 — EASEMENT ACCESS FOR TTC AND TORONTO HYDRO

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 11 367sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7
SharePoint#: 03082-21-1642

Title: SINGLE BORE TUNNEL PROPERTY ACQUISITIONS EEB-3 / ESB-1 1360 DANFORTH RD - ACCESS EASEMENT

Dwg. No. FE65-1-SK-G0089

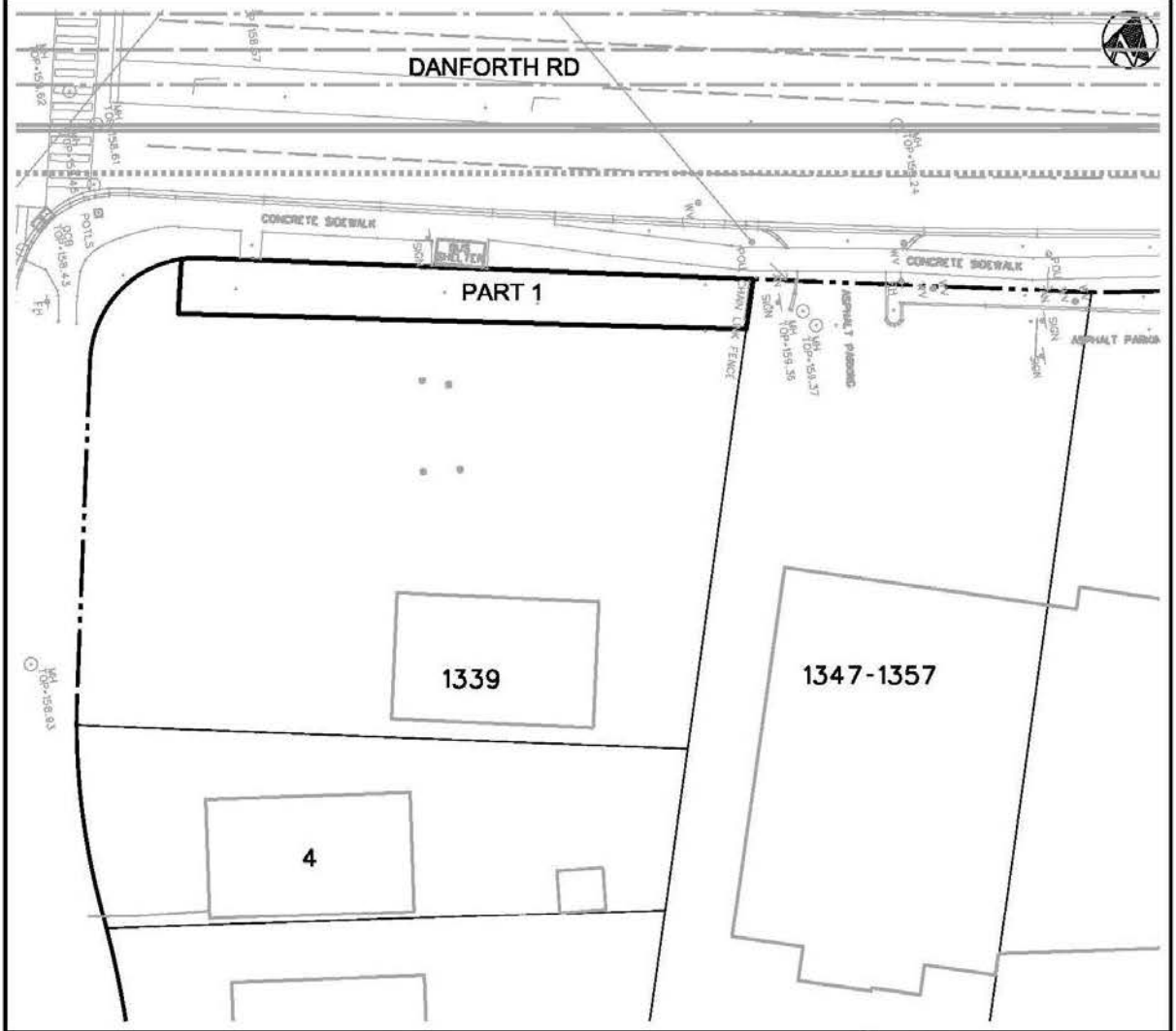
Scale 0 2 4 6 8 10 15m

PLOT DATE: 26-Mar-2019

Property No. 16

MODIFIED: 02/12/2019
REVISION: 1.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	064800058



LEGEND

PART 1 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)
PART 1 154sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EEB-3 / ESB-1
1339 DANFORTH RD

Dwg. No.
FE65-1-SK-G0142

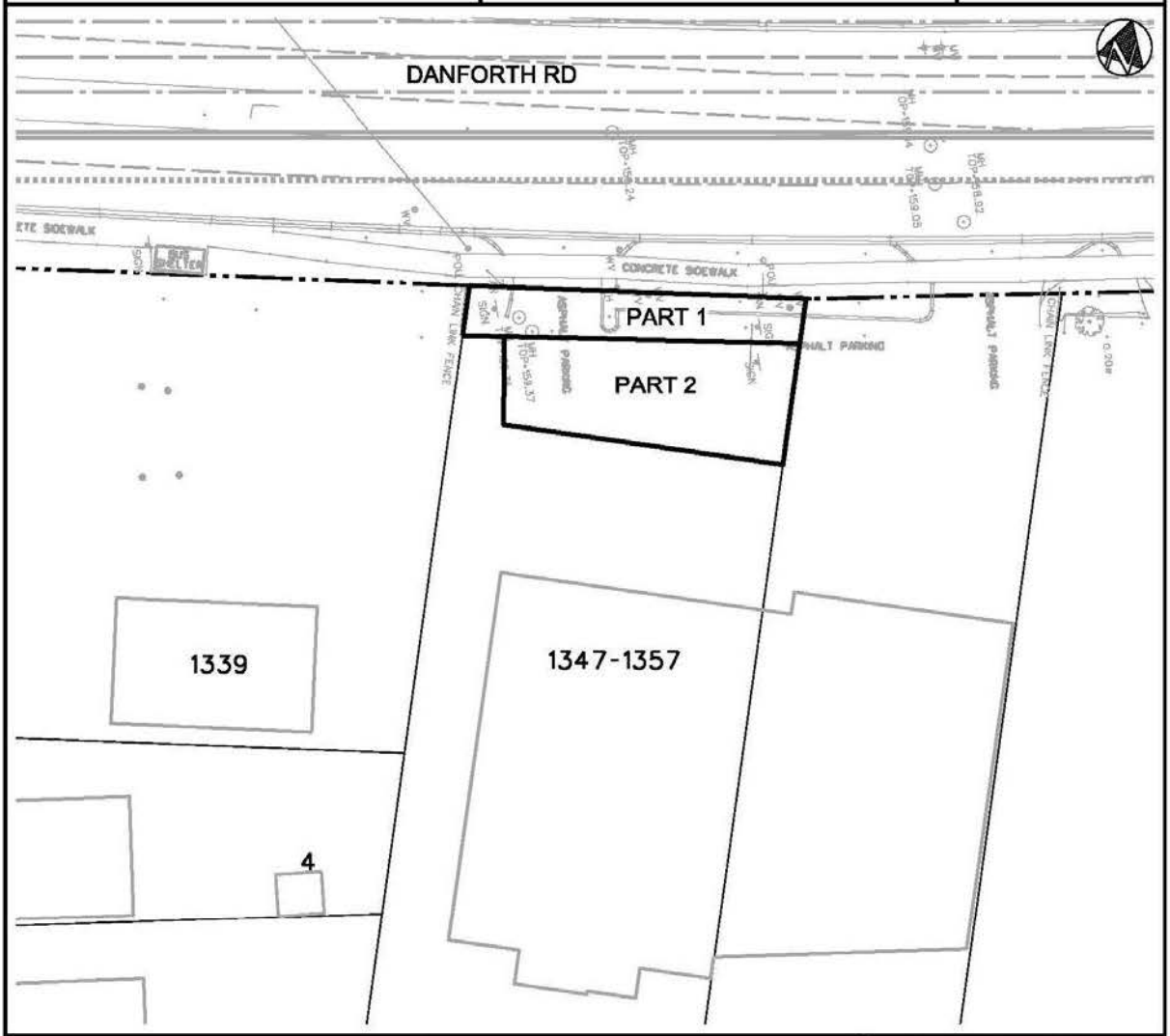
Scale 0 2 4 6 8 10 15m

PLOT DATE: 12-Feb-2019

Property No. 17

MODIFIED: 02/19/2019
REVISION: 4.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	064800057



LEGEND

PART 1 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

PART 2 — TEMPORARY EASEMENT FOR SHARED DRIVEWAY ACCESS

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	82sq.m
PART 2	157sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

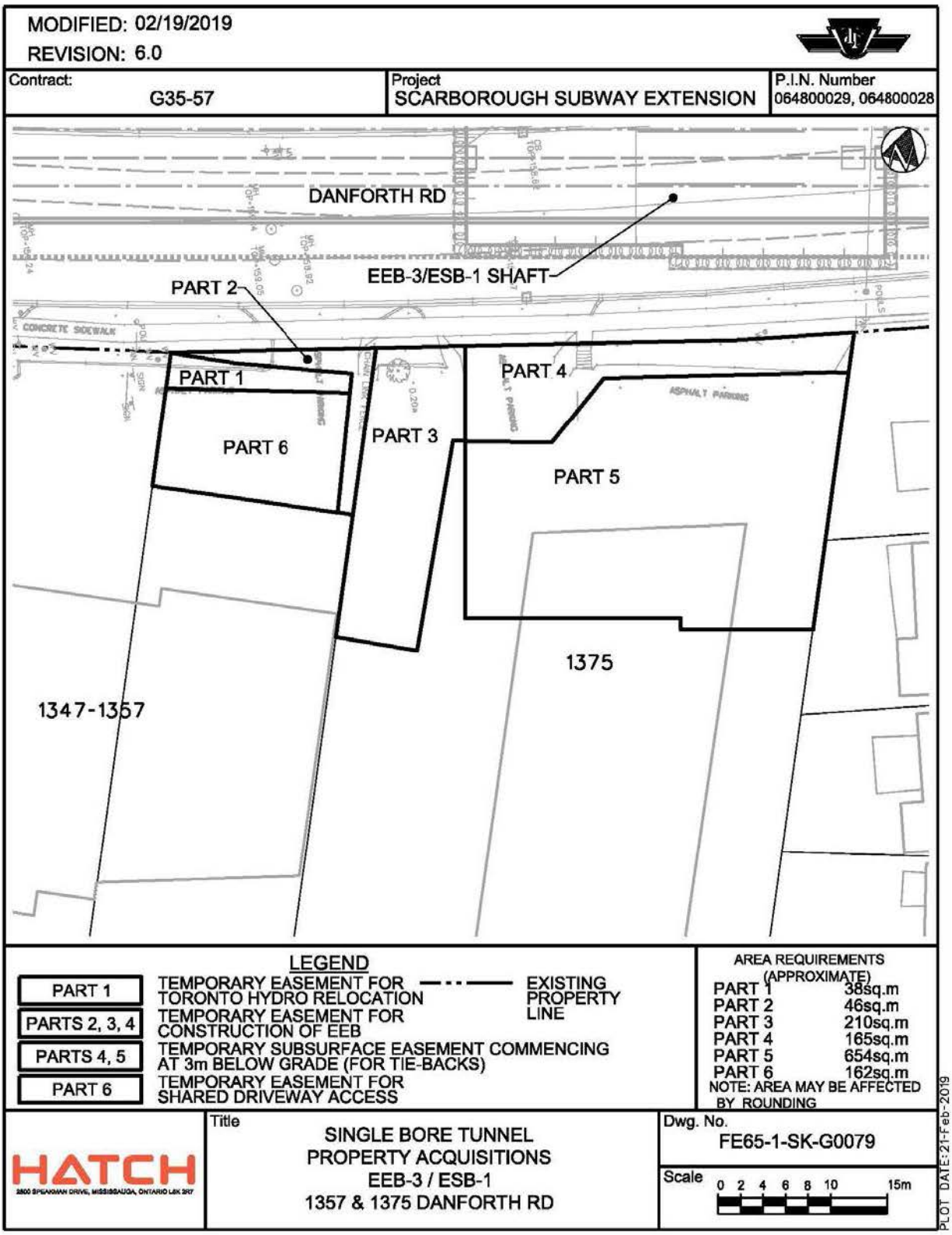
Title: SINGLE BORE TUNNEL PROPERTY ACQUISITIONS EEB-3 / ESB-1 1347 DANFORTH RD

Dwg. No. FE65-1-SK-G0078

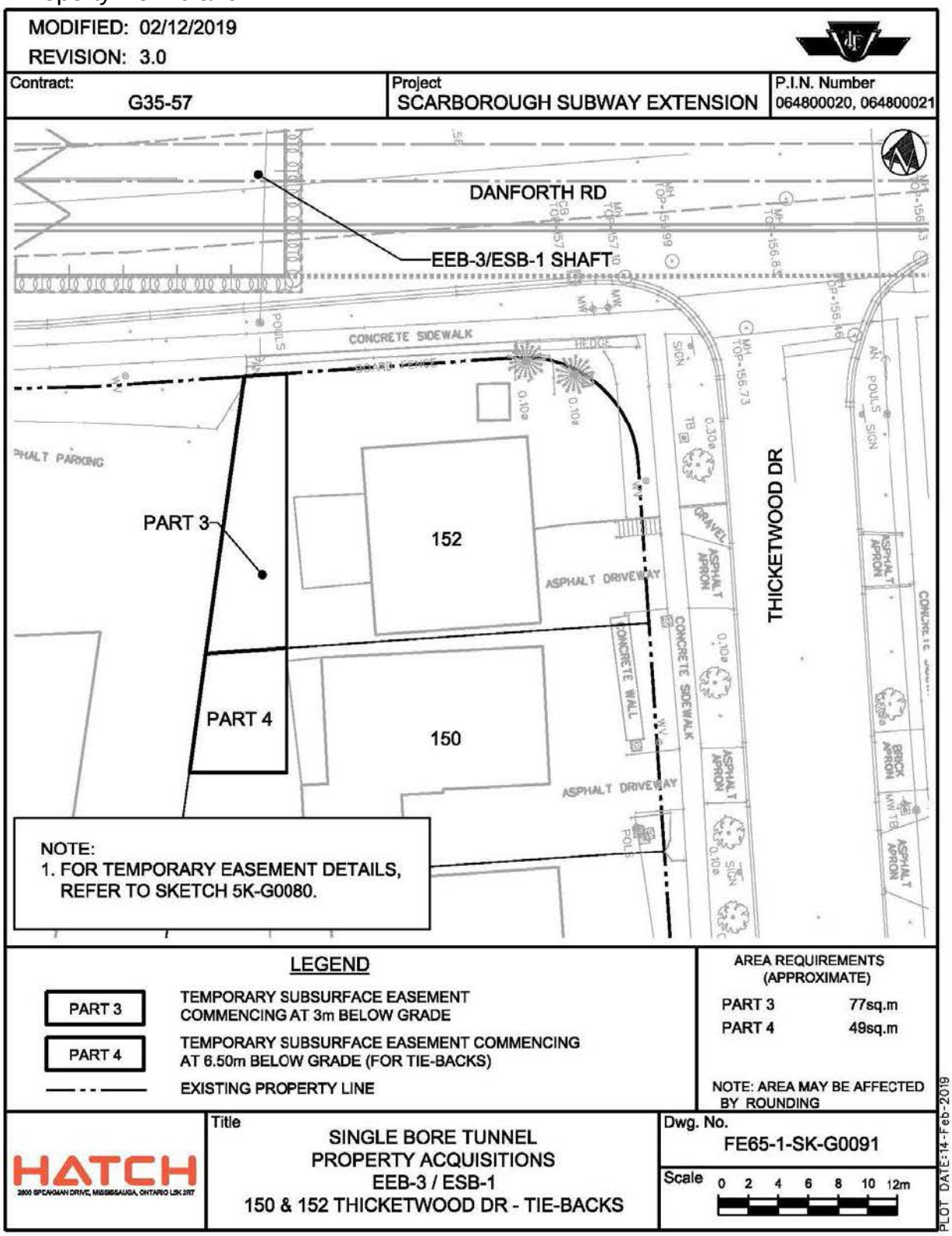
Scale 0 2 4 6 8 10 15m

PLOT DATE: 21-Feb-2019

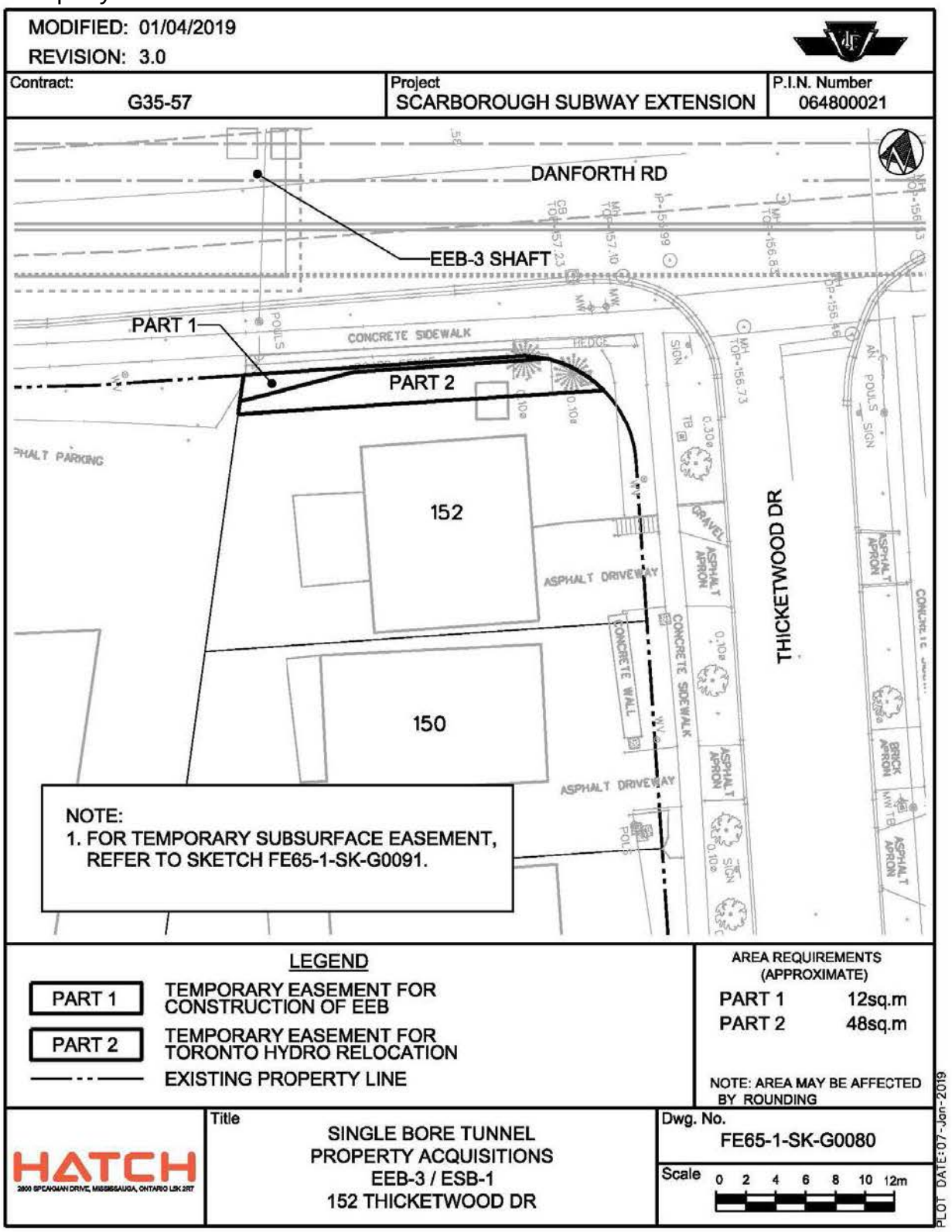
Property No. 18 and 19



Property No. 20 and 21



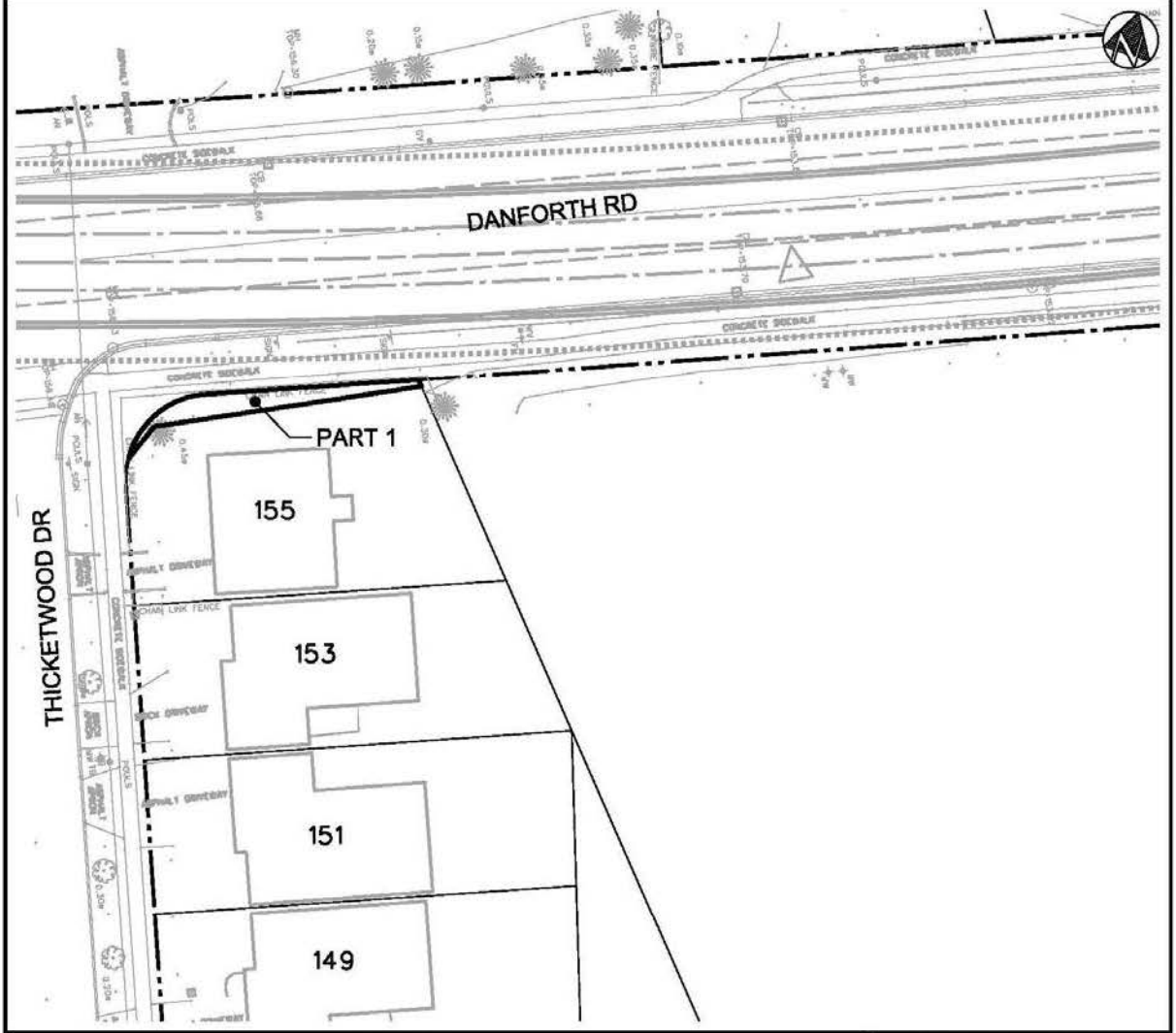
Property No. 21



Property No. 22

MODIFIED: 02/12/2019
REVISION: 3.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	064800001



LEGEND

PART 1 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1 38sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

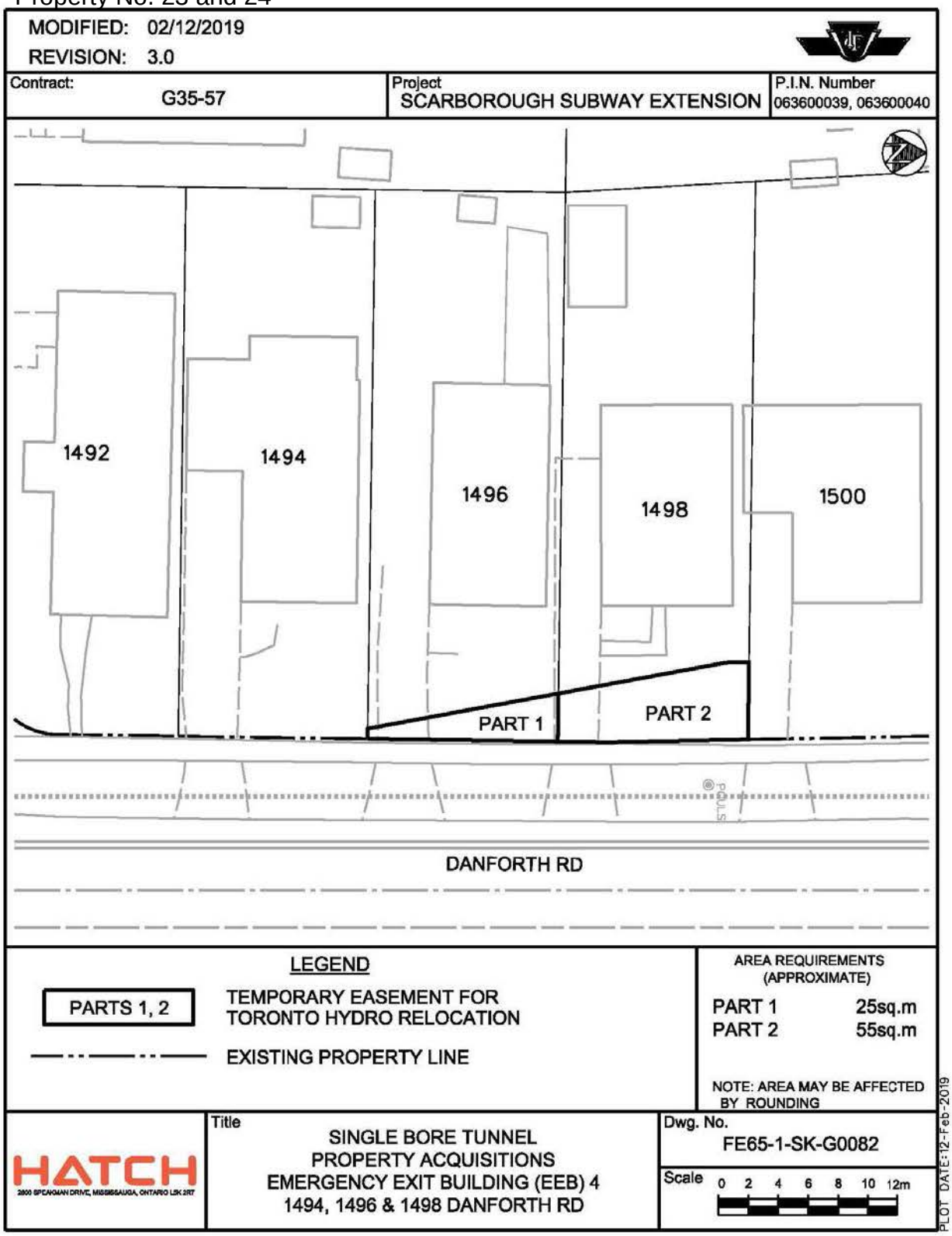
Title: SINGLE BORE TUNNEL PROPERTY ACQUISITIONS EEB-3 / ESB-1 155 THICKETWOOD DR

Dwg. No. FE65-1-SK-G0081

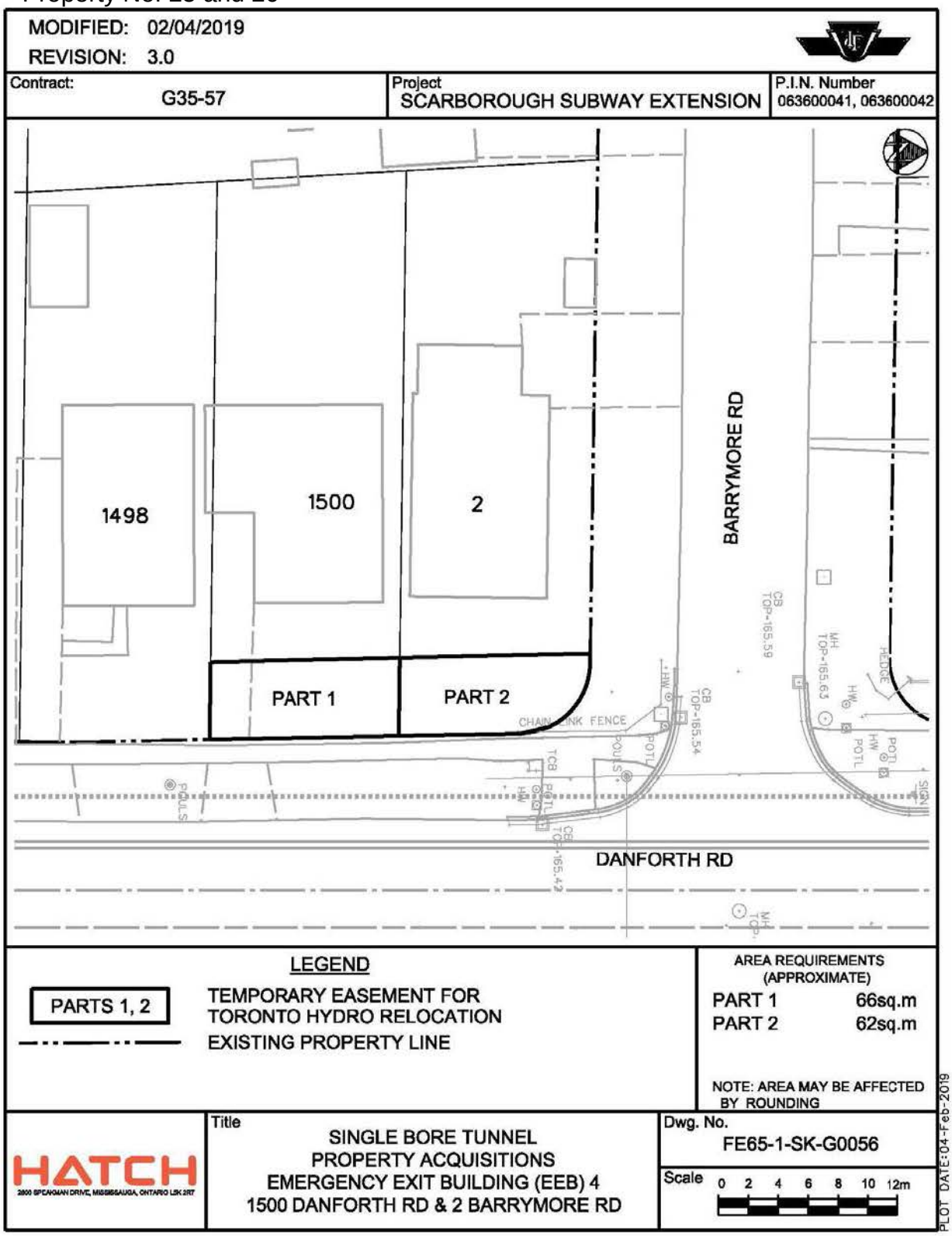
Scale 0 5 10 15 20m

PLOT DATE: 12-Feb-2019

Property No. 23 and 24



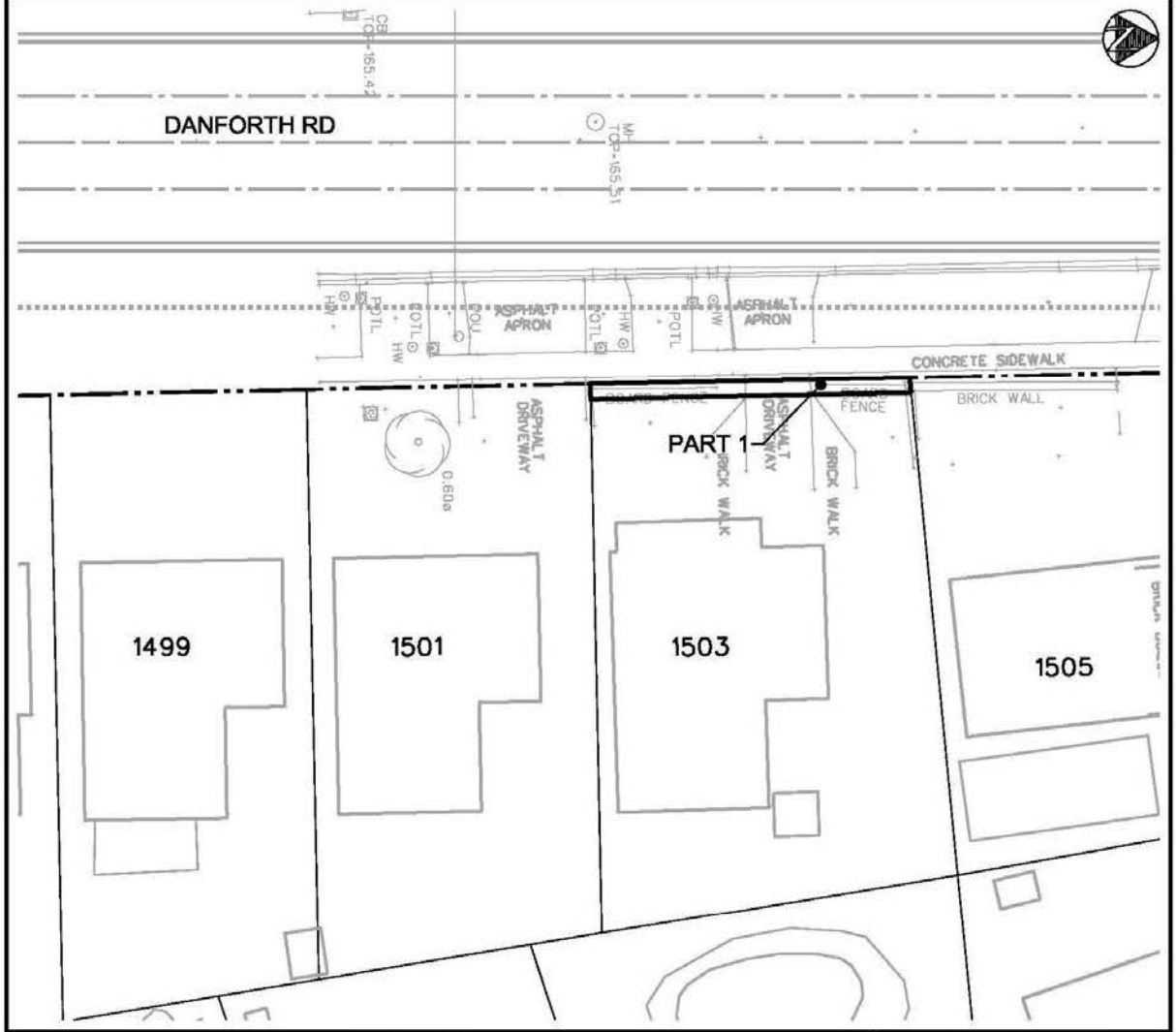
Property No. 25 and 26



Property No. 27

MODIFIED: 02/19/2019
REVISION: 4.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	063640054



LEGEND

PART 1 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1 15sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

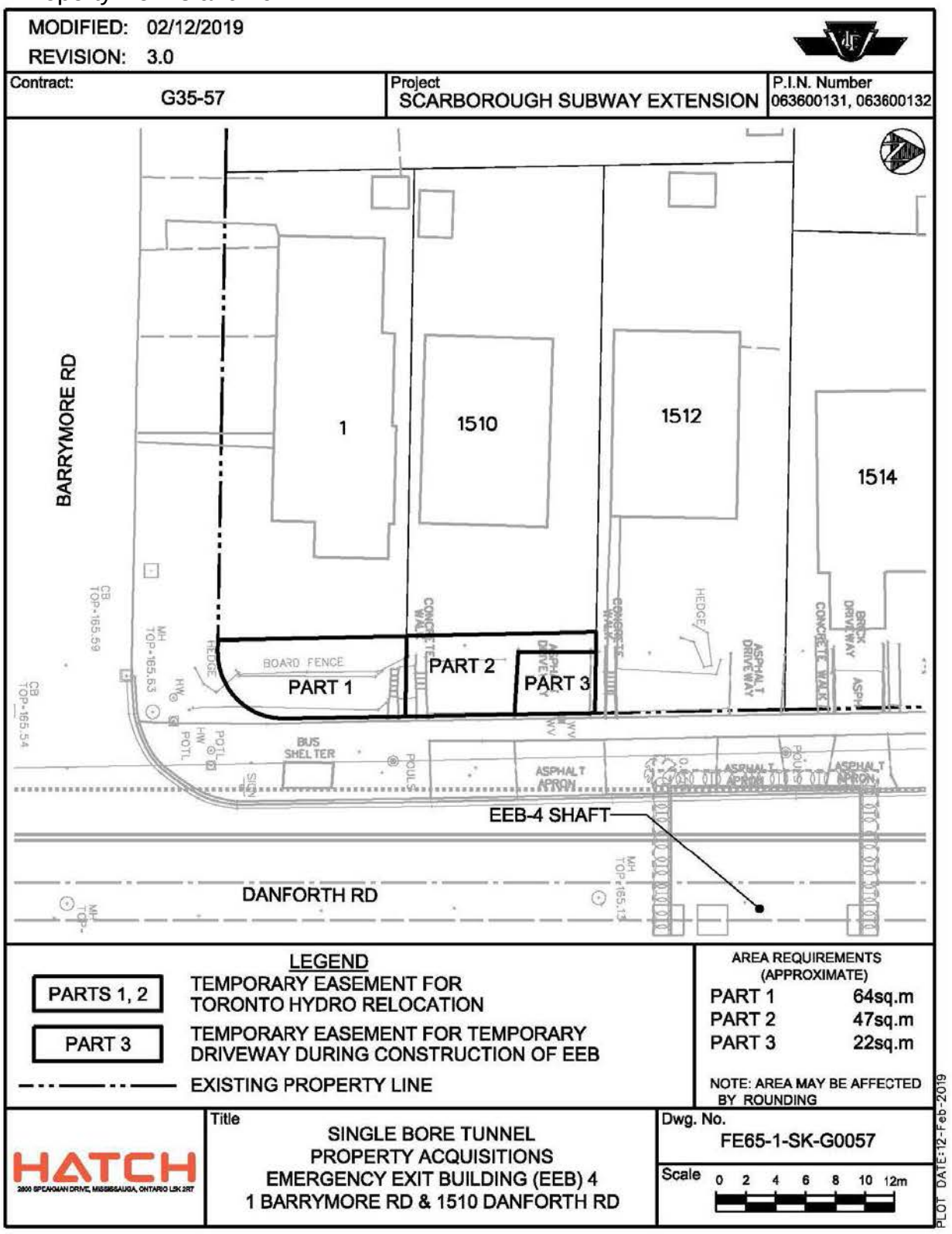
Title: SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 4
1503 DANFORTH RD

Dwg. No. FE65-1-SK-G0135

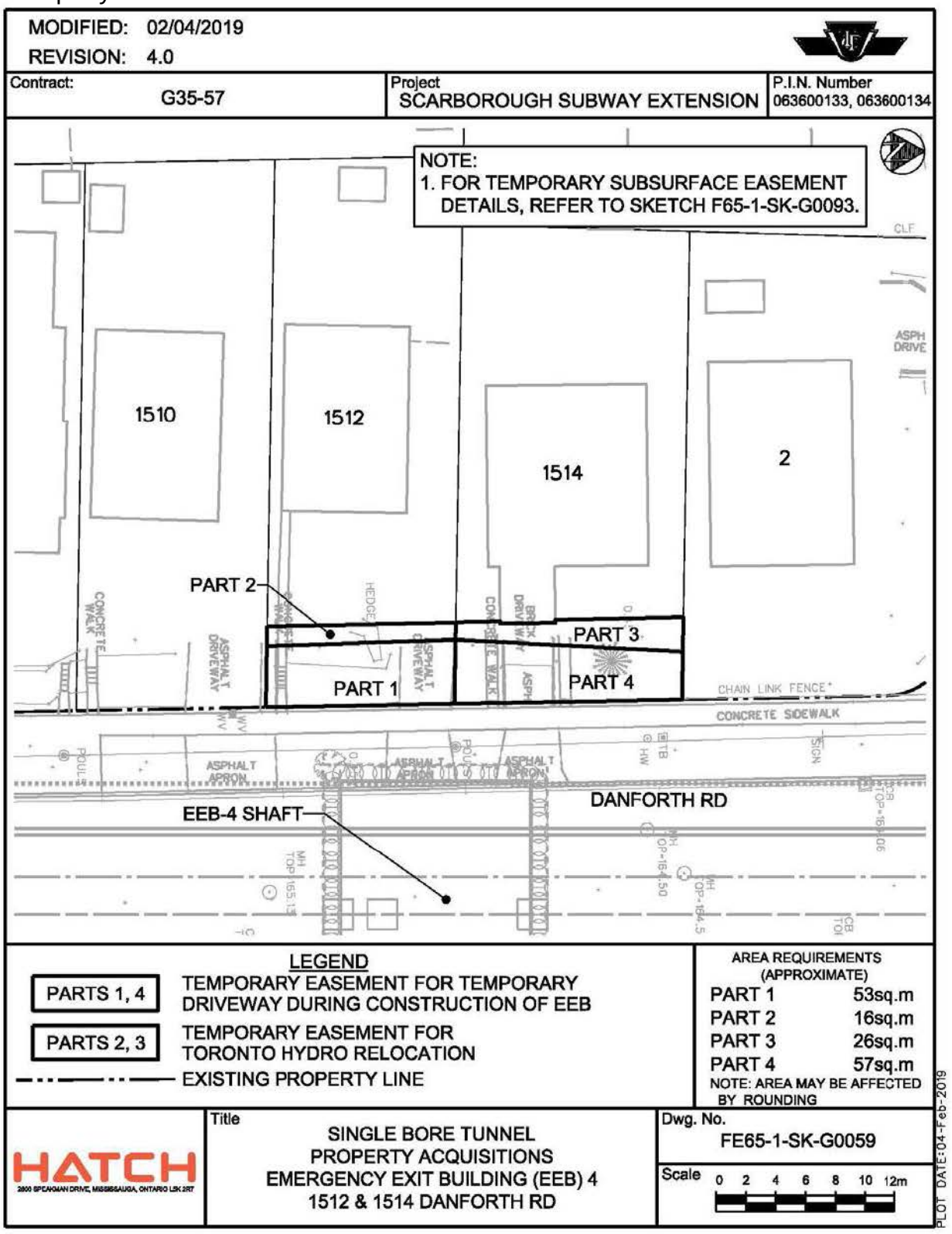
Scale 0 2 4 6 8 10 12m

PLOT DATE: 21-Feb-2019

Property No. 28 and 29



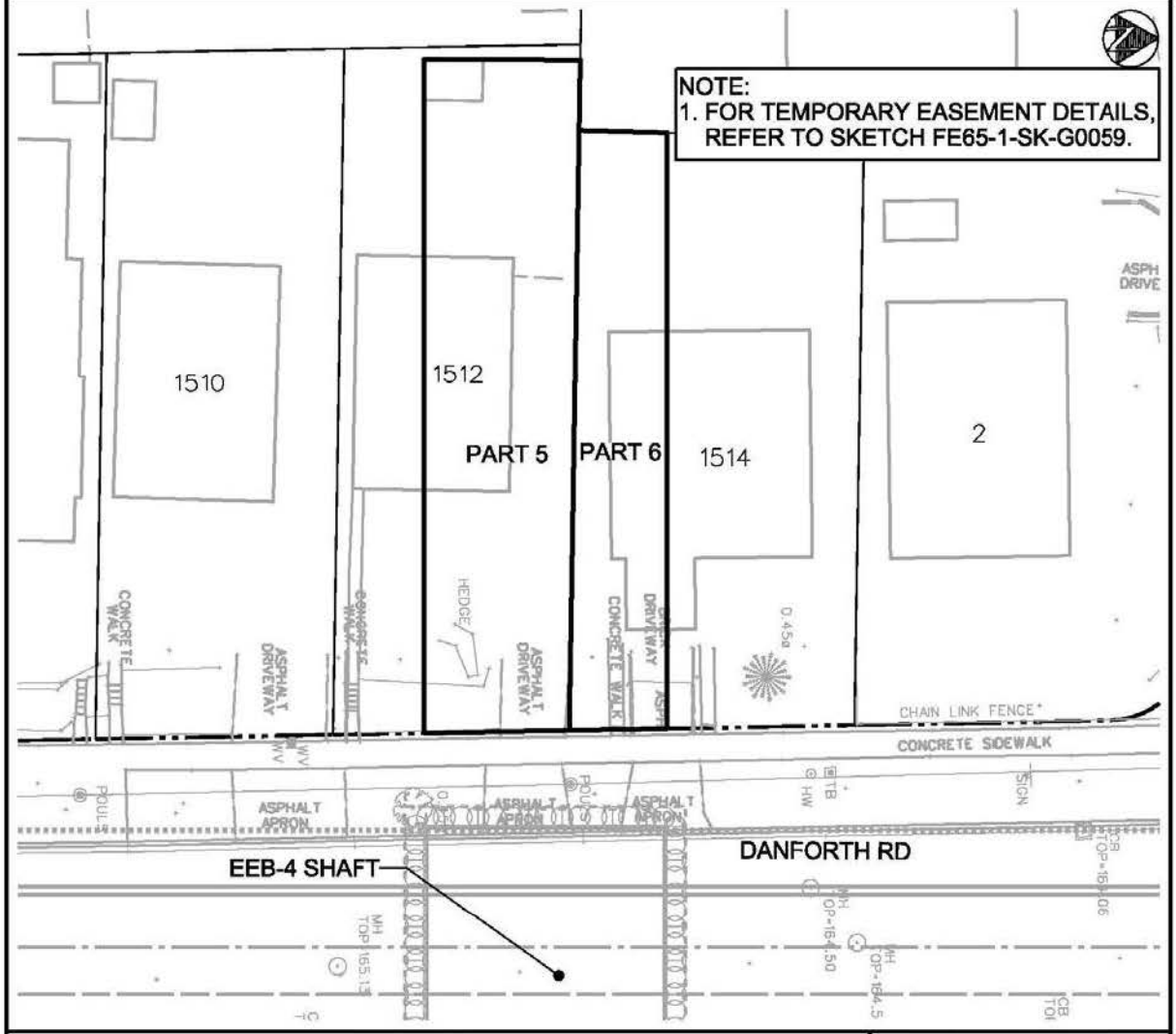
Property No. 30 and 31



Property No. 30 and 31

MODIFIED: 02/12/2019
REVISION: 4.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	063600133, 063600134



LEGEND

PARTS 5, 6 — TEMPORARY SUBSURFACE EASEMENT COMMENCING AT 2.50m BELOW GRADE (FOR TIE-BACKS)

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 5	289sq.m
PART 6	159sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

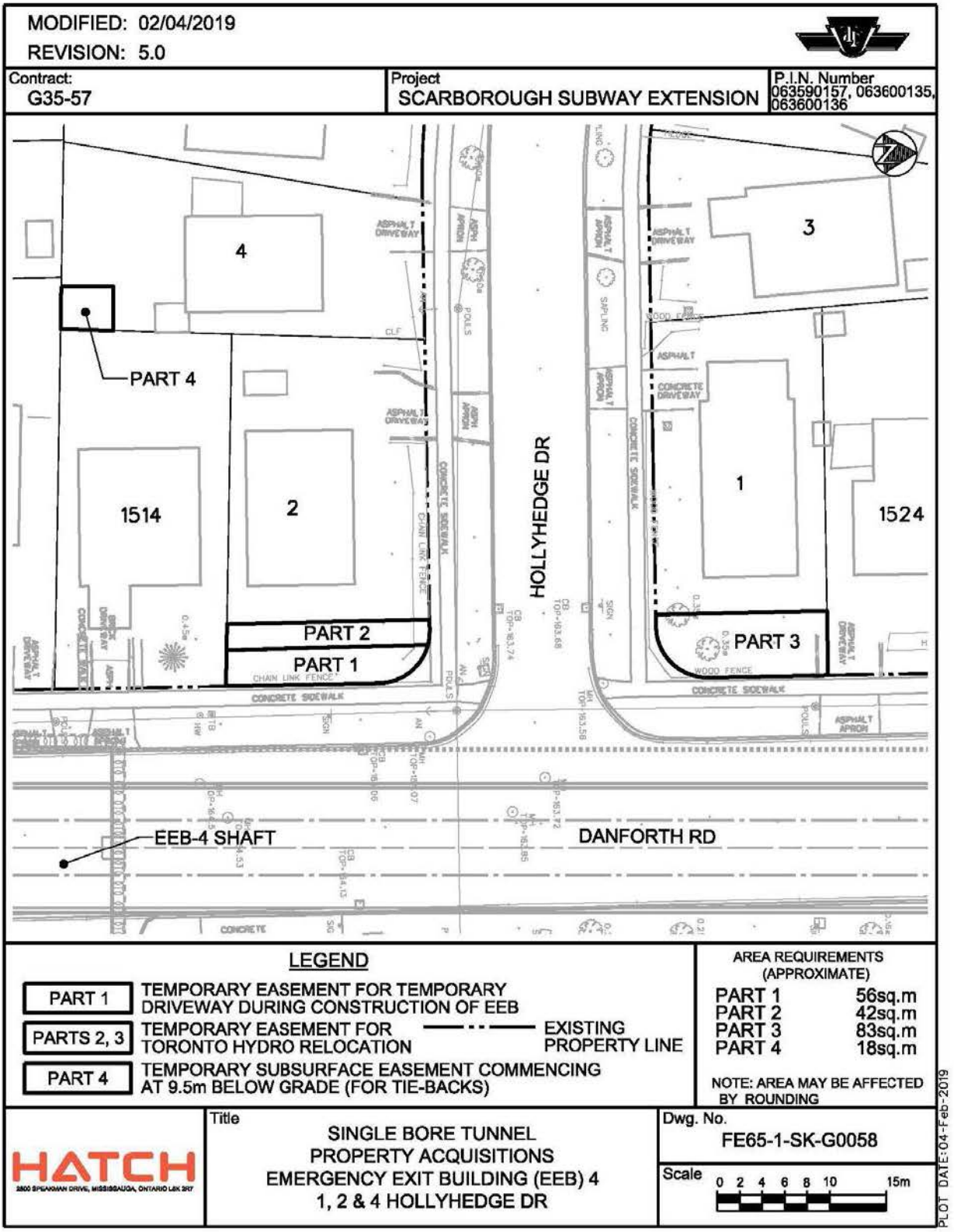
Title: SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 4
1512 & 1514 DANFORTH RD - TIE-BACKS

Dwg. No. FE65-1-SK-G0093

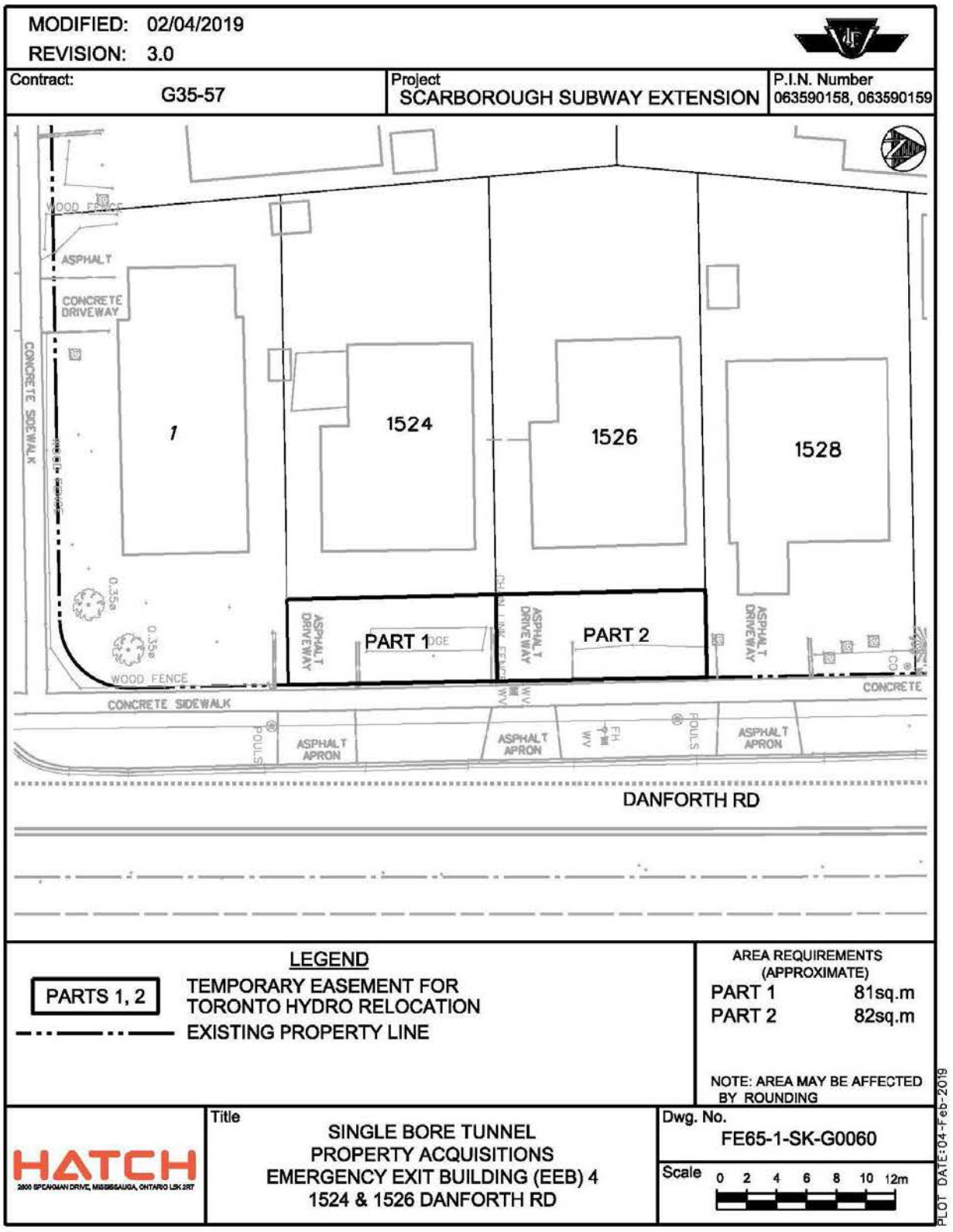
Scale 0 2 4 6 8 10 12m

PLOT DATE: 13-Feb-2019

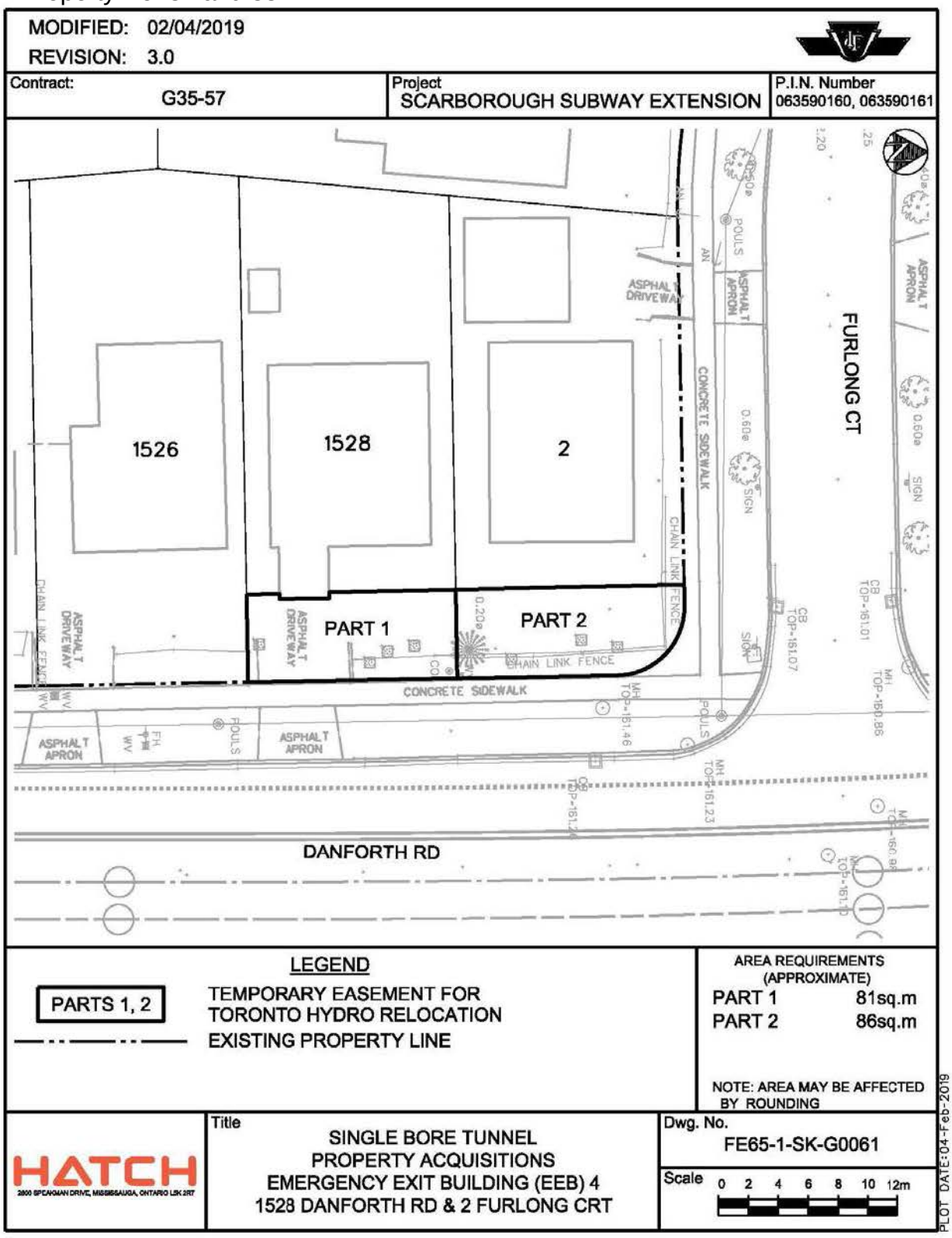
Property No. 32, 33 and 34



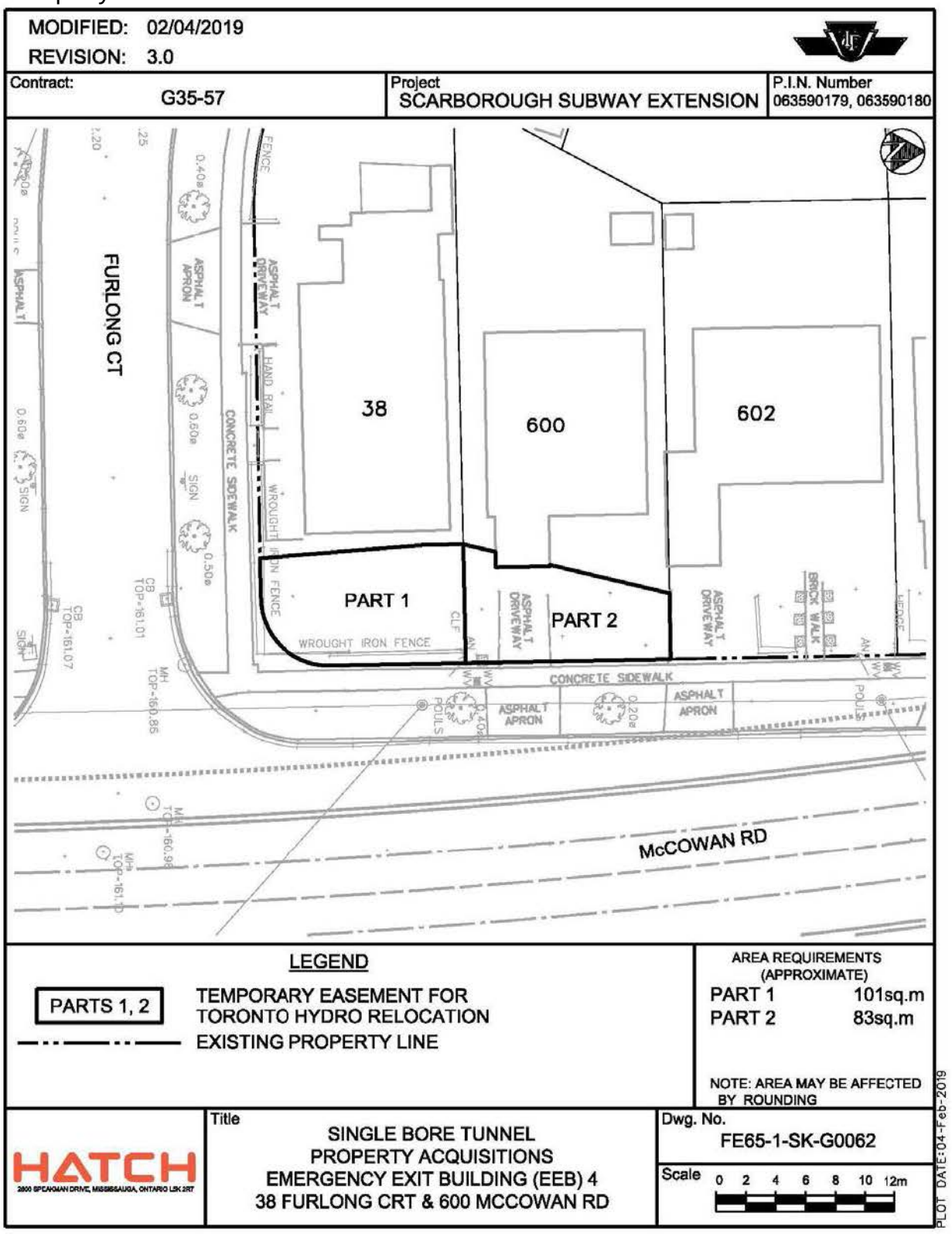
Property No. 35 and 36



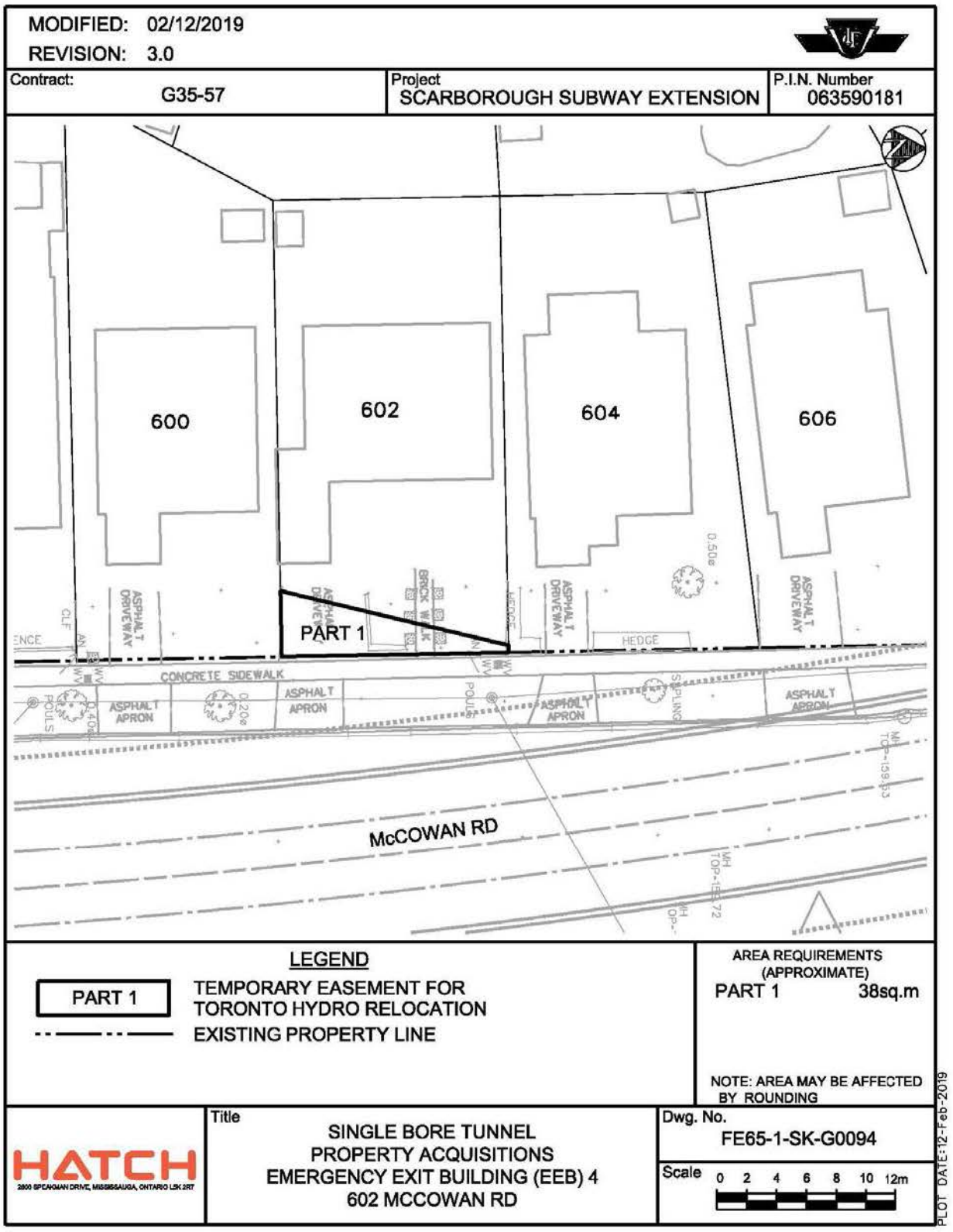
Property No. 37 and 38



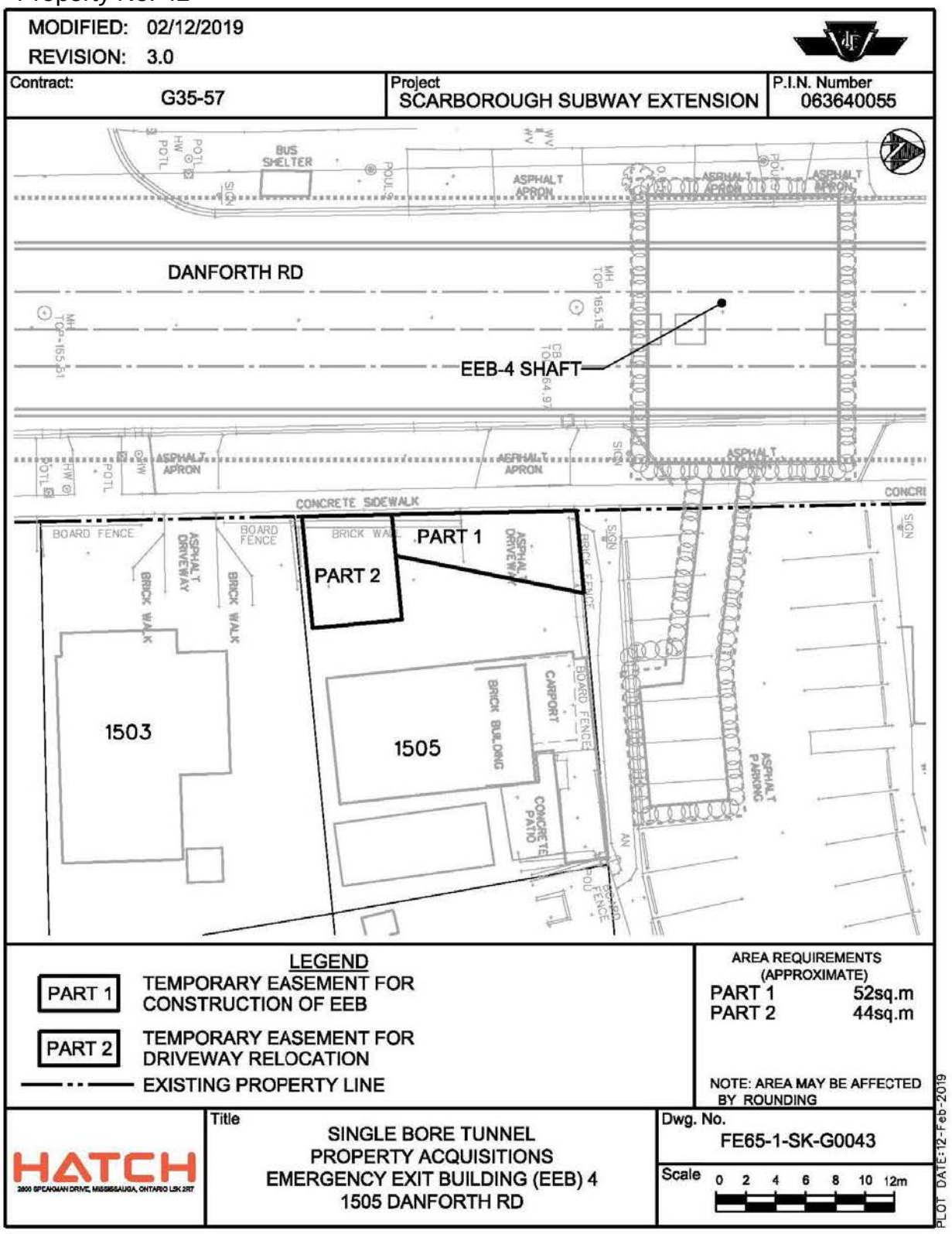
Property No. 39 and 40



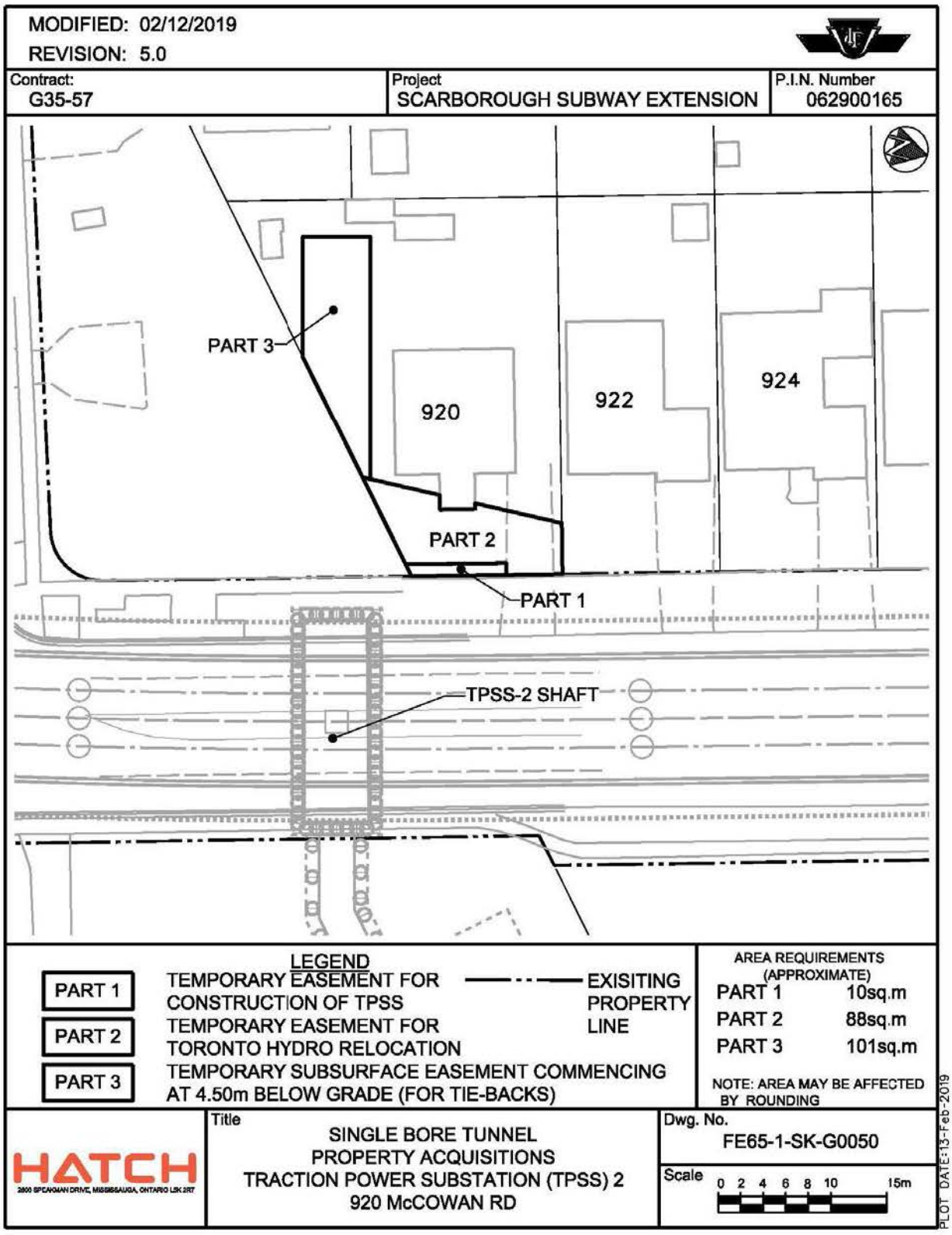
Property No. 41



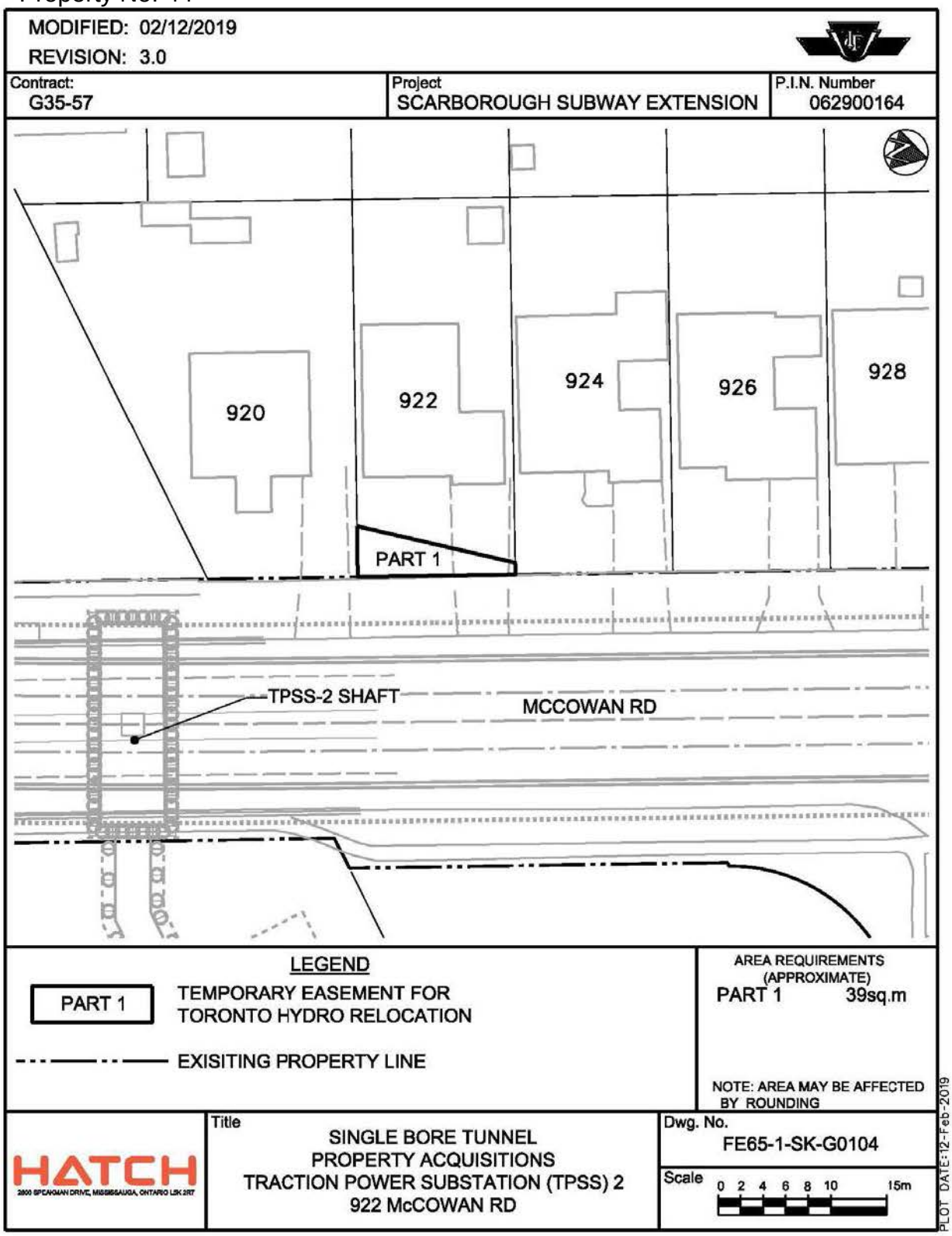
Property No. 42



Property No. 43



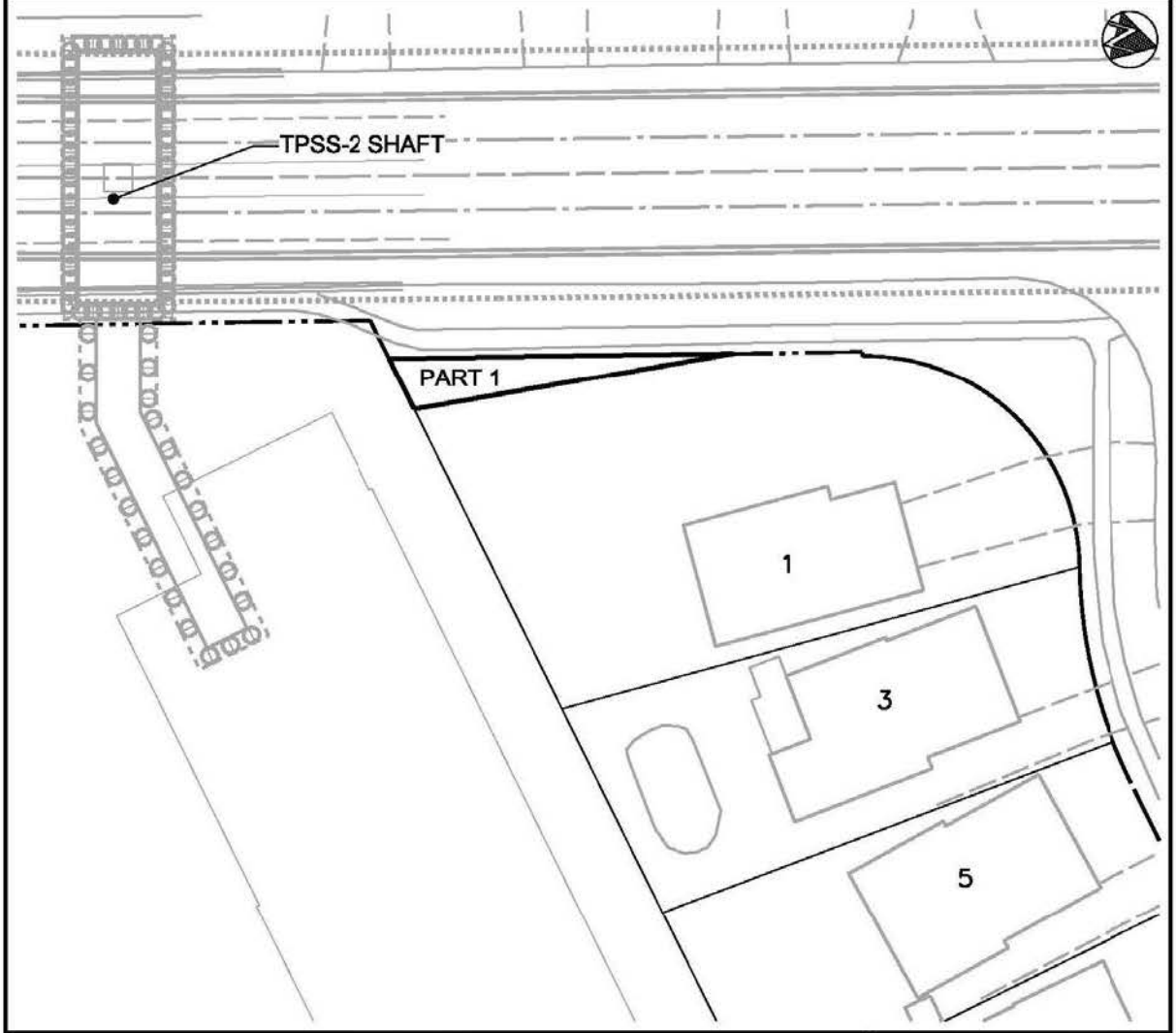
Property No. 44



Property No. 45

MODIFIED: 02/28/2019
REVISION: 3.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062800001



LEGEND

PART 1 — TEMPORARY EASEMENT FOR CONSTRUCTION OF TPSS

EXISITING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1 44sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

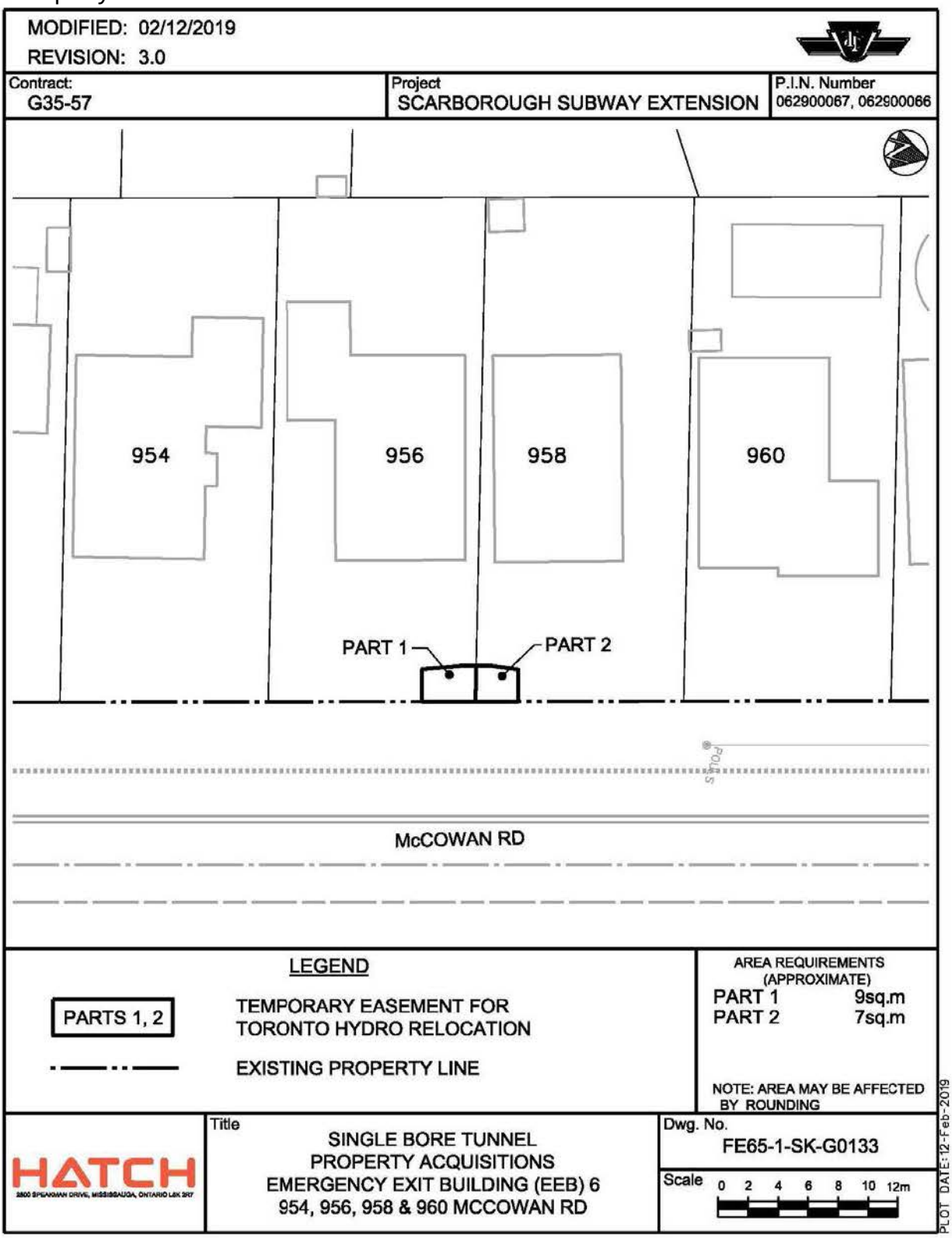
Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
TRACTION POWER SUBSTATION (TPSS) 2
1 BELLECHASSE ST

Dwg. No.
FE65-1-SK-G0049

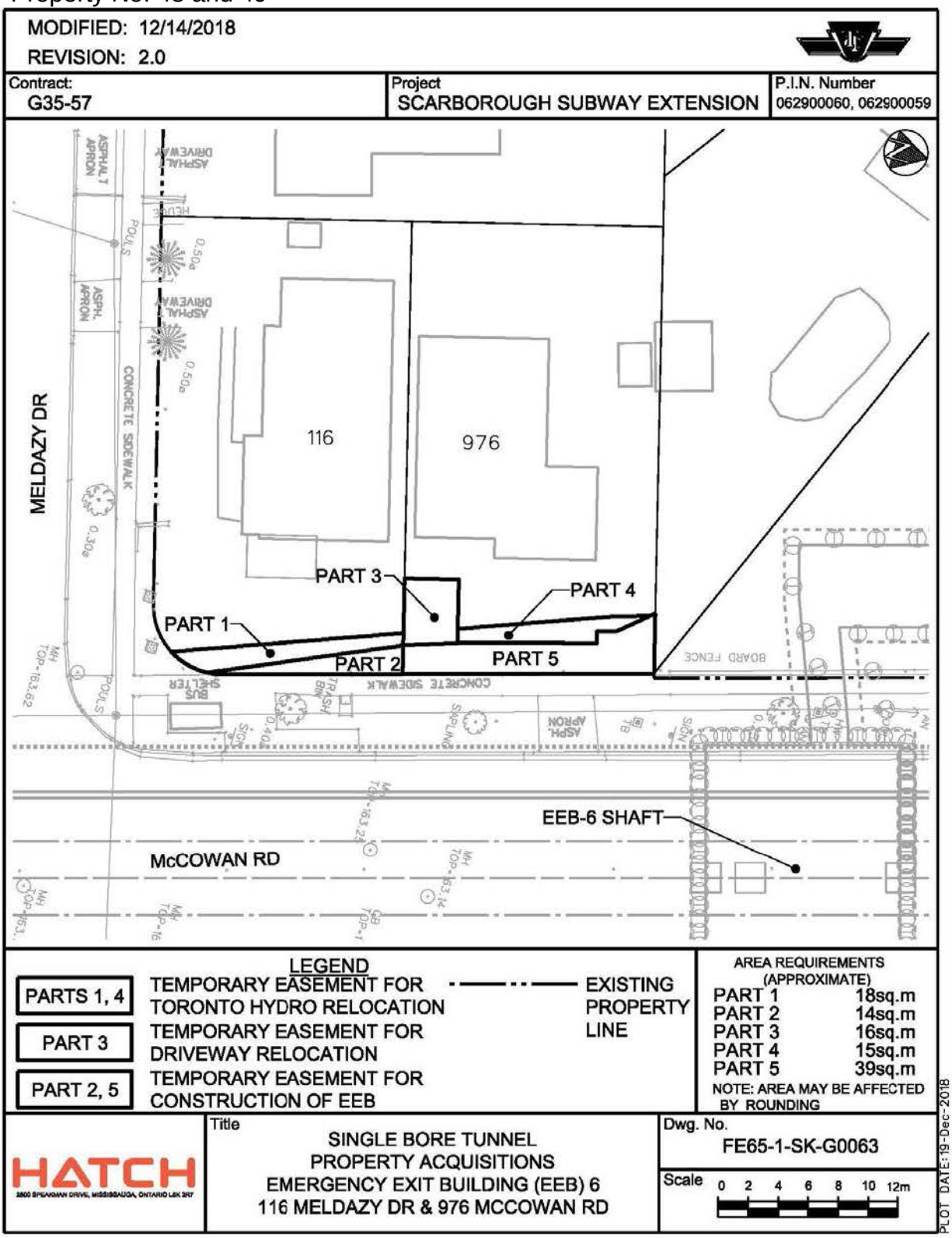
Scale 0 2 4 6 8 10 15m

PLOT DATE: 01-Mar-2019

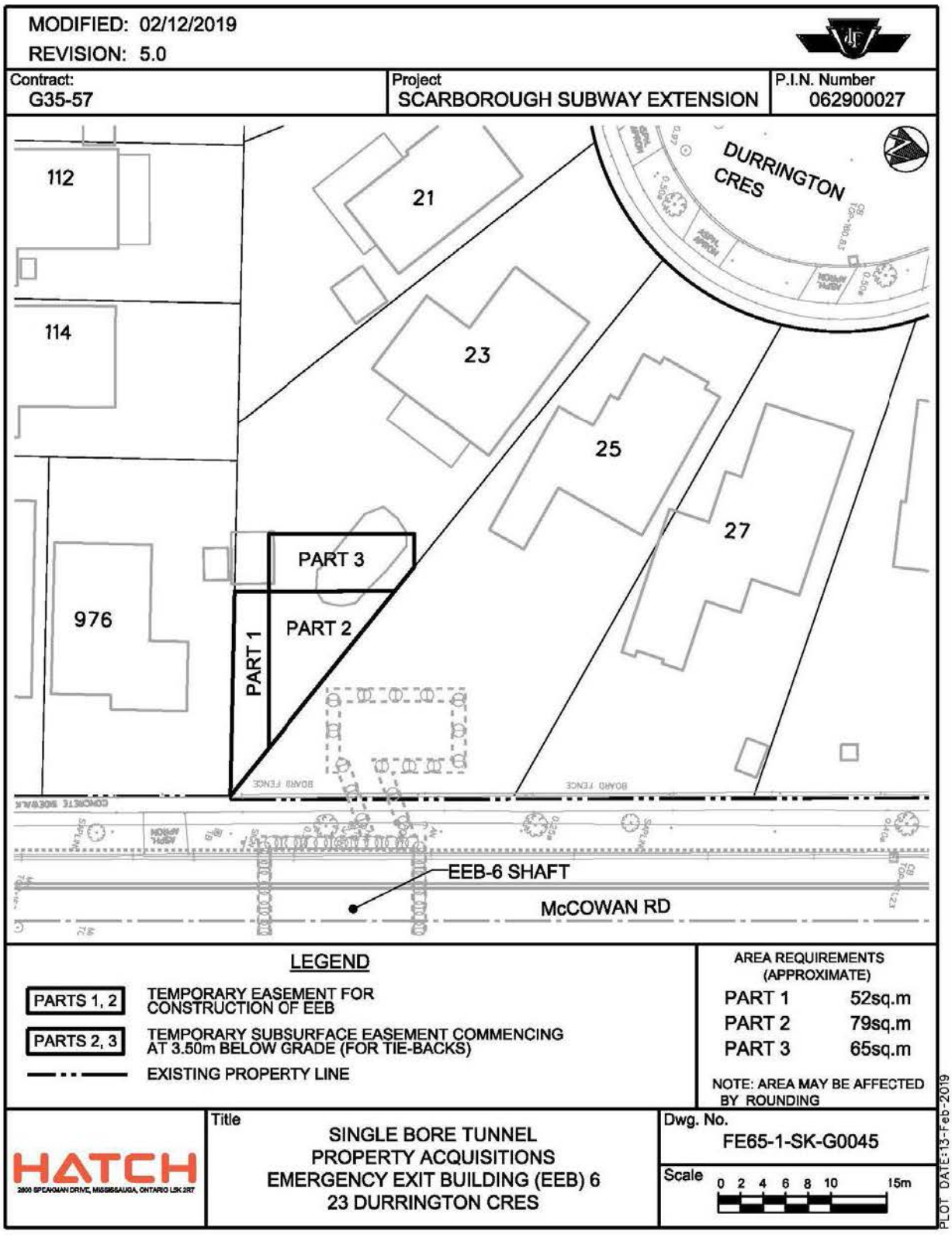
Property No. 46 and 47



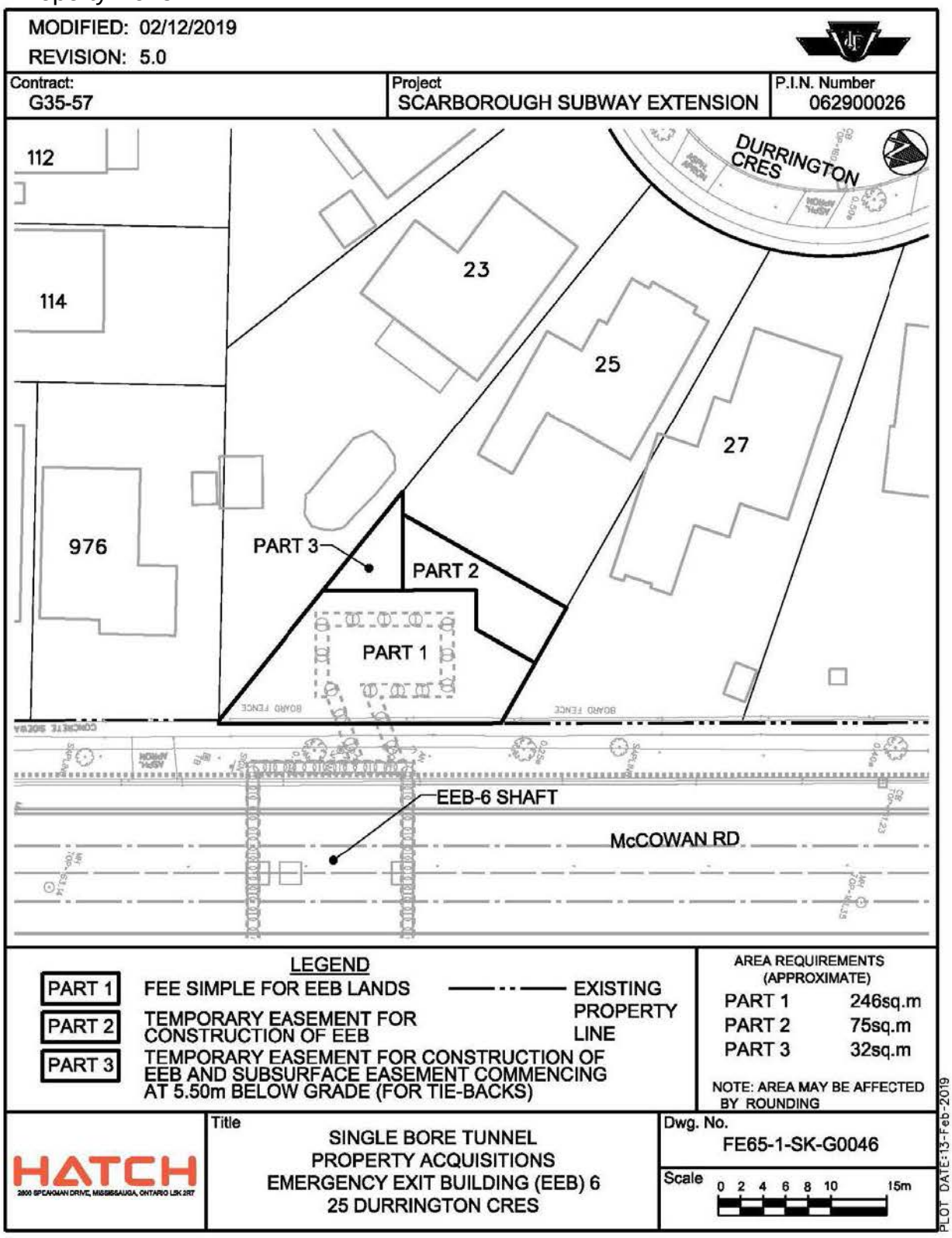
Property No. 48 and 49



Property No. 50



Property No. 51



Property No. 52

MODIFIED: 12/14/2018

REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062900025

LEGEND

PART 1 — TEMPORARY EASEMENT FOR CONSTRUCTION OF EEB

PART 2 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	53sq.m
PART 2	23sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title

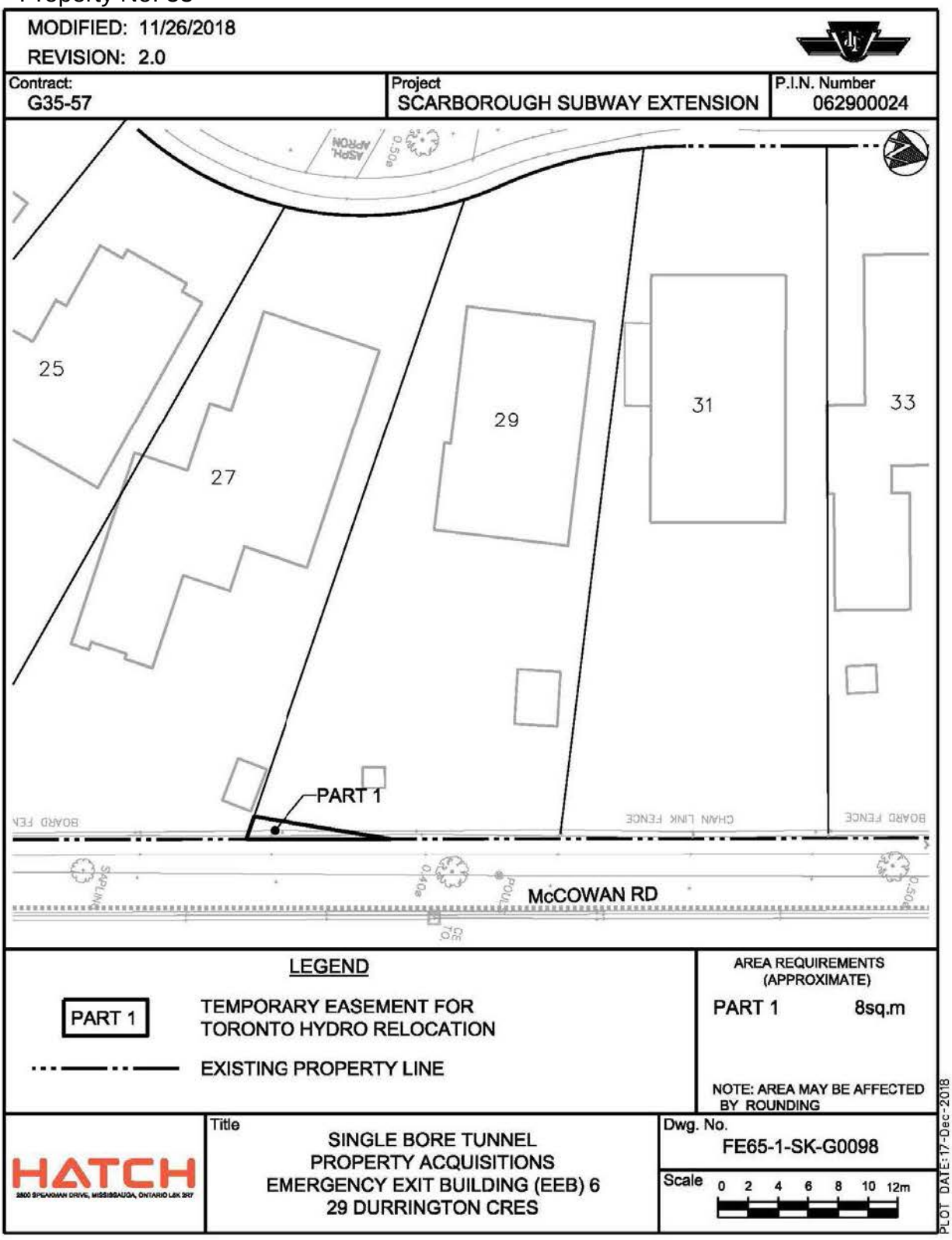
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 6
27 DURRINGTON CRES

Dwg. No. FE65-1-SK-G0047

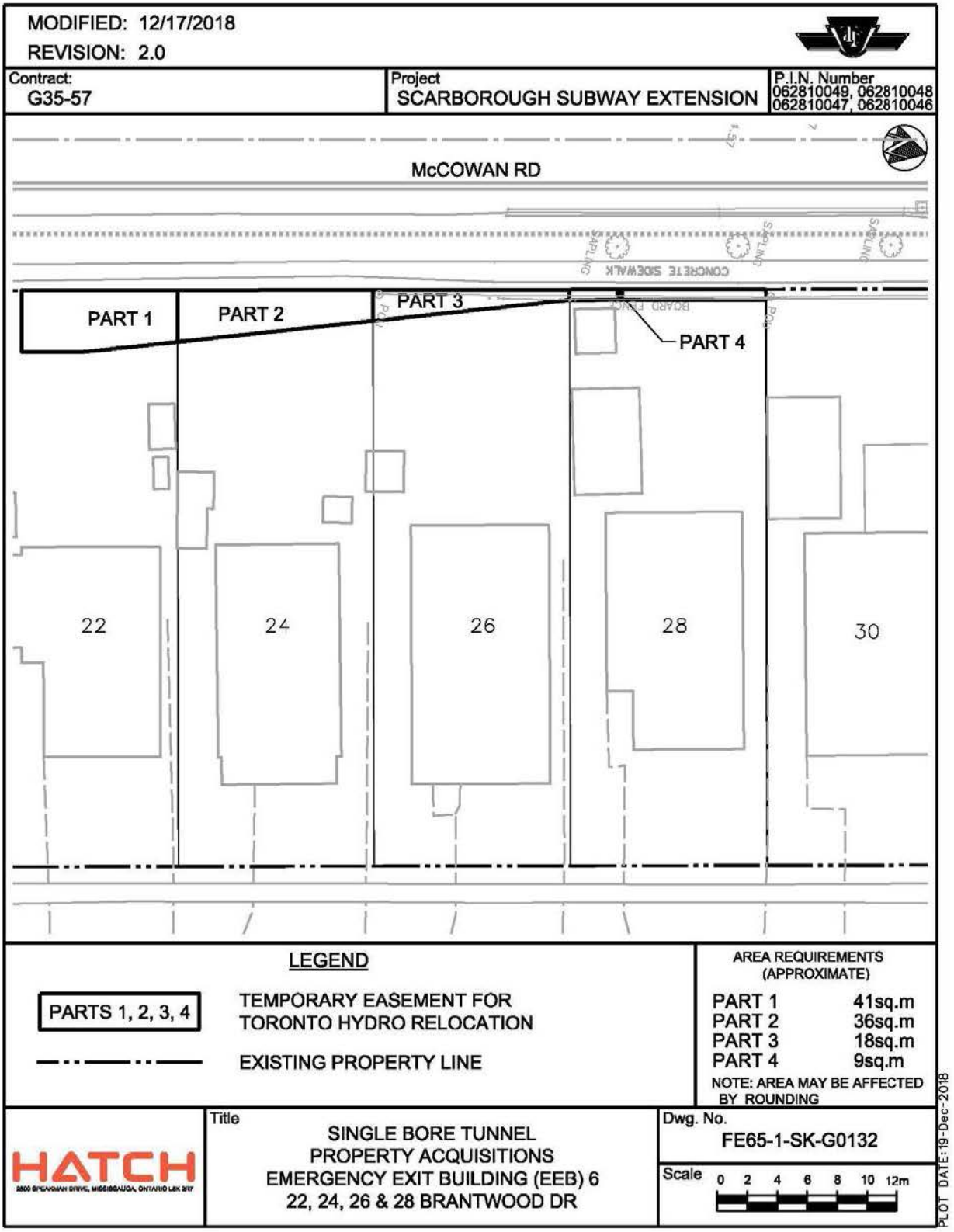
Scale 0 2 4 6 8 10 15m

PLOT DATE: 19-Dec-2018

Property No. 53



Property No. 54, 55, 56 and 57

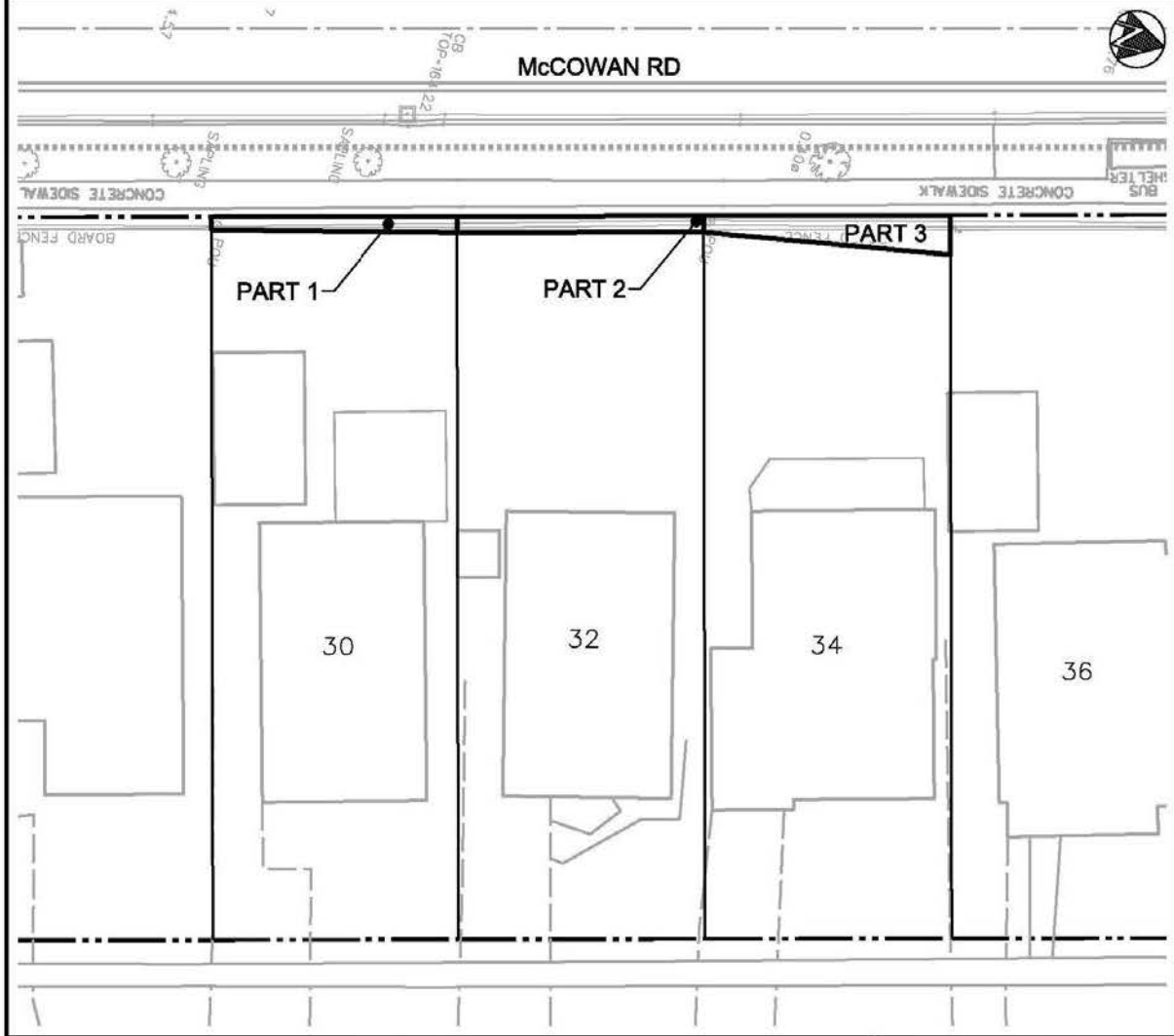


Property No. 58, 59 and 60

MODIFIED: 12/17/2018

REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062810045, 062810044 062810043



LEGEND

PARTS 1, 2, 3 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	11sq.m
PART 2	12sq.m
PART 3	20sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title: SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 6
30, 32 & 34 BRANTWOOD DR

Dwg. No. FE65-1-SK-G0128

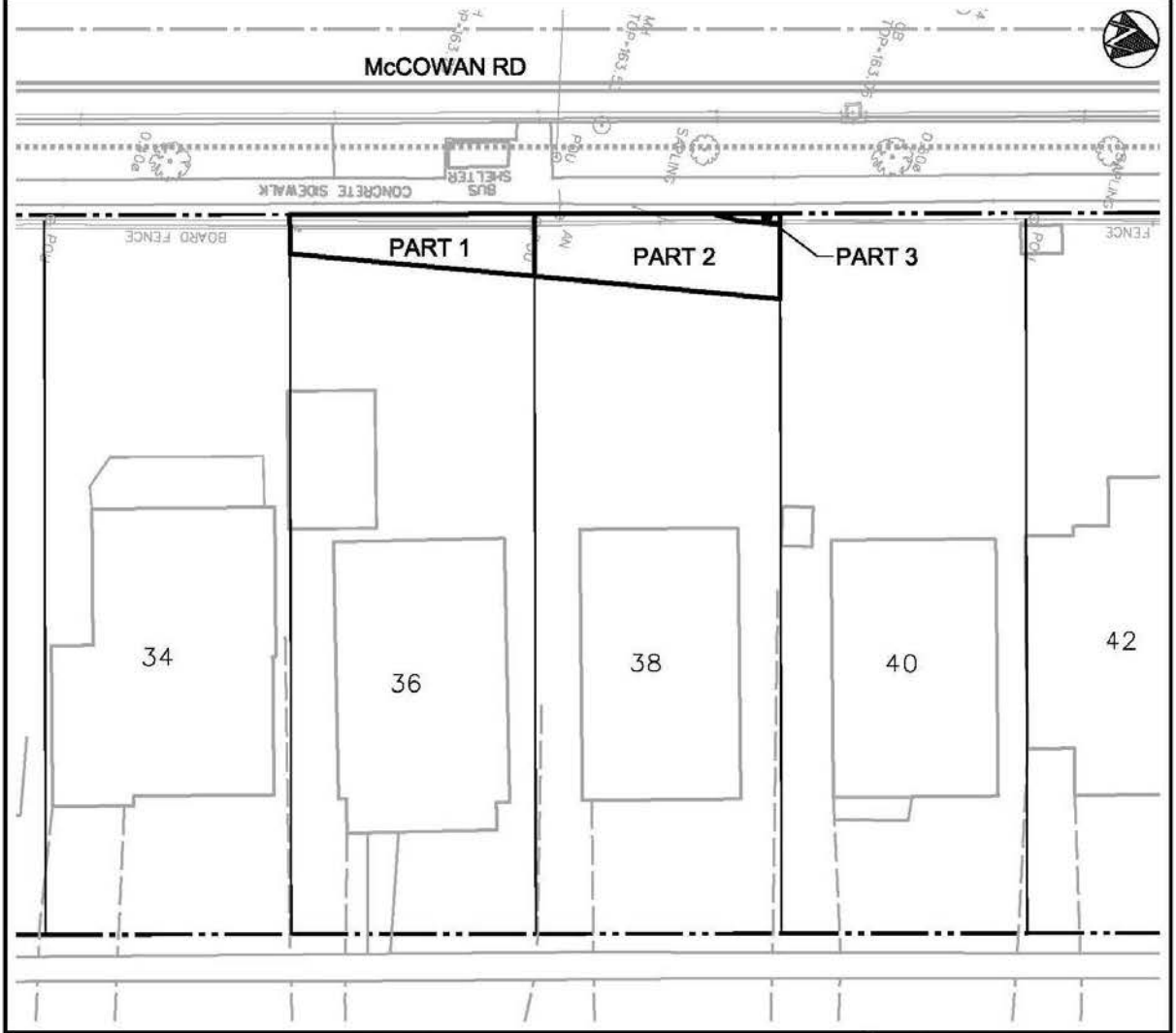
Scale 0 2 4 6 8 10 12m

PLOT DATE: 19-Dec-2018

Property No. 61 and 62

MODIFIED: 12/14/2018
REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062810042, 062810041



LEGEND

PARTS 1, 2 — TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION

PART 3 — TEMPORARY EASEMENT FOR CONSTRUCTION OF EEB

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	36sq.m
PART 2	51sq.m
PART 3	2sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

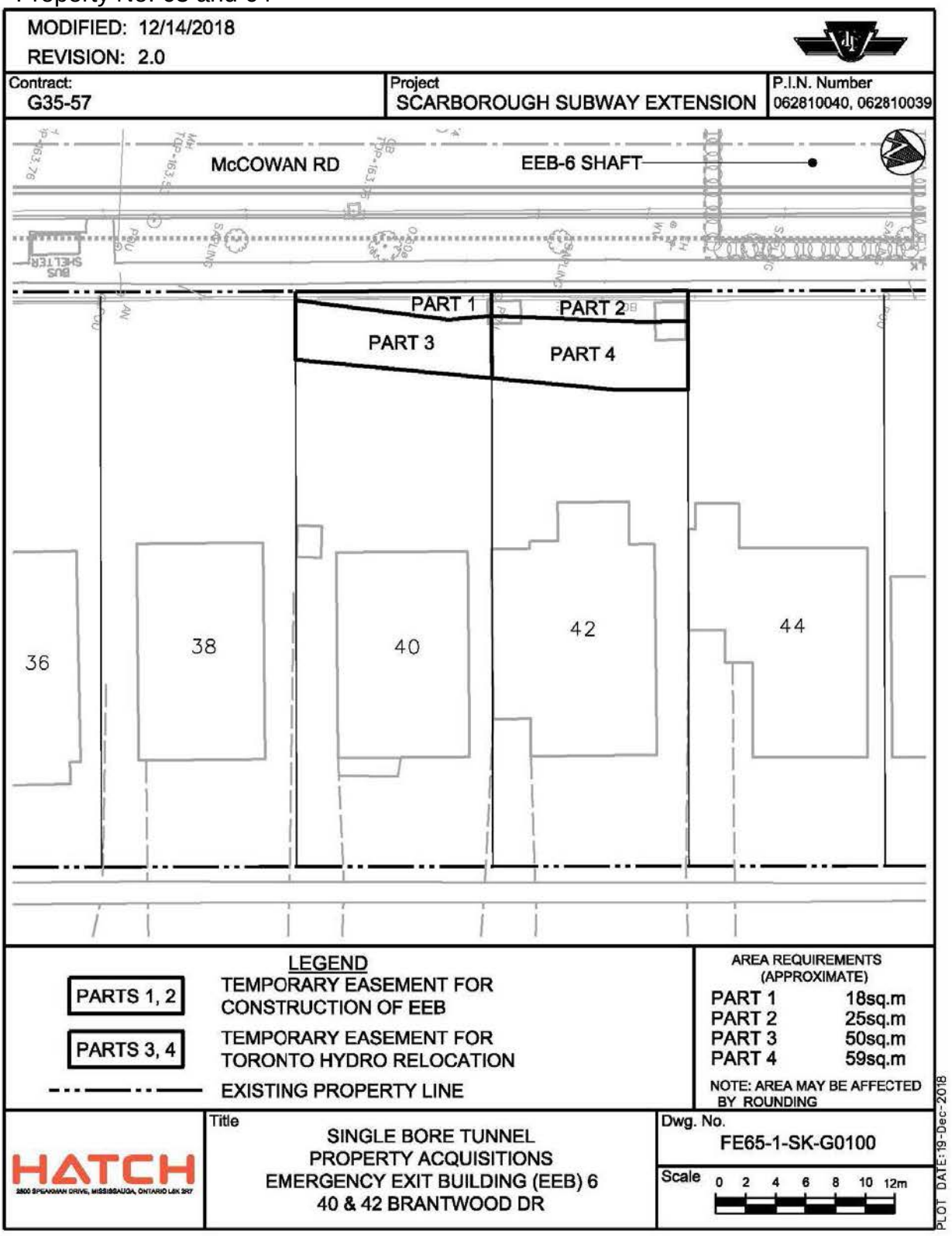
Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 6
36 & 38 BRANTWOOD DR

Dwg. No.
FE65-1-SK-G0099

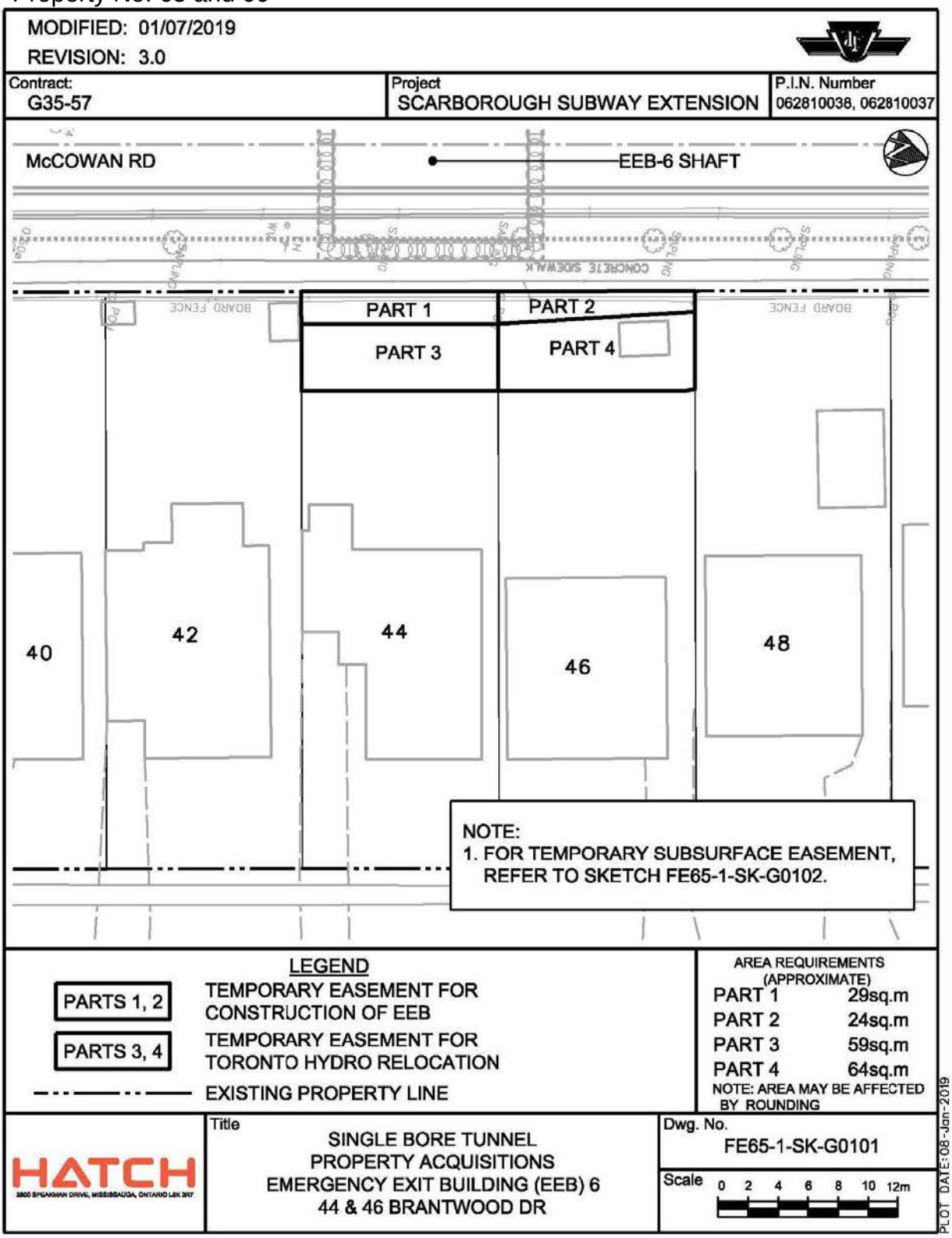
Scale 0 2 4 6 8 10 12m

PLOT DATE: 19-Dec-2018

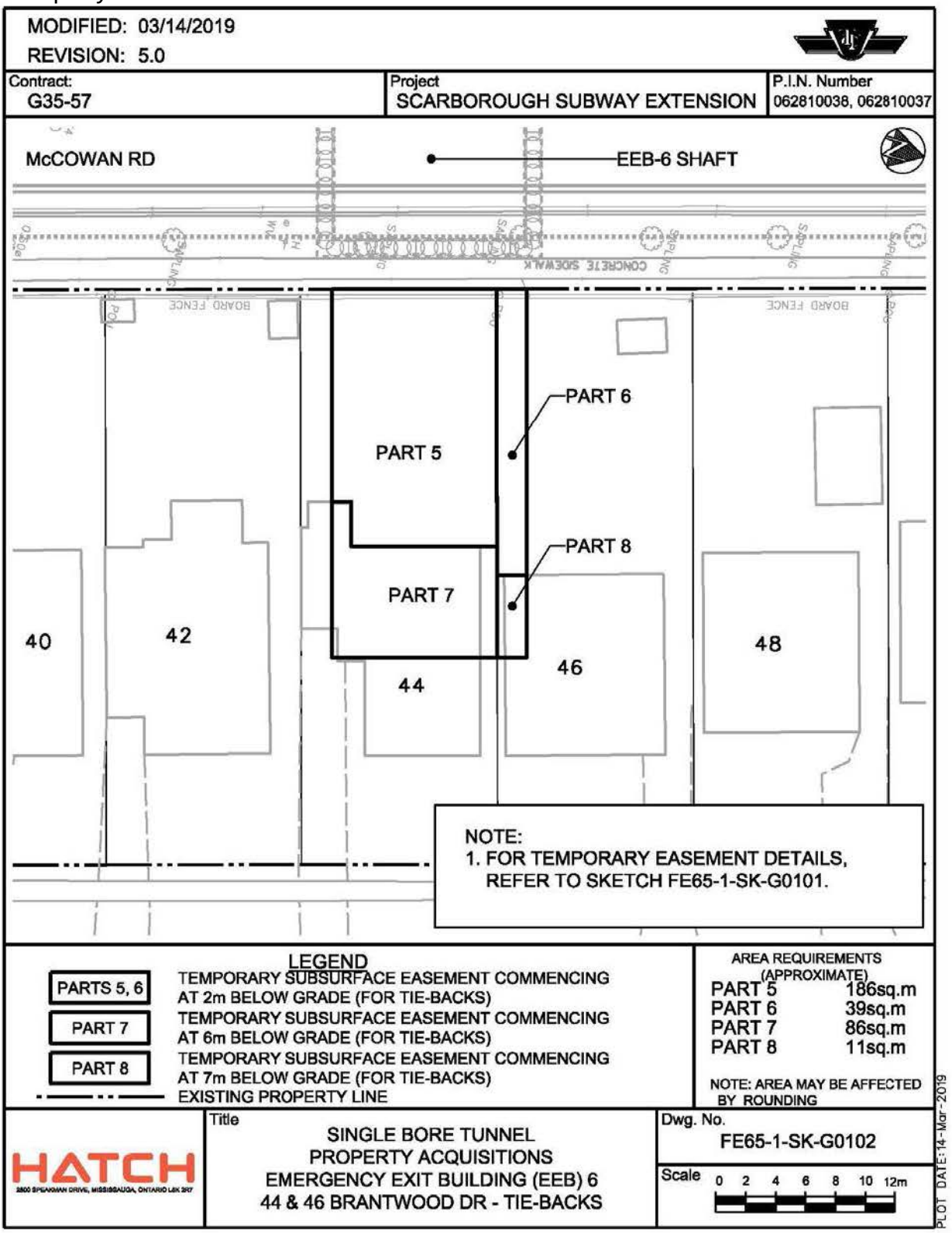
Property No. 63 and 64



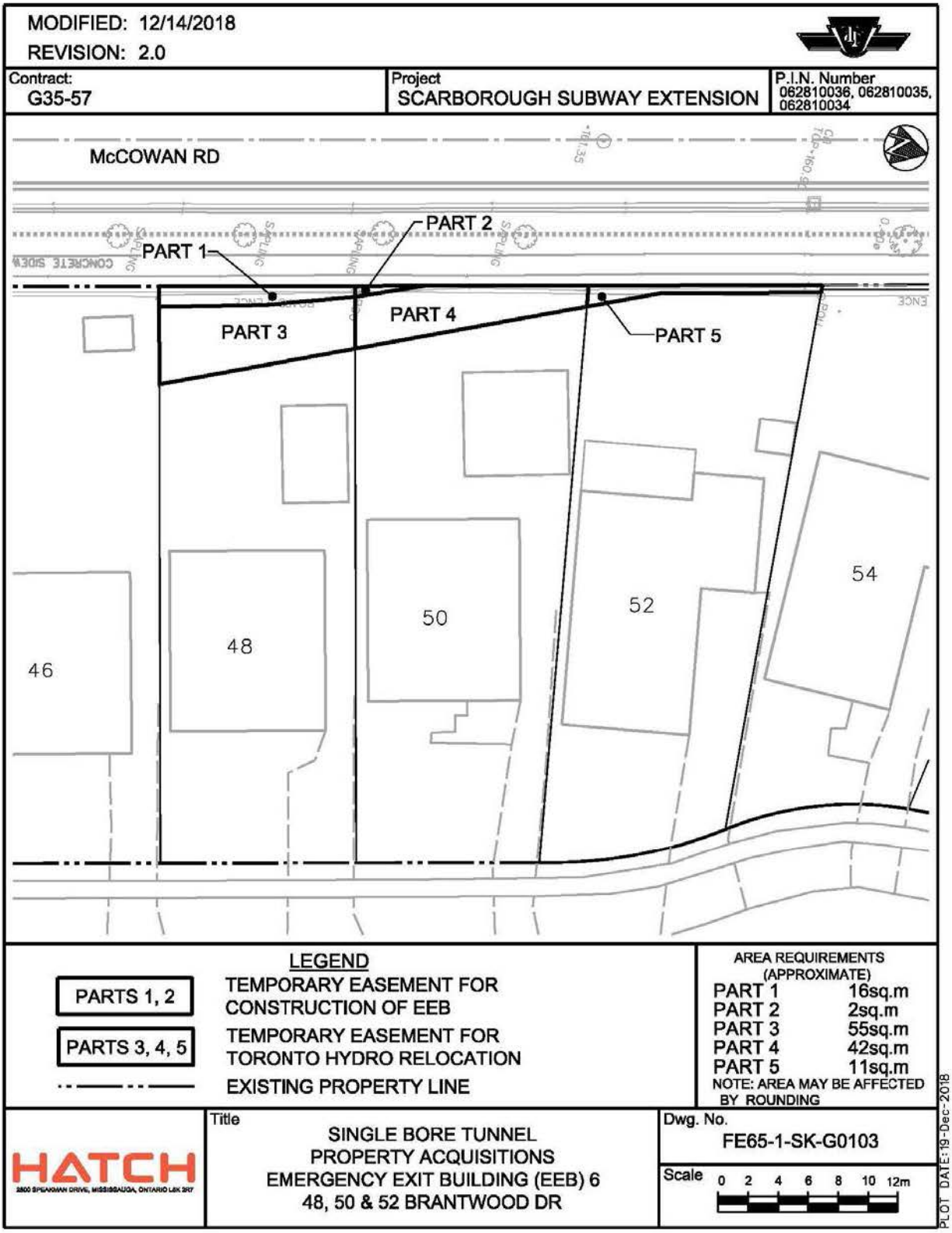
Property No. 65 and 66



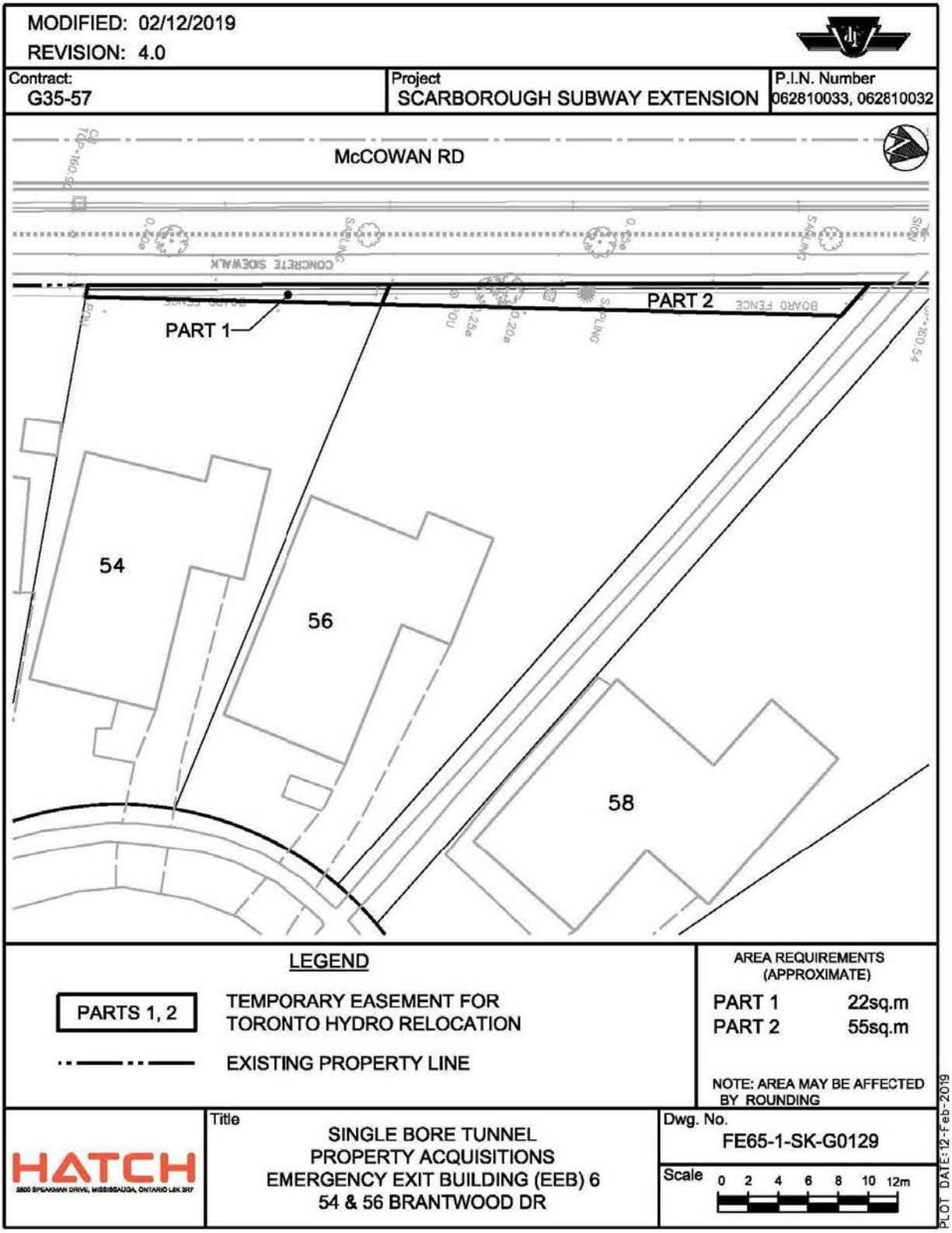
Property No. 65 and 66



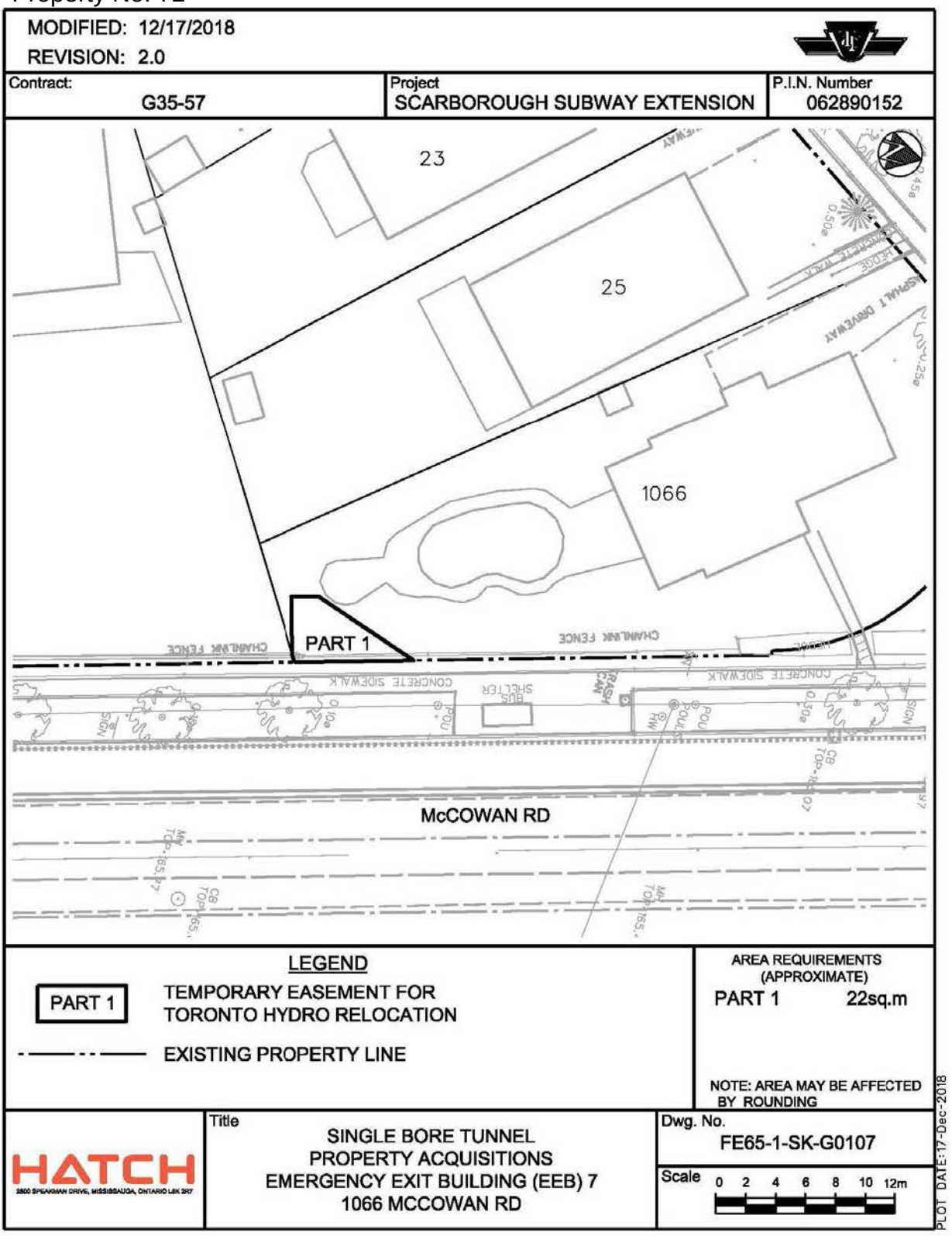
Property No. 67, 68 and 69



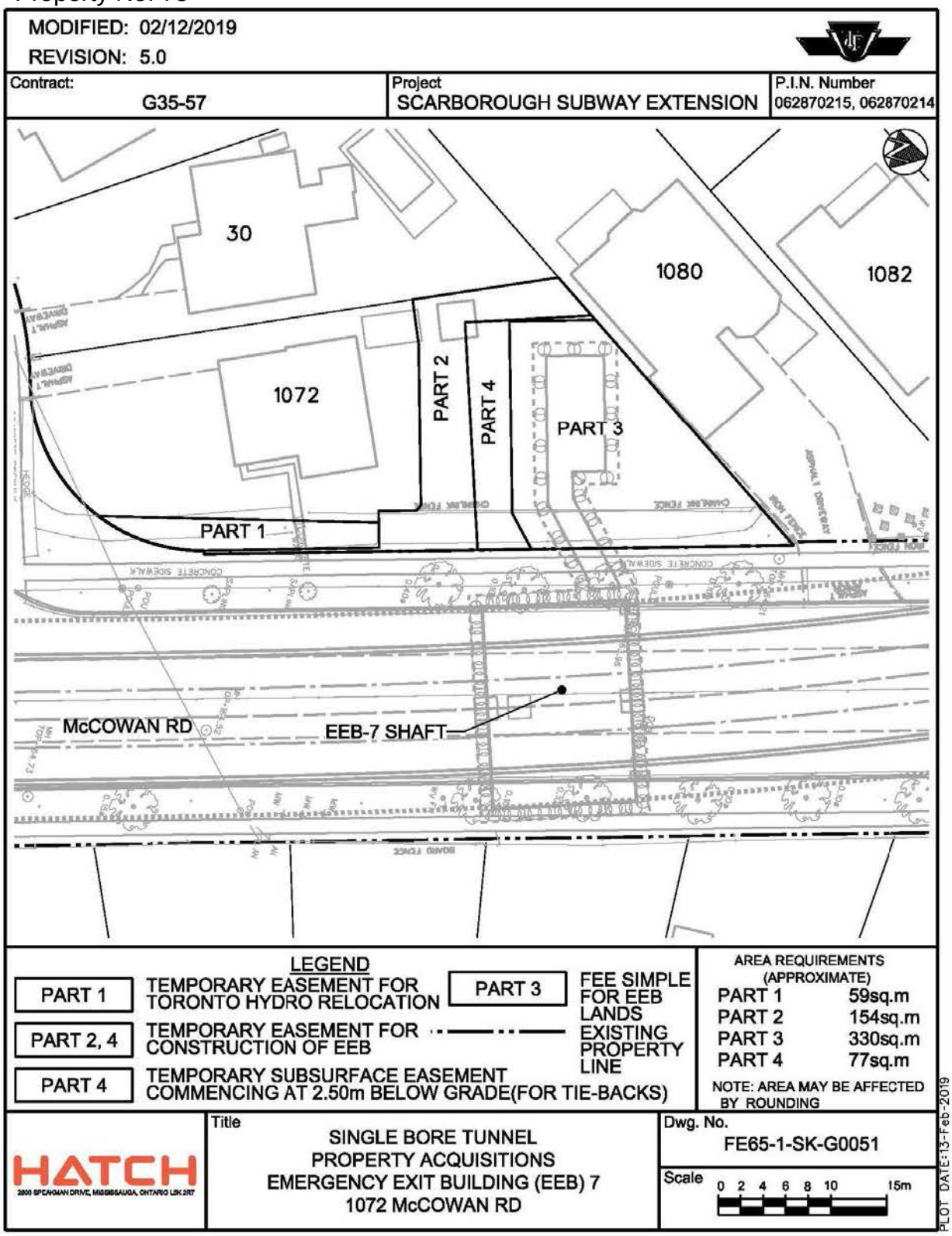
Property No. 70 and 71



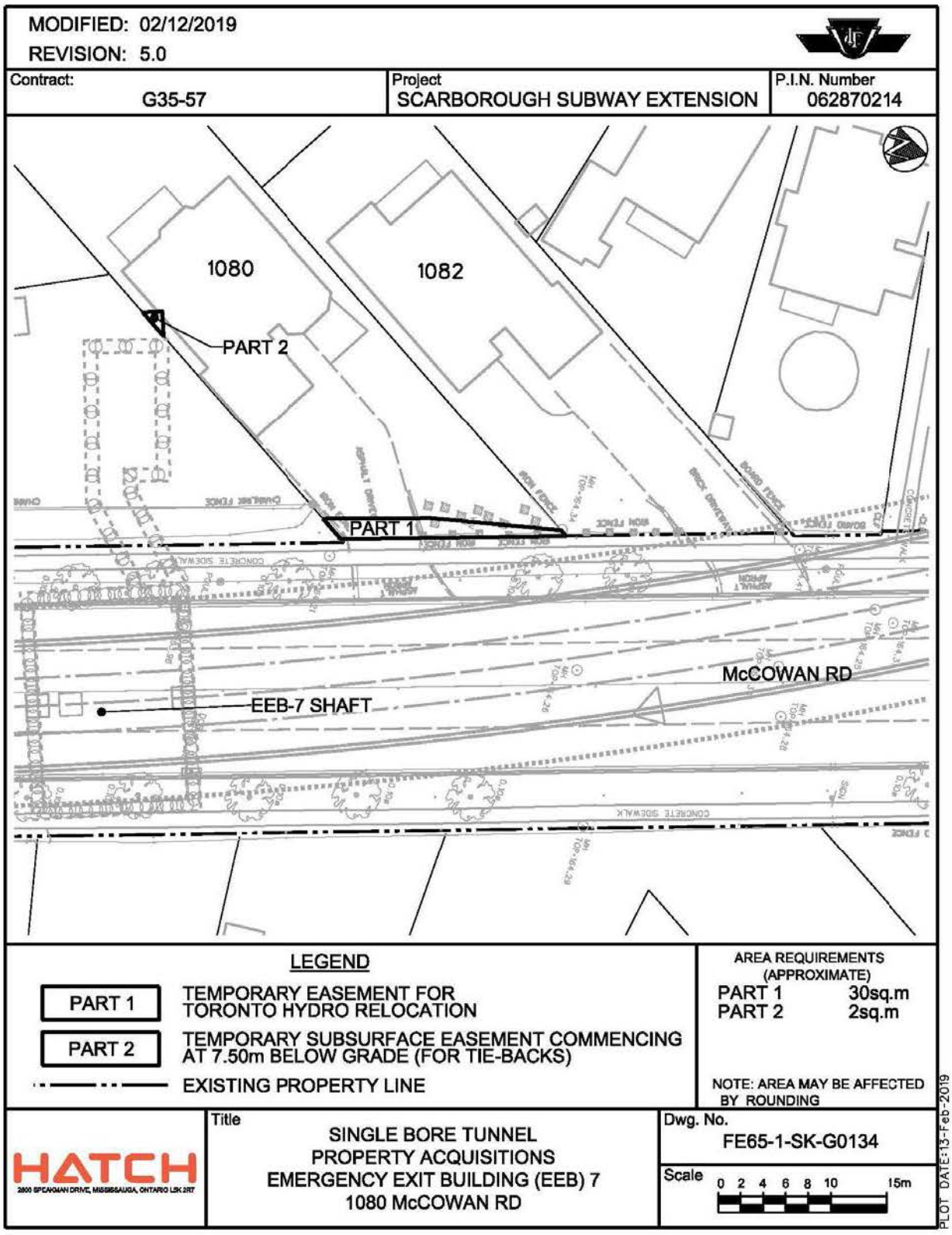
Property No. 72



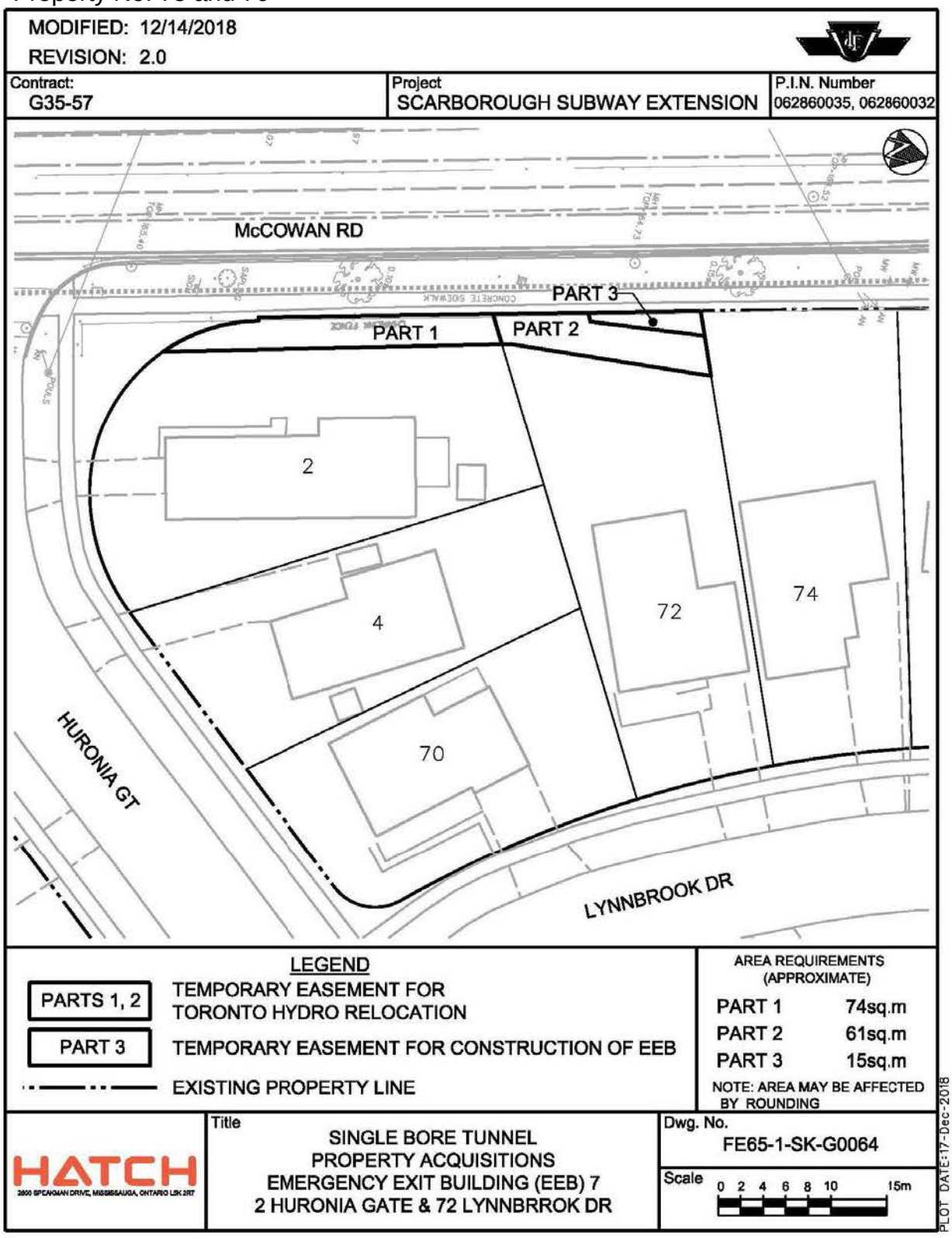
Property No. 73



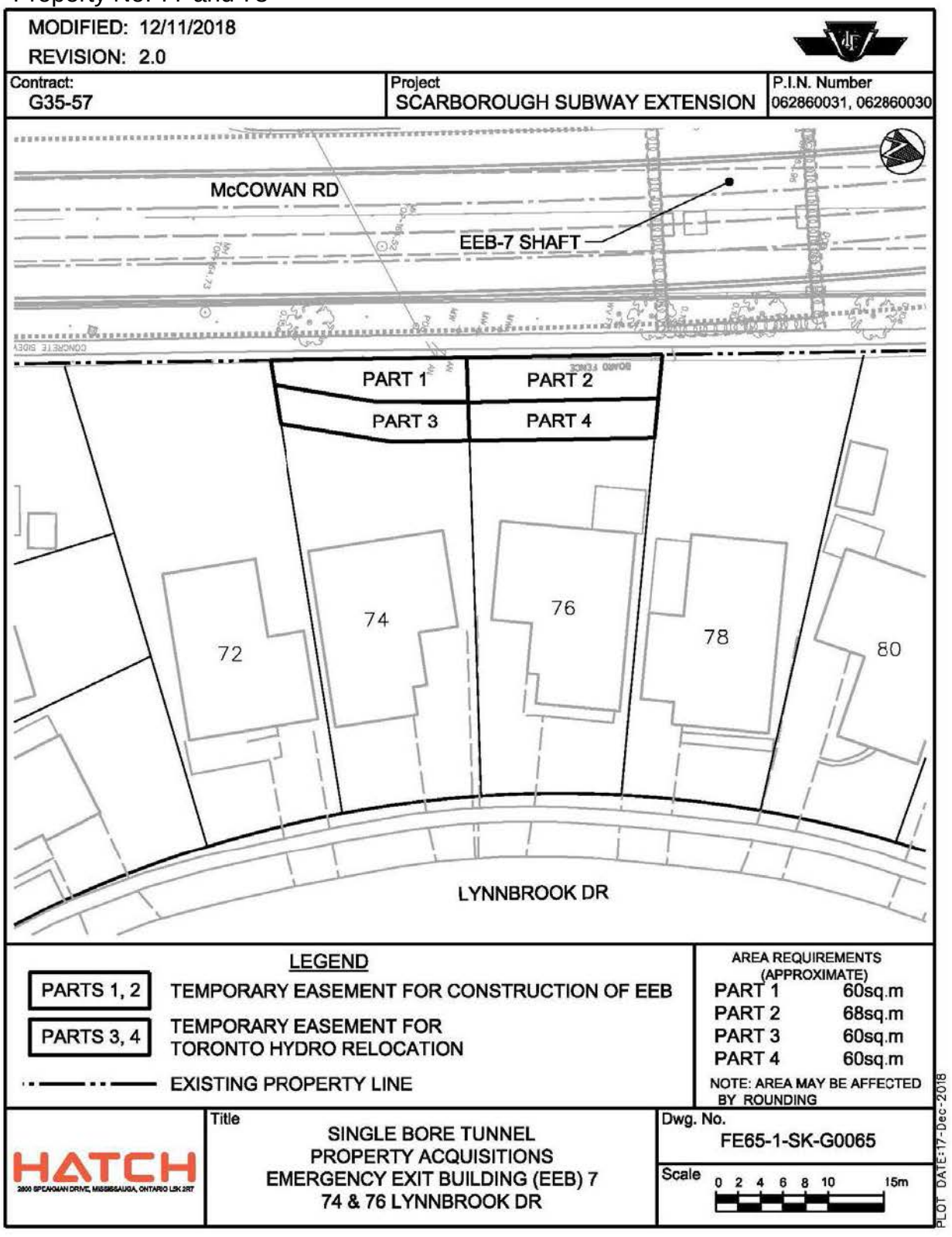
Property No. 74



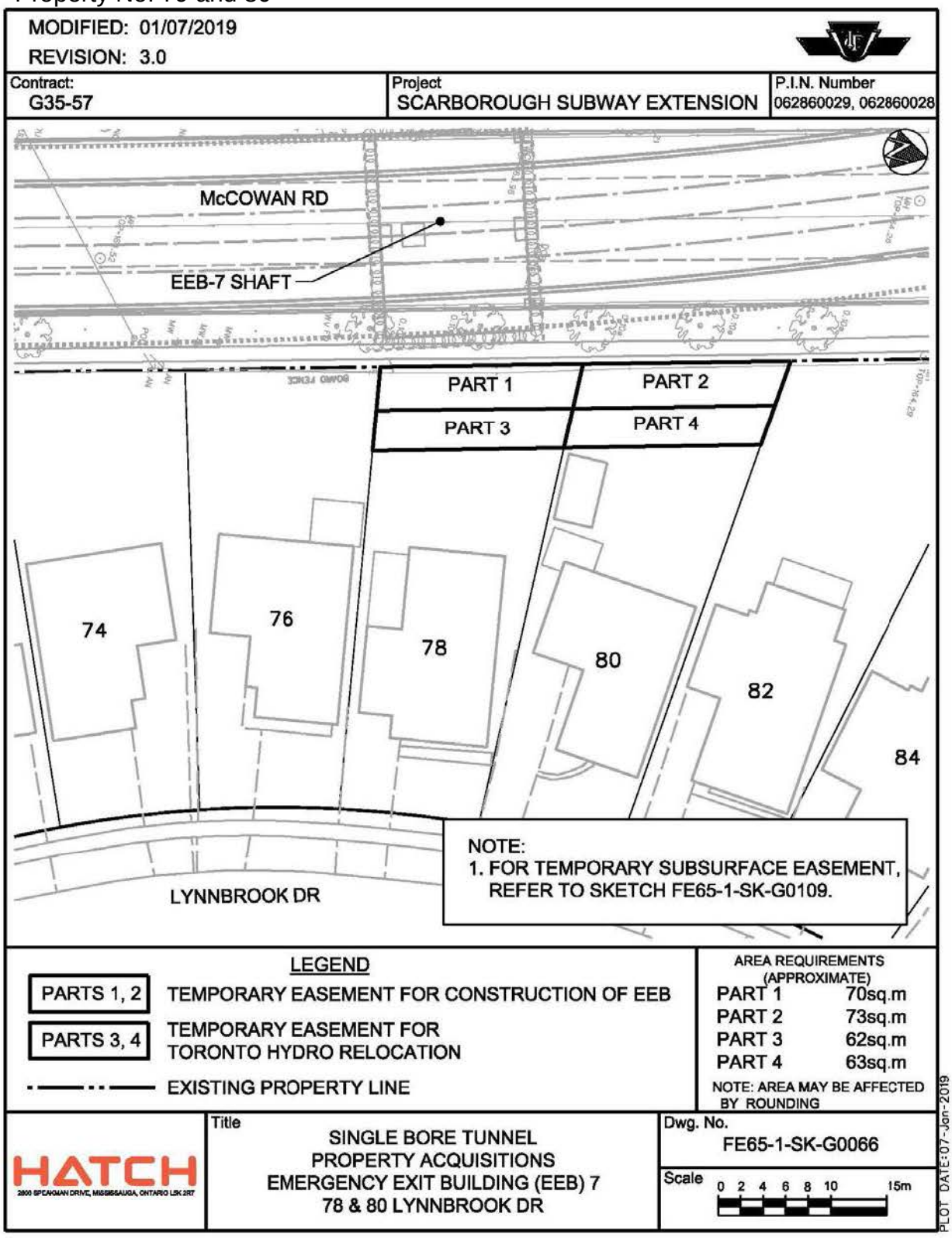
Property No. 75 and 76



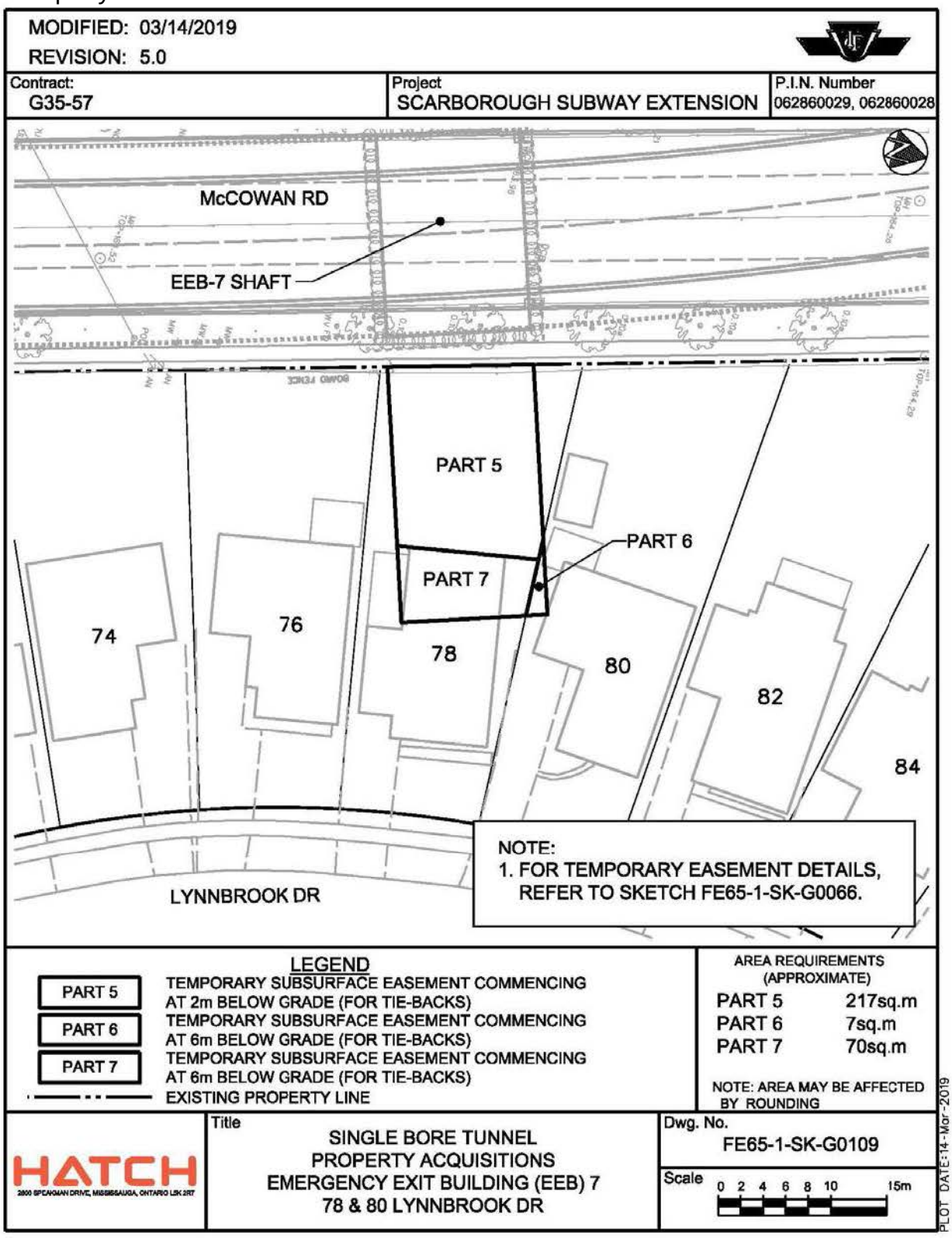
Property No. 77 and 78



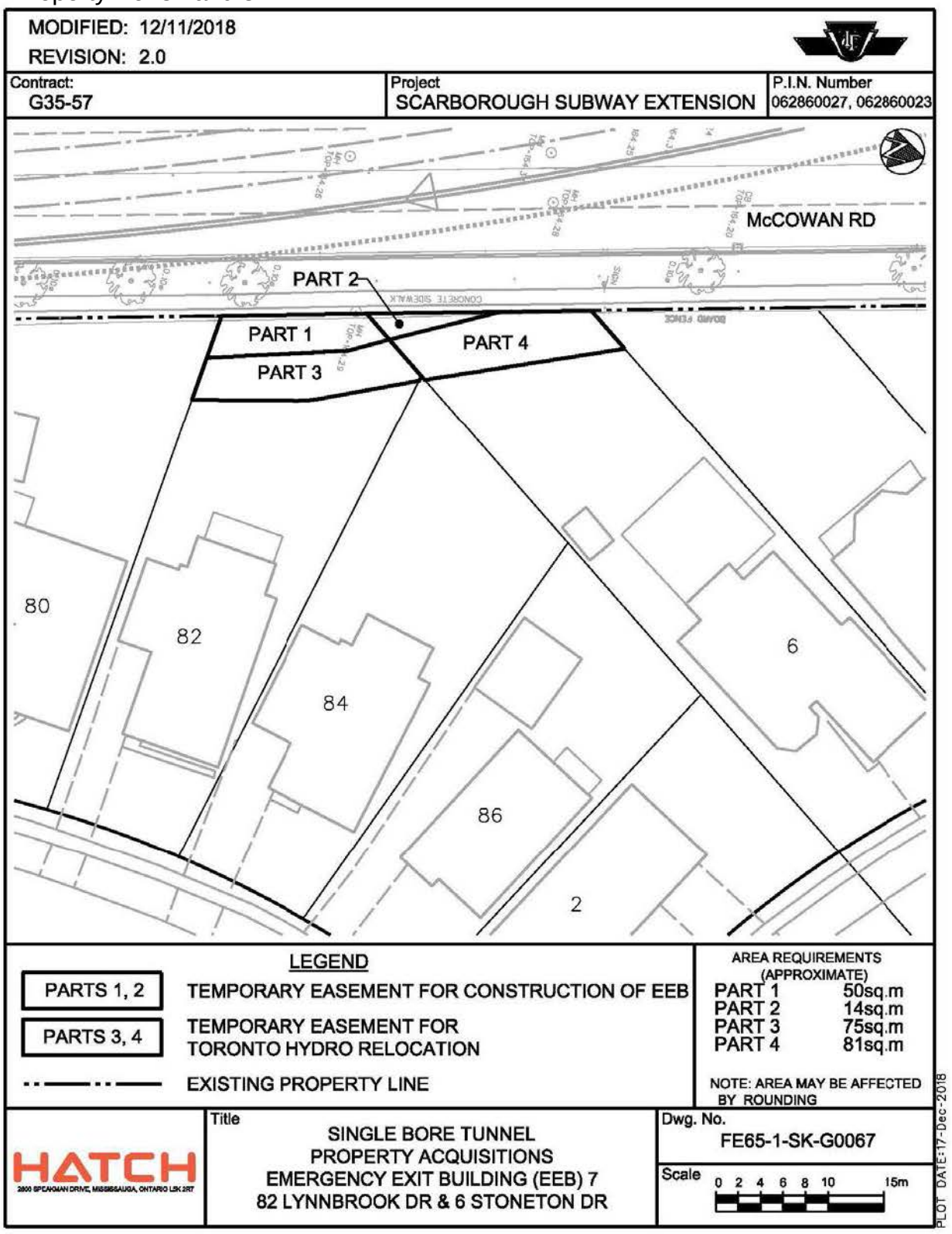
Property No. 79 and 80



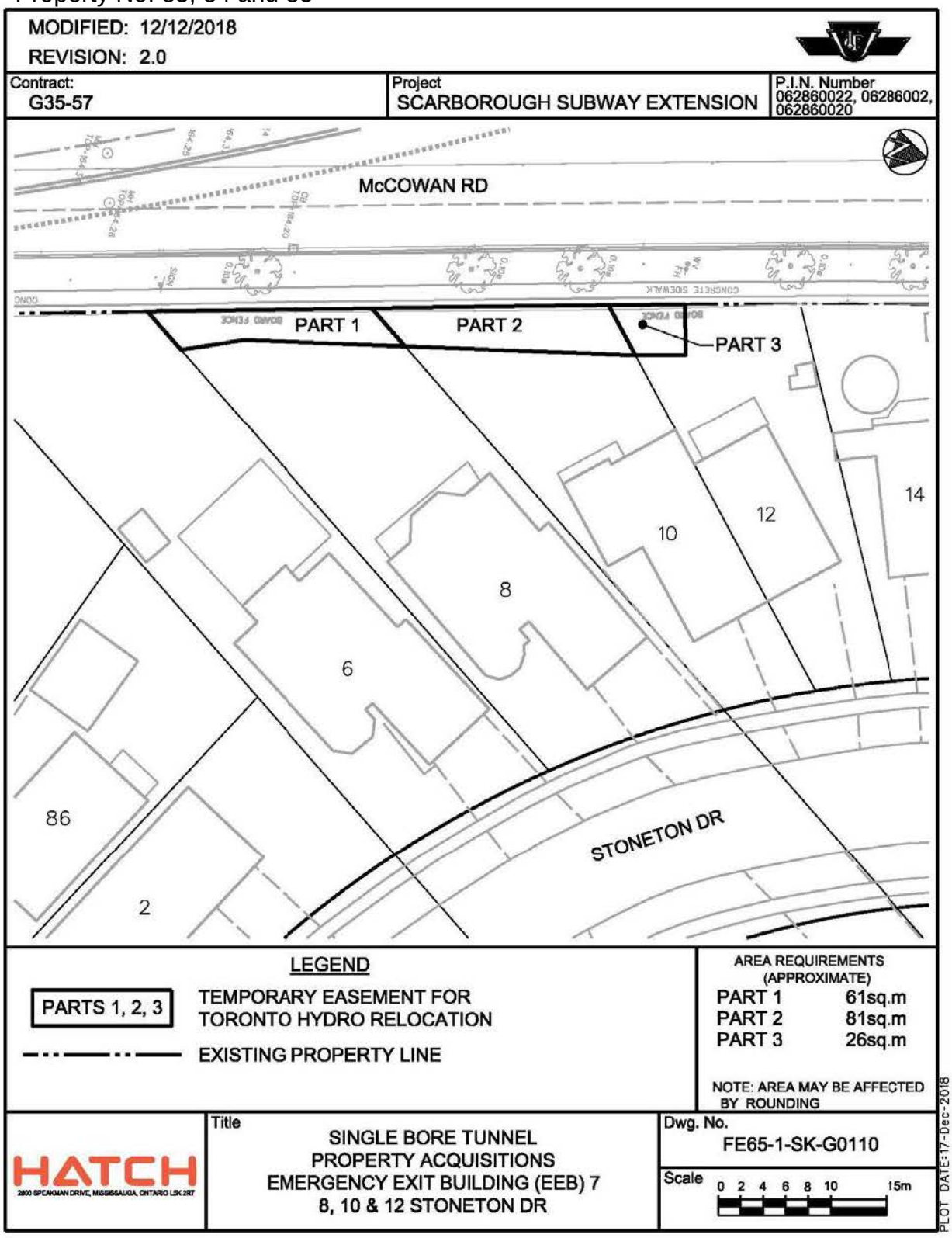
Property No. 79 and 80



Property No. 81 and 82



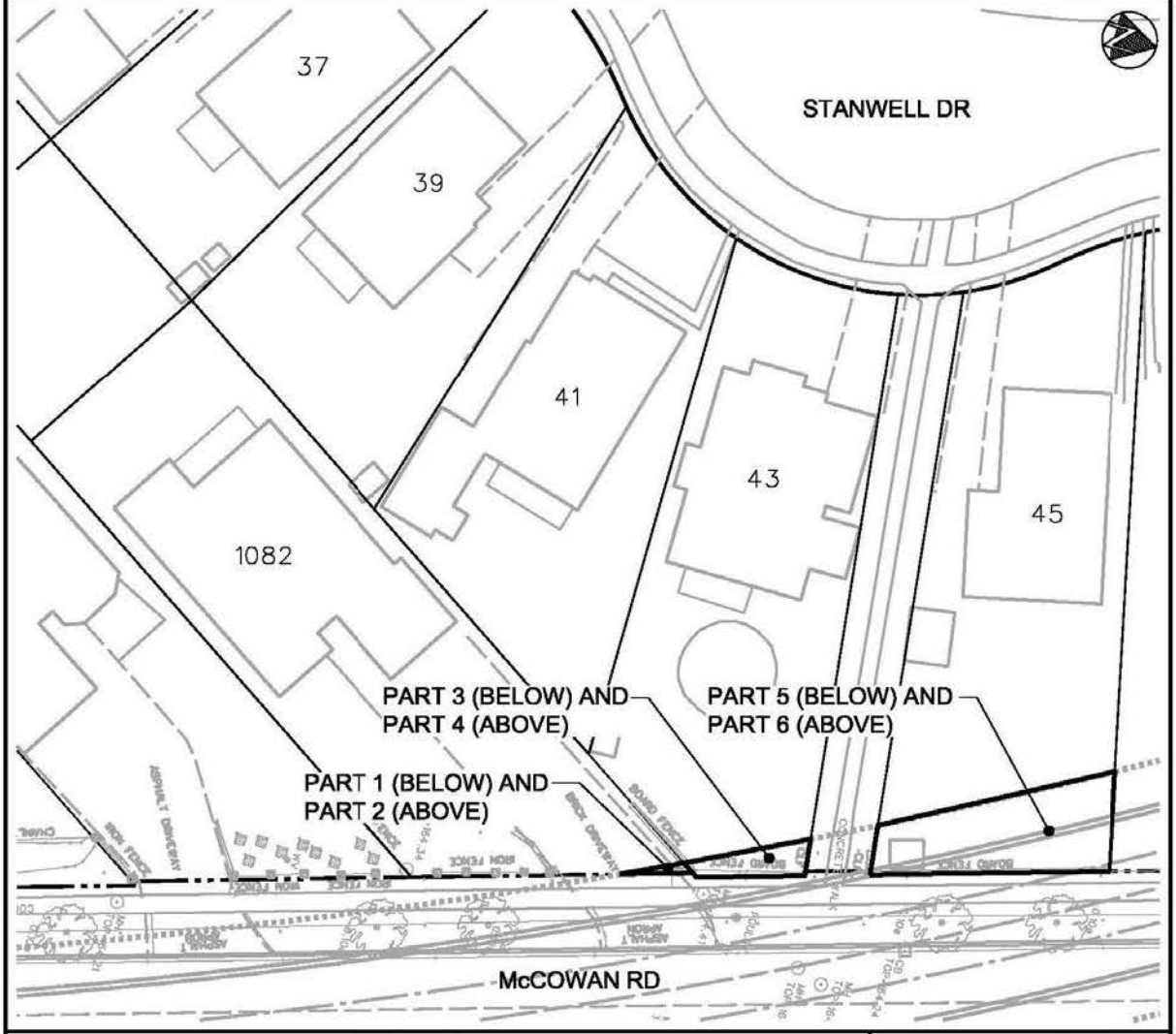
Property No. 83, 84 and 85



Property No. 86

MODIFIED: 12/07/2018
REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062870163, 062870165, 062870182



LEGEND

PARTS 1, 3, 5	FEE SIMPLE FOR TUNNEL LANDS COMMENCING AT 6m BELOW GRADE
PARTS 2, 4, 6	SUPPORT EASEMENT
	EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	2sq.m
PART 2	2sq.m
PART 3	16sq.m
PART 4	16sq.m
PART 5	90sq.m
PART 6	90sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
TUNNEL R.O.W.
43, 45 STANWELL DR & 1082 MCCOWAN RD

Dwg. No.
FE65-1-SK-G0121

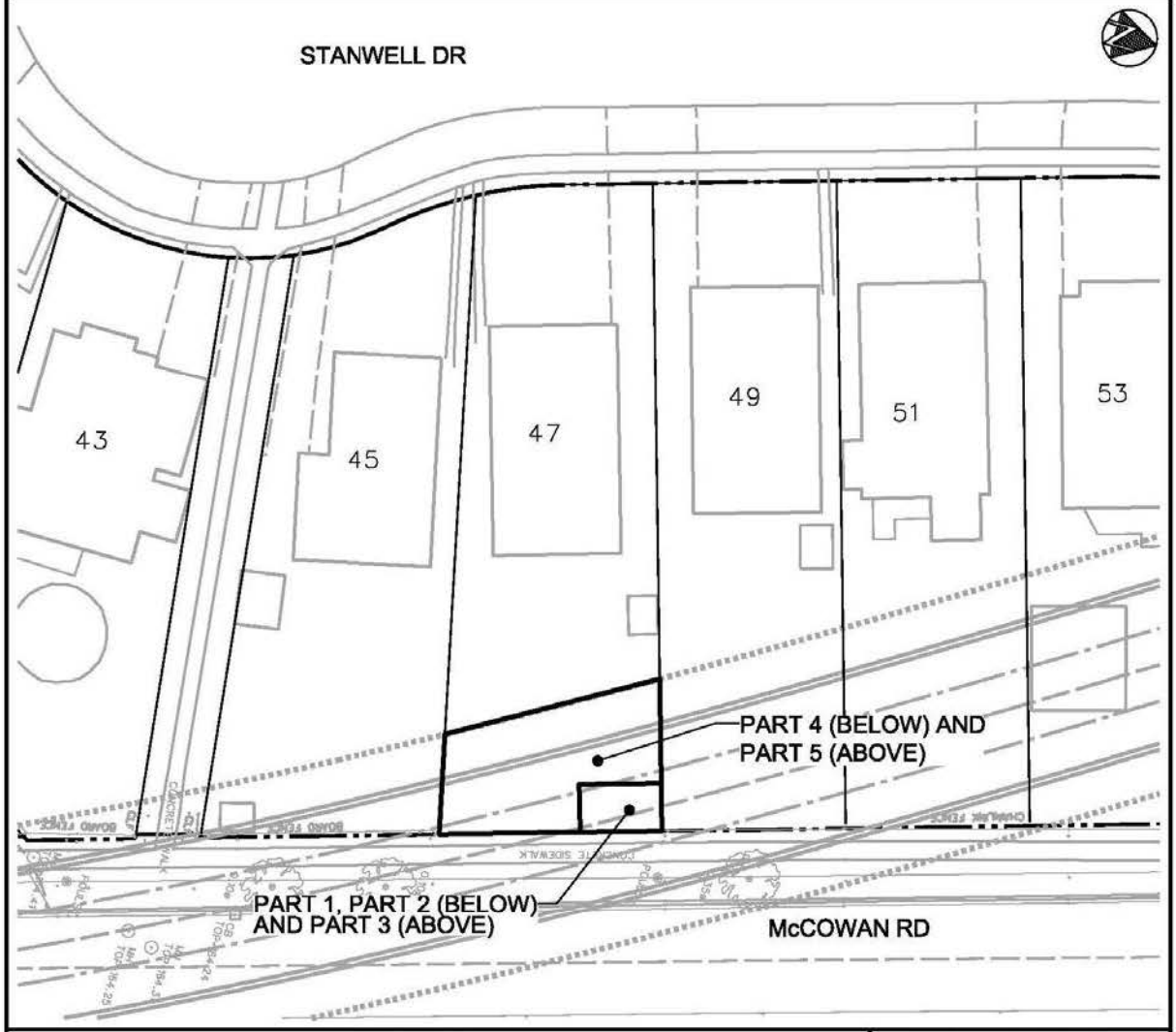
Scale 0 2 4 6 8 10 15m

PLOT DATE: 11-Dec-2018

Property No. 87

MODIFIED: 12/11/2018
REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062870166



LEGEND

PART 1	TEMPORARY EASEMENT FOR TORONTO HYDRO RELOCATION	EXISTING PROPERTY LINE
PARTS 2, 4	FEE SIMPLE FOR TUNNEL LANDS COMMENCING AT 6m BELOW GRADE	
PARTS 3, 5	SUPPORT EASEMENT	

AREA REQUIREMENTS (APPROXIMATE)

PART 1	20sq.m
PART 2	20sq.m
PART 3	20sq.m
PART 4	120sq.m
PART 5	120sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
EMERGENCY EXIT BUILDING (EEB) 7
47 STANWELL DR

Dwg. No.
FE65-1-SK-G0108

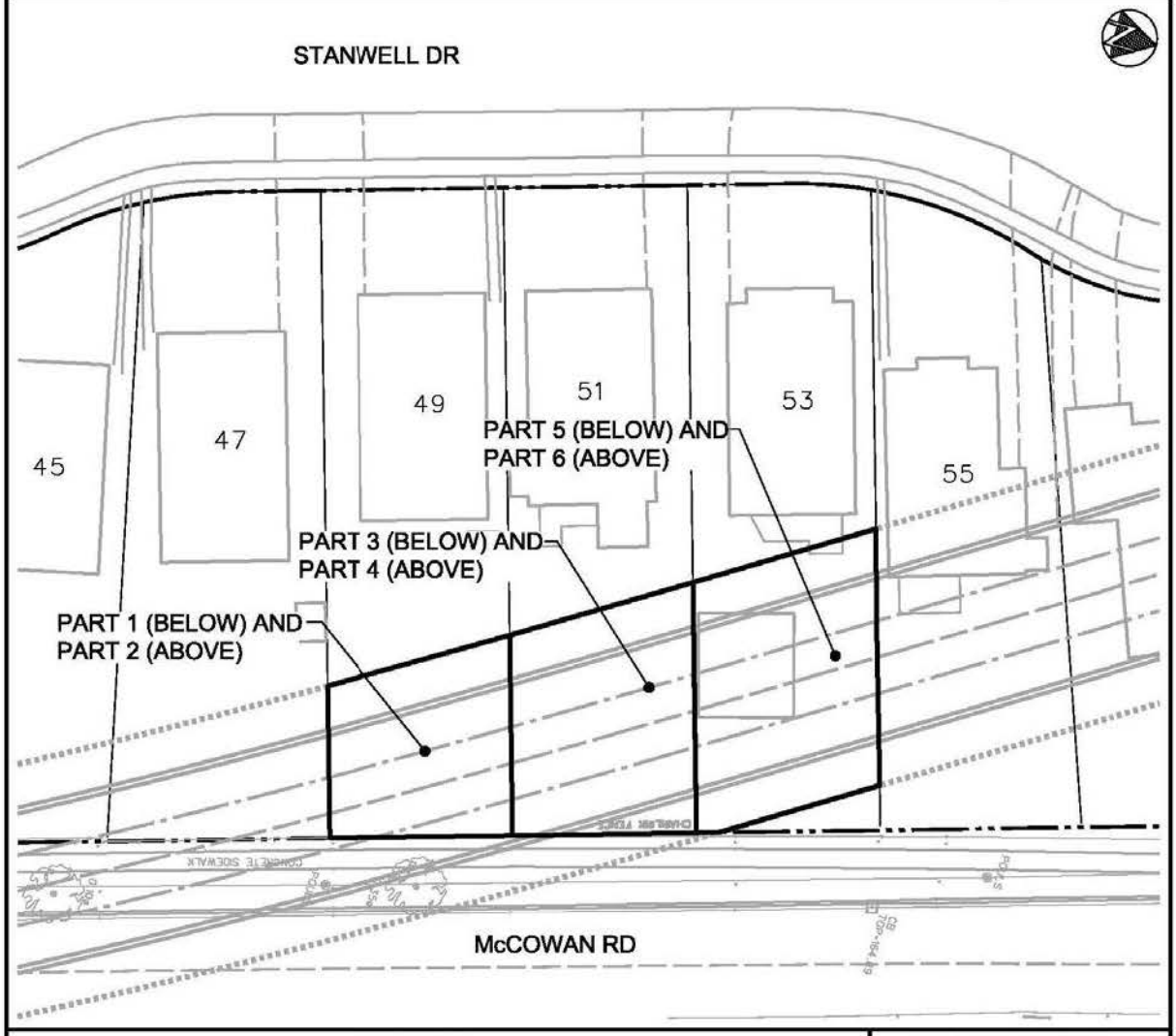
Scale 0 2 4 6 8 10 15m

PLOT DATE:17-Dec-2018

Property No. 88, 89 and 90

MODIFIED: 12/07/2018
REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062870167, 062870168, 062870169



LEGEND

PARTS 1, 3, 5	FEE SIMPLE FOR TUNNEL LANDS COMMENCING AT 6m BELOW GRADE
PARTS 2, 4, 6	SUPPORT EASEMENT
	EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	164sq.m
PART 2	164sq.m
PART 3	210sq.m
PART 4	210sq.m
PART 5	238sq.m
PART 6	238sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

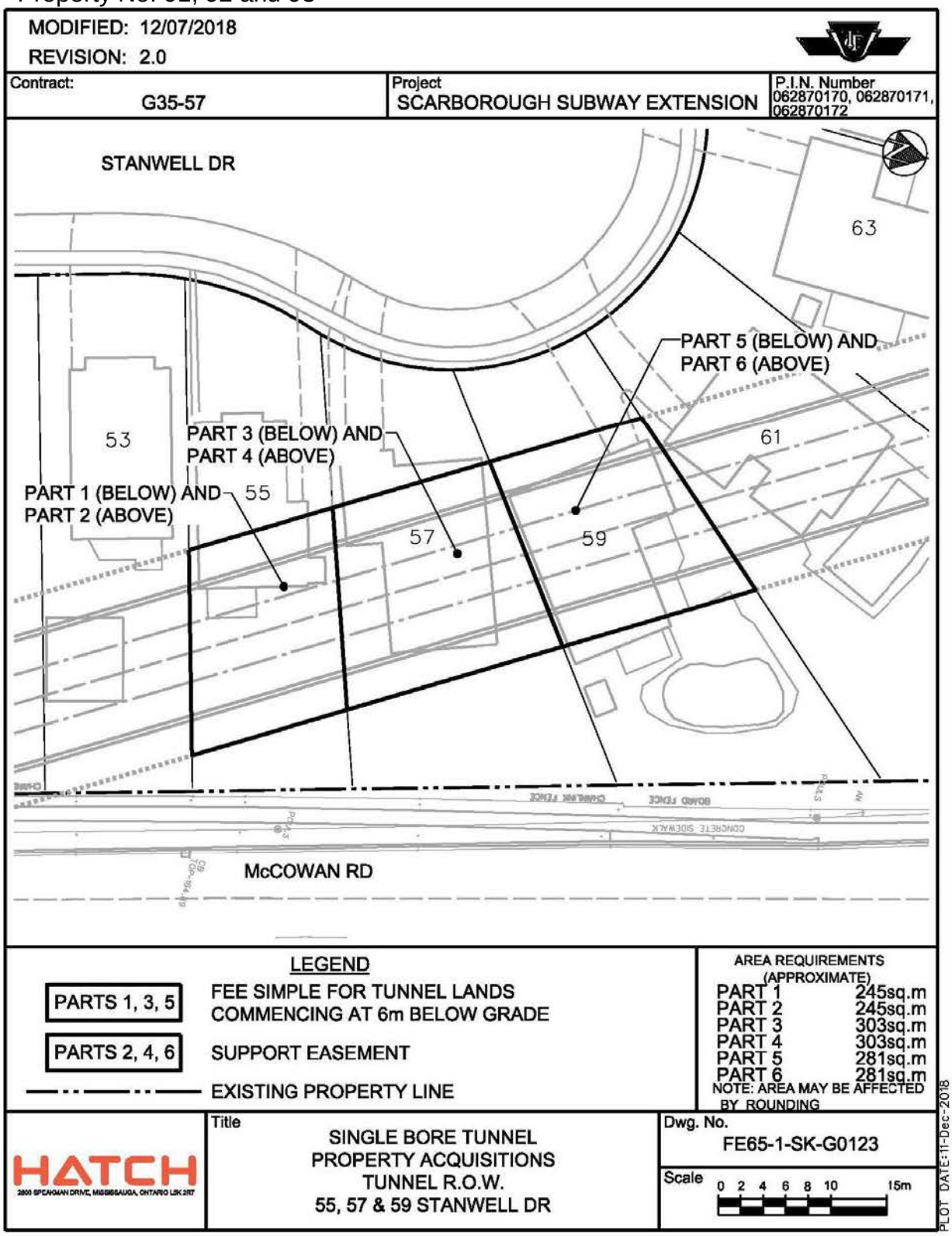
Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
TUNNEL R.O.W.
49, 51 & 53 STANWELL DR

Dwg. No.
FE65-1-SK-G0122

Scale 0 2 4 6 8 10 15m

PLOT DATE: 11-Dec-2018

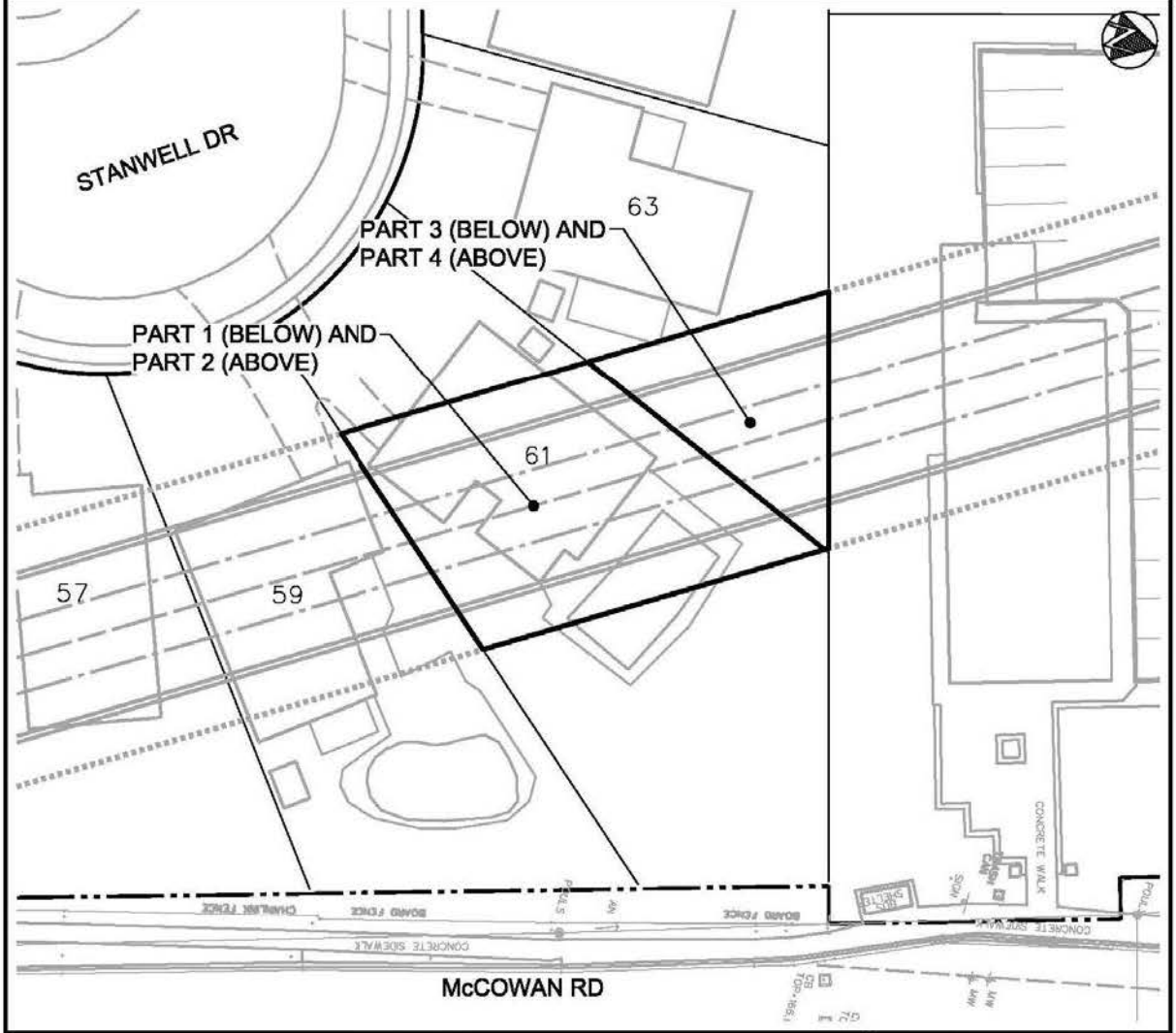
Property No. 91, 92 and 93



Property No. 94 and 95

MODIFIED: 12/07/2018
REVISION: 2.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	062870173, 062870174



LEGEND

PARTS 1, 3	FEE SIMPLE FOR TUNNEL LANDS COMMENCING AT 7m BELOW GRADE
PARTS 2, 4	SUPPORT EASEMENT
	EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	384sq.m
PART 2	384sq.m
PART 3	160sq.m
PART 4	160sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

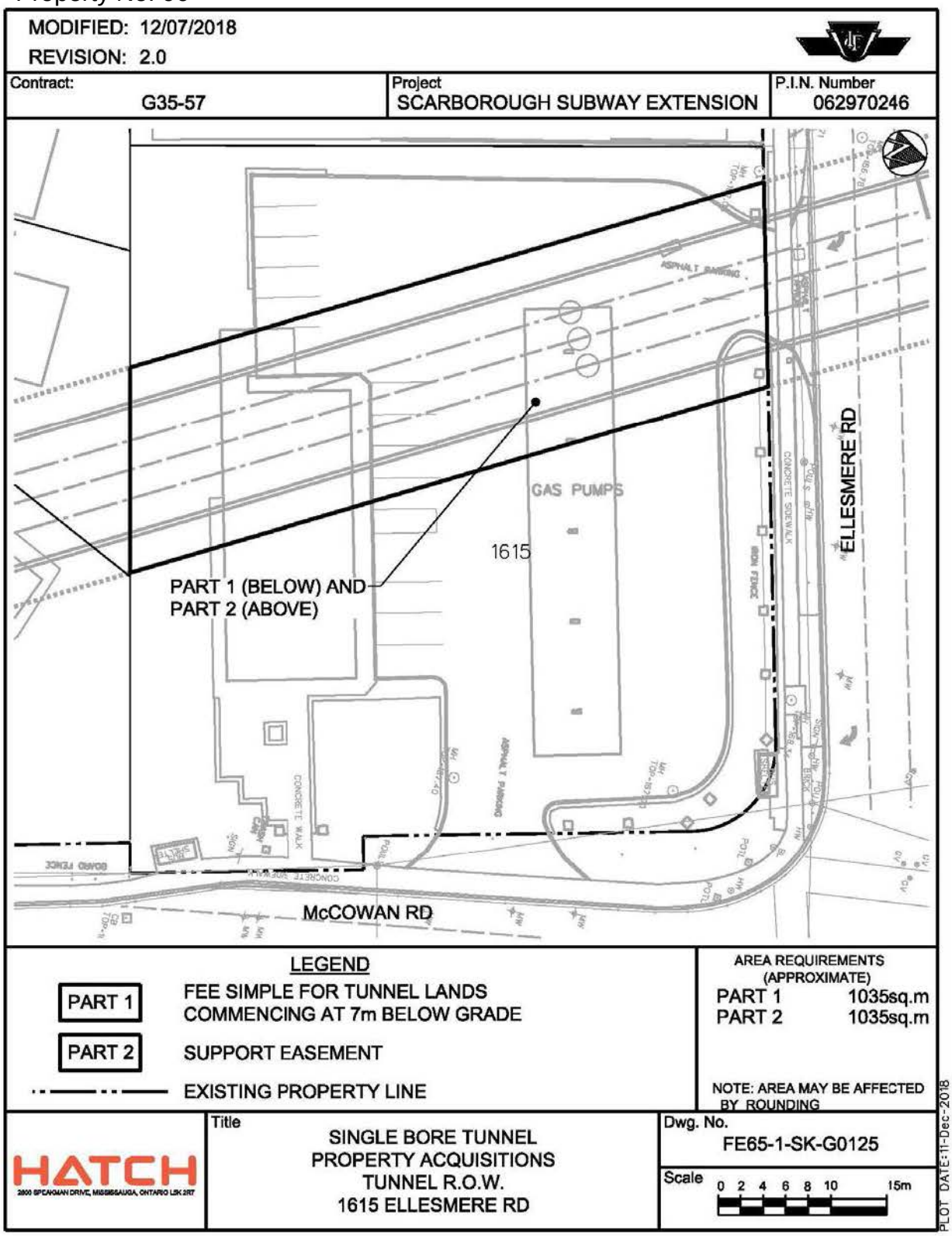
Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
TUNNEL R.O.W.
61 & 63 STANWELL DR

Dwg. No.
FE65-1-SK-G0124

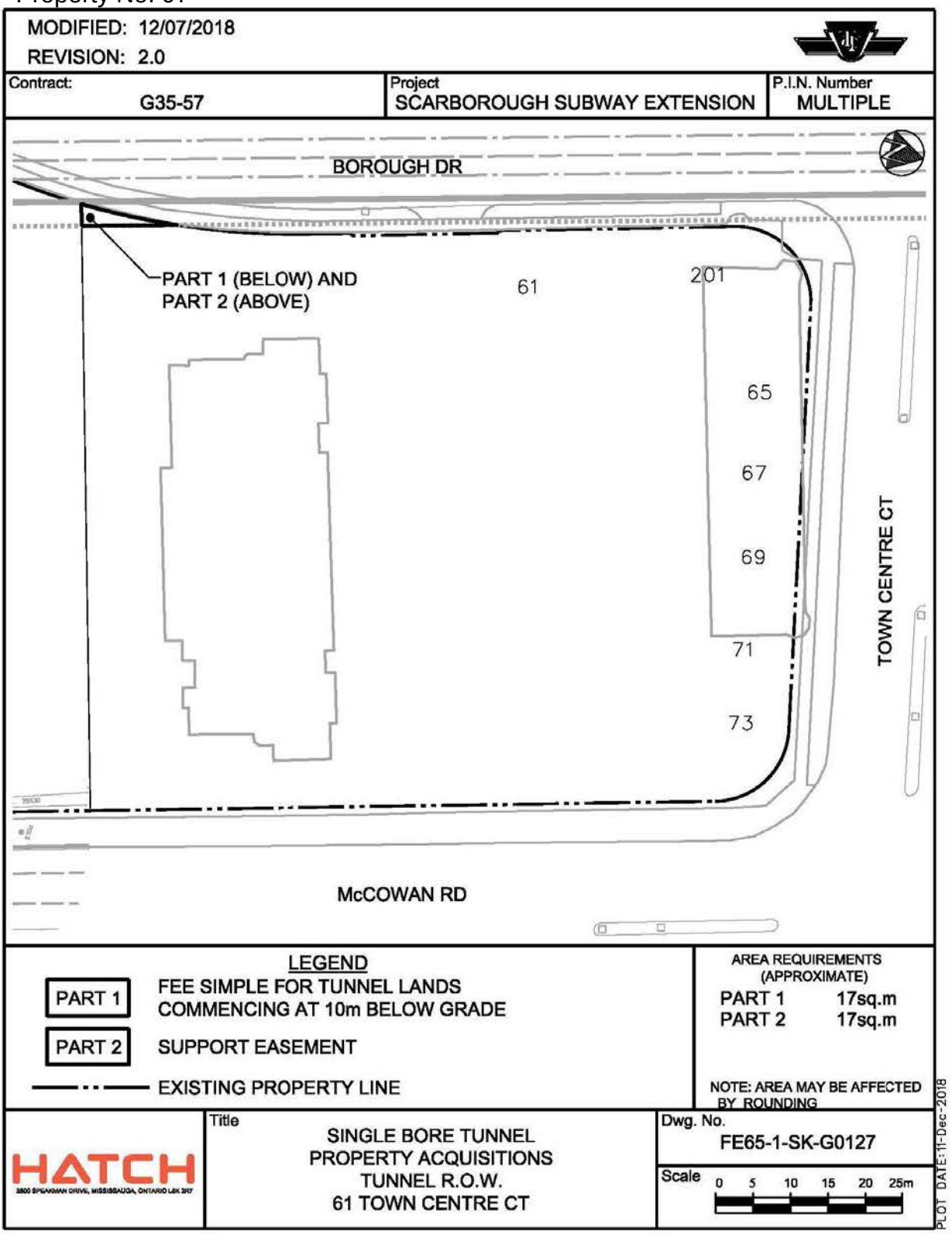
Scale 0 2 4 6 8 10 15m

PLOT DATE: 11-Dec-2018

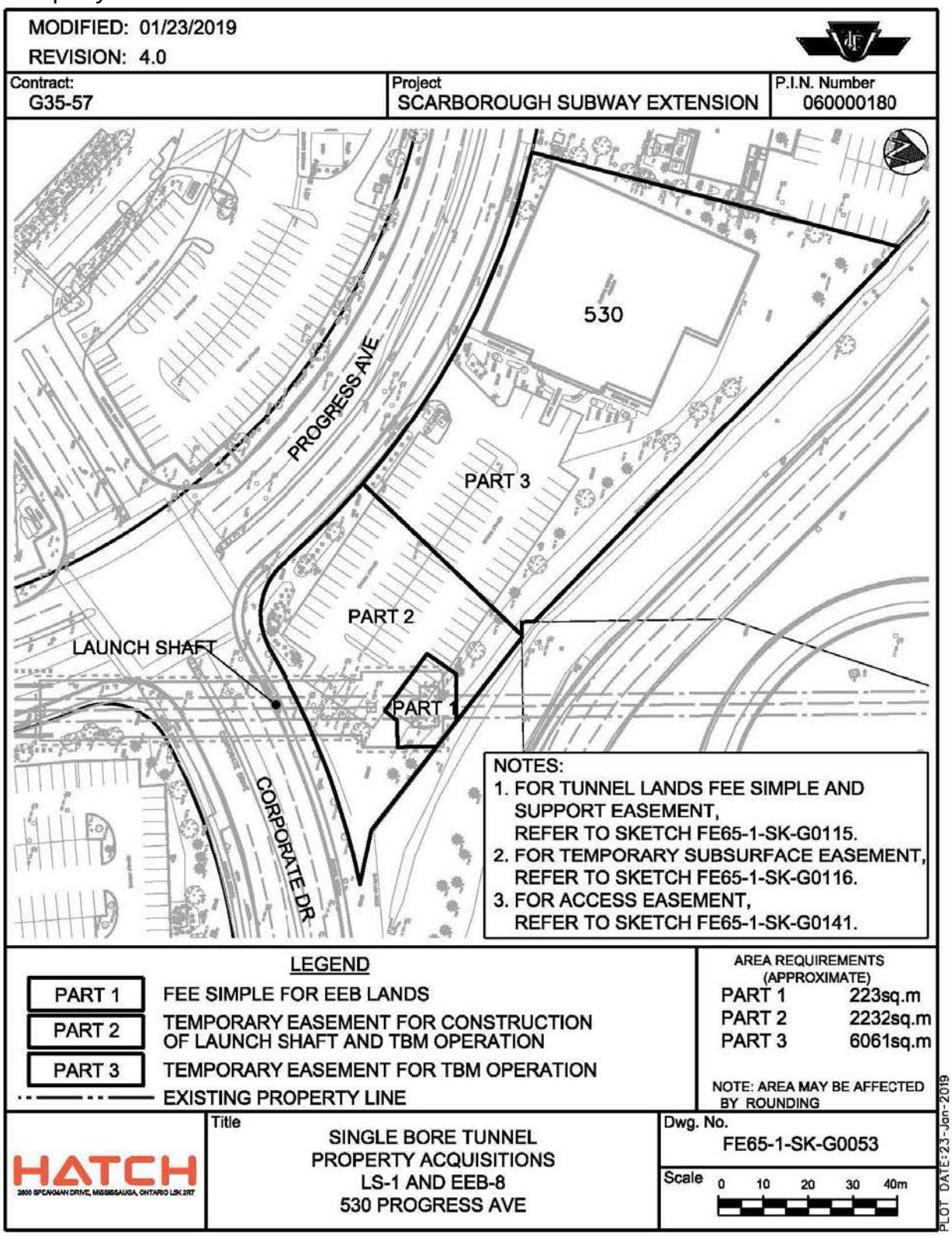
Property No. 96



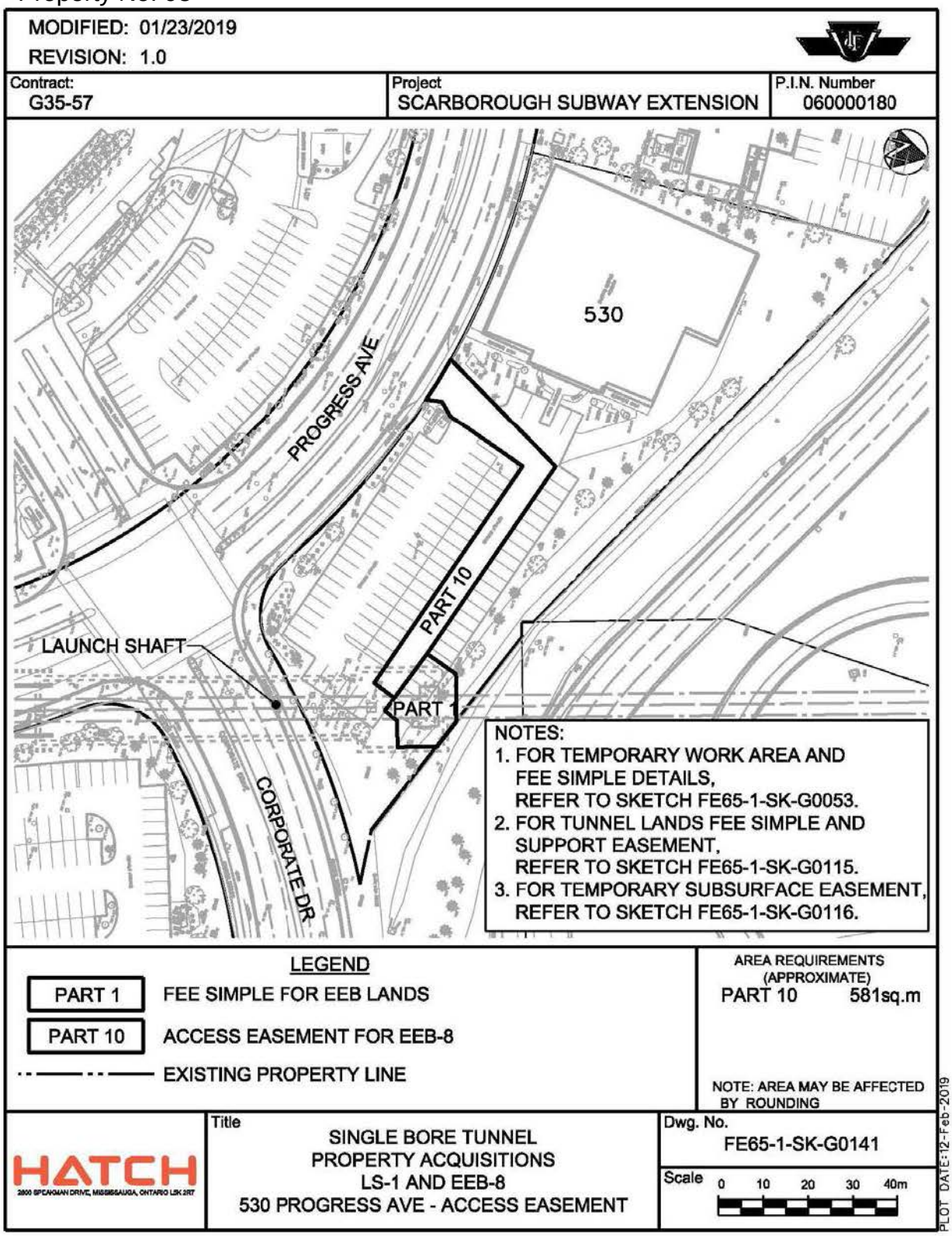
Property No. 97



Property No. 98



Property No. 98

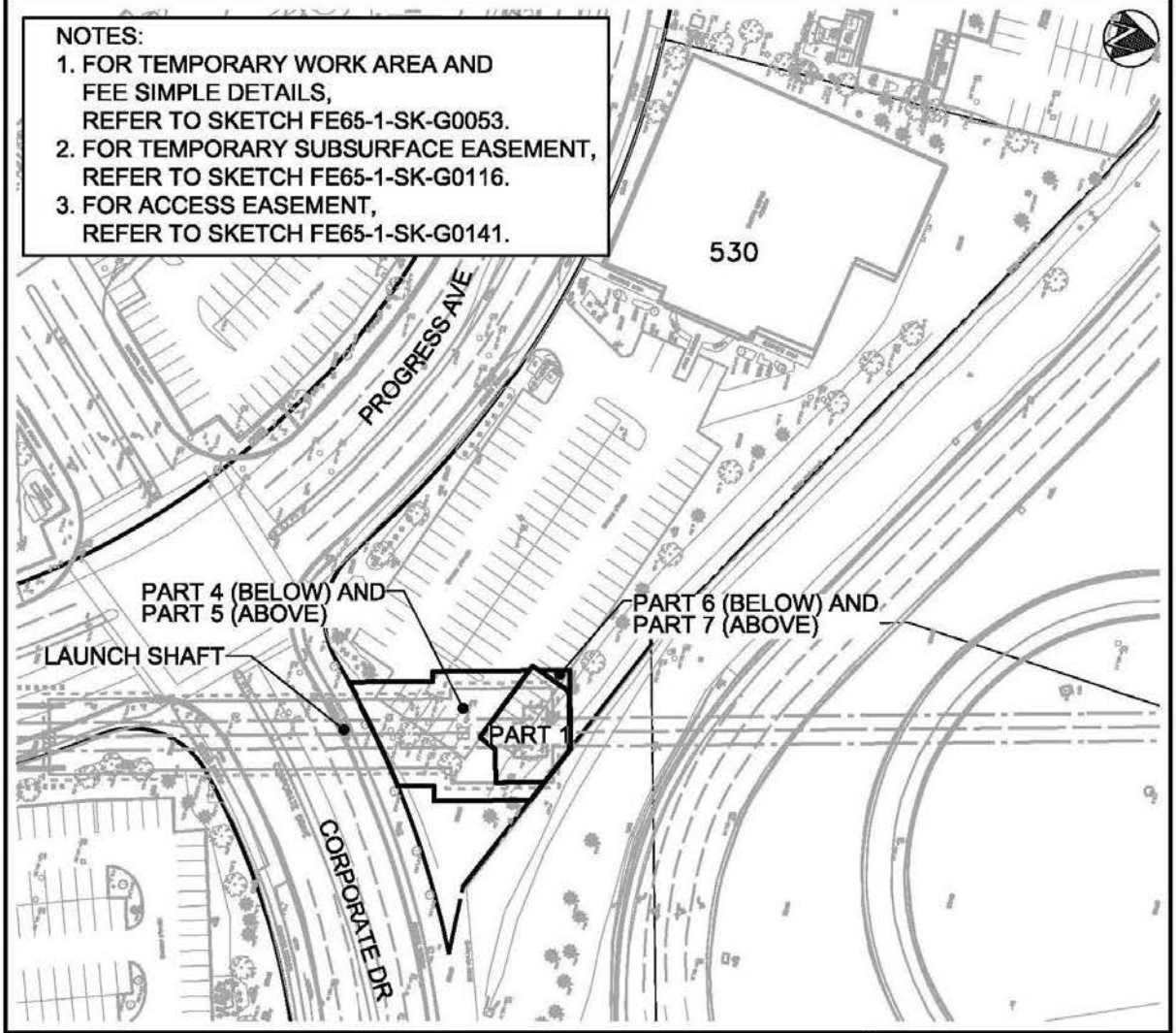


Property No. 98

MODIFIED: 01/23/2019

REVISION: 4.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	060000180



LEGEND

PART 1	FEE SIMPLE FOR EEB LANDS
PARTS 4, 6	FEE SIMPLE FOR TUNNEL LANDS COMMENCING AT 6m BELOW GRADE
PARTS 5, 7	SUPPORT EASEMENT
- - - —— - - - ——	EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 4	489sq.m
PART 5	489sq.m
PART 6	14sq.m
PART 7	14sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

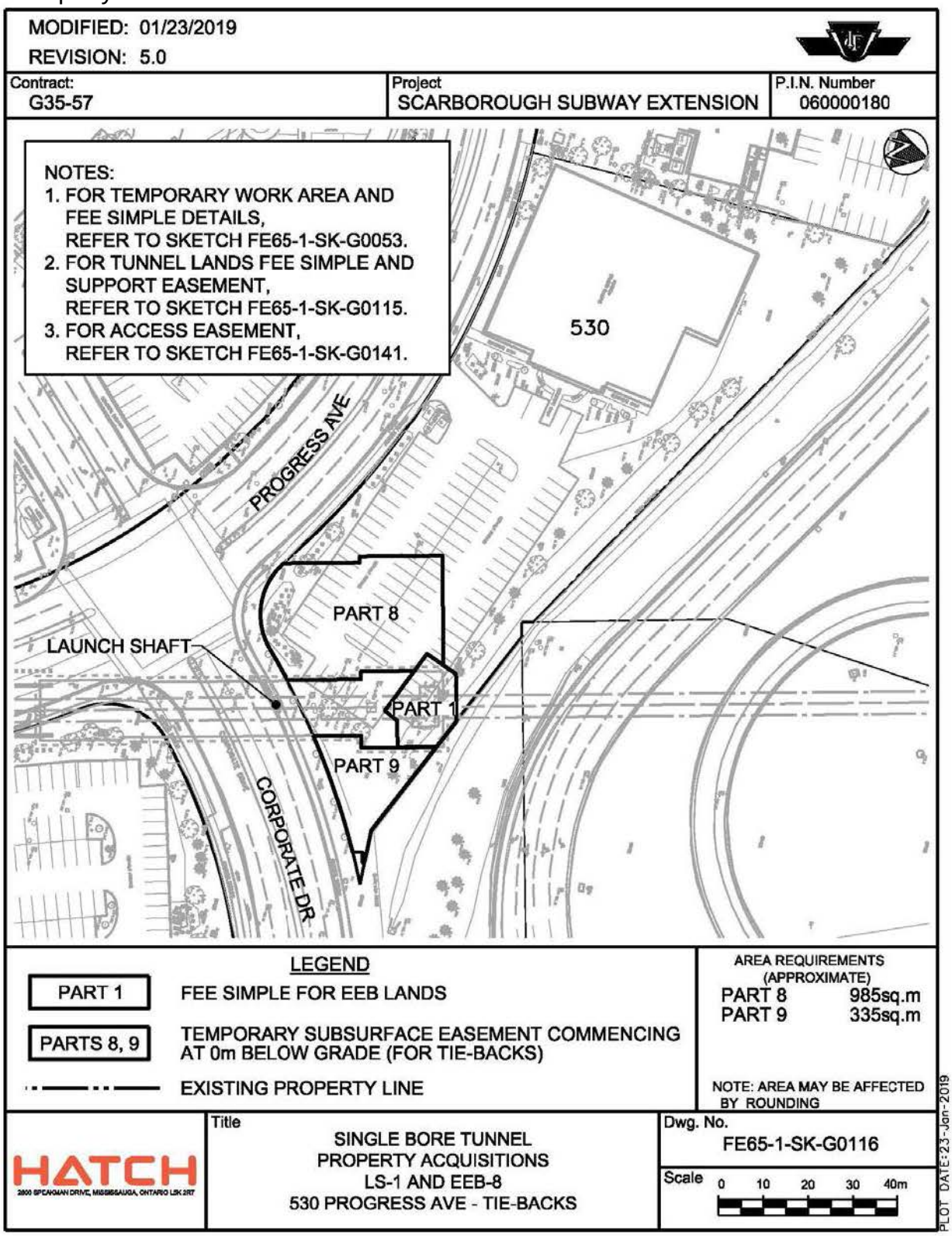
Title: SINGLE BORE TUNNEL PROPERTY ACQUISITIONS LS-1 AND EEB-8 530 PROGRESS AVE - TUNNEL

Dwg. No. FE65-1-SK-G0115

Scale 0 10 20 30 40m

PLOT DATE: 23-Jan-2019

Property No. 98



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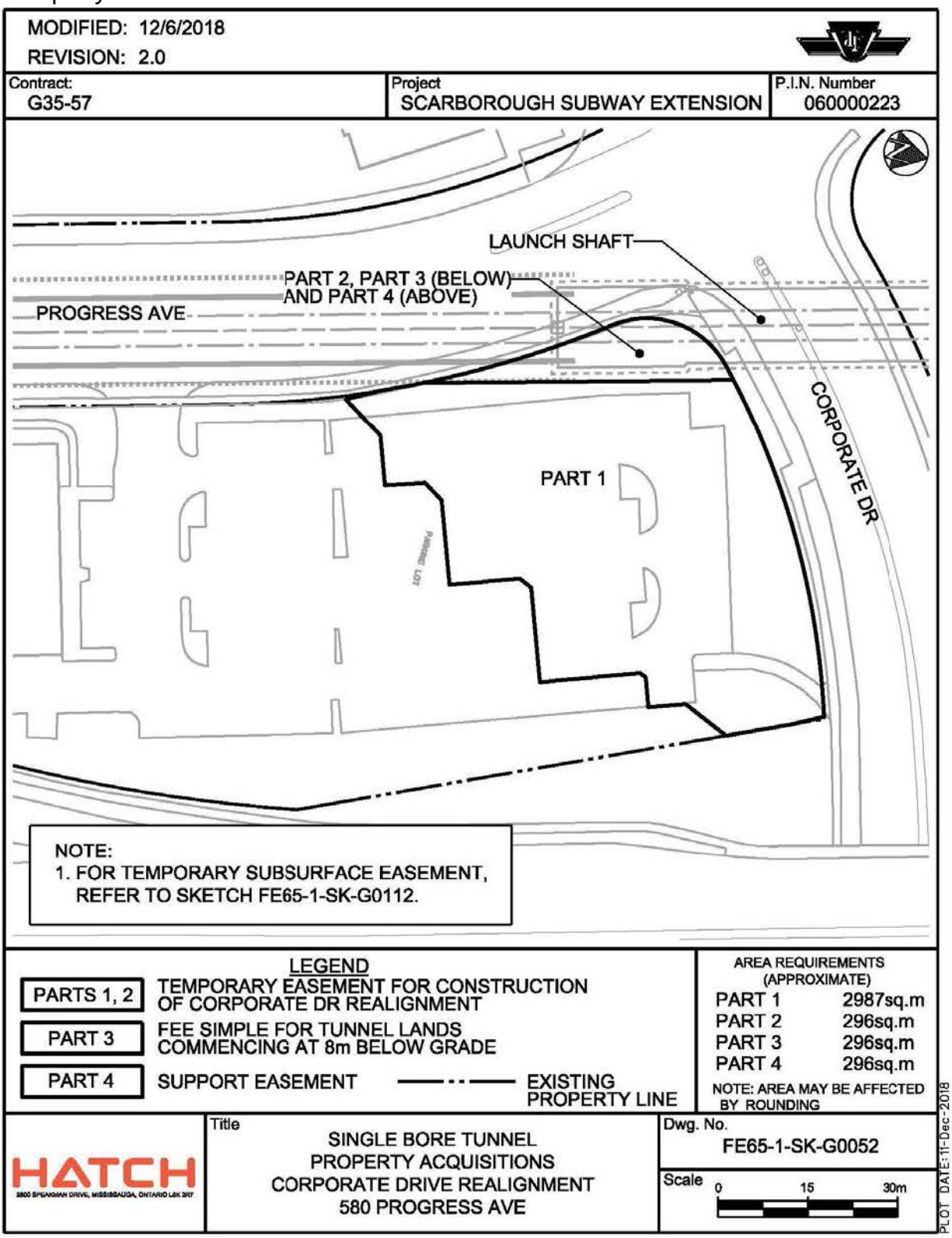

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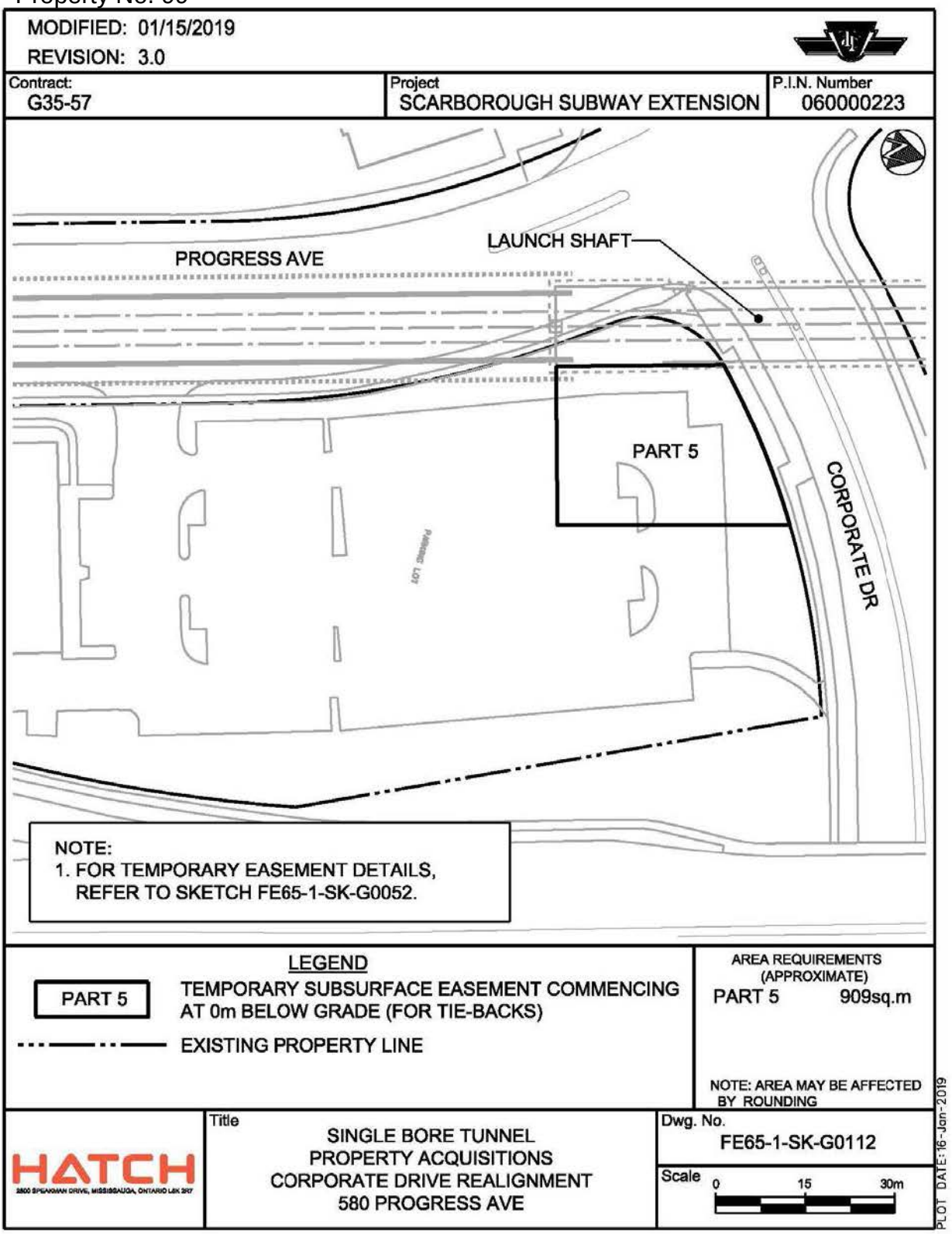

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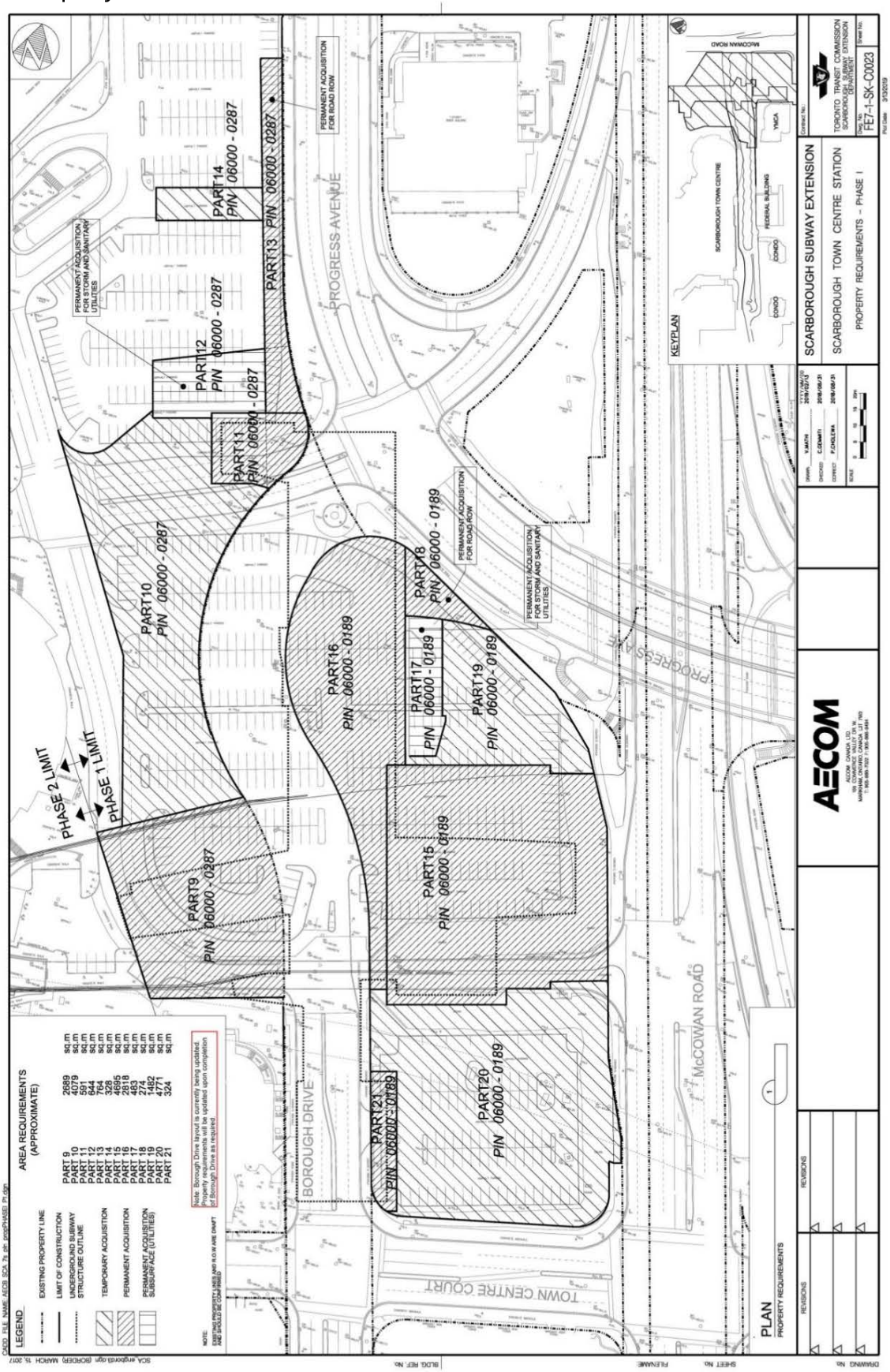

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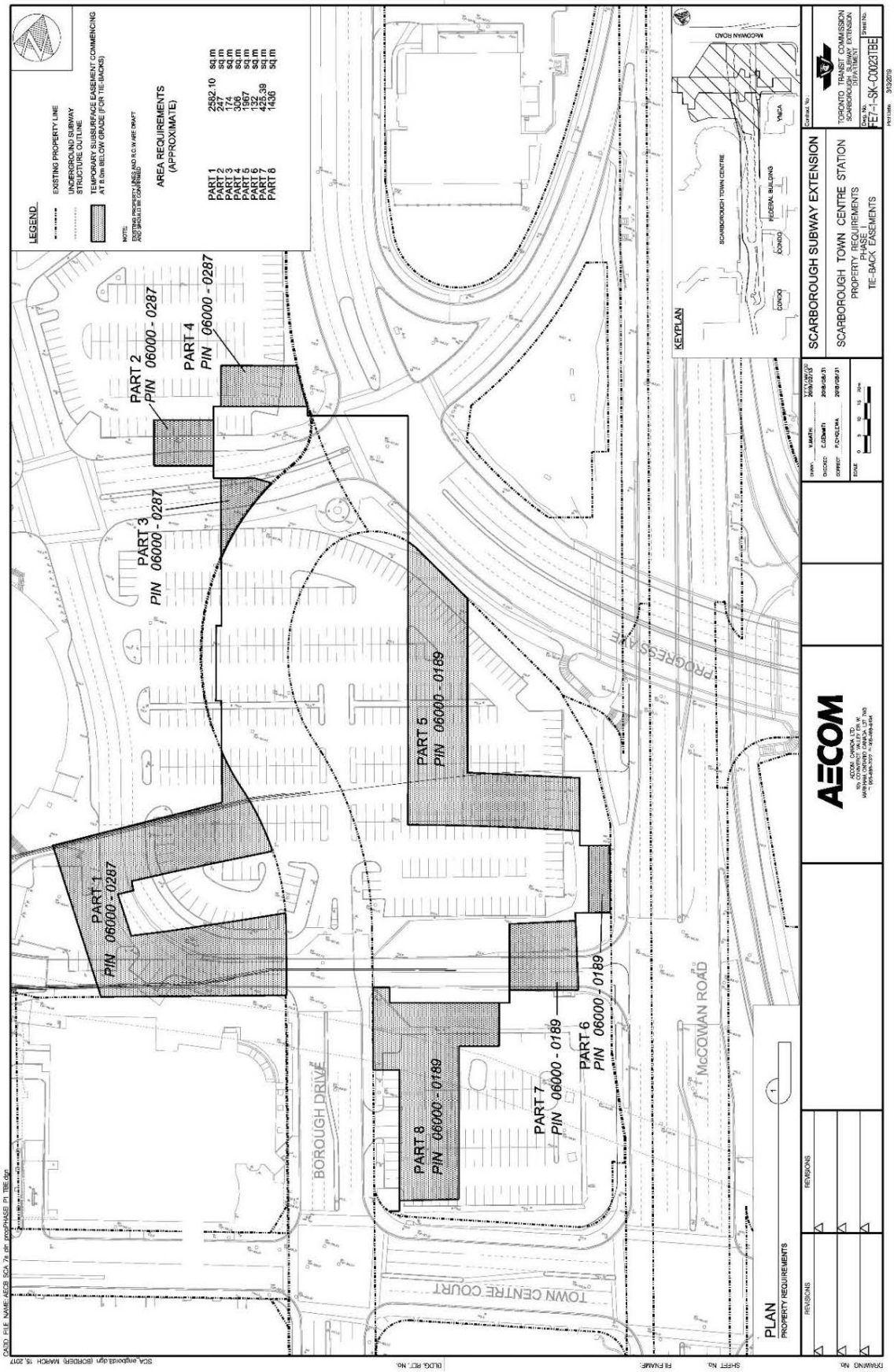


Property No. 100

MODIFIED: 01/15/2019
REVISION: 3.0

Contract:	Project	P.I.N. Number
G35-57	SCARBOROUGH SUBWAY EXTENSION	060000287

LEGEND

PARTS 1, 2 — TEMPORARY EASEMENT FOR CONSTRUCTION OF CORPORATE DR REALIGNMENT

PART 2 — SUBSURFACE EASEMENT COMMENCING AT 6m BELOW GRADE (FOR TIE-BACKS)

EXISTING PROPERTY LINE

AREA REQUIREMENTS (APPROXIMATE)

PART 1	1060sq.m
PART 2	10sq.m

NOTE: AREA MAY BE AFFECTED BY ROUNDING

HATCH
2800 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO L5K 2R7

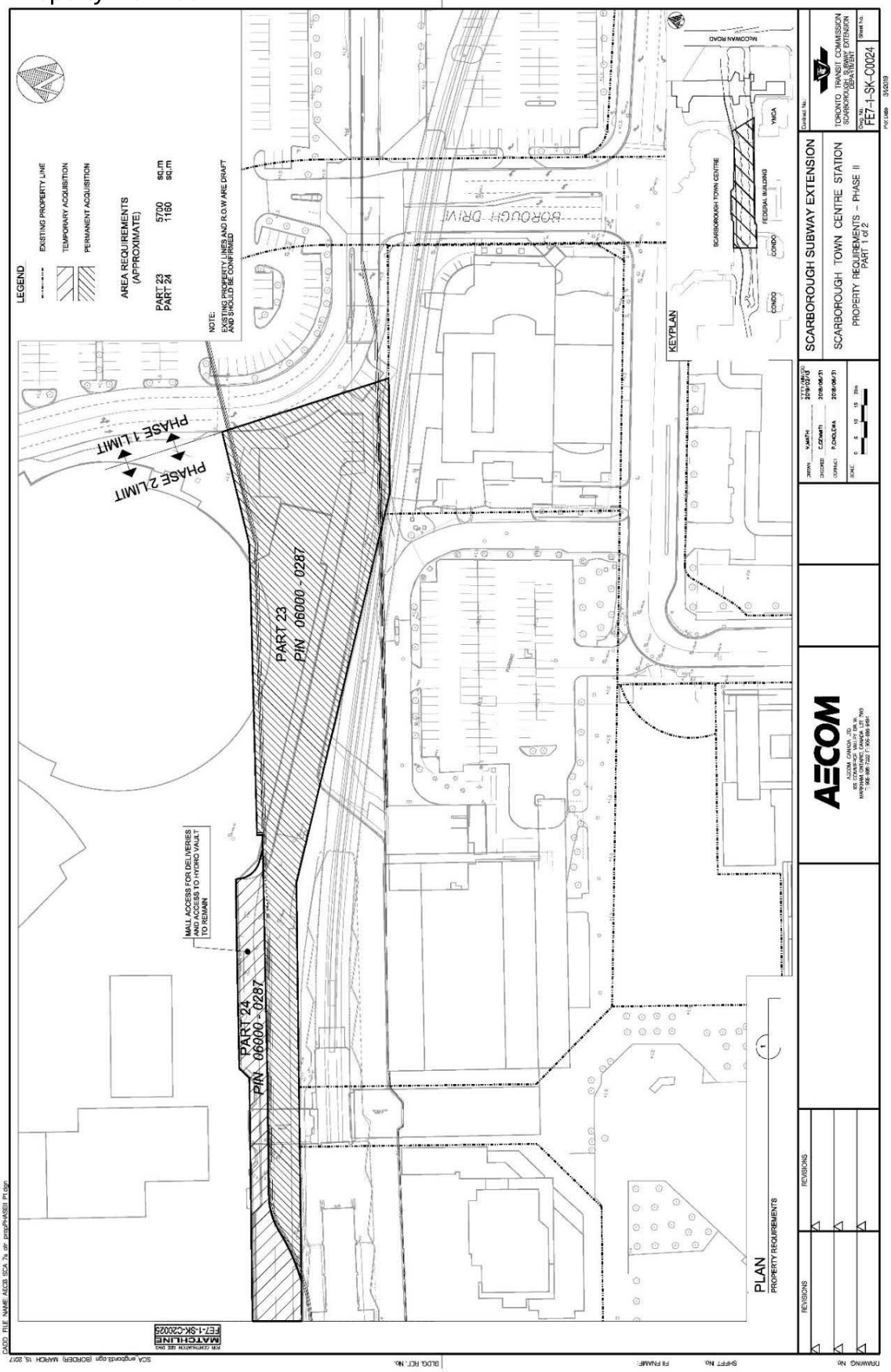
Title
SINGLE BORE TUNNEL
PROPERTY ACQUISITIONS
CORPORATE DRIVE REALIGNMENT
300 BOROUGH DR

Dwg. No.
FE65-1-SK-G0068

Scale 0 5 10 15 20m

PLOT DATE: 15-Jan-2019

Property No. 100



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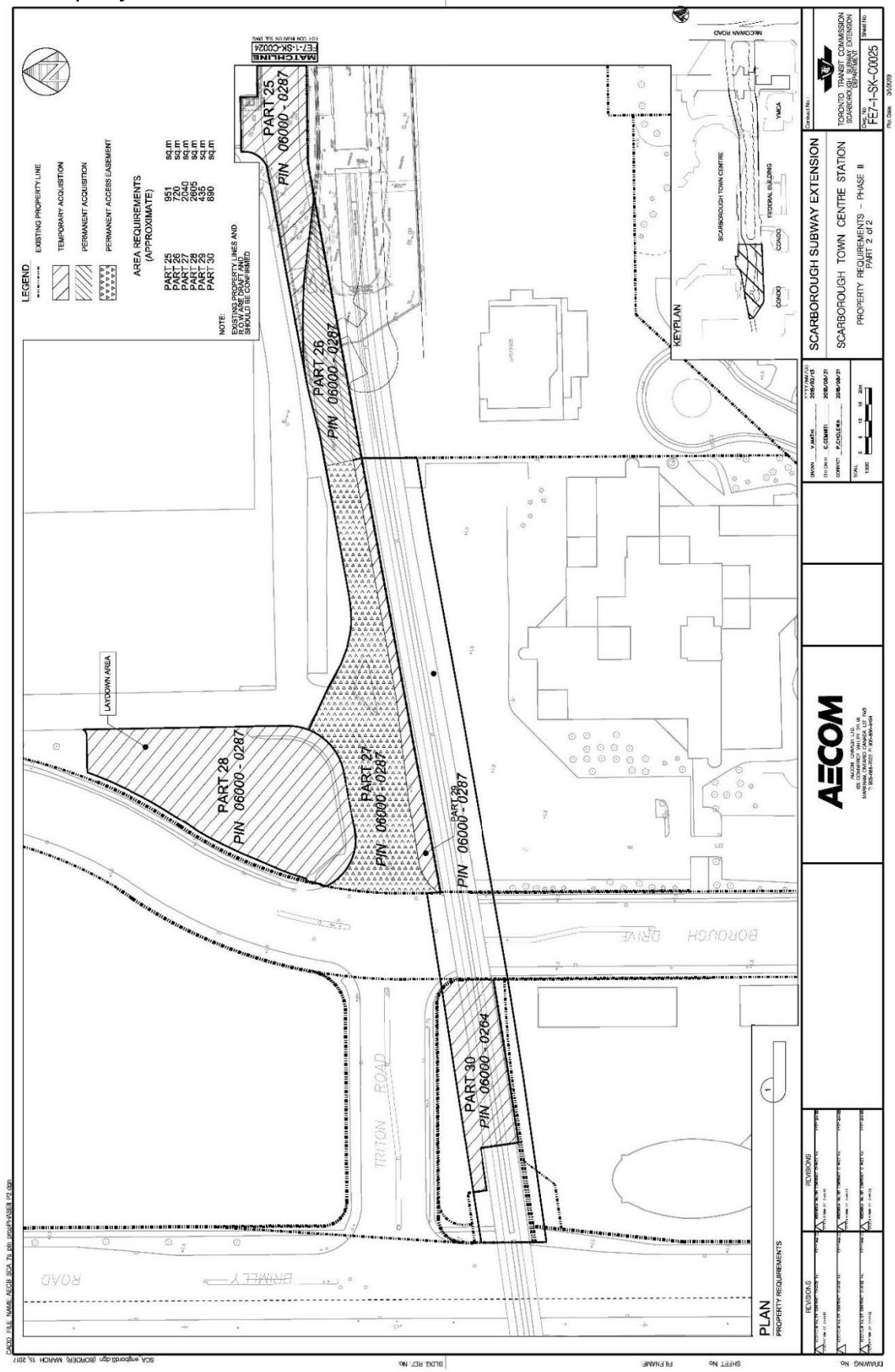
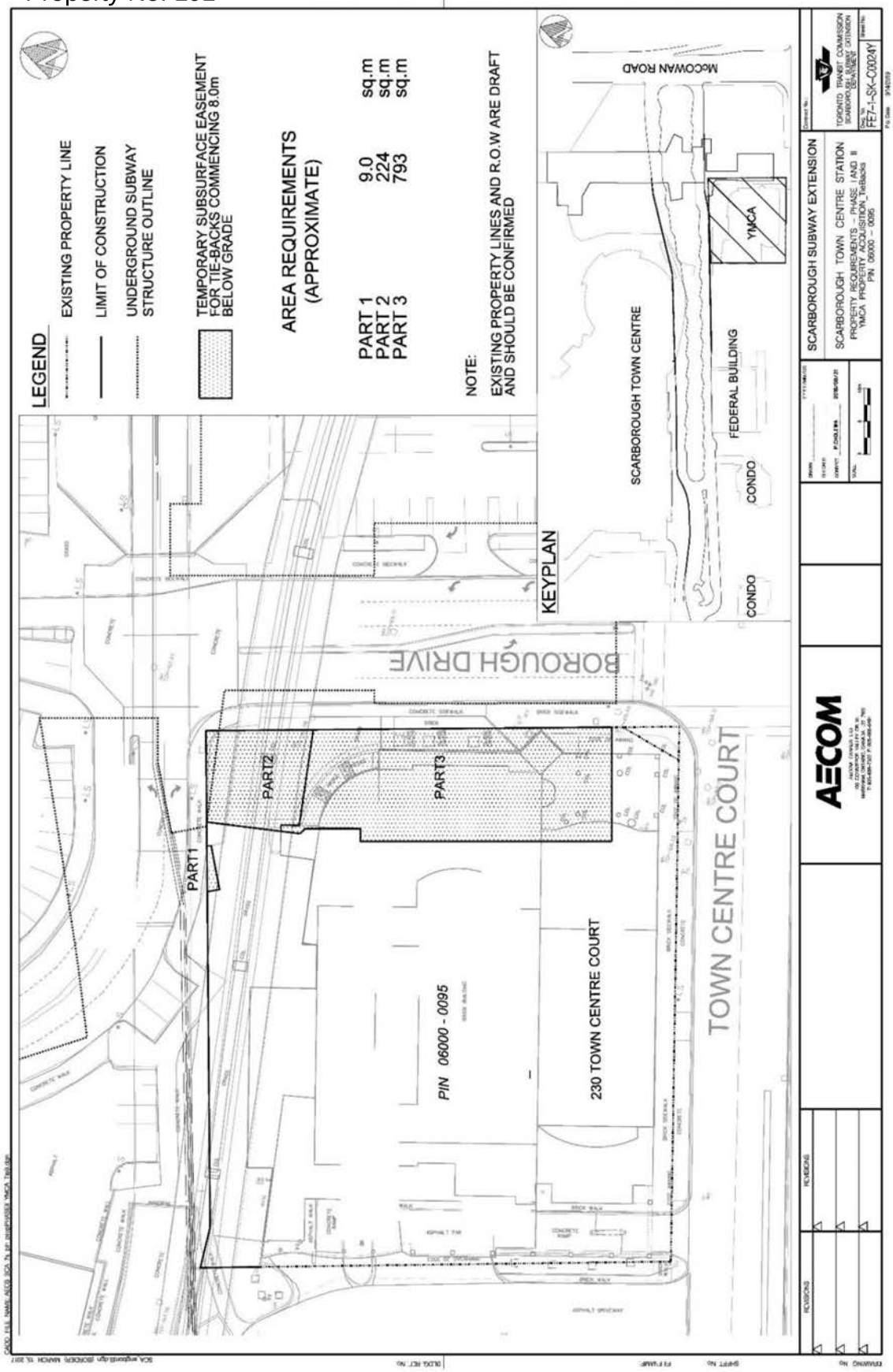
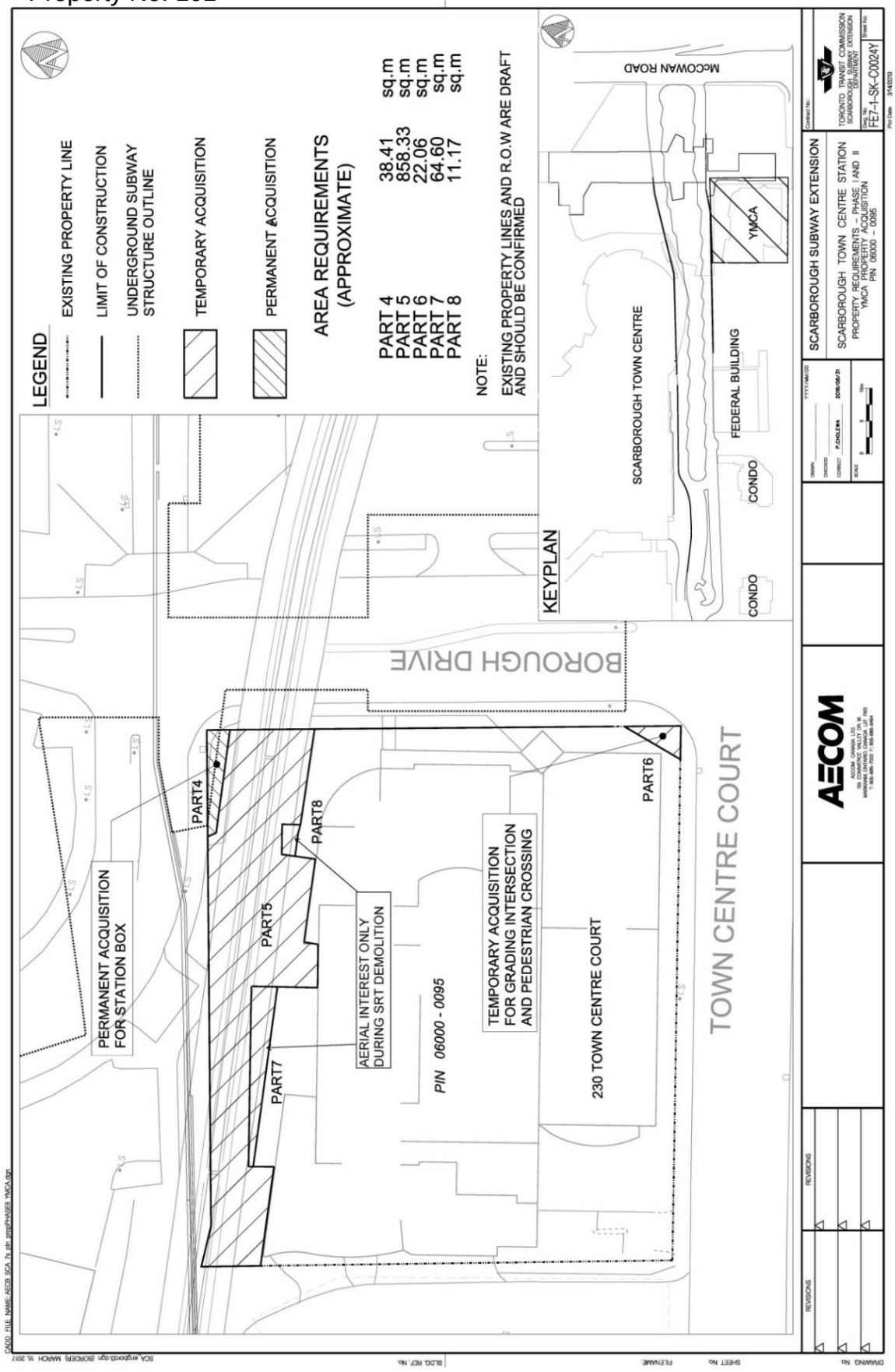


Property No. 101



Property No. 101



EX4.1

Appendix C

EXECUTIVE SUMMARIES OF PEER REVIEWS

Executive Summary –
Review of TTC schedule & cost analysis model

In February 2019, TTC commissioned Risk Decisions to review a Predict! Risk Analyser quantitative risk analysis model for one of their subway extension projects. The project is at 30% design and TTC are proceeding to a Stage Gate to get approval and set the project baseline. The analysis combines cost, schedule and risk information.

The scope of the review was to make a technical assessment of the construction, robustness and validity the analysis, considering the influence of the way it was built on outputs that may be used to support business case decisions. The scope excluded reviewing of any assumptions, or the accuracy and validity of the input data.

TTC adjusted the analysis throughout the review process. Risk Decisions' conclusions of the final analysis is that it is thorough, comprehensive, and well thought-out and constructed.

Below is a summary of the conclusions:

- General
  - The analysis is robust and produces reliable decision-making results based on the input data (and clarification statements from TTC where applicable).
  - Mathematical calculations are correctly made and cross-referenced.
  - Mechanisms to simulate correlation between elements of the analysis have been correctly implemented.
- The schedule
  - Partial progress of the schedule has been appropriately implemented to ensure that calculations to complete the schedule are valid.
  - Considered judgements have been made in identifying and ensuring that important activities are structured for analysis of their impact on key milestones.
  - TTC have explained the presence of any schedule constraints.
  - Risk Decisions has provided advice on changing the types of links used between some activities. These aren't activities that TTC are currently concerned with, though the advice would allow better modelling of risk and uncertainty against these activities should the need arise in the future.
  - Risk events have been appropriately linked into schedule activities to analyse their effects on key milestones.
- Costs
  - TTC has done an excellent job of representing the various uncertainty factors that could affect the cost of the project (rates, contractors' indirect uncertainty etc.).
  - Level-of-effort costs are calculated appropriately.
  - The calculations for the top-level total cost of the analysis are robust. Advice has been given on structuring the next layer of the analysis to aid clarity and understanding on how the costs calculations are broken down.

Document version: 27 March 2019

TTC Line 2 East Extension Project

Review DBB Master Construction Schedule
EXECUTIVE SUMMARY

Dominic Leadsom
Director

Turner & Townsend
2 St. Clair Avenue West, 12th Floor
Toronto, Ontario
M4V 1L5

t: +1 416 925 1424
e: Dominic.Leadsom@turntown.com
w: turnerandtownsend.com

TORONTO TRANSIT COMMISSION

30% Design Construction Schedule Review

TTC Line 2 East Extension Project

Toronto Transit Commission

Prepared by: Anahita Sadafi, Allan Sheung

Reviewed by: Dominic Leadsom, Stephane Chapuis, Sarbjit Bahra, James Lumsden

Document No: Can19352-50-RSR-001

21 March 2019

1 EXECUTIVE SUMMARY

The purpose of this report is to review and assess the constructability of the DBB Master Construction Schedule and Basis of Assumptions for Stage Gate#3 Document No.: SSE-PC-SCH-0001-BA submitted by Toronto Transit Commission. The review will highlight areas for improvement for further developing the schedule for future phases. Additionally it will also highlight where best practice are adopted.

Turner & Townsend was appointed by Toronto Transit Commission (TTC) to undertake a 30% design and estimate schedule review for the Line 2 East Extension, formerly the Scarborough Subway Extension (SSE).

The review utilizes qualitative and quantitative techniques based on the Turner & Townsend's model of excellence that incorporates AACE Recommended Practices to highlight gaps and provide recommendations for schedule development for future program phases.

1.1 Summary of Findings and Recommendations

1.1.1 Findings

- The Construction Schedule has been developed in accordance with the 30% design and estimation completion and based on the information available.
- The Project Scope Statements are well-defined and Work Breakdown Structure is well developed. All activities are well defined, sequentially and logically linked. All activities have predecessors and successors and Logic of schedule and sequence of activities are well-structured in schedule network as well as explained in basis of assumptions. Milestones are well-defined and support the entry and exit of each phase of project. The cascading approach has been reviewed and the WBS has been developed in-line with scope of the work packages.
- Revenue Start Date has been defined as completion date of phase and the rest of activities will be completed after Revenue Start Date.
- Duration allocated to work packages are reasonable and total duration is comparable with other similar projects in Canada.
- We have reviewed TTC's Line 2 East Extension Integrated Schedule-Cost Quantitative Risk Analysis report received on 8th March 2019, our schedule risk assessment is showing TTC schedule risk assessment is reasonable.

1.1.2 Recommendations & Improvements

For the next phase of the project we recommend the following issues be addressed as opportunities for improvement and are listed in order of priority:

- Review activities with a duration greater than two months can be further broken down, particularly those that are on the critical path. However, we understand that this is not a construction control schedule.
- We found over 50% of the activities have float greater than two months (high float). However, no open ends were found. We recommend TTC review the activities with high float to determine whether the consumption of that float is sensible and / or reasonable.
- Task / activities by WBS level(s), inconsistencies should be reviewed as some activities are grouped at WBS level 1 with none at level 3 or no activities grouped at WBS level 1 but tasks exist at level 3.
- Enhance activity codes, activity resources and other activity attributes, a more comprehensive activity code structure can help in filtering, grouping, and sorting activities.
- Review and address the 220 days of lag on the near critical path activity.
- If the contract is awarded as a single Design Bid Build (DBB) a single contractor will be in a better position to coordinate resources across work packages to optimize the schedule and work durations to provide flexible schedule to accelerate the work, reduce their risk and yield significant cost savings.
- Major long lead items such as tunnel boring machine manufacturing, special track work for example turnout, crossover, are recommended to be included and visible in the next phase of schedule development.
- The site constraints or difficult work conditions should be considered in the schedule which has the potential to decrease construction crews productivity, for example
  - Installing piles under existing water main or electrical duct banks,
  - Working near railroads, highway or historical buildings
  - Dealing with environmental hazards
  - Working in areas with limited space and room
  - Vibration, noise and dust restriction which will impact the neighbourhood
  - Related scope that requires need traffic diversion, such as road widening, restoration, utilities relocation, utilities connection, etc.
  -

  According to contractors' standard practice, winter condition allowances are usually between 10 to 12 days per calendar year. Extreme weather conditions such as freezing rain, cold temperatures, heavy rainfall and snowfall or flooding due to existing old storm sewers, can be evaluated during risk analysis.

- When work can only be performed at night or after TTC operational hours, the schedule should reflect night time or after hours construction activities, e.g. work to connect existing TPSS and Kennedy Station.
- The timing of a project's advertisement and issuing to the market will have an impact on bid prices from tender returns. The recommended bid closing months are April or May before the peak in construction activities for other major projects and programs.
- Construction Schedule of the following work packages should be developed in the next phase:
  - SCS Electrical/Mechanical breakdown and logic.
  - Line 2 East Extension Wide testing and commissioning breakdown.
  - Utilities.
  - SCS construction breakdown.
  - Impacts from extreme weather, e.g. extreme winter condition, flooding, earthquakes or major climate change.
  - Changes in regulatory requirements.
  - Changes in science or technology or in health & safety requirements.

TTC Line 2 East Extension Project

30% Design Estimate Review
Executive Summary

Dominic Leadsom
Director

Turner & Townsend
2 St. Clair Avenue West, 12th Floor
Toronto, Ontario
M4V 1L5

t: +1 416 925 1424
e: Dominic.Leadsom@turntown.com
w: turnerandtownsend.com

TORONTO TRANSIT COMMISSION

30% Design Estimate Review, Executive Summary, CAN19352-30-CSR-001

TTC Line 2 East Extension Project

Toronto Transit Commission

Prepared by: Paul Parham, Gareth Miller, Allan Sheung

Reviewed by: Dominic Leadsom, Stephane Chapuis, James Lumsden

15 February 2019

making the **difference**

1 EXECUTIVE SUMMARY

Turner & Townsend were appointed by Toronto Transit Commission (TTC) to undertake a 30% design estimate review of the Line 2 East Extension (L2EE), formerly Scarborough Subway Extension (SSE) project. The review focuses on the accuracy, correctness and reasonableness of the cost estimate for coming TTC stage gate requirement.

According to TTC Estimate Guideline and the American Association of Cost Engineers (AACE) International, Baseline Class 3 Estimate is recommended to be prepared by top-down (e.g. $/m2), factor based, and parametric approach.

Line 2 East Extension Cost Estimate has been prepared based on 30% Design submission and produced using a bottoms-up approach. The Cost Estimate includes more than 7,000 cost item details detailing quantity take-off material, union labors rates, equipment rates, crew assemblies and productivities, man hours, cost allowance supported by historical project data, contractor markup, owner's staff resources, risk, contingency and escalation.

In summary, Turner & Townsend finds that TTC has substantially met the objective to setup the baseline estimate for coming project stage requirement. The Estimate Review team did not find any items that could be classified as Critical. 85% of the items reviewed were considered as accurate, correct and reasonable while 15% can be improved in the next submission.

Our findings, as substantiated in this assessment, are:

- TTC properly developed and supported its baseline estimate for L2EE Project in conformance with TTC guideline and exceed AACE International guidance Class 3 requirement.
- TTC estimating process is robust and thorough in the development of the L2EE Project baseline estimate. The process used for developing the majority of the L2EE Project work packages was thorough and well-defined.
- TTC's process for developing the estimate baseline was generally successful in advancing the maturity of the work, and was consistent in characterizing its project estimates. As noted, approximately 90% of the

project estimates achieved sufficient maturity to be characterized as Class 2 or 3 levels.

- The Cost Estimate is aligned with our experience for Greater Toronto Area (GTA) mega transit capital projects for his nature and can form the basis for a robust project controls regime and budget approval.

ATTACHMENT 3

WATERFRONT TRANSIT NETWORK – UNION STATION-QUEENS QUAY LINK AND EAST BAYFRONT LRT

The Waterfront Transit Network Program comprises several transit expansion and improvement projects in various stages of the project lifecycle. Two priority segments of the Waterfront Transit Network are the Union Station-Queens Quay Link (and East Bayfront LRT), and the Exhibition Loop - Dufferin Gate Loop Connection (see Attachment 1).

This Attachment reports on the updated options analysis associated with the Union Station-Queens Quay Link as a component of the East Bayfront Transit (LRT) Project.

A focused study area for the Union Station-Queens Quay Link includes the lower Bay Street Corridor between Front Street and Queens Quay, and the Queens Quay Corridor between approximately York and Freeland Street (Figure 1). The surface section of LRT along Queens Quay to the vicinity of Parliament Street, approved through the 2010 East Bayfront Transit EA is already in an advanced phase of design (>30%).

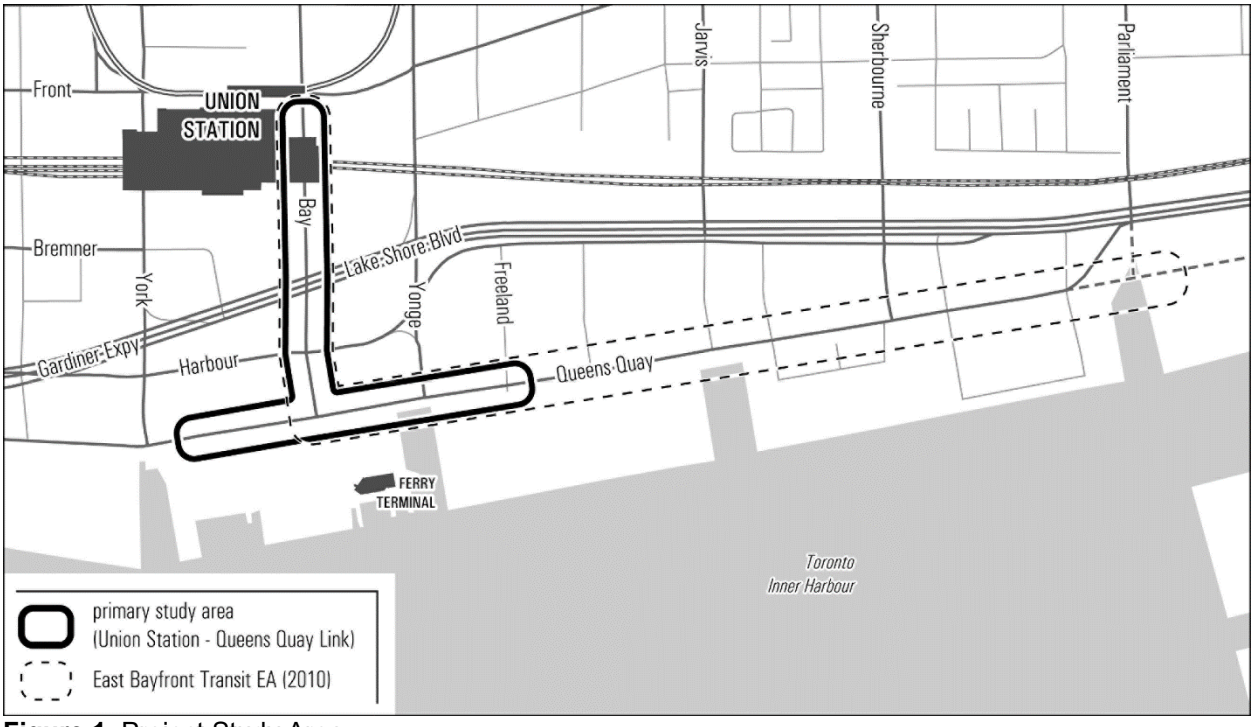


Figure 1. Project Study Area

The Union Station-Queens Quay Link, including the integrated East Bayfront LRT along Queens Quay is currently in the initiation and development phase of the project lifecycle, and is now at a decision-gate seeking authority to move to the next phase – preliminary design and engineering.

Decision History

In November 2015, City Council considered the report *EX9.9 Waterfront Transit Reset*, and directed City staff in consultation with the TTC and Waterfront Toronto to undertake a comprehensive review of waterfront transit initiatives and options.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.EX9.9

In July 2016, City Council considered the report *EX16.17 Waterfront Transit Network Vision* and directed City staff to initiate a second phase of the Waterfront Transit "Reset" for further development and costing of alignment concepts, detailed analysis of transit operations and ridership, identification of priority segments, as well as a Business Case and implementation strategy for delivering a coordinated waterfront transit solution.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.17

In January 2018, City Council considered the report *EX30.1 Waterfront Transit Network Plan*, and endorsed the overall Waterfront Transit Network Plan, including identification of priority segments. Council directed staff to complete a focused feasibility study of light rail and automated funicular technology options for connecting transit below grade between Union Station and Queens Quay.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX30.1

Current Status of Project

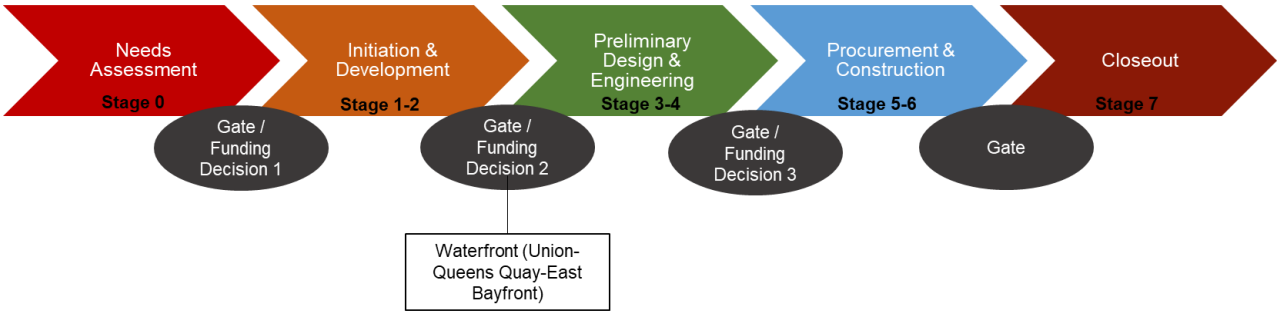


Figure 2. Current Status in the Project Lifecycle

The Union Station-Queens Quay Link is at a minimum of 5-10% design, with updated Class 4 cost estimates (Figure 2). The project is now ready to seek approval of the preferred technology option to proceed to the preliminary design and engineering phase. The previously approved surface section of the East Bayfront LRT along Queens Quay to the vicinity of Parliament Street is already in an advanced (>30%) phase of design. The line will ultimately connect to the Port Lands via an extension of Queens Quay to Cherry Street.

The 2010 East Bayfront Transit EA approved an LRT line from Union Station and along Queens Quay East to an interim loop in the vicinity of Parliament Street.[1] The EA included a streetcar portal along Queens Quay east of Yonge Street to transition the line from below grade under Bay Street to the surface along Queens Quay East. The EA also included a concept to expand the Union Station streetcar loop in order to accommodate the increased demand on the line. This element and the Bay Street section of the EA in particular were the focus for this study.

As directed by Council in EX30.1,[2] the feasibility study of light rail and automated funicular technology to connect transit below grade between Union Station and Queens Quay has been completed. A consultant team (led by Arup Canada) assisted the City with the study. This project is a partnership between the City, TTC, and Waterfront Toronto, led by the City Planning Division. Metrolinx was also consulted on the project.

The results of this study confirmed two viable options to improve the transit link between Union Station and Queens Quay – a Streetcar (Loop Expansion) Option and a driverless Automated People Mover (APM) Option. Each option was found to be consistent with Provincial 2041 Regional Transportation Plan Goals that will achieve higher transit ridership along the waterfront while providing access to key destinations for both residents and visitors.

Based on the analysis described in this attachment, the recommended preferred option is the Streetcar (Loop Expansion) Option. The key reason is that it expands the TTC's streetcar network capacity at the critical Union Station hub, allowing substantial flexibility for future waterfront streetcar service and operations to serve the significant and unique demands of the waterfront. The Streetcar Option provides a more convenient, moderately faster, and more accessible connection because no additional transfers or changes in vertical access would be required.

The preferred Streetcar (Loop Expansion) Option is generally consistent with the approved 2010 East Bayfront Transit EA Concept, with some key additional modifications to the design of both the Union and Queens Quay/Bay streetcar stations. The purpose of the modifications is to meet current transit station design and building codes, improve service and operational flexibility, and better integrate and connect transit passengers to adjoining land uses, transit services, and Union Station improvement plans.

Comments / Analysis

1. Project Objectives and Benefits

Toronto's waterfront is a unique and defining characteristic of the City. The area sees millions of annual visitors at its many venues and natural amenities and is increasingly

[1] https://waterfrontoronto.ca/nbe/wcm/connect/waterfront/611b92f5-1201-48ff-ac74-2f3de96dc609/ebf_environmsntal_study_report_1.pdf?MOD=AJPERES
[2] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX30.1

becoming a mixed-use environment with new residences, schools, parks and workplaces. In the coming years, thousands of new residents will call the waterfront home, and many more will travel to and from the area on a daily basis to work and play. Population in the larger waterfront between Long Branch and the Port Lands is projected to increase by approximately 280,000 (83%) between 2011 and 2041, and employment growth for the same period is anticipated to increase by approximately 190,000 new jobs (38%). The East Bayfront in particular is anticipated to accommodate 6,000 residential units and 8,000 jobs, with millions of square feet of employment space. The completion of the waterfront transit network, and the improvements to the Union Station-Queens Quay Link in particular, is critical to support existing residents, businesses, tourism, and future growth.

Beginning in 2015, the Waterfront Transit Reset established a new vision for guiding Toronto's waterfront transit network planning: "*Provide high quality transit that will integrate waterfront communities, jobs, and destinations and link the waterfront to the broader City and regional transportation network.*"

Travel demand forecasting at various stages of the study all confirmed that light rail transit or equivalent capacity technology will support future transit demand along the waterfront between Long Branch and Leslie Street to the 2041 horizon year. The network can be phased according to infrastructure coordination and demand priorities, but the most critical component is the link to Union Station. The improvement of this connection will allow the benefits of the rest of the waterfront network to be fully realized. The existing underground streetcar loop at Union Station and connecting 540 metre long tunnel to Queens Quay opened in 1990. This facility is currently overtaxed with existing demand and inadequate to serve future ridership needs. A single narrow platform is currently used for both alighting and boarding by two separate routes, served by a single track. A streetcar loop expansion concept at Union Station was approved in 2010 as part of the East Bayfront Transit EA, but has remained unfunded.

Currently, approximately 1,000 passengers use the existing streetcar service southbound between Union Station and Queens Quay in the AM Peak Hour and up to 1500 passengers use the system northbound in the AM Peak Hour. Additionally, thousands of walk trips are made along Bay Street and in the PATH network between Union Station and destinations in the Queens Quay and Bay Street area.

During special events at Exhibition Place or in the Central Waterfront, transit demand at the existing Union streetcar loop is even greater, exceeding weekday peak volumes. For example, during the Canadian National Exhibition, hourly volumes approach 2,000 on the 509 Harbourfront streetcar. Queues for streetcar service during these events routinely extend into the Union Station concourse level.

Future AM peak hour transit demand in the corridor is projected to be 4,000 to 8,000 passengers southbound by 2041, with significantly greater numbers of walking trips. Demand projections assume all Council-approved transit projects including the Relief Line South, and fare integration.

As noted, waterfront areas feature a very high concentration of tourism, recreation and special event activities, which increase all day transit ridership. Trips generated by these significant travel activities, and trips made to/from the Billy Bishop City Centre Airport, are not fully captured in the transit demand estimating model, and therefore the actual all-day ridership numbers will likely be higher. This issue would affect the Business Case findings for both technologies, which reflect the all-day transit forecast generated by the ridership model.

2. Detailed Background Investigation and Initial Screening Process

The January 2018 report to Council on the Waterfront Transit Network Plan carried forward two categories of options for further focused assessment:

1. Streetcar loop expansion at Union Station including either 2 or 4 platforms;
2. Funicular (or alternative transit technology) below Bay Street including either a below-grade or above-grade streetcar at Queens Quay and Bay.

The following work was undertaken by the project team to help refine the two categories of options for the Union Station-Queens Quay Link:

A. Background and Constraints Review – to improve understanding of constraints to constructability;
B. Confirm technology – to further examine transit technologies which can serve forecast ridership considering the constraints to constructability;
C. Ridership Review – to update the forecast transit demand for the Bay and Queens Quay corridors; and
D. Screening – an initial screening of options within the two categories

A) Background and Constraints Review

The project team reviewed transit designs, utilities and other information from a number of previous and ongoing initiatives in the project area.

In summary, the review found the most significant constraints in the vicinity of the existing Union Station streetcar loop area below and adjacent to the Bay Street right-of-way and the Union Station Rail Corridor (USRC). Key constraints in this area include existing high pedestrian volumes/corridors, major hydro and sewer utilities, existing and proposed building foundations including 141 Bay Street and Union Station, as well as the piers supporting the Union Station Rail Corridor. Key constraints at the southern end of the Bay Street corridor and along Queens Quay include the narrow right-of-ways, high multi-modal at-grade activity, and requirements for property access. Finally, based on previous work in the study area, much of the below grade environment consists of contaminated fill.

B) Confirm Technology

The two technology options were confirmed to be either the TTC low floor streetcar (LFLRV) used in the existing streetcar network or customized, driverless Automated People Mover (APM) Transit Vehicles.[3] Both options can accommodate forecast transit demand in the ~540 metre lower Bay Street Corridor. The key characteristics of the two technologies are summarized in Figure 3 below.

TTC Low-Floor Streetcar	
Length	30m
Capacity (standard load)	130
Propulsion	Traction power
Boarding/Alighting	Single side
	

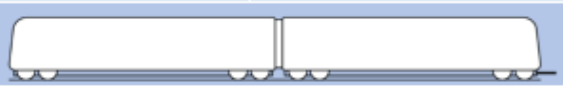
Automated People Mover (APM) Vehicle	
Length	36m
Capacity (standard load)	200 (mostly standing)
Propulsion	Cable-pulled
Boarding/Alighting	Both sides
	

Figure 3. Transit Technologies

While the streetcar is a well-known component of the TTC network, APM technology would be a new vehicle type. The Terminal Link Train at Toronto Pearson Airport is a local example of APM technology. This line is approximately 1.5 km in length, and runs on an elevated, mostly outdoor guideway that connects the Airport UP Express station with Terminals 1, 3, and a satellite parking facility. The project team completed further due diligence of APM technology, including review of various APM systems in operation worldwide and a meeting and site visit with Greater Toronto Airport Authority (GTAA) officials to gain a better understanding of APM operations and maintenance requirements and the overall reliability of the technology.

In summary, the due diligence review confirmed that APM are proven transit systems relied upon by many transit agencies, cities and airports worldwide to fulfill short distance transit needs. Due to operational constraints, APM are generally not an appropriate technology to serve longer distance (i.e., >2km) transit needs.

C) Transit Ridership Review

Transportation demand forecasting for the two confirmed technologies was undertaken using the City's Regional Demand Model (GTAModel V4). Forecasting was completed for a 2041 horizon year assuming the funded/committed future transit network and fare integration. The list of funded/committed projects includes the Line 2 East Extension, Eglinton Crosstown LRT, Finch West LRT, Sheppard East LRT, GO Expansion, SmartTrack Stations, and Relief Line South. The Waterfront LRT is assumed as the Council approved section from Park Lawn/Lake Shore Boulevard to Leslie

[3] During the previous phase study, the second option was referred to as a "funicular", which is a particular sub-type of APM

Street/Commissioners Street. For the ridership analysis, an assumption was made that the APM would be operated as part of the TTC network, although there is the potential that the APM could be operated as a separate and/or fare-free service.

Forecast peak hour transit volumes in the Bay Street Corridor (AM Southbound) ranged between approximately 4,000 and 8,000, representing more than a quadrupling over the peak hour demand at the existing undersized Union Station Streetcar loop (see Figure 4). The wide range in the forecast is due to transit passengers choosing to walk or take one of the technology options for one-stop trips. The significant forecast increase is attributed mainly to the planned major GO Transit service expansion at the Union Station hub, and substantial ongoing development in the waterfront, and the eastern waterfront in particular. The forecasting also found that approximately 40% of future (AM) peak hour trips are destined from Union Station to the vicinity of Queens and Bay and the remaining 60% of trips are destined to the wider waterfront beyond.

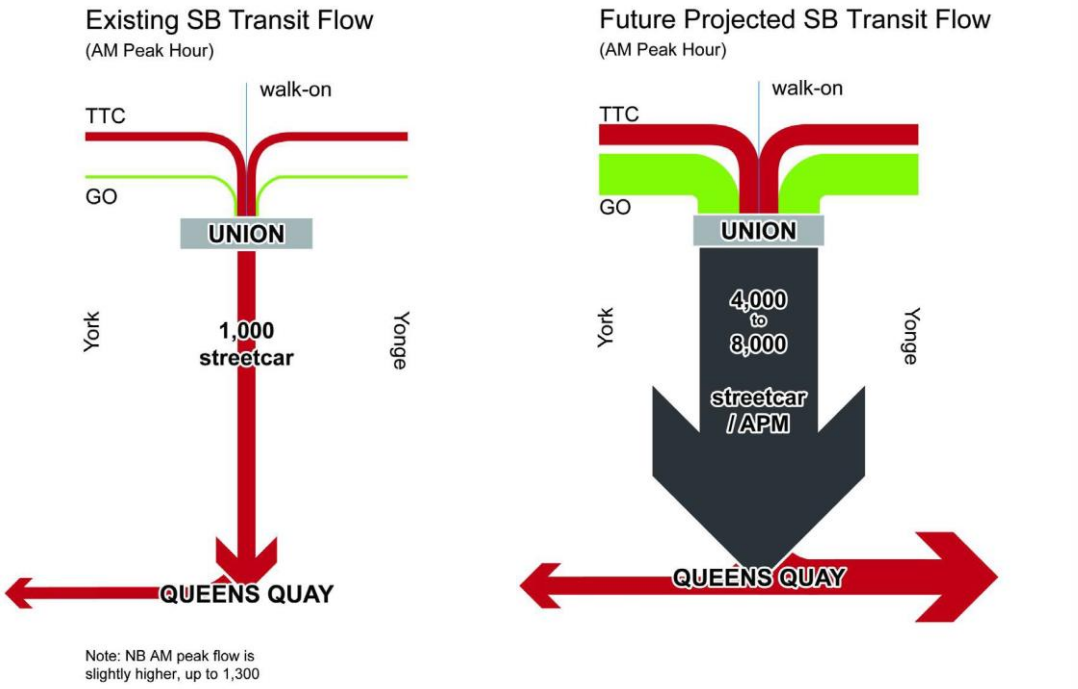


Figure 4. Existing vs. Forecast Transit Demand

The very high concentration of tourism, recreation and special event activities increase all-day transit ridership in the waterfront. Trips generated by these significant travel activities, and trips made to/from the Billy Bishop City Centre Airport, are not fully captured in the transit demand estimating model, and therefore the actual all-day ridership numbers will likely be higher than forecasts for all day ridership. Forecasts for all-day ridership are inputs into the Initial Business Case Assessment.

As noted during previous phases of the Waterfront Transit Reset, walk trips are very significant and growing in the Bay Corridor in particular, and pedestrian infrastructure should continue to be improved regardless of the transit option provided.

D) Link Options Screening

The City's Rapid Transit Evaluation Framework (RTEF) was used to compare the two categories of options for the Union Station-Queens Quay Transit Link.

The screening criteria included: user experience (including travel time, accessibility, connectivity, comfort, and reliability measures), cost (based on previous cost estimates), constructability (including impact to transit, pedestrians, and traffic), urban design and place-making opportunities, and other factors such as capacity and property impacts.

The two categories of options for screening included:

- Option 1: An expanded Union Station Streetcar Loop and Queens Quay/Ferry Docks Station (consistent with but building upon the approved EA concept);
    - 1A: Including four platforms at Union Station
    - 1B: Including two platforms at Union Station
- Option 2: Automated People Mover (APM) system under Bay Street from Union Station to Queens Quay
    - 2A: Including underground streetcar along Queens Quay at Bay Street;
    - 2B: Including surface streetcar along Queens Quay at Bay Street

Ultimately, Option 1B was screened out for the key reason that it cannot support the projected demand forecast for the project.

Option 2B was also screened out for the following reasons:

- The volumes of transit passengers transferring between the APM and a surface streetcar on Queens Quay (approx. 60% of peak hour trips) would create significant potential for conflicts between pedestrians, cyclists, transit, and traffic at the busy intersection;
- There is insufficient space to fit at-grade streetcar platforms without significant impacts to intersection operations and vehicle lanes; and
- Transit passengers making the transfer at Queens Quay and Bay would not have the benefit of a weather protected environment.

Based on the results of the screening, Options 1A and 2A were carried forward for further design refinement. For Option 2A, it was also confirmed that a double track bypass midway between Union Station and Queens Quay would not be required to support the projected demand forecast, with two larger APM trains (one in each tunnel) replacing four smaller APM trains (two in each tunnel).

3. Refining Options for Each Technology

The design of Options 1A and 2A were advanced to a 5-10% level and described in the following section. All stations for each option are designed to current standards (Ontario Building Code, AODA, National Fire Protection Association Standards for Fixed

Guideway Transit and Passenger Rail Systems (NFPA 130) and City of Toronto PATH guidelines).

1A) Streetcar Option

The expansion of the existing streetcar loop terminal at Union Station allows for increased passenger capacity and accommodates future streetcar service both east and west of Bay Street along Queens Quay. The design is essentially the 2010 EA-approved concept with some modification to both infrastructure and TTC service assumptions. The option includes, in summary:

- Four underground streetcar platforms at Union Station, two each on either side of the loop, including bypass tracks for all platforms, allowing separation of passenger flows for different directions of service, or for boarding and alighting;
- Lengthening the existing underground Queens Quay/Ferry Docks Station platform from approximately 35 metres to 60 metres to allow double berthing of streetcars;
- An underground streetcar track connection between Bay Street and Queens Quay East with portal to surface at a location east of Bay Street;
- Underground east-west (through) streetcar track at Queens Quay and Bay Street to allow flexibility for future streetcar service bypass of Union Station;
- Improved transit passenger connectivity to Union Station, Line 1 Subway, GO Transit, local developments, and the pedestrian network at both Union Station and Queens Quay/Ferry Docks Station;
    - Includes a proposed new connection to/from the Jack Layton Ferry Terminal under Queens Quay
    - Includes a proposed new connection to the Bay East Teamway, although this will require further review in conjunction with Metrolinx to determine overall feasibility/location
- Removal of the existing pedestrian level-crossing of the streetcar track underground at Queens Quay/Ferry Docks Station, and replacing it with an under-track accessible pedestrian connection to minimize delays to transit service;
- Replacing Union Station Rail Corridor piers between the teamways and roadway with reduced profile columns or alternative supporting structures to allow for efficient boarding and alighting of streetcars underground;
- Lowering the streetcar track/platforms a minimum of 1.4 m at Union Station in order to accommodate overtrack ventilation;
- Property required at 141 Bay, 1 Front, and Union Station (Metrolinx);
- Protection for a potential Bremner LRT service in the longer term to connect to the expanded Union loop.

Appendix A illustrates the Streetcar Option 1A Design.

2A) Automated People Mover (APM) Option

This option includes repurposing of the existing streetcar tunnel and stations under Bay Street with driverless, cable propelled vehicular transit systems connecting Union

Station to an east-west LRT/streetcar along Queens Quay. The option includes, in summary:

- Separate, individually propelled, automated transit system within each bore of the existing streetcar tunnel under Bay Street;
    - Three platforms at both Union Station and Queens Quay/Ferry Docks Station;
    - A common central platform to facilitate boarding to each vehicle/track and side platforms to facilitate alighting from each vehicle/track;
    - Boarding and alighting of vehicles at each station would occur simultaneously with doors on both sides of the vehicle;
- East-west streetcar track and new station underground at Queens Quay and Bay Street. The new station would include 60 m platforms to allow for streetcar double berthing;
- Underground pedestrian ramps between the east-west streetcar service and the north south APM vehicles to facilitate passenger transfers and reduce delays to streetcar operations;
- APM drive room including horizontal cable-drive wheel below Union terminal;
- APM maintenance room below track level north of the Queens Quay/Ferry Docks station;
- Streetcar portal on Queens Quay East to surface at a location east of Bay Street;
- Improved transit passenger connectivity to Union Station, Line 1 Subway, GO Transit, local developments, and the pedestrian network at both Union Station and Queens Quay/Ferry Docks Station;
    - Includes a proposed new connection to/from the Jack Layton Ferry Terminal under Queens Quay;
- A potential Bremner LRT in the longer term would not be able to connect to the existing Union Station terminal area and an alternative terminal for this route would need to be provided.

Appendix B illustrates the Automated People Mover Option 2A Design.

Eastern Portal Location & Analysis

The previously approved East Bayfront Transit EA provides for a streetcar portal located in the vicinity of Queens Quay and Freeland Street, east of Yonge Street. Due to costs and constraints involved with this design, an alternative portal location west of Yonge Street along Queens Quay may be more appropriate. The alternative portal location west of Yonge Street may provide benefits in terms of cost, public realm, and transportation operations. A new portal location may be accommodated with either technology option and is not a decision relevant factor for the evaluation of options, but further analysis is recommended during the next stage of design.

4. Key Evaluation Criteria and Detailed Assessments

The evaluation framework used for the initial screening process was further refined to include only the key criteria which would indicate notable differentiation between Option 1A (Streetcar Option) and Option 2A (APM Option). The key criteria used in the final

evaluation between the technologies included *Transit User Experience*, *Network Transportation*, *Constructability*, and *Cost*. A summary of the analysis is as follows.

Transit User Experience Assessment

For the two options, a transit user experience assessment was conducted to assess travel time, convenience, reliability, and station accessibility and safety from a passenger perspective. Overall, both options offered certain travel time and convenience advantages depending on the individual transit trip destinations and origins. For those passengers connecting between Union Station and the east and west waterfront, the Streetcar Option provides a more convenient, moderately faster, and more accessible connection because no additional transfers or changes in vertical access would be required. For those passengers travelling only between Union Station and Queens Quay (such as to access or depart the ferry terminal, hotel, office, and residential buildings), the APM Option provides a moderately faster and more reliable connection.

The majority of trips are longer distance, and the transfer would be particularly inconvenient for those with accessibility needs, families with strollers, and large groups. As a result, the Streetcar Option ultimately was preferred in this component of the evaluation.

Network Transportation Assessment

For the APM Option, forecast ridership is lower on the eastbound and westbound Queens Quay streetcars compared to the Streetcar Option. This is attributed to the inconvenience of forcing a passenger to transfer from APM to the streetcar at Queens Quay and Bay to complete a longer distance trip. The APM Option has higher forecast ridership volumes than the streetcar option between Union Station and Queens Quay because the frequent, reliable and convenient service attracts significant numbers of passengers who would otherwise walk the one-stop distance.

Overall TTC network ridership may be slightly higher with the Streetcar Option, and overall GO network ridership may be slightly higher with the APM Option, but the difference in overall transit network ridership between the options is minimal.

As established during the earlier phases of the Waterfront Transit Reset, the overarching vision is an interconnected and continuous network where possible, and not individual, segmented transit lines. For this key reason the Streetcar Option is preferred in this component of the evaluation because it expands the TTC's streetcar network presence at the critical Union Station hub. It also provides significant flexibility for future waterfront streetcar service, operations, and adaptability to the evolving and unique demands of the waterfront. This includes the potential for a future Bremner LRT service to connect to Union Loop.

Constructability Assessment

For the Streetcar Option, the construction of the expanded Union Station Loop is complex and will require advanced construction techniques and more time to implement due to the extent of works required under the active Union Station Rail Corridor (estimated duration 4-5 years). This work requires replacing rail corridor piers in combination with lowering the streetcar track underground due to clearance requirements for overtrack ventilation to meet fire and life safety requirements. It is important to note that the replacement of rail corridor piers has been undertaken for the adjacent revitalization of Union Station and the appropriate construction methodology is well-understood. The Bay East and West pedestrian teamways under the Rail Corridor, as well as portions of property at 141 Bay Street and 1 Front Street would be impacted during the construction of the streetcar option because the proposed station platforms and passenger circulation areas are located directly beneath them. The next phases of design would determine temporary pedestrian structures and/or diversion routes for the significant pedestrian activities within this area in particular.

For either option, construction of the new/expanded Queens Quay/Ferry Docks Station will likely be a traditional open cut excavation using secant pile walls. Construction in this area would be of a longer duration for the APM Option due to the significantly larger station footprint, including adding new streetcar platforms under Queens Quay, but the overall construction period is shorter with the APM option (estimated duration 3-4 years).

Utility relocations throughout the study area will be significant for either option and a SUE B level utility investigation will be required as an early component of follow-up works.

During the construction period, direct streetcar service to/from Union Station would be suspended during tunnel work. Mitigation for impacts to transit during construction would be evaluated in follow up work, including replacement bus service, phasing options to minimize downtime for streetcar service along Queens Quay, and improvement of pedestrian routes. One lane of traffic will be preserved in either direction on impacted roads during the construction period.

Overall, the APM Option would have both a shorter duration and less complex construction (e.g., teamways could remain open) and is preferred in this component of the evaluation.

Both capital and operating costs were included as key evaluation criteria and are presented in the following section.

5. Costs

Table 1 includes preliminary (Class 4) capital construction cost estimates for each transit option for the Union Station-Queens Quay Link, and includes the cost of completing the East Bayfront LRT to the vicinity of Parliament Street. The capital cost

estimates were prepared by A.W. Hooker quantity surveyors based on the definition for estimate classifications (Class D) outlined in the *Guide to Cost Predictability in Construction* prepared jointly by the Federal Government and an Industry Cost Predictability Taskforce. Class 4 cost estimates are intended for planning purposes only and will be refined as detailed design and project planning advances. Further design work is required to provide an increased level of confidence and greater precision with regard to project elements, feasibility and risks suitable for budget authorization. Per best practice established by the Association for the Advancement of Cost Engineering International (AACE), the project budget and schedule should be established once a Class 3 cost estimate has been achieved.

Table 1. Capital Costs

Option	Capital Costs (2019$)
1A. Streetcar Expansion below Bay Street integrated with streetcar along Queens Quay East (Streetcar Option)	$612 M
2A. Automated People Mover below Bay Street and streetcar along Queens Quay East (APM Option)	$600 M
Note: Class 4 cost estimates include capital construction for each transit option for the Union Station-Queens Quay Link and includes the cost of completing the East Bayfront LRT to the vicinity of Parliament Street, including revitalization/roadway reconstruction along Queens Quay between Bay Street and Parliament Street. Excludes costs associated with procurement, escalation, lifecycle, operations and maintenance.	

The above cost estimates exclude any required property costs and include the EA-approved eastern streetcar portal located on Queens Quay East of Yonge Street. There are potential cost savings with an alternative portal location west of Yonge Street which will be further evaluated during the next phase of design. Escalated costs for the streetcar option are shown in Table 2.

Table 2. Streetcar Option Escalated Costs

Option	Capital Costs (YOE$)
1A. Streetcar Expansion below Bay Street integrated with streetcar along Queens Quay East (Streetcar Option)	$745 M
Note: Escalated by 4% per year to midpoint year of project, assuming a 2021-2027 construction period. Based on a Class 4 cost estimate of $612 M (2019$) from Table 1. Excludes costs associated with procurement, lifecycle, operating and maintenance.	

A high level review of operations costs was completed by Arup. This review confirmed that operating costs between the two options would be relatively similar for a 30-year lifecycle. The APM Option would likely result in labour cost savings for operation of the link service, but this would likely be offset by increased streetcar operating costs due to the loss of the streetcar operating flexibility provided by the centralized Union Station Loop.

6. Evaluation Summary

Table 3. Summary of Evaluation

Criterion	Streetcar Option	APM Option
User Experience		
Travel time assessment	Medium/longer trips faster	Short trips faster
Service reliability	Union Loop subject to potential on-street delays	Higher headway reliability for Bay Street trips
Comfort/convenience/ accessibility	Direct ride to/from Union	Additional transfer to/from Union
Conclusion	**Preliminary Preferred**	
Transportation		
Local (QQ & Bay) transit riders	Higher along QQ east and west	Higher for Bay Street
Network (GTA) transit riders	Small increase in TTC ridership	Small increase in GO ridership
Streetcar network	Expanded terminal at Union with more flexibility for routing and service	No terminal at Union with less routing flexibility for waterfront network
Conclusion	**Preliminary Preferred**	
Construction Impacts		
Risk profile	Rail viaduct risks	No rail viaduct risks
Pedestrian teamways	Teamways closed and pedestrians rerouted due to construction	Teamways not closed for construction
Property impacts	141 Bay basement impacts and teamways	No significant impacts
Bay Street lane impacts	South of rail viaduct impacts	No significant impacts
Duration estimation	4-5 years	3-4 years
Conclusion		**Preliminary Preferred**
Cost		
Capital costs (to vicinity of Parliament St.) - Class 4, $2019	$612 million	$600 million
Conclusion	***Comparable; No Preliminary Preferred***	
Overall Preliminary Preferred	**Streetcar Option**	

7. Consultation

Public and stakeholder consultation was undertaken to present and receive feedback on the analysis, key criteria and the preliminary evaluation of alternatives. The consultation program included:

- Stakeholder Advisory Committee (SAC) meetings on January 22, 2019 and February 28, 2019
- A public meeting on March 4, 2019 at the Harbourfront Centre
- Online consultation through updates to the project website (www.toronto.ca/waterfronttransit) and emails to the project mailing list (waterfronttransit@toronto.ca)

Through these methods of consultation, over 100 participants were engaged in person and over 50 detailed comment forms and online responses were received.

The feedback received showed overwhelming public and stakeholder agreement with the identification of the Streetcar Option as a preliminary preferred option. Most participants indicated support for this option because it retains the continuous existing transfer free link to Union Station.

Overall, participants agreed that the evaluation criteria and evaluation were logical and clear. A common concern was uncertainty about the project timeline and funding from Council. Some participants raised concerns about the length and impact of the construction period and that streetcar service to Union Station would not be possible during construction of the Streetcar Option. Others suggested the City should look for ways to allow for an east-west streetcar service along Queens Quay to operate during the construction period.

A meeting with the Waterfront BIA and local landowners was held on March 8, 2019. Overall, the feedback from this meeting generally echoed the feedback received from the public, including construction impacts and potential phasing to advance the East Bayfront LRT. Additionally, the BIA/landowners were interested in opportunities to extend the PATH network connections to the waterfront.

The project was presented to the Waterfront Design Review Panel for information on March 20, 2019. Overall, the feedback from this meeting also echoed the feedback received from the public, indicating general support for the streetcar option and the need to prioritize the project. One suggestion from the panel, to be considered for subsequent design refinements, was to apply a refined architectural touch such as "radii" to the station walls to help create a "sense of place" within the stations.

8. Summary of Initial Business Case Assessment (IBCA) Findings for the Waterfront Transit Network

An initial business case assessment (IBCA) for the implementation of the entire waterfront transit network was undertaken by Arup, the lead study consultant, using

methodology consistent with Metrolinx business case guidance and modified for City of Toronto purposes. The IBCA included a comparative assessment of the Union Queens Quay Link Streetcar Option 1A and APM Option 2A including the extension of LRT to the East Bayfront for both options.

The following is a high level summary of initial business case findings. The full findings of the IBCA for waterfront transit can be found on the project website at www.toronto.ca/waterfronttransit.

Strategic case

Both the APM Option and the Streetcar Option meet the 2041 Regional Transportation Plan (RTP) goals and accommodate and facilitate greatly increased transit ridership in the waterfront. The significant increase in weekday commuter (peak hour) demand is only one part of the findings. There is significant additional demand outside of typical commuter peaks (e.g., all-day and weekends) associated with the Jack Layton Ferry Terminal, Harbourfront Centre, Billy Bishop Toronto City Airport, and other general activities, events and recreational uses in the waterfront.

Based on the analysis of specific criteria identified for the comparative evaluation, the Streetcar Option is preferred over the APM Option for the Union Queens Quay Link. The key strategic benefits of the Streetcar Option are for the key reasons of one less transfer in the network and increased routing flexibility for the network.

Financial case

The financial case includes capital costs, 60 year operating and maintenance (O&M) costs and incremental revenue. Costs are based on previous Class 5 cost estimates for the waterfront transit streetcar network from Park Lawn to Leslie, plus the updated Class 4 cost for the Union Station-Queens Quay Transit Link Options. Approximate total net costs for the waterfront transit network including either APM or Streetcar Option for the Union Queens Quay Link are in the order of $2.05 billion.

Economic case

The resulting expanded benefit-cost ratio (BCR) for the waterfront transit network including either an APM Option or Streetcar Option for the Union Station-Queens Quay Link is in the range of 0.41-0.55. Because of the unique network location, new transit technology and all-day ridership considerations that are not well captured in the forecasting model, there could be variations on the BCR; hence a range is presented. Also, the IBCA did not include an analysis of land value uplift and agglomeration economies, which, if considered in a more detailed analysis, would provide for a higher BCR range.

Deliverability and operations case

The Streetcar Option has a higher risk profile associated with a longer construction period. There are long term operational efficiencies for TTC in servicing the wider waterfront network.

The APM Option has a lower risk profile associated with a shorter construction period. The APM has a higher operational risk profile due to the fact this is a new vehicle and system type in the network which would require specific training and procedures. Introduction of the APM would also require a terminal station be constructed for a potential future Bremner streetcar.

Overall, further expansion of the waterfront transit network will continue to increase pressure on the existing streetcar loop at Union Station. Given this, the Union-Queens Quay Link should be prioritized in advance of, or concurrent with, delivery of other waterfront network expansion projects.

9. Recommended Option and Next Steps

In conclusion, the analysis described in this report reinforces the need to implement a waterfront streetcar/LRT network that will serve growth in the eastern waterfront in particular. Based on both the results of the technical evaluation (in particular the benefits to streetcar service network planning and operations), as well as input from the public and stakeholders, the Streetcar Option is recommended as the preferred option for the Union Station-Queens Quay Transit Link. The recommended Preferred Streetcar Option for the Union Station-Queens Quay Transit Link was well received by the public and stakeholders, who expressed the importance of ensuring this project moves to the next phases of design and construction as soon as possible.

In view of these findings, staff recommend that City Council approve the Streetcar Option as identified in this report, and authorize advancing the preliminary design and engineering of the project in order to develop a Class 3 cost estimate and Level 3 schedule, which would include the previously approved section of the Queens Quay LRT to Parliament Street. Any requirements for EA Addendum, if appropriate, would be undertaken as part of the next phase of design.

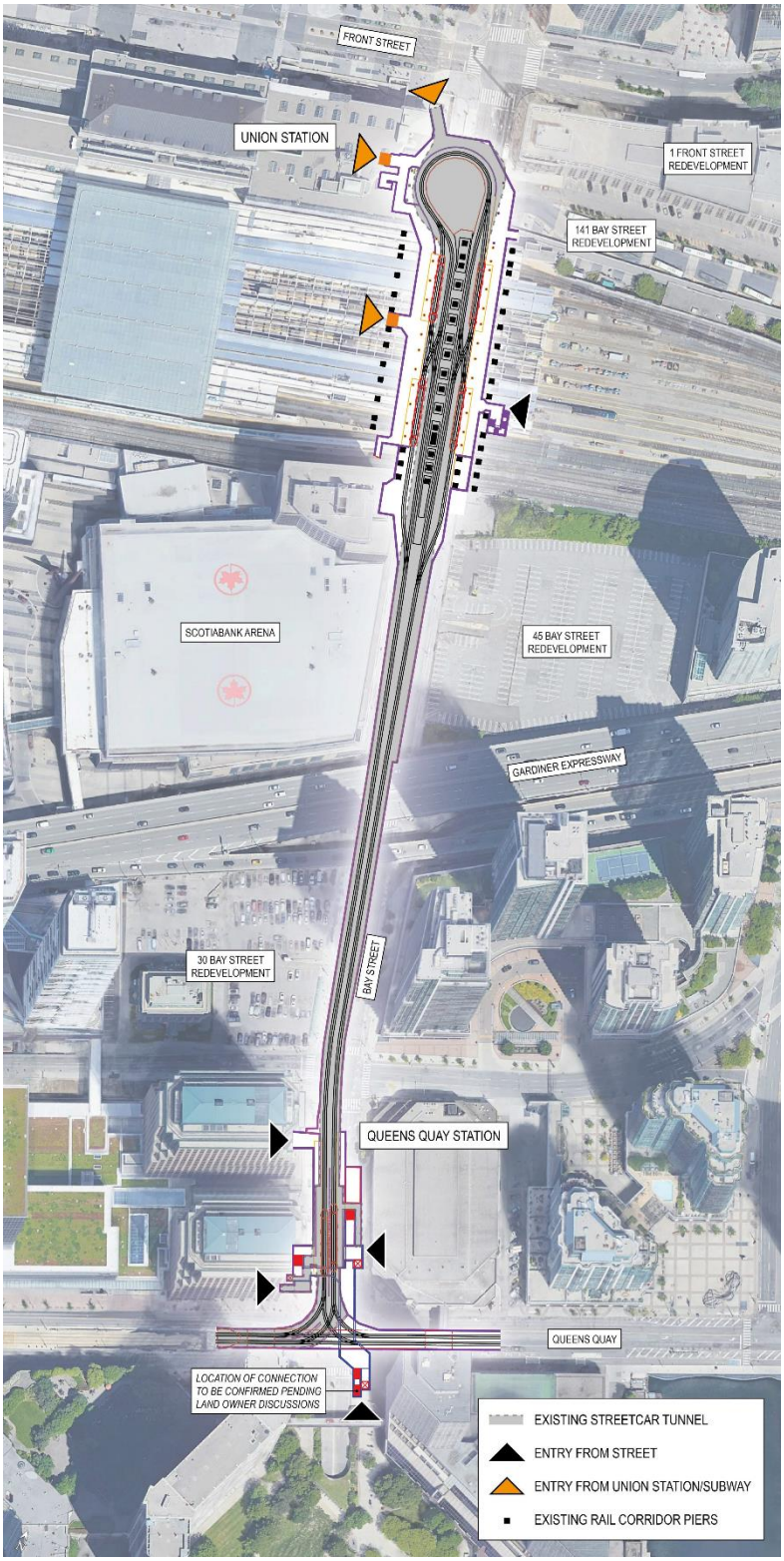
In addition to the key task of advancing the overall project design, the next stage of the project would include considering and advancing, if warranted, a potential cost-saving alternative eastern portal west of Yonge Street, and an alternative streetcar turning loop location at the east end of the project. In addition, the City will continue to work with landowners in the lower Bay Street and Queens Quay corridors to identify further opportunities for improvements to the PATH/pedestrian network.

Contact

James Perttula, Director Transit and Transportation Planning, City Planning Division
Email: james.perttula@toronto.ca, Tel: 416-392-4744

Nigel Tahair, Program Manager, Transportation Planning, City Planning Division
Email: nigel.tahair@toronto.ca, Tel: 416-392-1326

Appendix A – Preferred Streetcar Option



Note: *All drawings are preliminary and are not necessarily representative of final design.*

Figure A1. Concept Map, Preferred Streetcar Option for Union Station-Queens Quay Link

Figure A2. Union Station Streetcar Station looking South-Southeast along West platform. Artist's depiction subject to change and future design refinement.

Figure A3. Queens Quay/Ferry Docks Streetcar Station looking South along East platform. Artist's depiction subject to change and future design refinement.

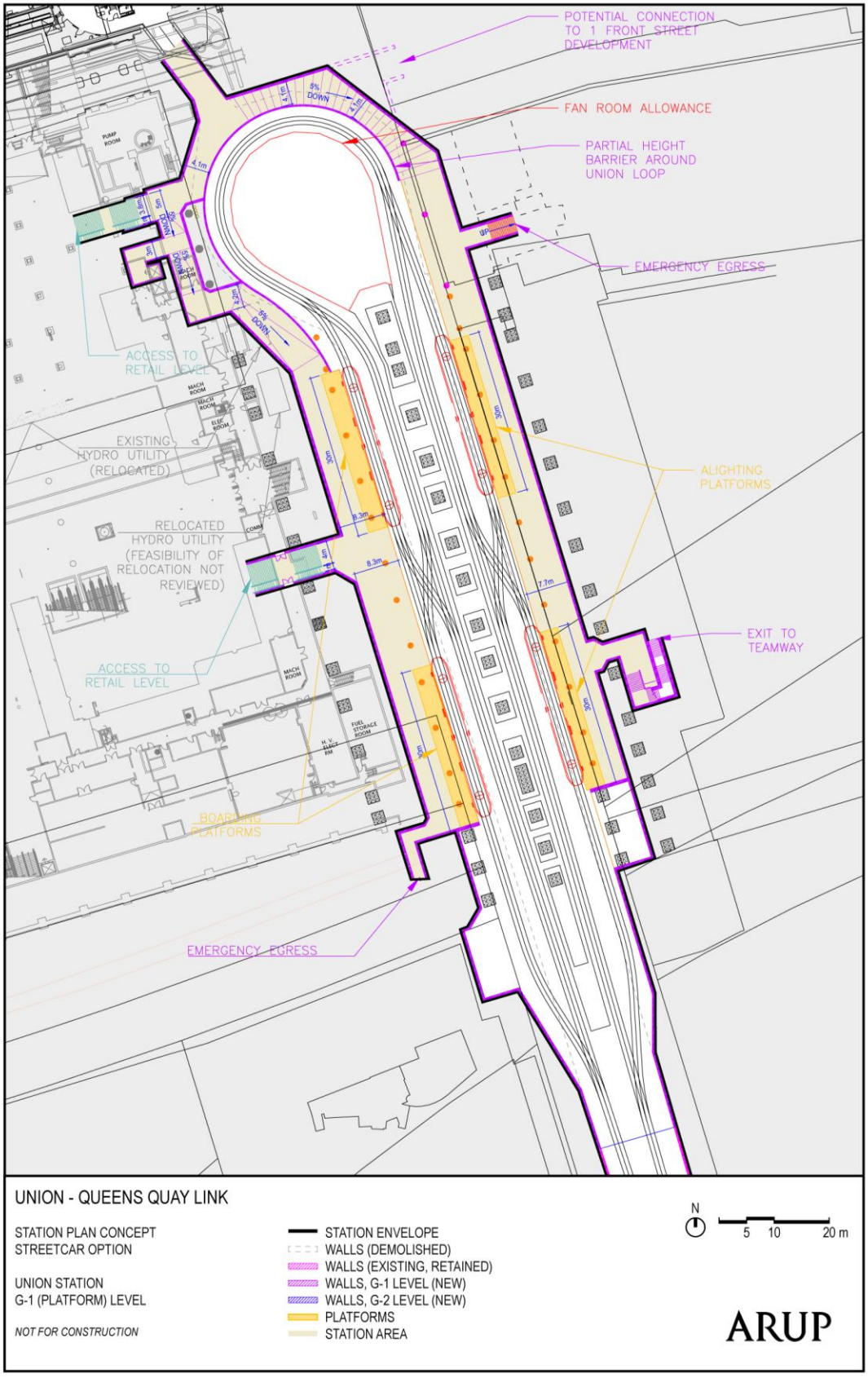


Figure A4. Union Station Streetcar Station Design, track level

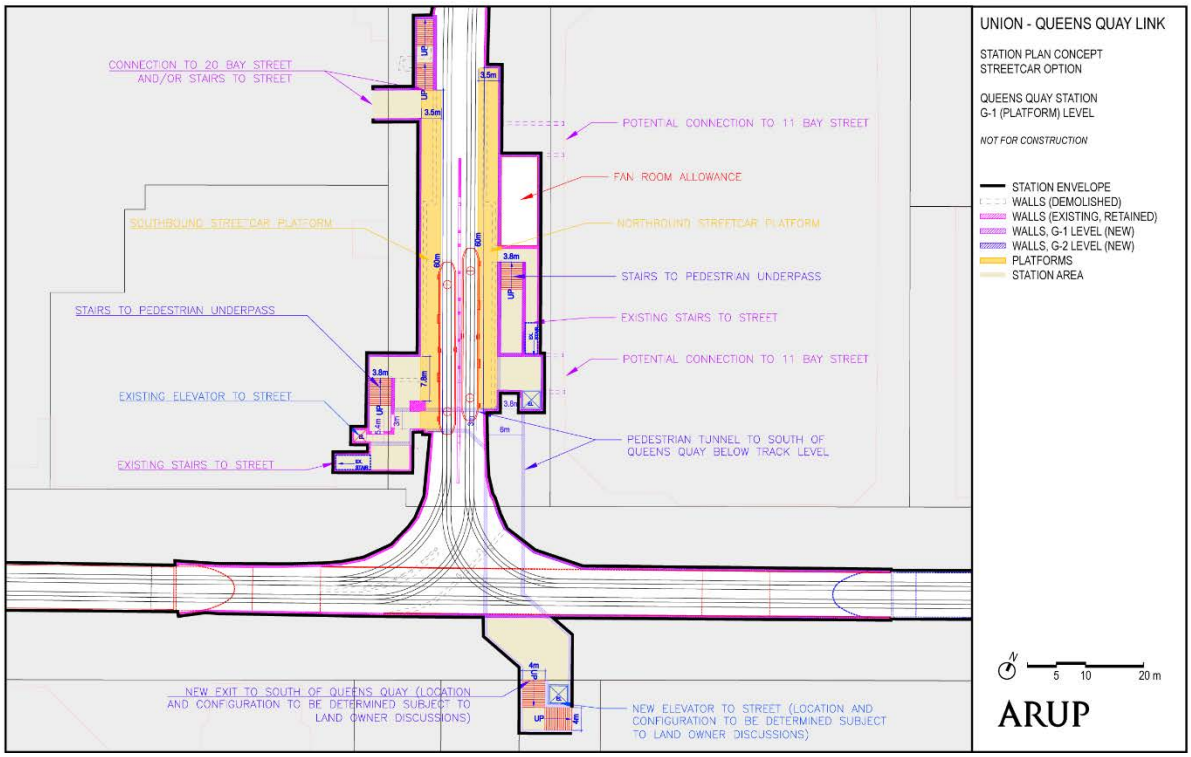


Figure A5. Queens Quay/Ferry Docks Streetcar Station Design, track level

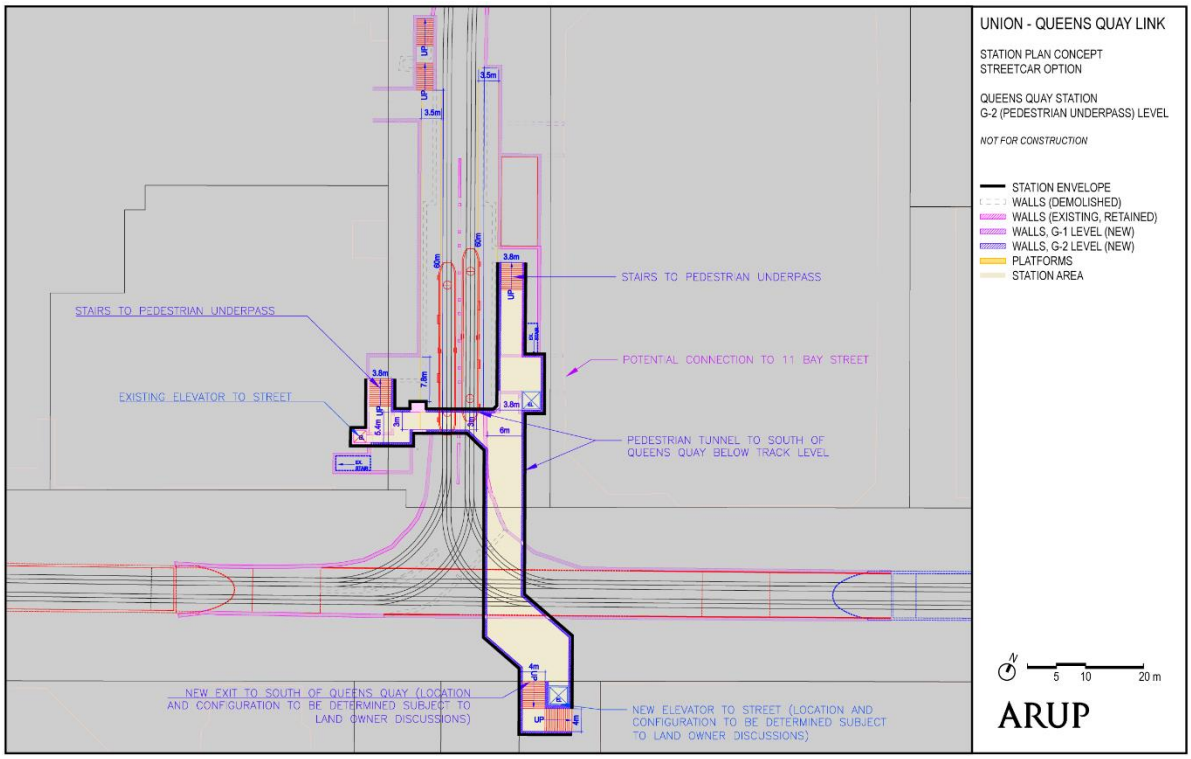


Figure A6. Queens Quay/Ferry Docks Streetcar Station Design, below track level

Appendix B – APM Option

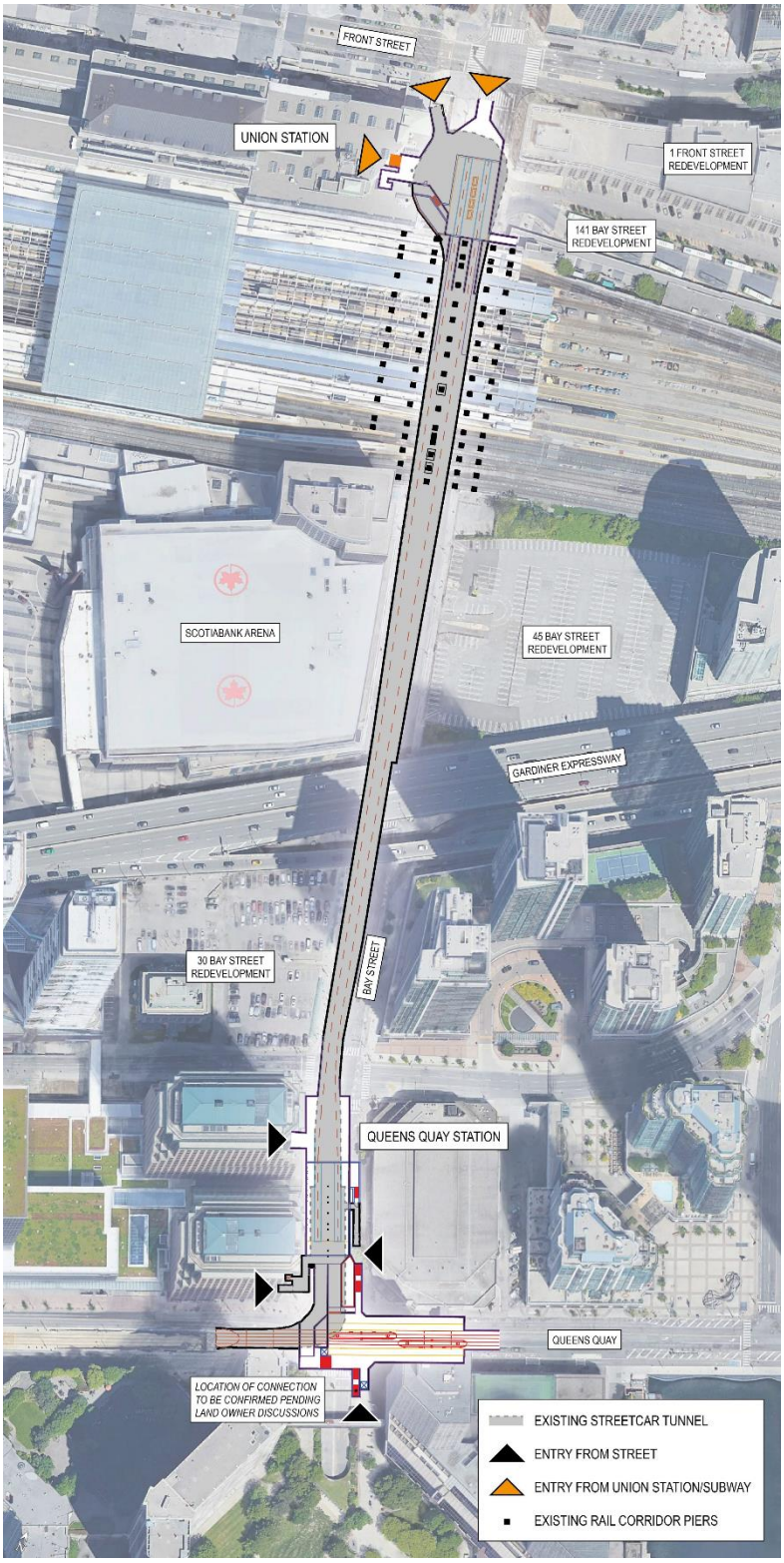


Figure B7. Concept Map, APM Option for Union Station-Queens Quay Link

Figure B8. Union Station APM Station looking South-West from Northeast portion of circulation area. Artist's depiction.

Figure B9. Queens Quay/Ferry Docks APM Station rendering looking South from East platform. Artist's depiction.

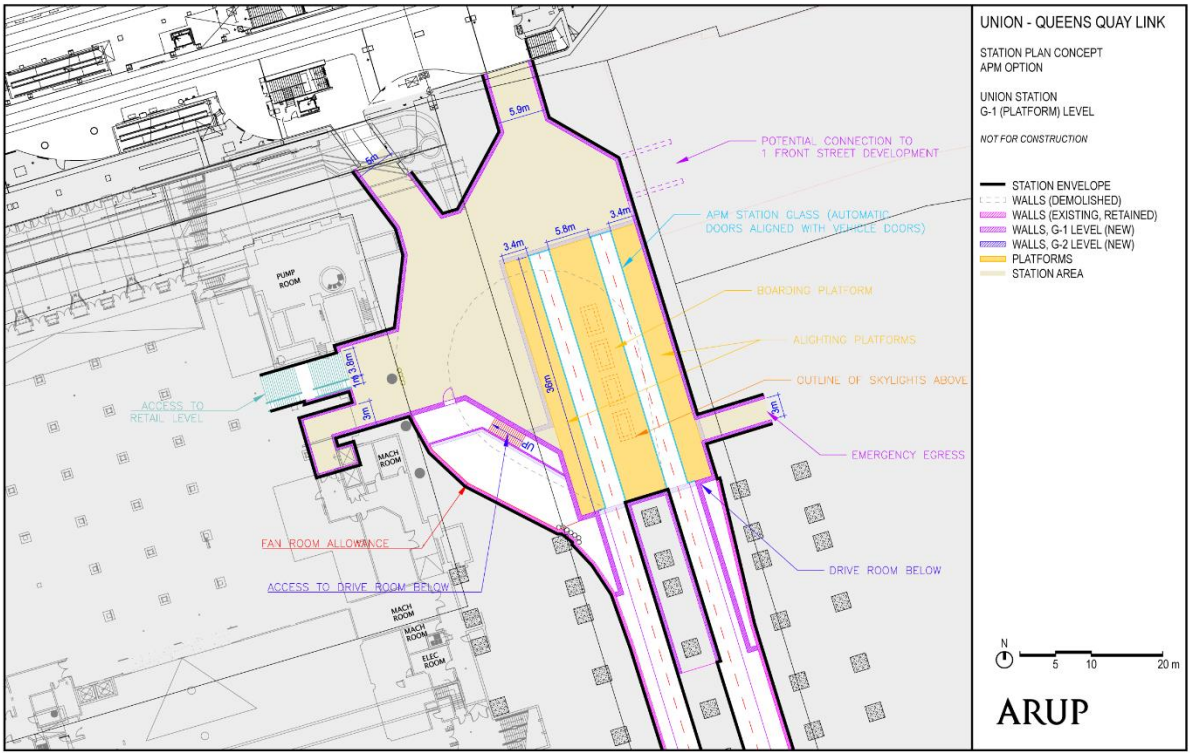


Figure B10. Union Station APM Station Design, track level

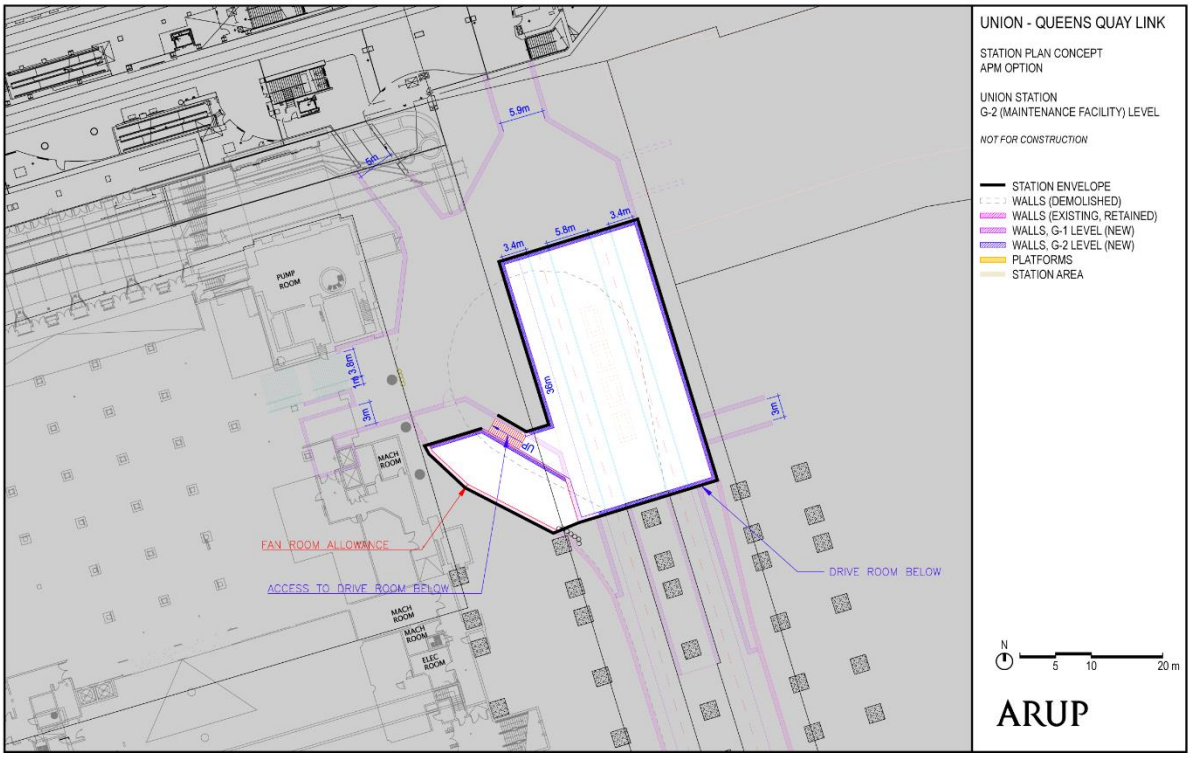


Figure B11. Union Station APM Station Design, below track level

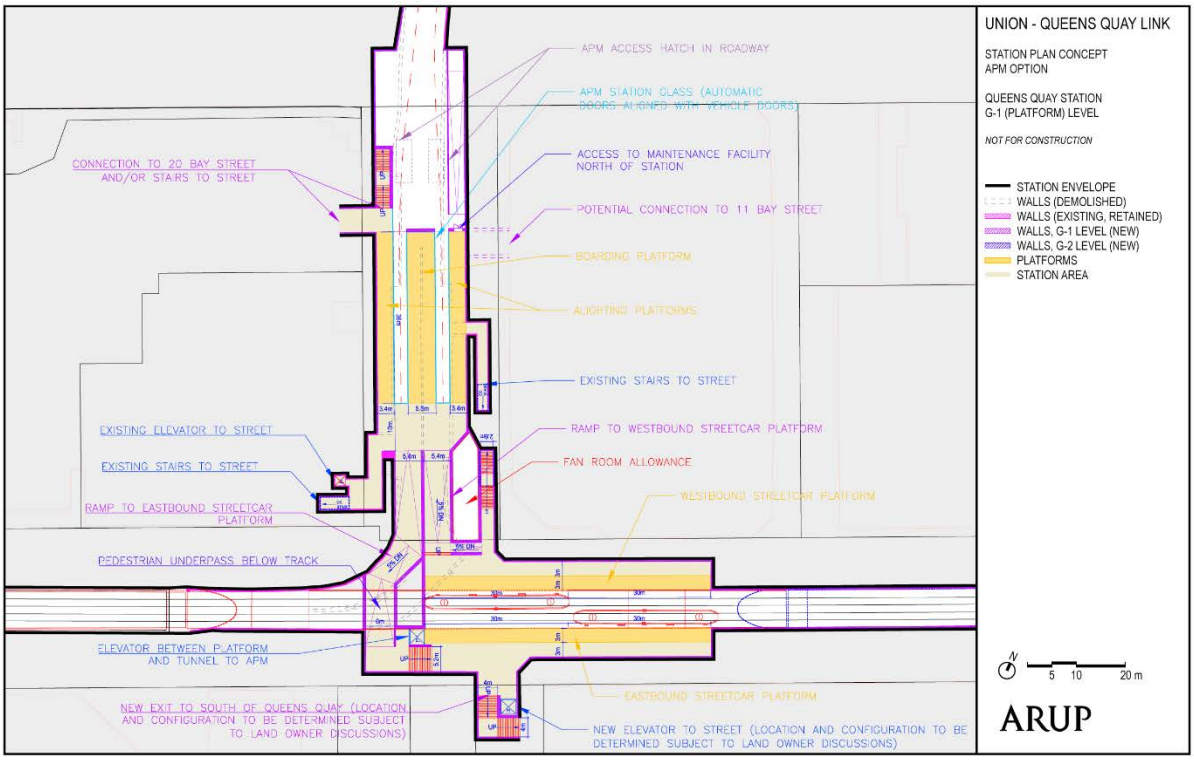


Figure B12. Queens Quay/Ferry Docks APM and Streetcar Station Design, track level

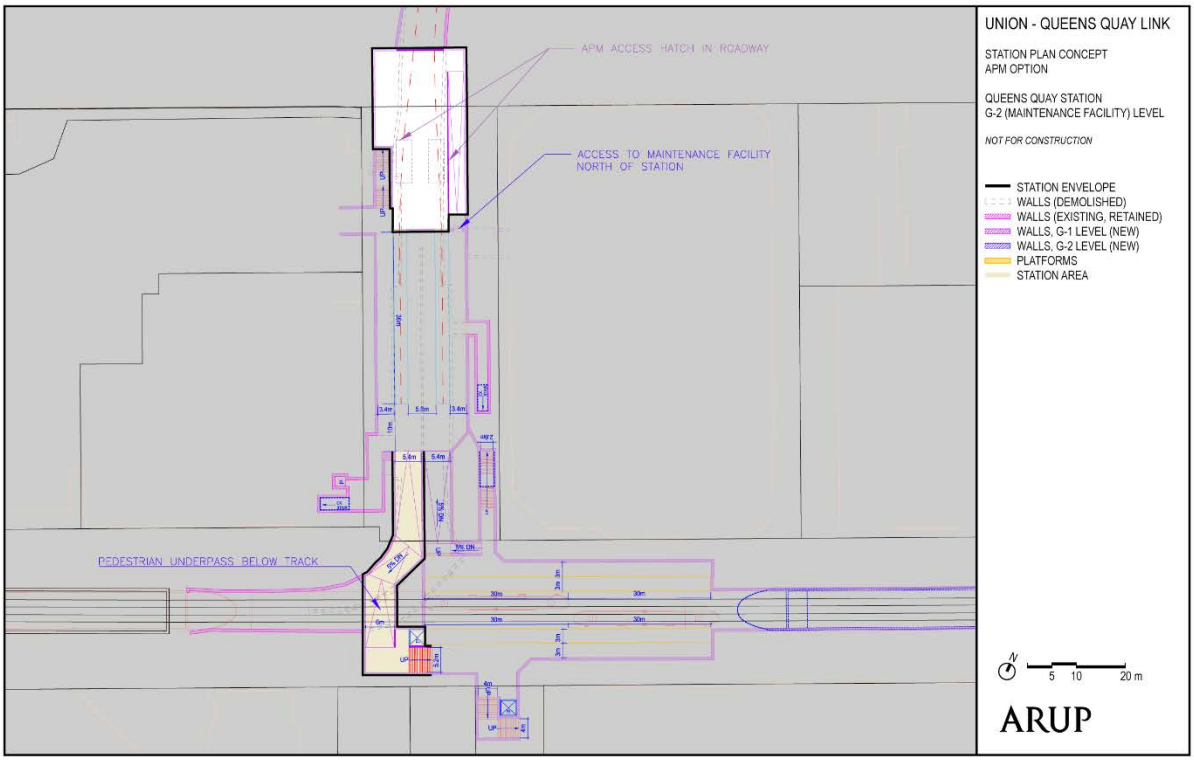


Figure B13. Queens Quay/Ferry Docks APM and Streetcar Station Design, below track level

EGLINTON EAST LRT

Introduction

The Eglinton East Light Rail Transit ("EELRT") is an eastern extension of Line 5 (Eglinton Crosstown LRT), which is currently under construction and owned by Metrolinx. The concept (Figure 1) comprises an extension up to 15 km from Kennedy Station to Malvern with up to 21 stops, three connections to GO Transit (Kennedy, Eglinton & Guildwood), and a potential connection to the proposed Durham-Scarborough Bus Rapid Transit at Ellesmere and Military Trail.

Figure 1. Full Eglinton East LRT concept.

Project Benefits

The Eglinton East LRT would serve historically underserved communities in the City. The EELRT would travel through or adjacent to seven Neighbourhood Improvement Areas (NIAs), and would bring higher-order transit to within walking distance of an additional 49,000 people, including an equity-weighted population of 30,000.

The EELRT would operate in its own dedicated guideway, which would reduce uncertainty in travel time. Currently, it can take anywhere from 24 minutes to 39 minutes to travel between Kennedy Station and University of Toronto Scarborough (UTSC) by buses operating in mixed traffic.[1] The LRT would provide improved transit reliability along the corridor. By also providing connections to other higher-order transit services, including Eglinton, Guildwood and Kennedy GO stations and Line 2 subway, the EELRT would provide improved transportation choice in a predominantly auto-oriented environment.

The EELRT envisions catalyzing wider community-building benefits as a result of the investment in the project. This includes development of new community-gathering spaces and civic spaces at key locations, such as Eglinton Avenue and Kingston Road (Figure 2), and improving the streetscape and public realm along the route. These community gathering spaces would support wider social equity and community development goals.

[1] UTSC Commuting Patterns & Transit Reliability, by J.Allen, N.Wessel, S.Farber, University of Toronto Scarborough

Figure 2. Proposed new community gathering space at Eglinton Ave and Kingston Road (view facing west).

Extended to UTSC, the EELRT would support campus expansion, projected to grow to 35,000 students and 2,500 faculty and staff over the long-term. The EELRT would provide a strategic link between UTSC and the central and western areas of Toronto, and would support UTSC's ambition to become an anchor institution.[2]

The EELRT addresses the project objective of providing local transit access, which will connect up to five retail clusters, up to 72 existing community services and facilities, two post-secondary institutions, and the Toronto Pan Am Sports Centre, an elite sports facility and community centre.

The EELRT route is planned to support local economic development. The EELRT would bring higher-order transit access to 7,400 existing jobs not currently served by transit. A Skills Workback Strategy (which would aim to train local people to work on the project) and Community Benefits Agreement (which would ensure local labour was hired) could be planned to connect local Scarborough residents with skills training and connections to jobs related to the implementation of the EELRT.

[2] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.SC25.7

The EELRT would also support the development of complete communities and transit-oriented development along designated Avenues of Eglinton Avenue East and Kingston Road (Figure 3), and Malvern Town Centre.

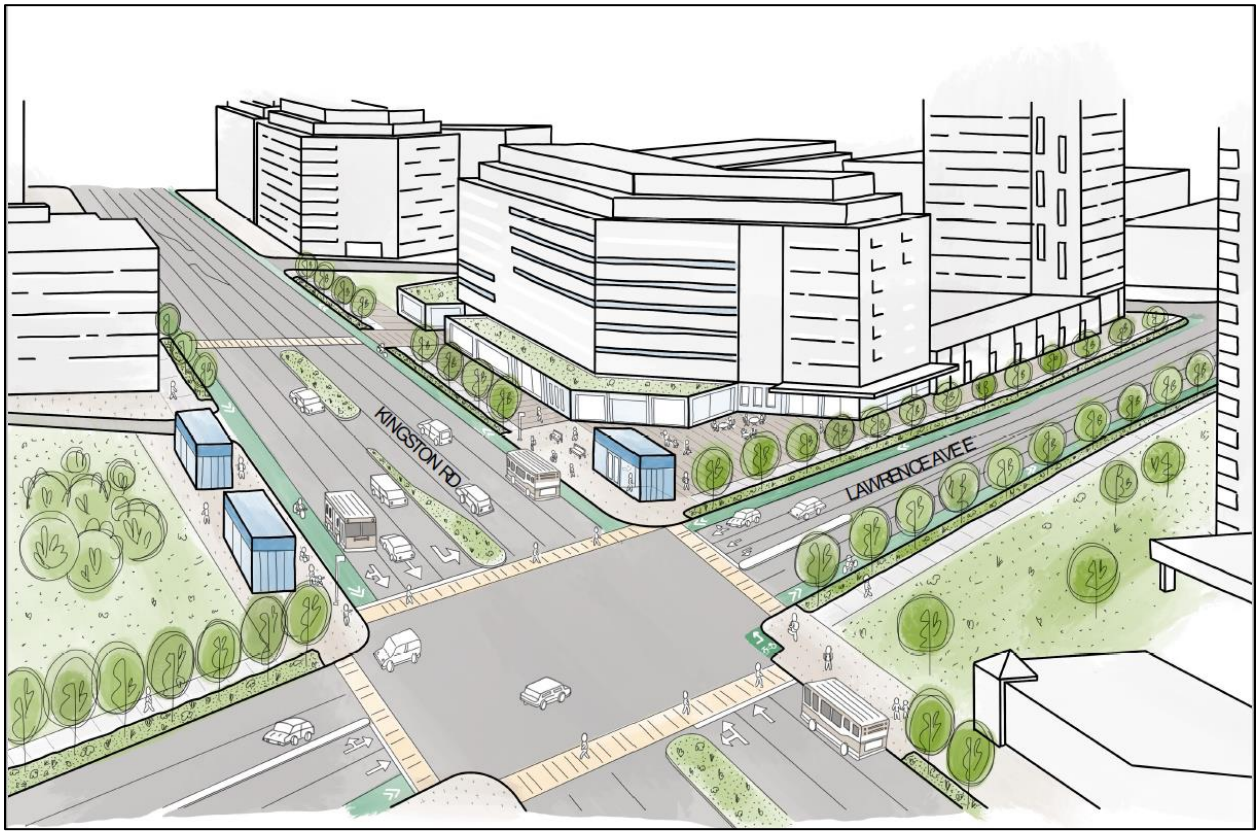


Figure 3. This illustration shows a potential scenario for future development at Kingston-Lawrence-Morningside as suggested by the planning and urban design consultant firm, Perkins+Will. The view looks north-east at the intersection of Kingston Road and Lawrence East, and shows entrances to the LRT stop, which would be underground on Kingston at this location. This image is for illustrative purposes only. To enact transformative change to the area, detailed planning and urban design studies, that include consultation with the adjacent community and stakeholders, would be required.

The EELRT would provide approximately the same transit travel time between points along the corridor as the future Business as Usual ("BAU") scenario where the existing bus services are maintained and grown to meet demand. In all cases, the frequency of the LRT service is less than bus frequency in the BAU scenario, but the LRT would improve transit reliability, crowding, amenity, and would provide higher capacity.

There is a strong need for a higher-order transit service to be provided along the Eglinton East corridor. Future travel demand modelling estimates that approximately 4,800 peak period, peak direction (PPPD) riders would ride buses in the Eglinton East corridor in a future scenario where there is no higher-order transit investment. While it is technically possible to provide enough buses to carry this many riders in the future, accommodating them would require large expansions to the Kennedy Station bus terminal and storage facilities. Operations of this terminal and the buses along Eglinton Avenue East would be a challenge, and reliability and comfort would be low.

Decision History

In March 2016, City Council considered *EX13.3 Developing Toronto's Transit Network Plan: Phase One* and directed the Chief Planner and Executive Director, City Planning in consultation with the TTC, to complete the review of corridor options and related work for the Line 2 East Extension, including integration of an Eglinton East LRT into the University of Toronto Scarborough (UTSC) as part of the Scarborough Transit Network plan. At this meeting, City Council also directed staff identify areas in need of an Avenue Study to facilitate intensification along the proposed LRT corridor in consultation with the Toronto Transit Commission, Metrolinx and the University of Toronto.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX13.3

In July 2016, City Council adopted *EX16.1 Developing Toronto's Transit Network Plan to 2031* and requested staff to advance the EELRT between Kennedy Station and UTSC to five percent design, including the connection to Kennedy Station and its interface with the preferred Line 2 East Extension alignment, the potential realignment of Military Trail through UTSC and the requirements of the next phase of the EELRT extension to Malvern. City Council also requested a business case analysis for the Scarborough Rapid Transit Network.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.1

In November 2016, City Council adopted *EX19.1 Transit Network Plan Update and Financial Strategy*, confirming that the TTC will be responsible for operating the proposed EELRT and that the City will be responsible for the operating and regular (i.e., all non-lifecycle) maintenance costs of the EELRT.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX19.1

In March 2017, City Council adopted *EX23.1 Next Steps on the Scarborough Subway Extension*, which included direction to the City Manager to develop a construction timeline and funding plan for the EELRT.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX23.1

In May 2018, City Council considered *EX34.1 Eglinton East Light Rail Transit Project Update and Next Steps*, and approved a tunneled alignment through the Kingston-Lawrence-Morningside intersection with a single stop, an at-grade alignment through UTSC and a realigned Military Trail, as well as an extension to Malvern with up to six stops.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX34.1

Current Status of Project

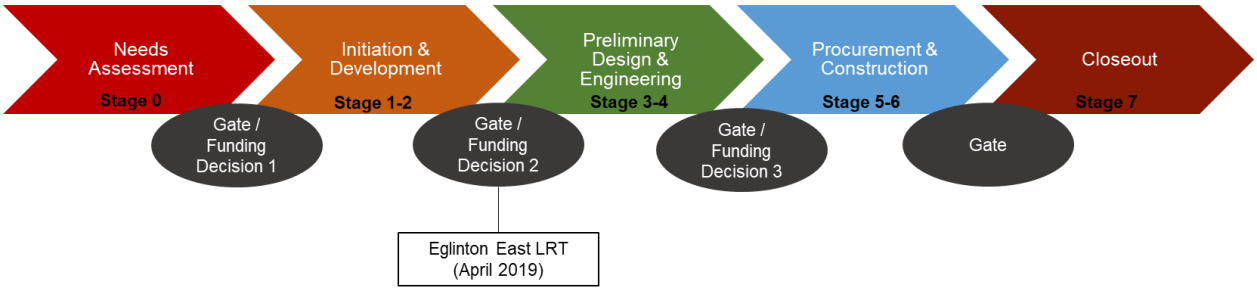


Figure 4. Current status in the project lifecycle

City staff, in partnership with TTC and in consultation with Metrolinx, have completed the requirements for the Initiation and Development phase of work (Figure 4). This phase includes completion of conceptual design of the alignment to a proposed Malvern Centre Station and a Maintenance and Storage Facility (MSF) south of Highway 401 and east of Morningside Avenue, and the creation of an updated Class 4 cost estimate.

The conclusion of this work is a recommendation that the scope of the EELRT be defined as an easterly extension of Line 5 (Eglinton Crosstown) from Kennedy Station to UTSC as a first phase. A second phase to Malvern Centre is dependent on further discussions with Metrolinx about timing and scope of the Sheppard East LRT (SELRT) and the construction timing for the Conlins MSF. Should it proceed ahead of the SELRT, the first phase of the EELRT would need to be serviced by a new MSF south of Highway 401 and east of Morningside Avenue.

In accordance with other City Council direction, staff are finalizing a study of opportunities for updated land use planning policy work, community development policy work or other infrastructure investments to further achieve the objectives of the LRT. Staff anticipate reporting the findings of this study to Scarborough Community Council before the end of 2019.

Comments/Analysis

In July 2016, City Council directed City staff to advance the design of the EELRT to a minimum of 5% and to develop an updated cost estimate and business case analysis (BCA). City Council also directed staff to identify the requirements for the next phase of the LRT extension to Malvern. In May 2018, City Council endorsed the inclusion of the Malvern extension as part of the Initiation and Development phase of work.

The full concept of the Eglinton East LRT (Figure 1) would extend Line 5 (Eglinton Crosstown LRT) 15 km east from Kennedy Station with 21 stops to Malvern. The LRT would be surface-running in the centre of the road, with the following exceptions:

- Tunnelling under the Stouffville rail corridor, between Kennedy Station and Midland Avenue to connect with the Line 5 Kennedy LRT Station currently under construction;
- Tunnelling from Kingston Road and Lawrence Avenue East to Morningside Avenue north of Kingston Road, as endorsed by City Council in May 2018;

- Running on the east side of the road along Morningside Avenue from north of Kingston Road to south of Ellesmere Road; and
- Running on the south side of the road along Ellesmere Road from east of Morningside Avenue to the west side of a realigned Military Trail.

The concept also includes the realignment of Military Trail, consistent with the concept through UTSC campus endorsed by City Council in May 2018.

1. Role of the Sheppard East LRT

The EELRT concept between UTSC and Malvern is inter-related with the development of the Line 7 Sheppard East LRT (SELRT). Along Sheppard Avenue East between Morningside Avenue and Neilson Road, the alignment would share track and stops with the SELRT. This alignment was recommended by staff and endorsed by City Council in May 2018 because it provides the best service to the residents of Malvern and reduces the cost of the EELRT, assuming that the SELRT will be built first.[3]

The full Eglinton East LRT concept could be serviced by the expansion of the Maintenance and Storage Facility (MSF) that would be built as part of the SELRT project and be located on a site north of Sheppard Avenue East at Conlins Road (Figure 5).

Figure 5. Sheppard East LRT Maintenance and Storage Facility (“Conlins MSF”)

The SELRT is an approved project funded by the Province, to be built after the Line 6 Finch West LRT. There is uncertainty around the construction timeline for the SELRT. Further engagement with Metrolinx is required to understand the interdependencies with the location of the MSF for the recommended EELRT concept and the SELRT.

[3] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.EX34.1

2. Summary of Phasing Options

Three concepts, each contemplating an eastern extension of Line 5 (Eglinton Crosstown LRT) from Kennedy Station to a different terminus, have been evaluated:

Option 1 — 7.5 km surface-running extension with 12 stops to a below-ground terminal station in the area around Kingston Road, Lawrence Avenue East and Morningside Avenue (Figure 6).

Option 2 — 11 km surface-running extension with 16 stops to a terminal stop near the Toronto Pan-Am Sports Centre on the campus of UTSC (Figure 7).

Option 3 — 15 km surface-running extension with 21 stops to a terminal stop in Malvern Centre, near the intersection of Neilson Road and Sewell's Road/Tapscott Road (Figure 8).

All options have been evaluated with a parallel bus service from Kingston/Lawrence/Morningside to Kennedy Station, operating alongside Line 5. Further detailed bus service planning is required to refine the connecting bus network, and to determine if this parallel bus service is required. Enhanced on-street connections to connecting bus services are envisioned at Eglinton Avenue East and Markham Road, Kingston/Lawrence/Morningside, and at Ellesmere Avenue and the realigned Military Trail.

The connection to an underground Kennedy Station will require a portal and tunnel below the Stouffville GO Corridor, between Kennedy Station and Midland Avenue. This portal will be constructed in close proximity to the Line 2 East Extension tunnel below Eglinton Avenue. City and TTC staff have been working together to coordinate the design of both facilities. A pre-investment in the EELRT has been recommended as part of the Line 2 East Extension scope to ensure that both facilities are protected (see Attachment 2).

Figure 6. Option 1 – Terminal station at Kingston/Lawrence/Morningside

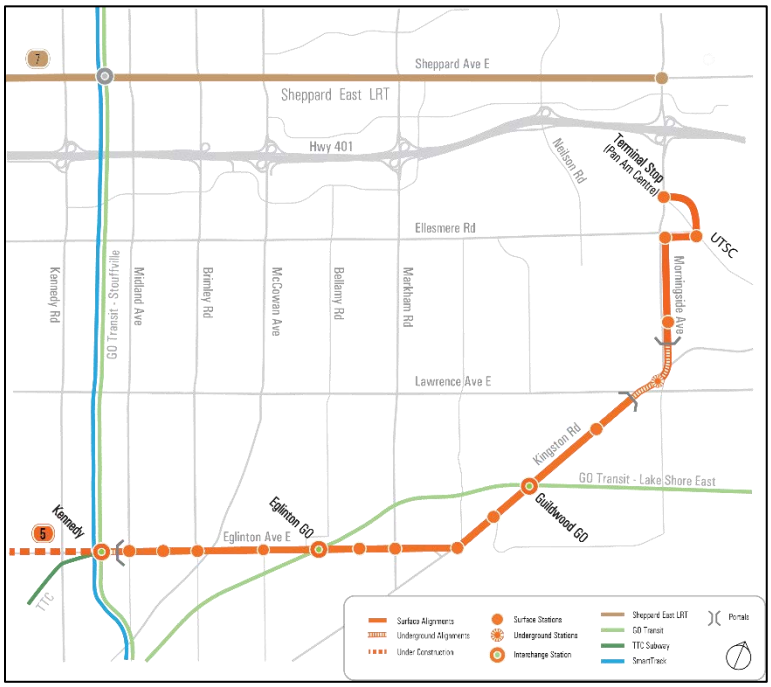


Figure 7. Option 2 – Terminal stop at UTSC

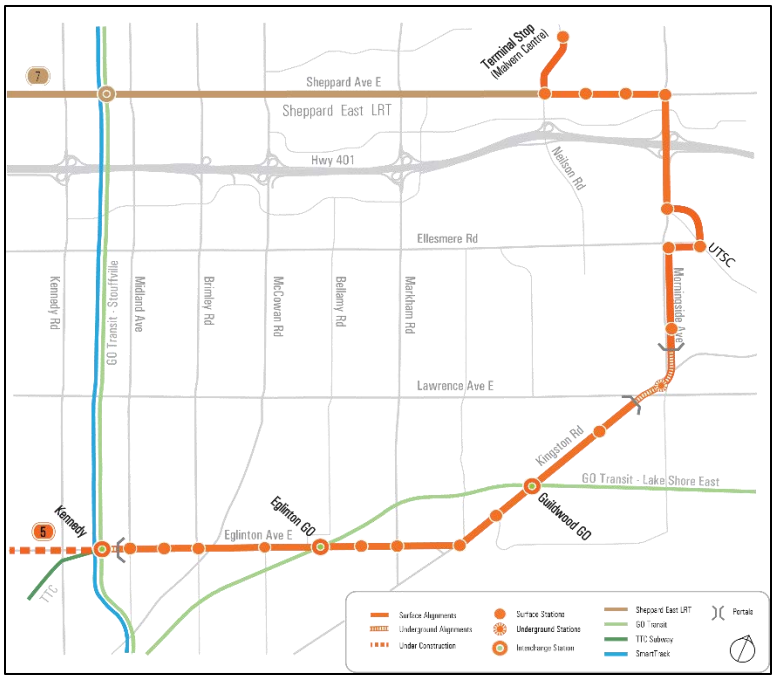


Figure 8. Option 3 – Terminal stop at Malvern Centre

2.1 Option 1 – Terminus at Kingston/Lawrence/Morningside

Option 1 supports the development of complete communities along the growth corridors of Eglinton Avenue East and Kingston Road. This portion of the EELRT corridor has the highest existing density of people.

Option 1 would bring transit infrastructure investment to six Neighbourhood Improvement Areas (NIAs).[4] Approximately 37,000 more residents would be within walking distance of a higher-order transit stop, including an equity-weighted population of 23,000. Approximately 5,400 more existing jobs would be within walking distance of higher-order transit stops. Daily transit ridership across the network would increase by 500 transit users.

No appropriate site has been identified for an MSF between Kennedy Station and Kingston/Lawrence/Morningside. Option 1, therefore, would need to be serviced by an expansion to the Mt. Dennis MSF, which will service LRVs for Line 5 (Eglinton Crosstown) currently under construction. An expansion to the Mt. Dennis MSF has been designed by Metrolinx to service LRVs required for the Eglinton West LRT (EWLRT). However, the Mt. Dennis MSF cannot be expanded to accommodate LRVs required for both EWLRT and EELRT.

Even if the EWLRT is not built, use of the Mt. Dennis MSF may constrain the level of service available for the entirety of Line 5 and would add operational costs and risks to the EELRT Option 1 due to the distance between the MSF and the eastern terminus at Kingston/Lawrence/Morningside.

[4] For more information on Neighbourhood Improvement Areas, see: https://www.toronto.ca/legdocs/mmis/2014/cd/bgrd/backgroundfile-67382.pdf

2.2 Option 2 – Terminus at University of Toronto Scarborough (UTSC)

In addition to supporting complete communities along Eglinton Avenue East and Kingston Road, Option 2 also supports UTSC as an anchor post-secondary institution and helps advance UTSC's growth ambition. UTSC is anticipated to grow to over 35,000 students and 2,500 staff over the long-term. The EELRT supports this growth and provides a higher-order transit connection to downtown and the St. George campus.

Compared to the future BAU scenario, Option 2 would bring a higher-order transit stop to within walking distance of approximately 44,000 more existing residents, including equity-weighted population of approximately 27,000. Approximately 7,400 more existing jobs would be within walking distance of higher-order transit stops. Daily ridership across the transit network would increase by 1,000 transit users.

Option 2 would also bring a higher-order transit connection to within walking distance to Centennial College Morningside Campus and the Toronto Pan Am Sports Centre, an important community centre and elite sports training facility.

Further discussions are required with Metrolinx to understand the timing and location of the MSF to service the LRVs required for Option 2. The MSF could be serviced by a Morningside MSF located south of Highway 401 and east of Morningside Avenue (Figure 9), which could have the flexibility to service LRVs required for the SELRT should the SELRT be built after the EELRT.

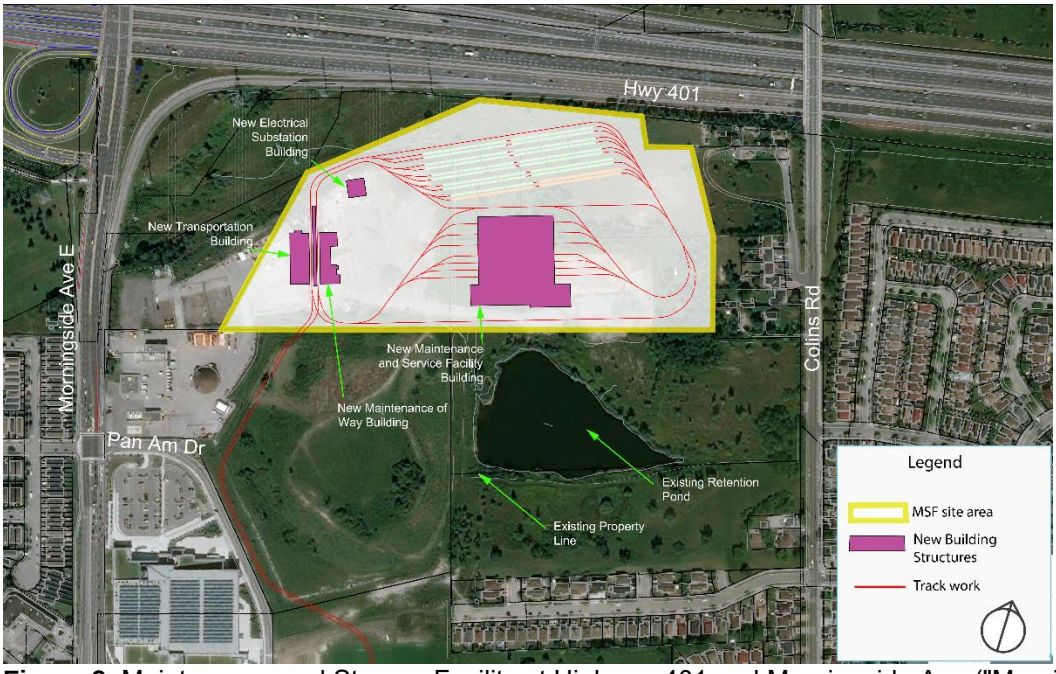


Figure 9. Maintenance and Storage Facility at Highway 401 and Morningside Ave ("Morningside MSF")

Option 2 would have significant property impacts along Morningside Avenue between Kingston Road and the Morningside Ravine, where the existing right-of-way is narrow. While final requirements are not yet confirmed, several residential parcels may be required to facilitate construction.

There would also be environmental impacts to the Morningside Ravine, which may exceed those identified in the project's previously-approved Environmental Project Report.

2.3 Option 3 – Terminus at Malvern Centre

In addition to supporting the development of complete communities on Eglinton Avenue East and Kingston Road, and supporting UTSC as an anchor post-secondary institution, Option 3 would bring a higher-order transit connection to Malvern Centre.

Compared to the BAU scenario, Option 3 would bring a higher-order transit stop within walking distance of approximately 49,000 more existing residents, including equity-weighted population of approximately 30,000. Approximately 8,700 more existing jobs would be within walking distance of higher-order transit stops. Daily ridership across the transit network would increase by 300 transit users, which is less than the two scenarios that terminate near Kingston-Lawrence-Morningside and UTSC.

The capital cost of this option is minimized through the sharing of infrastructure with the Sheppard East LRT, including track and LRT stops along Sheppard Avenue between Neilson Road and Morningside Avenue. LRVs required for Option 3 would be serviced by the Conlins MSF located north of Highway 401 at Conlins Avenue. This MSF is already approved as part of the SELRT project, and would be able to expand to service LRVs required for the EELRT should it be built after the SELRT. This option would provide greater flexibility for the TTC in defining service options on the two LRT lines.

Option 3 would also require coordination with MTO on the rehabilitation of the Morningside overpass across Highway 401. MTO anticipates rehabilitating this structure in the 2020s, and this rehabilitation work could constrain when the Eglinton East LRT could be delivered.

3. Cost Estimates

The estimated cost of the Eglinton East LRT concept terminating at UTSC (corresponding to Option 2) was previously reported to City Council in 2016.[5] To compare the three phasing options currently being considered, certified cost estimators under contract to the City prepared updated Class 4 Cost estimates based on updated engineering design work. A comparison of costs for all options is shown in Table 1.

[5] https://www.toronto.ca/legdocs/mmis/2016/ex/bgrd/backgroundfile-94597.pdf

Table 1. Comparison of LRT Cost Estimates (excluding MSF in all cases)

	2016 Class 5[(1)] Estimate (2019$)[(2)]	2019 Class 4 Estimate (2019$)[(3)]
Option 1 (Kingston/Lawrence/Morningside)	N/A	**$1.4 B**
Option 2 (UTSC)	$1.5 - 1.6 B	**$1.6 B**
Option 3 (Malvern)	N/A	**$2.0 B**

Notes:
All cost estimates in this table exclude Maintenance and Storage Facility (MSF), property acquisition, escalation, financing, lifecycle and operations/maintenance.
(1) Class 5 estimates are considered accurate within a range of -50% to +100%.
(2) Escalation assumed to be 3% per year for three years.
(3) Class 4 estimates are considered accurate within in a range of -30% to +50%. This estimate includes the tunnel segment in the vicinity of Kingston Road, Lawrence Avenue East and Morningside Avenue, endorsed by City Council in May 2018.

The initial investment in an MSF is much more costly than a future expansion because all of the systems and maintenance facilities need to be built, whereas an expansion may be restricted to an increase of the storage space needed. Both the Conlins MSF and Morningside MSF are expected to have similar costs if either was built to accommodate LRVs for both EELRT and SELRT. Therefore, the costs associated with the MSF options have been excluded from the comparison of the LRT options. Further discussions are required with Metrolinx to understand the location and cost implications of the MSF.

4. Public Feedback

The project team has received thousands of comments, questions, ideas and suggestions, primarily from residents in Scarborough. Throughout the consultation program, there have been:

- 81 community touchpoints;
- 11 public meetings;
- 4 stakeholder meetings;
- 4 stakeholder workshops;
- 4 walking tours;
- 528 survey responses;
- 3000+ postcards;
- 39,000+ website hits;
- 28,700+ flyer invitations; and,
- 5 pop-ups.

The feedback gathered on the EELRT has overall showed strong public support for the project. One of the strongest messages the project team heard during all three phases of consultation was a desire to see the transit investment in Scarborough to improve local and regional connectivity and access to jobs, education and services. Other themes and comments that have emerged through public consultation include:

- **Make this project happen.** There has been general support and awareness of this project. Many people were supportive of the LRT and appreciated that the LRT project team is working to bring much-needed transit to Scarborough.

- **Provide connections to transit services and key destinations along the LRT route.** Participants were interested in understanding how the EELRT line will connect with the wider transit system in Scarborough and beyond. They were also interested in how connections will be made or improved to key destinations and communities in the study area. Residents want to see bus service connected to LRT stops so that the full transit system is connected.

- **Provide good planning for amenities and public spaces along the corridor.** There is support for building on investment in LRT. Participants want nicely designed public space with places to sit and gather. Transit waiting stations should be comfortable, safe, heated and accessible as a way to encourage ridership.

- **Communicate the process and timelines of this project.** Participants want this project to be transparent so that they are informed of project updates, timelines, outcomes of the business case, and options for funding commitments.

- **Manage traffic and communicate alternatives**. There was general interest in understanding what the traffic impacts will be along the corridor before, during and after construction, and particularly for bus service during construction.

Further information is found in the Eglinton East LRT Consultation Summary available on the project website.[6]

5. Preferred Option

Option 2 is the recommended first phase of the EELRT because it achieves the strategic objectives of supporting growth and development of Complete Communities along the Avenues and providing a higher-order transit connection to UTSC.

Option 1 is not recommended because its LRVs must be serviced at an expanded Mt. Dennis MSF. This is only sustainable if the Eglinton West LRT is not constructed, and the service required on the rest of Line 5 (from Mt. Dennis to Kingston/Lawrence/ Morningside) does not exceed the capacity of the MSF.

Option 3 is not recommended as part of the first phase of the project because its concept is complicated by interdependencies with the SELRT and bridge rehabilitation work planned by MTO. The uncertainty around the delivery timeline for the SELRT would have an impact on the delivery timeline of the EELRT. That risk and uncertainty could increase costs of the project and make it difficult for both the City and private landowners to make future plans for investment.

[6] http://www.eglintoneastlrt.ca/april2019report

While it would be possible to build the EELRT to Malvern prior to delivery of the SELRT, preliminary estimates of travel demand suggest that there may be few riders travelling between Malvern and UTSC, and that the case for a higher-order transit investment in this area is stronger when there is a good connection to the SELRT. Further work would be required to fully understand the benefits of the Malvern Extension should it be built prior to the SELRT.

To provide the Malvern community with access to higher-order transit, the Malvern Extension alignment from UTSC to Malvern should be considered as a second phase of the EELRT project.

6. Supporting Growth and Community Development

In March 2016, City Council also directed staff to identify areas in need of an Avenue study to support intensification. City staff have consulted with local communities along the EELRT corridor to identify key areas where investment in the project could may also achieve other community objectives. Staff have also identified areas that may have potential for development and growth.

The study identifies opportunities along the full length of the EELRT route with a particular focus on Neighbourhood Improvement Areas. Examples include:

- Provision of public spaces in key locations and enhanced public realm;
- Economic development potential for key industry clusters and employment areas;
- Achievement of key objectives of the Toronto Strong Neighbourhoods Strategy through initiatives like Community Benefits Agreements; and
- Identification of appropriate areas for Transit-Oriented Development.

City staff anticipate reporting to Scarborough Community Council by the end of 2019 on the conclusions and recommended next steps to capitalize on the benefits of the LRT investment, including potential public realm amount projects.

7. Conclusion

As a first phase, the Eglinton East LRT should be advanced to terminate at UTSC. This recommendation is based on the following considerations:

1. There is a strong need for a higher-order transit service to be provided along the Eglinton East corridor.

   Future travel demand modelling estimates that approximately 4,800, peak period, peak direction (PPPD) riders are riding on buses in the Eglinton East corridor in a future scenario where there is no higher-order transit investment. While it may be possible to provide enough buses to carry this many riders in the future, accommodating them would likely require large expansions to the Kennedy Station bus terminal and storage facilities. Operations of this terminal and the buses along Eglinton Avenue East may be a challenge; reliability and comfort would be low.

In the case where the EELRT is built, future travel demand modelling estimates that peak hour ridership in the busiest direction in the morning peak period would be approximately 7,400 riders on the LRT and on buses in the corridor.

2. The EELRT would provide important enhanced connections to neighbourhoods along the LRT corridor, including seven Neighbourhood Improvement Areas.

3. Investment in public transit infrastructure along this corridor represents an investment in communities. Enhanced public realm and public spaces that will be part of the LRT will encourage further private investment and growth along the corridor.

Staff recommend that City Council request Metrolinx to work with the City to develop a plan to address the phasing for the EELRT, including a first phase to UTSC and a second phase to Malvern Centre; the location and construction timing of the MSF; and commence the preliminary design and engineering phase of the EELRT project. Staff also recommend that City Council request the Deputy City Manager, Infrastructure and Development Services to report back to City Council with recommended plan, schedule, cost and funding requirements for consideration in the City's 2020 budget process.

Contact

James Perttula, Director Transit and Transportation Planning, City Planning Division
Email: james.perttula@toronto.ca, Tel: 416-392-4744

Mike Logan, Program Manager, Transit and Transportation Planning, City Planning Division
Email: mike.logan@toronto.ca, Tel: 416-338-5568

EGLINTON WEST LRT

Introduction

The Eglinton West Light Rail Transit ("EWLRT") is a western extension of Line 5 (Eglinton Crosstown LRT), which is currently under construction and owned by Metrolinx. The EWLRT extension will also be owned by Metrolinx. The project comprises two components: (i) a 9 km **Toronto Segment** from Mt. Dennis Station to Renforth Station at Commerce Boulevard, and (ii) a 5 km **Airport Segment** from Renforth Station to Pearson International Airport (Figure 1).

Figure 1. Both segments of the Eglinton West LRT.

The EWLRT extension would fill a missing link in the higher-order transit network, connecting the western terminus of Line 5 (Eglinton Crosstown LRT) at Mount Dennis Station and the eastern terminus of the Mississauga Transitway (Bus Rapid Transit line) at Renforth Station.

Project Benefits

- Choice in order to move around the city and region in the future, particularly given expected growth in traffic along the Eglinton West corridor.
- Serve people travelling between the Mississauga Airport Corporate Centre and midtown Toronto, which could support growth and economic development with the employment zone south of the airport.
- Improve rapid transit connections for users of busy north-south bus routes along the Eglinton West corridor, providing an alternative route to the Line 2 subway.
- Restore the through-transit connection along Eglinton Avenue at Weston Road that will be lost when the Line 5 Eglinton replaces the existing bus service east of Weston Road.
- If the Airport Segment is added to the Toronto segment, the project may also support the Greater Toronto Airports Authority's ("GTAA") plans to develop Toronto Pearson International Airport as a multi-modal transportation hub, connecting air travel and regional transit to local services. The EWLRT may provide good alternatives for accessing the airport for journeys originating in the

region west of Toronto and in Central Etobicoke; benefits may be small for other residents given the UP Express service from the future Mt. Dennis Station.

This Attachment provides an update on the further analysis requested by City Council in December 2017 for the Toronto Segment, which includes outputs resulting from a Community Working Group. Additional analysis on the options for the Toronto Segment of the project continues to demonstrate that the at-grade EWLRT option with 10 stops as recommended by staff in December 2017 best serves the City's planning and transit service objectives, while taking into consideration cost.

Metrolinx continues to undertake early planning work on the Airport Segment of the EWLRT extension, which is currently less advanced than the Toronto Segment. Metrolinx has also advised an interest in further reviewing the options for the Toronto Segment in the context of the overall extension of the EWLRT to Pearson International Airport and potential regional benefits of a tunnelled option. This additional analysis by Metrolinx is not available at this time.

As a result of the current status of Metrolinx analysis, the Toronto Segment of the EWLRT is not ready to move through the Stage Gate Process specifically agreed to for SmartTrack (including the EWLRT project) by the City and Province/Metrolinx under the 2016 Toronto-Ontario Agreement in Principle (see Decision History and Appendix A). Further direction will be sought from City Council once Metrolinx and the GTAA have completed their analysis on the Airport Segment and Regional Transportation Passenger Centre requirements.

Decision History

In January 2015, City Council considered *EX2.2 SmartTrack Work Plan (2015-2016*) and directed staff to undertake a feasibility study of SmartTrack options on the Eglinton Avenue West corridor, from Mount Dennis station to the Mississauga Airport Corporate Centre, including a new heavy rail corridor option.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.EX2.2

In March 2016, City Council considered the report *EX13.3 Developing Toronto's Transit Network Plan: Phase 1* and requested City staff and Metrolinx to finalize technical and planning analysis for SmartTrack, and removed heavy rail options on the western corridor from consideration.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX13.3

In July 2016, City Council considered the report *EX16.1 Developing Toronto's Transit Network Plan to 2031*, and approved a SmartTrack concept that included the EWLRT with 8 to 12 stops between Mount Dennis Station and Renforth Station. City Council also directed staff to consider targeted grade separations to address potential traffic impacts of an at-grade LRT along the corridor, including a review of their associated costs. City Council also requested the City and TTC to work in partnership with Metrolinx, the City of Mississauga, and the GTAA to develop options for the extension of the EWLRT to Pearson International Airport, and assess opportunities for commuter parking along the EWLRT corridor.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.1

In November 2016, City Council considered the report *EX19.1 Transit Network Plan Update and Financial Strategy*, and adopted terms for a broad cost-sharing agreement with the Province of Ontario that included the EWLRT. City Council adopted a "SmartTrack Stage Gate Process", developed by the City and the Province, that allows for key decisions at defined stages of the project. Under the agreement, the City as the proponent of SmartTrack, agreed in principle to contribute full funding for the procurement and construction of the Toronto Segment of the EWLRT, subject to the parties agreeing to advance the project through the Stage Gate Process. Both parties have a right to reconsider commitment to the project as it advances through the Stage Gate Process. To date, City Council has confirmed funding of $51 million for early planning and design to advance the Eglinton West LRT. No further funding commitment has been made to the project.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX19.1

In December 2017, City Council considered the report *EX29.1 SmartTrack Project Update and Next Steps*. City Council direct staff to continue planning the EWLRT transit extension concept for the Toronto Segment between Mount Dennis Station and Renforth Station ("Toronto Segment"), with ten stops as described in Attachment 2 to the report. City Council also requested staff to form a working group of community stakeholders in consultation with local councillors, to investigate further grade separation and or tunnelling options to further develop traffic modelling and an enhanced framework that places additional consideration on local community interest.
Link: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX29.1
Attachment 2: Eglinton West LRT Technical and Planning Update:
https://www.toronto.ca/legdocs/mmis/2017/ex/bgrd/backgroundfile-109250.pdf

Current Status of Project

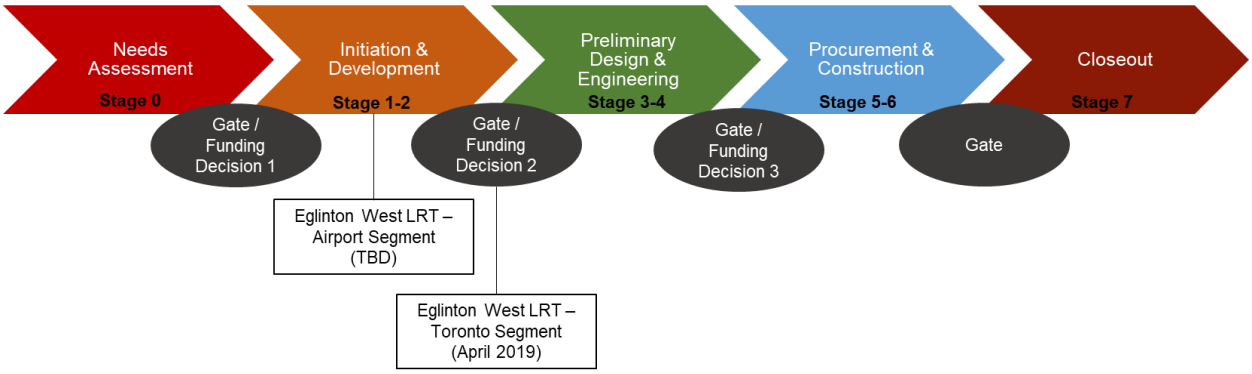


Figure 2. Current status in the project lifecycle

The EWLRT was originally approved under Ontario's Environmental Assessment Act in 2010 as Phase 2 of the Eglinton Crosstown LRT. An Initial Business Case, jointly developed by the City and Metrolinx, concluded that the previously-approved Phase 2 of the Eglinton Crosstown LRT (i.e., surface-running LRT) was the preferred concept for the SmartTrack western corridor. City Council directed staff to complete the remaining technical and planning analysis for an EWLRT extension with between 8 and 12 stops in Toronto.[1]

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

City staff, in partnership with TTC and Metrolinx, have undertaken the required analysis to complete the requirements of the Initiation and Development phase of the **Toronto Segment** of the project. This corresponds to Stage 3 work outlined in the specific Stage Gate process outlined for SmartTrack as part of the City and Province's Agreement in Principle (see Attachment 1 of 2016.EX19.1).[2] This work includes completion of conceptual design and the development of a Class 4 cost estimate. In accordance with other City Council direction, City staff have also completed a planning and streetscape study for the corridor, studied opportunities for commuter parking, and conducted significant public consultation.

Planning and conceptual design for the **Airport Segment** from Renforth Station to the proposed Regional Transportation Passenger Centre ("RTPC") at Pearson International Airport is being led by Metrolinx with support from City and TTC staff. The Airport Segment concept has not significantly developed from the alignment contemplated in the project's 2010 Environmental Project Report because the RTPC concept, being advanced by the GTAA, has not advanced to a point where the terminus of the Airport Segment can be identified with any certainty. As a result, the Airport Segment of the overall EWLRT extension is further behind the Toronto Segment in the project lifecycle (Figure 2).

In a March 22, 2019 letter to the City Manager and Chief Executive Officer of the TTC, the Province proposed that a significant portion of the EWLRT be subterranean (i.e., tunnelled), a concept which has been studied throughout this project, including as part of this report and as part of the 2016 Initial Business Case[3] jointly developed by Metrolinx and the City.

Notwithstanding the City's identification of a preferred EWLRT concept and development of Class 4 cost estimate for the at-grade LRT option with 10 stops, the next phase of work can only reasonably continue once Metrolinx has completed their analysis. Because Metrolinx is the asset owner of the Crosstown LRT and future LRT extensions, concurrence on the preferred option for the project is required to continue to advance per the agreed to Stage Gate Process between the parties (Appendix A).

Comments/Analysis

In December 2017, City Council directed staff to consult with identified members of the public (the Community Working Group, or CWG) on further grade separated and/or tunnelled concepts for the Toronto Segment of the project. Fourteen community members were identified by local Councillors to form the CWG. City, TTC and Metrolinx staff met with this group six times over a period of four months, to facilitate the CWG in identifying:

a) their preferred EWLRT Toronto Segment;
b) additional metrics of interest to the community; and
c) enhanced approach to traffic modelling.

[2] https://www.toronto.ca/legdocs/mmis/2016/ex/bgrd/backgroundfile-97894.pdf
[3] https://www.toronto.ca/legdocs/mmis/2016/ex/bgrd/backgroundfile-94621.pdf

All activities of the CWG, including the Terms of Reference, membership, minutes of all meetings and final recommendations of the CWG to City staff, are available on the project website.[4]

City Council's direction to work with the CWG was in response to community concerns that a surface LRT concept would negatively impact traffic conditions in the Eglinton West corridor, and that the City's evaluation had not appropriately considered factors that are important to the local community.

Project team staff have compared tunnelling concepts for the EWLRT, including the concept developed by the CWG. Staff have updated traffic modelling based on advice from the CWG and have ensured that all additional metrics recommended by the CWG are part of the analysis of EWLRT concepts.

The conclusion of this analysis is that the surface-running LRT would achieve the City's objectives and would offer a good choice for travelling between Mt. Dennis and the Mississauga Airport Corporate Centre, and around the community. All other options have much higher capital costs, which would limit the City's ability to invest in other important transit and infrastructure projects. The conclusion of the additional analysis undertaken, is that the surface-running LRT option continues to be the preferred option in meeting the City's project objectives. This is consistent with the concept recommended in July 2016 and December 2017.

1. Summary of Options

Four concepts for the Toronto Segment have been compared:

Option 1 — 10-stop surface-running concept as recommended to City Council in both July 2016[5] based on the findings of the Initial Business Case ("IBC") jointly prepared by the City and Metrolinx, and in December 2017[6] based on a further review of targeted grade separations to alleviate perceived traffic impacts (Figure 3).

Option 2 — 10-stop underground concept, developed in response to both the need to provide transit connectivity to the community, and a strong community desire to construct the EWLRT underground (Figure 4).

Option 3 — 3-stop elevated and underground concept, previously considered in the July 2016 Initial Business Case jointly authored by the City and Metrolinx, with parallel bus route (Figure 5).

Option 4 — 7-stop elevated and underground concept, developed by the CWG, with parallel bus route (Figure 6).

[4] http://www.eglintonwestlrt.ca/project-materials-2/cwg-materials/
[5] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.EX16.1
[6] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX29.1

For Options 2, 3 and 4, all underground segments would be tunnelled, and stations would feature concourse levels. These parameters replicate the approach to the Eglinton Crosstown LRT underground segment and were included based on feedback from the community.

For Options 3 and 4, the EWLRT guideway would be elevated across the Eglinton Flats and Humber River, with elevated stations. The LRT guideway would go underground through a portal between Scarlett Road and Royal York Road and emerge through a portal west of Renforth Avenue.

All concepts would be serviced by an expanded Mt. Dennis Maintenance and Storage Facility (MSF) that is currently being built by Crosslinx for Line 5 Eglinton.

A common Airport Segment alignment was developed by Metrolinx staff based on preliminary alignment work, and added to each Toronto Segment concept to complete the project scope for modelling purposes. The common Airport Segment alignment features:

a) an elevated segment over Highway 401 with an elevated station at Convair Drive;
b) a surface-running segment with a stop at Silver Dart Drive; and
c) an elevated segment with a station at the proposed Regional Transportation Passenger Centre (RTPC) at Pearson International Airport.

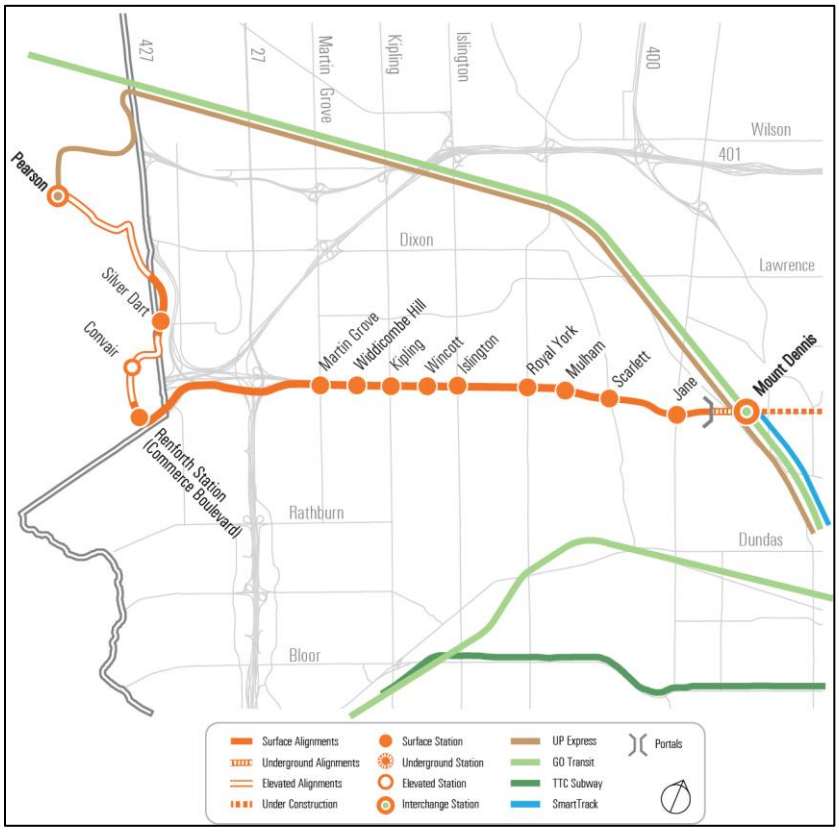


Figure 3. Option 1.

Figure 4. Option 2.

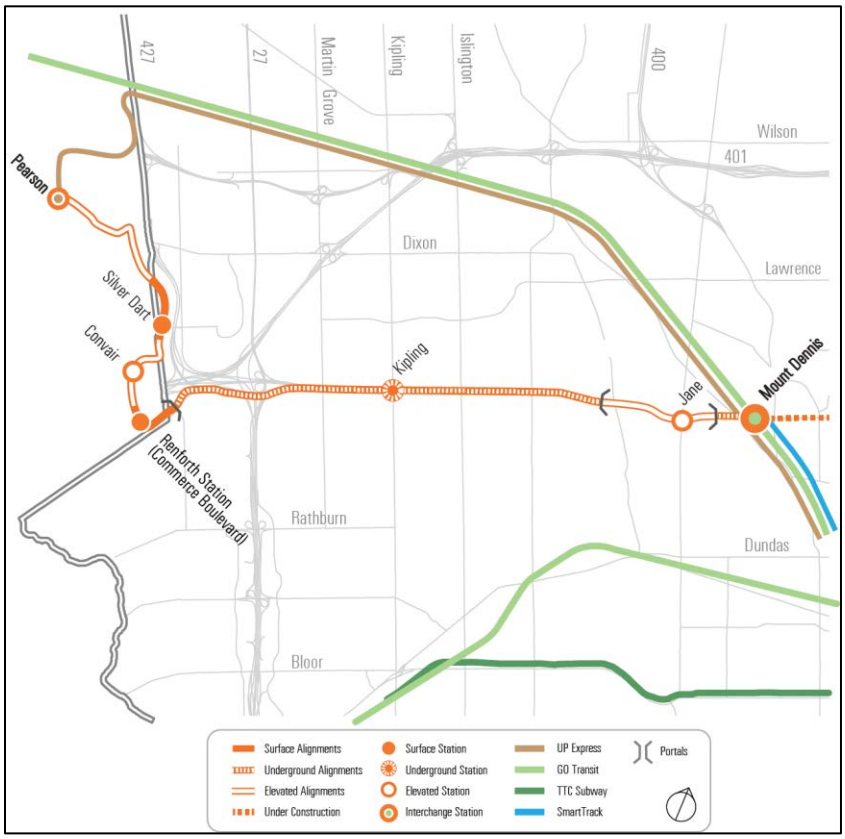


Figure 5. Option 3.

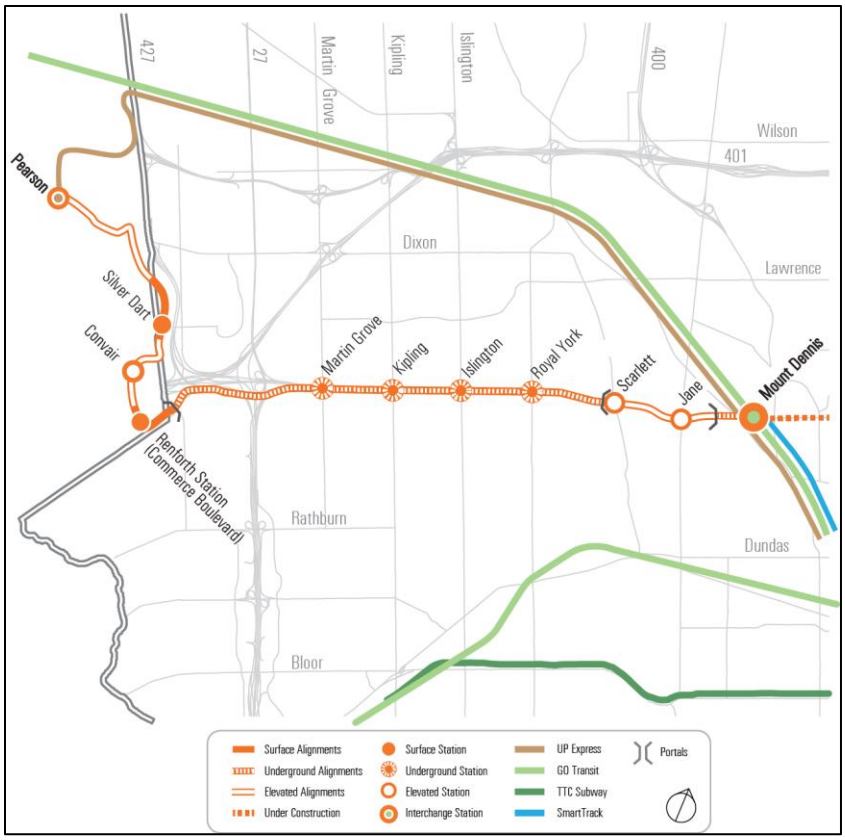


Figure 6. Option 4.

2. Cost Estimate Comparison of Options

The estimated costs of both the 8 to 12-stop surface-running EWLRT concept (corresponding to Option 1) and the 6-stop fully grade separated Eglinton West LRT concept (corresponding to Option 3) were previously reported to City Council in 2016.[7]

To compare the four Toronto Segment options, certified cost estimators under contract to the City prepared updated Class 5 cost estimates for the Toronto Segment based on updated engineering design work. These estimates were reviewed by Metrolinx. The updated cost estimate for the Airport Segment was prepared by Metrolinx. A comparison of costs for all options is shown in Table 1. A Class 3 cost estimate is required to establish the project budget baseline.

[7] https://www.toronto.ca/legdocs/mmis/2016/ex/bgrd/backgroundfile-94597.pdf

Table 1. Comparison of Cost Estimates.

	2016 IBC Class 5[1] Estimate (2014$)	2016 IBC Class 5 Estimate (2019$)[2]	2019 Class 5 Estimate (2019$)
Toronto Segment Option 1	$1.2 - $1.8 B	$1.4 - $2.1 B	**$1.5 B**
Toronto Segment Option 2	N/A		**$4.0 B**
Toronto Segment Option 3	$1.7 - $2.7 B	$2.0 - $3.1 B	**$2.2 B**
Toronto Segment Option 4	N/A		**$3.0 B**
Airport Segment[3]	$0.28 B	$0.33 B	**$1.0 B**

Notes:
All cost estimates in this table exclude escalation, property acquisition, financing, lifecycle and operations/maintenance, and costs associated with expansion of the Mount Dennis Maintenance and Storage Facility.
(1) Class 5 estimates are considered accurate within a range of -50% to +100%.
(2) Escalation assumed to be 3% per year for five years.
(3) Prepared by Metrolinx.

3. Comparison of Options

As an extension of the Eglinton Crosstown LRT, the EWLRT must be constructed to the Eglinton Crosstown's design specifications. This means that all options have the same frequency and capacity. The assumed build-out of the EWLRT is assumed to have a capacity of 7,400 passengers/hour in each direction, based on a 96 m, three-car consist with a headway of approximately four minutes.

Option 1 is the preferred concept for the Toronto Segment of the EWLRT because it is has the lowest cost while meeting all of the City and TTC's project objectives and policy objectives for transit connectivity.

1.1 Option 1

Option 1, a 10-stop surface-running LRT in the centre of the Eglinton Avenue West right-of-way, is a variation of the EWLRT concept that was previously endorsed by City Council and the Metrolinx Board, and approved under Ontario's Environmental Assessment Act.

The design of Option 1 has been refined and detailed traffic analysis has been undertaken based on previous City Council direction.

Option 1 would achieve the greatest connectivity for people along the corridor because it includes 10 LRT stops along Eglinton Avenue West. It will provide increased opportunities to board the EWLRT to access jobs, goods, services, and neighbourhoods.

Option 1 would also replace the existing Eglinton West 32 TTC bus and would connect with 11 other TTC bus routes. These connections would offer an alternative rapid transit route to midtown and downtown for people who currently take the bus to Line 2. This would be particularly beneficial for those travelling to or from the Kingsview Village-The Westway Neighbourhood Improvement Area along the Dixon Road corridor to the north of Eglinton Avenue.

Typical Metrolinx LRT program stop designs were assumed for costing purposes. These designs may expose waiting passengers to some weather compared to underground stations. It would be possible to invest in enhanced shelters that would provide greater protection and amenity if weather protection is identified as an important objective. Increased access at surface level also allows visibility to surface destinations and improved wayfinding, as well as ensuring consistently barrier-free access that does not require the use of stairs, escalators, or elevators.

The EWLRT is expected to have a travel time from Mt. Dennis Station to Renforth Station of 25 minutes. This is a similar or better travel time along the corridor than auto traffic during peak periods, which makes the LRT a good alternative for travelling through the corridor. Peak point, peak direction (PPPD) ridership for Option 1 based on this travel time is estimated to be 2,700 passengers/hour, which represents an increase of 1,900 passengers/hour compared to maintaining the existing bus service. LRT travel times may be further improved through the refinement of traffic operations and transit signal priority measures and should be considered a conservative estimate of travel time.

The design has been updated to remove any “Michigan left” turn movements due to community concerns.

While Option 1 would have some negative impacts to traffic operations on the Eglinton Avenue West corridor, advanced traffic simulation modelling suggests that these impacts would be minimal. Implementation of the EWLRT would not decrease the capacity of the existing roadway because there would be no reduction in the number of general road lanes, and left turns for motorists would continue to be possible at all signalized intersections. Traffic operations can also be further improved through refinements to transit signal priority and more detailed design work.

The corridor is predicted to be congested in the future, regardless of whether or not there is a surface LRT. Vehicles are predicted to detour from the corridor particularly at congested segments. See Section 7 for further detail about traffic impacts.

Option 1 would have very minimal property impacts because the EWLRT would make use of under-utilized space in the public right of way, but would require an additional bridge across the Humber River, which was not previously anticipated.

Of the four options, Option 1 is estimated to have the lowest capital cost, lifecycle capital cost and operating cost, as well as the shortest construction period and least construction impact.

1.2 Option 2

Option 2, when compared to Option 1, offers the only direct comparison between a surface-running and underground concept with the same stops.

Option 2 would also achieve the greatest connectivity for people along the corridor because it also considers 10 LRT stops along Eglinton Avenue West. It will provide increased opportunities to board the LRT to access jobs, goods, services and neighbourhoods.

Additional strategic benefits of Option 2 include enhanced shelter for passengers and slightly improved reliability.

While both Options 1 and 2 offer the same connectivity benefits, Option 2 offers a faster service (19 minutes from Mt. Dennis Station to Renforth Station compared to 25 minutes for Option 1) due to it running in a completely dedicated right-of-way. This improved travel time is estimated to increase PPPD ridership during the morning rush by approximately 800 passengers, to 3,500 passengers/hour. Option 2 is assumed to have no impact on traffic operations once LRT construction is complete because the existing roadway configuration would be maintained.

Compared to Option, 1, Option 2 would have a longer construction period with resultant impacts to traffic and adjacent communities, risks associated with construction under the Humber River and ongoing risk of flooding to the tunnel. This option is also has much higher capital, lifecycle and annual operating costs than Option 1.

Option 2 would also have more property impacts than Option 1 to facilitate tunnel boring machine ("TBM") launch and extraction sites, as well as station construction sites and entrances.

Option 2 is not recommended because its high costs would limit the City’s ability to invest in other important transit and infrastructure projects.

1.3 Option 3

Option 3, the 3-stop elevated and underground concept previously considered in 2016, would provide the least amount of transit accessibility benefit for local communities with minimal LRT stations/stops. With only three stops along Eglinton Avenue West, this option would provide fewer opportunities for residents to access jobs, goods, and services.

Option 3 is faster than Options 1 and 2 (with a travel time of 12 minutes from Mt. Dennis Station to Renforth Station) and a corresponding increase in PPPD ridership to 3,800 passengers/hour. However, there is such limited connectivity provided for the local community, residents who live or work near the transit line would receive minimal benefit.

Option 3 is assumed to have no impact on traffic operations once EWLRT construction is complete because the existing roadway configuration would be maintained.

Option 3 would have more property impacts than Option 1 but fewer than Option 2, to facilitate TBM launch and extraction sites, as well as station construction sites and entrances.

Similar to the findings of the 2016 IBC, Option 3 is not recommended because it does not meet the City and TTC's objectives for connectivity, and would do little to improve transit in the area where it is built.

1.4 Option 4

Option 4 (Community Working Group option), the 7-stop elevated and underground concept, proposes a different balance between connectivity and speed.

Option 4 would achieve moderate improvement in access to jobs and people with seven LRT station stops at arterials. It will provide moderate opportunities to local communities to access jobs, goods, and services.

Option 4 provides enhanced shelter for passengers in four underground stations, but may expose passengers to greater impacts from the elements at two elevated stations. Noise from the LRT operating across the Eglinton Flats on an elevated guideway may also have impacts which have not been fully studied, would have visual impacts on the park landscape, and would be an intrusion into the apartment neighbourhood around Eglinton Avenue West and Scarlett Road.

Compared to Options 1 and 2, Option 4 removes three stops that are required by TTC service coverage policy but that do not connect to bus services. As a result, the travel time from Mt. Dennis Station to Renforth station is reduced to 16 minutes compared to 25 and 19 minutes for Options 1 and 2, respectively. The PPPD ridership with the LRT increases to 4,100 passengers/hour.

Option 4 is assumed to have no impact on traffic operations once LRT construction is complete because the existing roadway configuration would be maintained.

Option 4 would have more property impacts than Option 1 (but fewer than Option 2) to facilitate TBM launch and extraction sites, as well as station construction sites and entrances.

Compared with Option 2, Option 4's elevated segment across the Eglinton Flats eliminates the risk of construction under the Humber River and ongoing risk of tunnel flooding through the floodplain. The elevated segment and removal of three stations also results in Option 4 having a lower capital cost estimate than Option 2, while lifecycle capital costs and annual operating costs are similar.

4. Public Feedback

Extensive consultation with community stakeholders, the Community Working Group, and members of the public has been undertaken throughout the past two years. Consultation and outreach activities have included:

- Public meetings on March 5 and 7, 2019
- Stakeholder meetings on July 18, 2018 and February 25, 2019
- Six Community Working Group meetings between March and July 2018
- Walking tours on August 1 and September 25, 2018
- Six pop-up consultations at various locations within the community between July and September 2018
- Four workshops with the Kingsview Village-The Westway Neighbourhood Area Planning table, the Toronto Youth Cabinet and the TTC Advisory Committee on Accessible Transit between June and November, 2018
- Online consultation using Social Pinpoint, the project website (http://www.eglintonwestlrt.ca/) and email

Through these activities, more than 700 participants were engaged in person and over 600 online responses were received. Feedback shows that there is strong support for an LRT along Eglinton Avenue West in order to improve local and regional connectivity and improve access to jobs, education and services. Some participants have stated that this project is a key link to building a citywide rapid transit network.

Most of the participants adamantly supported Option 4 or Option 2, mainly due to the perception that an underground LRT would have fewer impacts on traffic and vehicular travel times than a surface-running LRT. Those supportive of these options were of the view that a fully underground LRT would provide the most relief to current and future traffic congestion on Eglinton, provide the least number of impacts on the local community during operation, and require less maintenance and fewer delays due to inclement weather. Many participants did not consider project cost to be a significant issue and felt that the additional cost to construct either of these options would be worth the long-term benefit.

Many participants who preferred Option 4 were supportive of the elevated alignment between Jane and Scarlett to mitigate potential impacts to natural features, including the Humber River floodplains. Many Option 4 supporters were also in favour of the removal of the LRT stop at Wincott Drive and were of the view that a stop at this location would cause increased traffic in this primarily low-density residential area.

Many participants supportive of Option 4 or Option 2 raised concern about a surface-running LRT. Despite the results of the analyses and the design work, participants were of the view that a surface-running LRT would increase vehicular travel times, add to congestion in the corridor, result in reductions of traffic lanes along Eglinton Avenue West or could not be built without significant property impacts. Some participants raised concern that a surface-running LRT would negatively impact their daily commutes, be a safety concern for those crossing the street, cause increased noise, and result in visual impediments due to overhead wiring.

Participants who showed support for Option 1 noted the comparatively lower cost to construct the LRT, the faster approval and construction period with the least amount of construction disruptions, the higher number of stops, and the increased comfort and experience for individuals riding the LRT with full access to natural light. Some also stated that Option 1 would be the most accessible to everyone due to the 10 stops on

the surface, allowing the greatest proximity and connectivity to TTC bus routes, local amenities and jobs. Some participants stated that Option 1 would be the best use of the limited resources available for transit expansion and have raised concern that if a more expensive option is selected, the project could be significantly delayed, or move forward at the expense of another transit project.

The least preferred option was Option 3. Those who expressed preference favoured the low cost, the fact that the majority of the line would be underground, and the comparatively fast travel time from Mount Dennis to Commerce Boulevard. Some suggested Option 3 should be chosen with provisions for stops to be added in the future when required.

Further documentation of public feedback is found on the project website.[8]

5. Results of Option Analysis

Options 2 and 3 are not recommended as described above. Based on a direct comparison of Options 1 and 4, the results of the analysis indicate the preferred concept for the Toronto Segment of the EWLRT is Option 1. As described above, Option 1 is the 10-stop surface-running concept (Figure 3).

Option 4 offers a good, pragmatic balance between connectivity and speed of the LRT with economic benefits that exceed those of Option 1. Nonetheless, it does not meet all of the City and TTC's policy objectives for transit connectivity and would require the TTC to maintain the operation of the Eglinton West bus service.

The improvement in travel time between Option 1 and Option 4 is partly due to the reduction of stops, and partly due to the fully-exclusive nature of the transit right-of-way. With further refinements to traffic operations and transit signal priority, travel time for Option 1 can be improved to approach that of Option 4.

Option 1 also has some impacts on traffic operations, ranging from 1 to 3 minutes (up to 5%) for autos travelling from Mt. Dennis to Renforth Station, compared to Option 4 which is assumed to have no impact on traffic operations. A further detailed study of solutions to traffic issues is described in Section 7.

Option 4 has a longer construction period, greater construction impacts, visual impacts and potential noise impacts to both the apartment neighbourhood around Eglinton-Scarlett and the Eglinton Flats.

Option 4 capital, lifecycle capital and annual operating costs far exceed the costs of Option 1. The estimated capital costs, at approximately $3 billion (2019$), would limit the City's ability to invest in other important transit and infrastructure projects. This expenditure is not warranted when Option 1 would achieve the City's objectives and would offer an excellent choice for travelling through the community and between Mt. Dennis and the Mississauga Airport Corporate Centre.

[8] http://www.eglintonwestlrt.ca/april2019report

6. Class 4 Cost Estimate for the Preferred Option 1

Further design work was undertaken on the preferred Toronto Segment concept (Option 1), including an updated cost estimate to reflect the maturation of the project definition. A Class 4 cost estimate for Option 1 was prepared by certified cost estimators under contract to the City and reviewed by Metrolinx, to satisfy Gate 4 of the SmartTrack Stage Gate process (see Appendix A). This further design is the completed conceptual design, and has been fully documented to inform the future Preliminary Design & Engineering (PDE) phase of work. Cost estimates for the Airport Segment are at Class 5. A comparison of the maturation of cost estimates is shown in Table 2.

Table 2. Maturation of Cost Estimates for Option 1.

	2016 Initial Business Case Class 5[(1)] Estimate (2019$)	2019 Class 5 Estimate (2019$)[(2)]	2019 Class 4[(3)] Estimate (2019$)
Toronto Segment (Option 1)	$1.4 - $2.1 B	$1.5 B	$1.8 B
Airport Segment	$0.33 B	$1.0 B	N/A

Notes:
Cost estimates exclude escalation, financing, lifecycle and operations/maintenance, and costs associated with expansion of the Mount Dennis Maintenance and Storage Facility.
(1) Class 5 estimates are considered accurate within a range of -50% to +100%.
(2) Escalation assumed to be 3% per year for five years.
(3) Class 4 estimates are considered accurate within a range of -30% to +50%.

The Class 4 cost estimate for Option 1 is within the estimate range reported in the 2016 Initial Business Case. The updated cost estimate for the Toronto Segment of $1.8 B (2019$) is a Class 4 estimate, and is still not suitable for establishing a baseline project budget. Additional preliminary design and engineering is required to mature the project to a Class 3 level estimate. The 2019 Class 4 updated cost estimate for the Toronto Segment also includes two changes in scope. These changes were:

1. The need for an additional structure across the Humber River because it was determined that the existing structure cannot be widened; and
2. The inclusion of green trackway as recommended by the planning and streetscape study, to achieve the objective of a green corridor and low impact design.

7. Solving the Traffic Problem

Community members have repeatedly raised concerns about traffic operations along the Eglinton West corridor. Concerns about worsening traffic operations as a result of introducing a surface LRT are the most common reason that community members prefer an underground LRT concept. Multiple rounds of detailed traffic simulation modelling have been undertaken to more fully understand the issues that exist and those that may be expected in the future, with and without the implementation of Option 1.

The Eglinton Avenue West corridor is unique in Toronto because it was originally planned to accommodate the Richview Expressway, which was cancelled in 1971. The right-of-way is over 100 metres wide in places, and is characterized by very wide boulevards between the street and private properties.

The Highway 401-Highway 427-Highway 27-Eglinton Avenue interchange at the western end of the EWLRT corridor was also originally designed to direct traffic to the planned Richview Expressway. Because the Expressway was never built, seven lanes of traffic exit the highway interchange and are required to stop at an urban stoplight at Eglinton Avenue and Martin Grove Road. As a result, the Eglinton-Martin Grove intersection is one of the city's most congested intersections. Operational issues spill over to intersections along the Eglinton corridor including Kipling Avenue and Islington Avenue.

Observations of existing conditions and modelling future scenarios suggest that the operational issues are exacerbated, particularly in the afternoon peak period, by:

1. The inability for vehicles leaving the Mississauga Airport Corporate Centre to directly access Highways 401 and 427, forcing traffic to use Eglinton Avenue and one of the north-south arterial roads to access the highway network; and
2. Congestion on Highway 401 due to lack of "collector lanes" between Highways 427 and 409, incenting drivers to use Eglinton Avenue and one of the north-south arterial roads to bypass this segment.

Extensive simulation modelling suggests that the traffic network in the area around the potential EWLRT corridor is saturated during peak hours today, and estimates that travel time in the Eglinton West corridor between Renforth Station and Mt. Dennis Station will approximately double by 2041.

One conclusion of the traffic study is that a surface-running LRT would have a minimal impact on auto traffic, using current assumptions for transit signal priority ("TSP").[9] Further refinement to traffic operations and TSP assumptions could further reduce the impact of the surface LRT on auto traffic operations.

The surface-running LRT would not remove any through- or turning-lanes of traffic, but would only change signal timing along the corridor. In other words, a surface EWLRT is not the cause of congestion, nor would building an underground LRT mitigate this congestion.

This conclusion notwithstanding, traffic congestion is a concern today and will be of increasing concern in the future. Detailed modelling suggests that normal growth in traffic will significantly increase auto travel times in the corridor even without a surface LRT. The biggest congestion concerns are in the area around the Highway 401-Highway 427-Highway 27-Eglinton Avenue interchange at the western end of the corridor with many vehicles using Eglinton Avenue as an alternative route to the busy highways.

[9] Available at http://www.eglintonwestlrt.ca/april2019report

While several solutions to traffic congestion have been tested through the EWLRT detailed traffic study, these interventions are outside the scope of the EWLRT project because the EWLRT is not the cause of the congestion. In addition, the solutions tested do not capture the full range of possible solutions. Further work to assess these possible solutions requires the full partnership of Ontario's Ministry of Transportation (MTO).

Staff recommend that work already undertaken by the City be advanced, in consultation and partnership with MTO, to identify the preferred solution for traffic congestion on Eglinton Avenue West.

8. Commuter Parking

City Council directed staff to assess opportunities to provide commuter parking along the EWLRT corridor. This assessment has been undertaken as part of a larger multi-modal access plan for the EWLRT that considers how to enhance access to stops and help ensure that the LRT would be attractive to use. Recommendations for multi-modal access have been taken into consideration in the conceptual design for the EWLRT.

A total of nine potential sites for commuter parking were identified, as illustrated in Figure 7. Of these, only the three potential sites in the hydro corridor near Eglinton Avenue West and Martin Grove Road are both large and immediately adjacent to an LRT stop. Given the traffic congestion in this area as described above, traffic generated by the lots themselves could further worsen traffic congestion in the area.

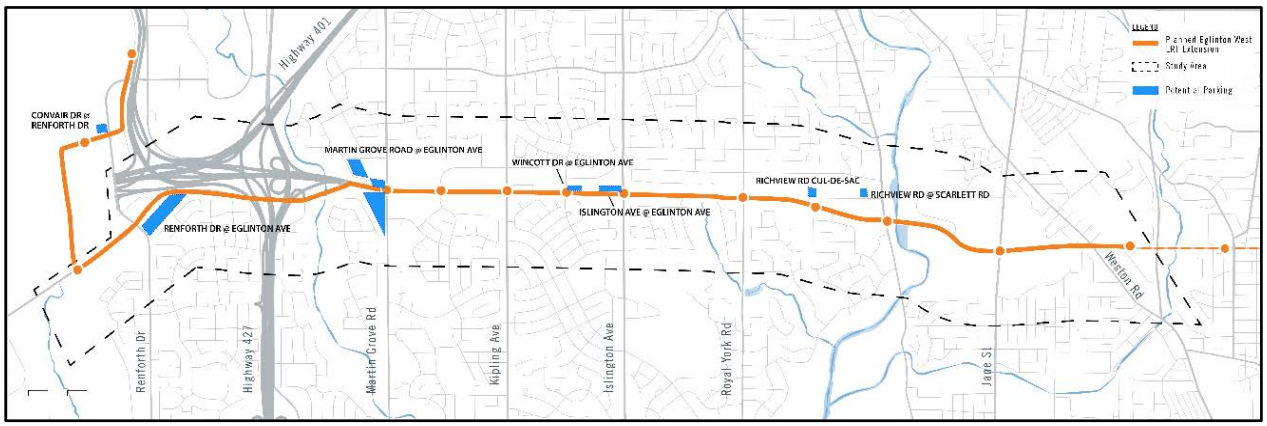


Figure 7. Potential locations for commuter parking lots (highlighted in blue).

Further, commuter parking is not recommended because:

1. It is not consistent with Official Plan policy 2.4(7)(d) that seeks to encourage transit through limiting surface parking as a non-ancillary use;
2. It has relatively high capital, operations, and maintenance costs to implement compared to the revenue that the lots could be expected to generate;
3. Subsidizing parking would have the effect of attracting drivers; and
4. Many of the potential lots identified would occupy land better suited to transit-oriented development or natural preservation.

The provision of commuter parking should be removed from consideration as part of the EWLRT project. Further details can be found in the Commuter Parking Report available on the project website.[10]

9. Streetscape Design

Consistent with City Council direction from July 2016, an extensive streetscape design and land use planning study has been undertaken to evaluate development potential along the EWLRT corridor and identify streetscape design principles and opportunities to ensure that the City's objectives are achieved by potential investment in the EWLRT.

Recommendations and key themes from Eglinton Connects – the broad planning study undertaken by the City for the Eglinton Crosstown corridor – were reviewed and adapted for the Eglinton West corridor, in consultation with the local community. Details of the study can be found in the Planning & Streetscape Study Report.[11] Recommendations have been incorporated into the conceptual design. Key recommendations include the following:

1. Create direct and wide paths for travel and greater buffers between pedestrians and vehicular traffic;
2. Maintain cycling facilities along the corridor, introduce new cycling connections, and upgrade the multi-use trail to current standards;
3. Design excellent shelters at LRT stops for safe access and comfortable waiting experiences such as designing platform widths to allow for enclosed shelters;
4. Maintain and enhance the existing “green corridor” by implementing a green guideway for the LRT, planting new trees, and designing the street and public realm according to principles of low impact development; and
5. Consider implementing complimentary projects along the corridor to further enhance the public realm, such as public art installations or naturalizing Mimico Creek and Silver Creek.

10. Land-Use Planning

A review of land use planning policy and built form have been undertaken as part of the planning and streetscape study. The study notes that much of the corridor is designated "Neighbourhoods" in the Official Plan with relatively few opportunities for significant changes, and it does not propose substantial changes to land use policies. However, the study does include recommendations regarding future development that may occur, such as:

- Ensuring new development respects the open and green character of much of the area and transitions appropriately between low-rise and high-rise areas;
- Encouraging new development to contribute to pedestrian connectivity by providing direct visual or physical connections, such as mid-block connections to transit stops or stations; and
- Prioritizing mixed uses on larger sites and those near transit stops, particularly to encourage the provision of new or improved community services and amenities.

[10] http://www.eglintonwestlrt.ca/april2019report
[11] Available at: http://www.eglintonwestlrt.ca/april2019report

A separate report on land use planning policy recommendations will be presented to Etobicoke-York Community Council.

11. Conclusion

Of the four options analyzed for the Toronto Segment of the Eglinton West LRT, Option 1 is City staff's preferred concept because it is has the lowest cost while meeting all of the City and TTC's project and policy objectives for transit connectivity.

While there is opposition to the preferred concept from many community members and organizations represented on the project's Stakeholder Advisory Group and Community Working Group, the economic and financial cases would not support an underground option because the expected benefits would not be sufficient to offset the significantly higher costs.

The economic case is relatively low for all options, with benefit-cost ratios all below 0.5 and negative net present values of benefits, which means that costs would exceed benefits.

If no higher-order transit infrastructure were built on the Eglinton West corridor, a "Business as Usual" (BAU) scenario could maintain existing buses and increase bus service to meet demand in the future. Continued bus operations could serve the existing demand and are projected to adequately serve a future 2041 demand of approximately 800 riders in the peak period and peak direction.

Metrolinx and the GTAA continue to study options for the Airport Segment on the extension. Metrolinx also continues to study alternative project concepts for the Toronto Segment of the EWLRT, which may include concepts already studied by the City or variations on those concepts, and is evaluating potential regional benefits of the project.

Staff recommend City Council forward this attachment and other technical reports to Metrolinx, the Province and the GTAA as they continue their work on the Eglinton West LRT. Once their work is complete, a report on next steps for the project will be brought back to City Council. The City's commitment to this project is subject to the SmartTrack Stage Gate Process as described in the Toronto-Ontario Agreement in Principle (see Appendix A).

Contact

James Perttula, Director Transit and Transportation Planning, City Planning Division
Email: james.perttula@toronto.ca, Tel: 416-392-4744

Mike Logan, Program Manager, Transit and Transportation Planning, City Planning Division
Email: mike.logan@toronto.ca, Tel: 416-338-5568

Appendix A – SmartTrack Stage Gate Process

In November 2016, City Council approved a Stage Gate Process (Figure A1) for phased decision-making on the SmartTrack project that was developed by the City and the Province and included in a Summary Term Sheet (EX19.1 Attachment 1 – Appendix A).[12] This process allows City Council to consider advancing commitments at defined stages of the SmartTrack project, and identifies decision points in the project where City Council and the Province reserve the right to assess the following:

- Whether the City and Province's conditions outlined in the Summary Term Sheet have been addressed to the City and Province's satisfaction; and
- Whether to cancel or alter the project scope, subject to the party who cancels or alters the project scope making the other party whole for costs incurred to date.

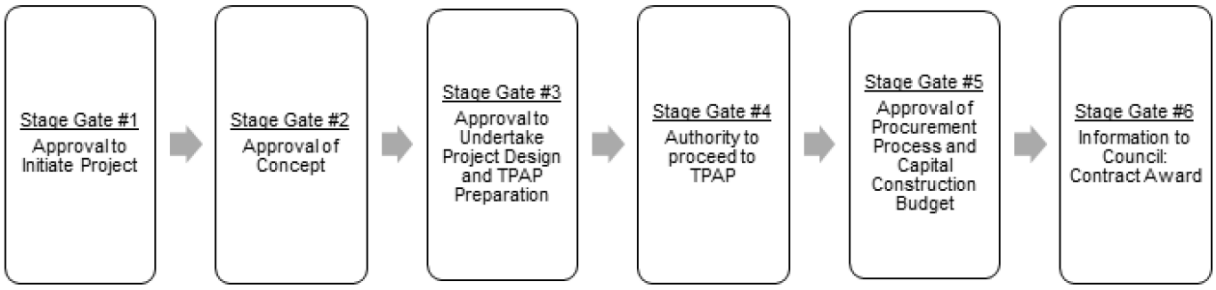


Figure A1. Schematic of the SmartTrack Stage Gate Process

Since 2016, further work has been undertaken by the City and TTC to develop a standard guideline around "stage-gating" and phases of a transit expansion project. There are some differences between the guideline referenced throughout the cover report and the Stage Gate Process developed by the City and Province in 2016 specifically for SmartTrack.

The components of the SmartTrack project are at different stages as outlined in Table A1. The SmartTrack Stations Program component of SmartTrack has gone through Stage Gate 5, and will move into procurement and construction phase subject to the finalization of required agreements in accordance with Council direction from April 2018 (see Attachment 1 for more information). The timelines for advancing both segments of EWLRT to Stage Gate 4 decision-making is subject to the conclusion of further analysis being undertaken by Metrolinx and the GTAA and required reporting back to City Council to determine next steps.

[12] http://www.toronto.ca/legdocs/mmis/2016/ex/bgrd/backgroundfile-97894.pdf

Table A1. Status of SmartTrack project components in Stage Gate Process

SmartTrack Stage Gate Process	SmartTrack Stations Program	Eglinton West LRT – Toronto Segment	Eglinton West LRT – Airport Segment
1. Approval to initiate project	February 2015 – Complete (EX2.2)	February 2015 – Complete (EX2.2; EX13.3)	February 2015 – Complete (EX2.2; EX13.3)
2. Approval of concept	July 2016 – Complete (EX16.1)	July 2016 – Complete (EX16.1)	July 2016 – Complete (EX16.1)
3. Approval to undertake project design and TPAP preparation	November 2016 – Complete (EX19.1)	November 2016 – Complete (EX19.1)	November 2016 – Complete (EX19.1)
4. Authority to proceed to Transit Project Assessment Process (TPAP)	December 2017 – Complete (EX29.1)	TBD	TBD
5. Approval of procurement process and capital construction budget	April 2018 – Complete (EX33.1)	TBD	TBD
6. Information Report to City Council: contract award	TBD	TBD	TBD