City of Brampton

LRT Extension Study

Council Workshop 2

February 27, 2023

01

Introduction

Timeline and Council Decisions

Sept 2014 — Transit Project Assessment Process (TPAP) for Hurontario-Main LRT was approved.

April 2015 — Province announced funding for the Hurontario-Main LRT.

Oct 2015 — Brampton Council approved construction of the LRT to Steeles Ave only.

Feb 2017 — Brampton Council directed staff to study alternate LRT routes from Steeles Avenue into Downtown Brampton.

Dec 2018 — Brampton Council directed staff to prioritize the LRT route along Main Street as originally recommended in the 2014 TPAP.

Timeline and Council Decisions

May 2019 — Brampton Council approved the study that would update the 2014 approved TPAP alignment and bring the LRT up Main Street.

June 2020 — Update to Council on the long list and short list of LRT alignments into Downtown Brampton that were being considered.

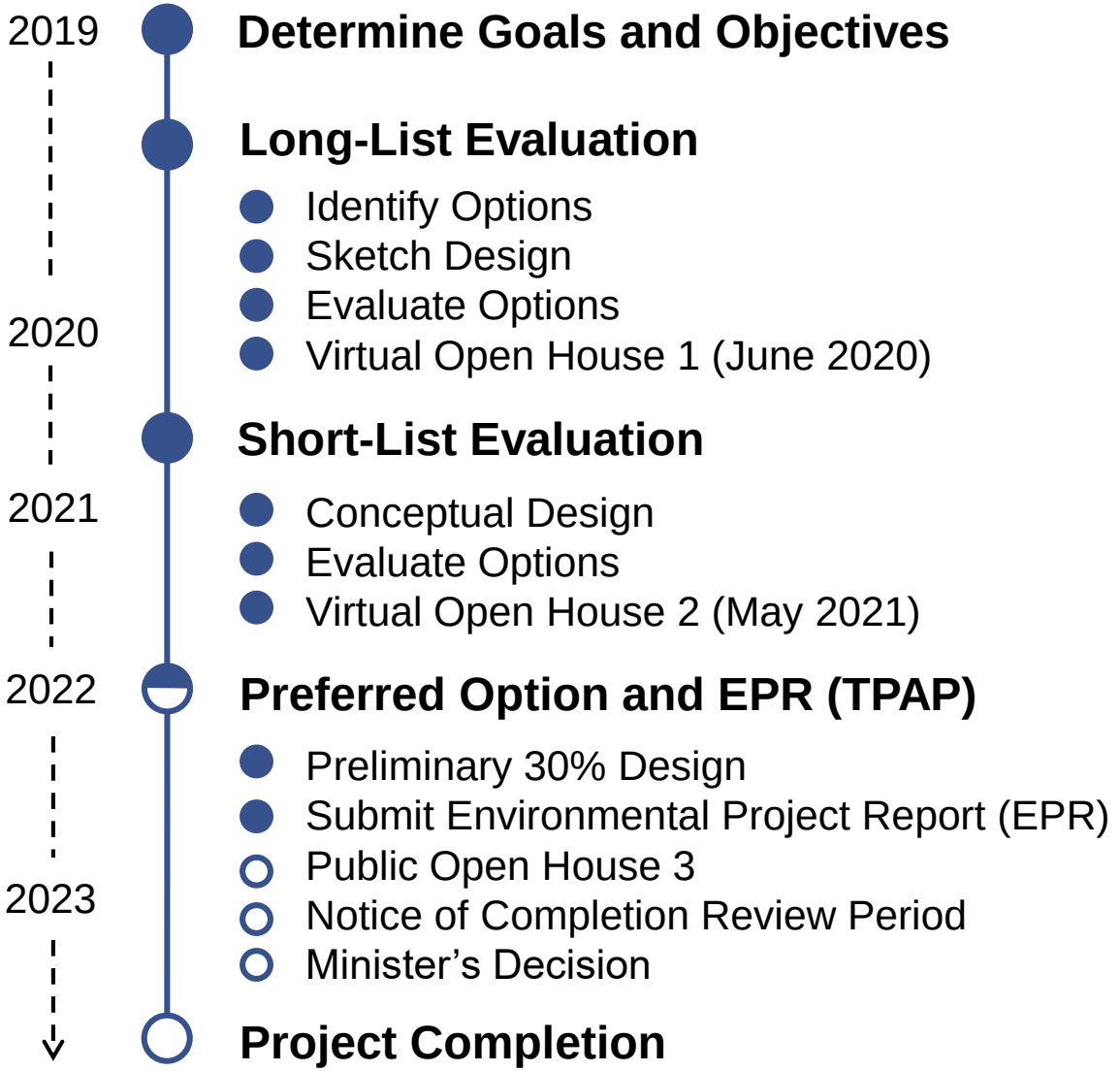
March 2021 — Update to Council on the short list of LRT alignments and the Metrolinx Preliminary Design Business Case for each of these alignments.

June 2021 — Council directed staff to take both the preferred surface and preferred tunnel alignments through the 30% Design and Draft Environmental Project Report phase.

Feb 2023 — Today’s Council Workshop

Study Process

- The study evaluated LRT options in a multi-level process.
- Over the course of the study, the options were evaluated, presented to the public and narrowed down to one surface and one underground for preliminary design.
- Only one option will be taken through the Transit Project Assessment Process (TPAP).



Investment Options

- The long list of investment options was evaluated and presented to stakeholders and the public and narrowed down to a short list.
- Short listed options were further evaluated in a Preliminary Design Business Case (PDBC). Findings of the PDBC were presented to City Council in March 2021 which confirmed the preferred options for preliminary design.

Long List	Short List	Preferred
6 Surface Options	4 Surface Options	1 Surface Option
2 Underground Options	2 Underground Options	1 Underground Option
2 Loop Options		

Public Feedback

54%
UNDERGROUND

46%
SURFACE

Public preference for the preferred options according to the 131 community members who responded to the survey.

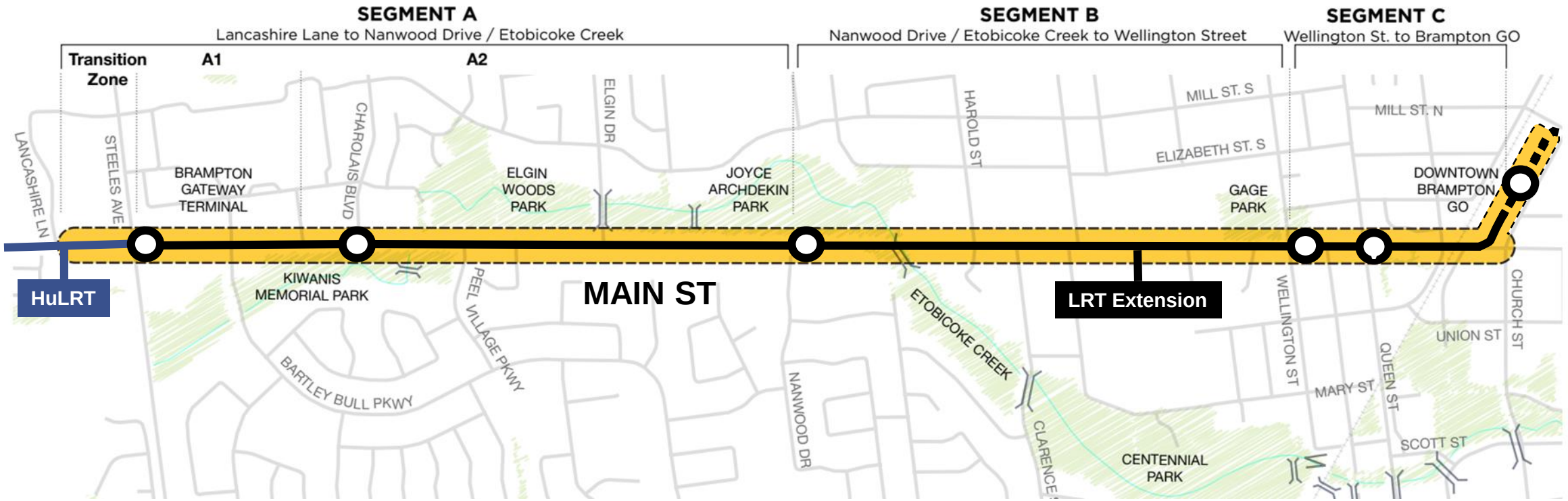
Key Themes Identified at Virtual Open House #2

- Revitalize Downtown
- Shorten travel time to Downtown
- Create a transit hub at Brampton GO with easy transfers
- Protect for a northern extension
- Increase opportunities for cycling

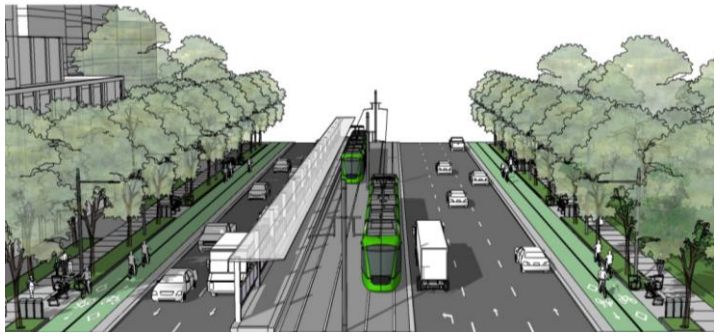
02

Preferred Surface Option

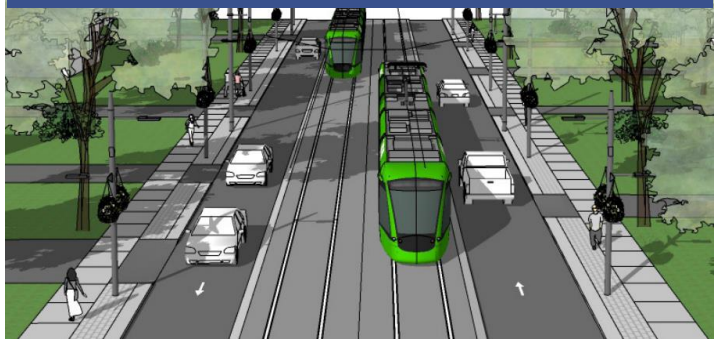
Preferred Surface Option



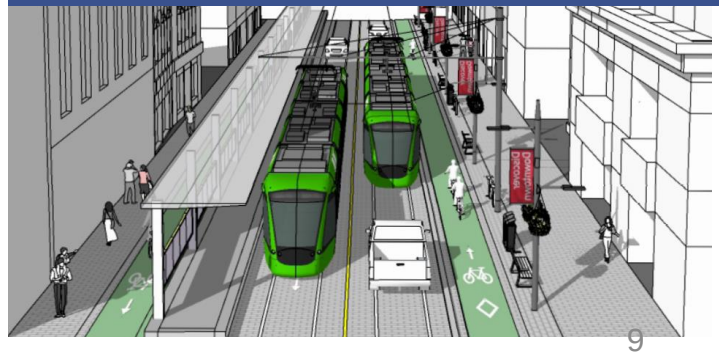
Segment A: LRT in Dedicated Lanes
(generally, 6 lanes, cycle tracks)



Segment B: LRT in Dedicated Lanes
(4 lanes, no cycle tracks)



Segment C: LRT in Mixed Traffic
(2 lanes, cycle tracks)



Note: All renderings are conceptual and subject to change.

Surface Option: Key Design Considerations

1

TRANSPORTATION IMPACTS

Higher travel times, access modifications, and cycling network gap

2

IMPACTS TO DOWNTOWN

Lowering of Main St under CN Bridge and impact to Downtown Revitalization cross-section

3

FUTURE EXTENSION

Considerations for future northern extension

4

OPERATION & MAINTENANCE RISKS

Risks related to streetlighting, overhead catenary system, and road maintenance

5

PROPERTY IMPACTS

Impacts to heritage features from TPSS and Brampton GO Station property taking

6

BRAMPTON GO STATION

Updates to the design at the Brampton GO LRT terminus station

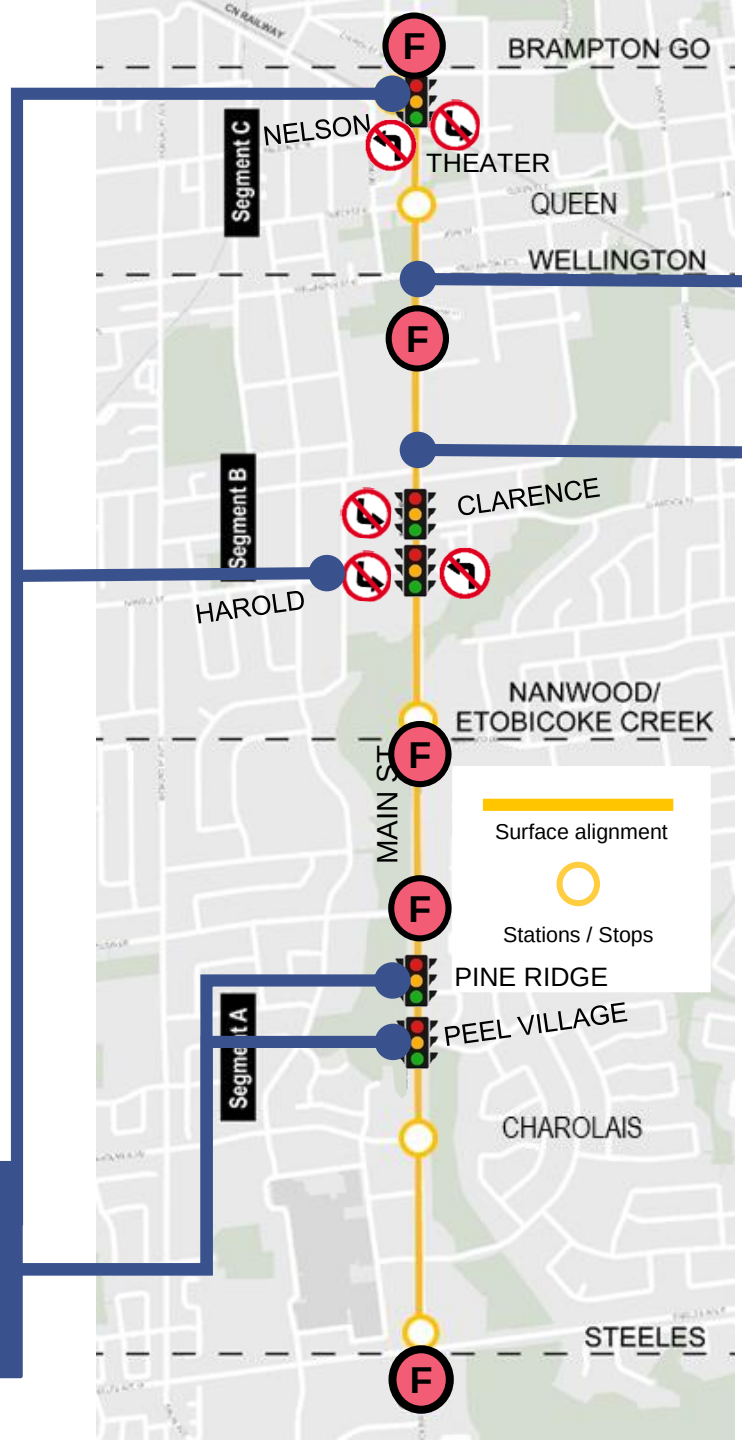
1 TRANSPORTATION IMPACTS

Higher Travel Times and Access Modifications

Mode	Direction	Surface Option Travel Time (min)	Underground Option Travel Time (min)
Transit	NB	10 min	7 min
	SB	9 min	7 min
Auto	NB	24 min	7 min
	SB	7 min	7 min

- All left turn phases parallel to the LRT corridor operate under a “protected-only” phase to avoid any potential vehicle conflicts.
- U-turns are only allowed at signalized intersections.
- Most residential and business access will be accessible on a right-in-right-out (RIRO) basis. Drivers wishing to turn left will require a U-turn at the nearest signalized intersection with a protected left turn phase.

Note: All values reported are for the PM peak hour



High delays from turning movements at transition to mixed traffic section.

All intersections in Segment B will be converted to RIRO except Harold and Clarence, where traffic signals will be added.

New signalized intersections at: Peel Village, Pine Ridge, Harold, Clarence, and Nelson

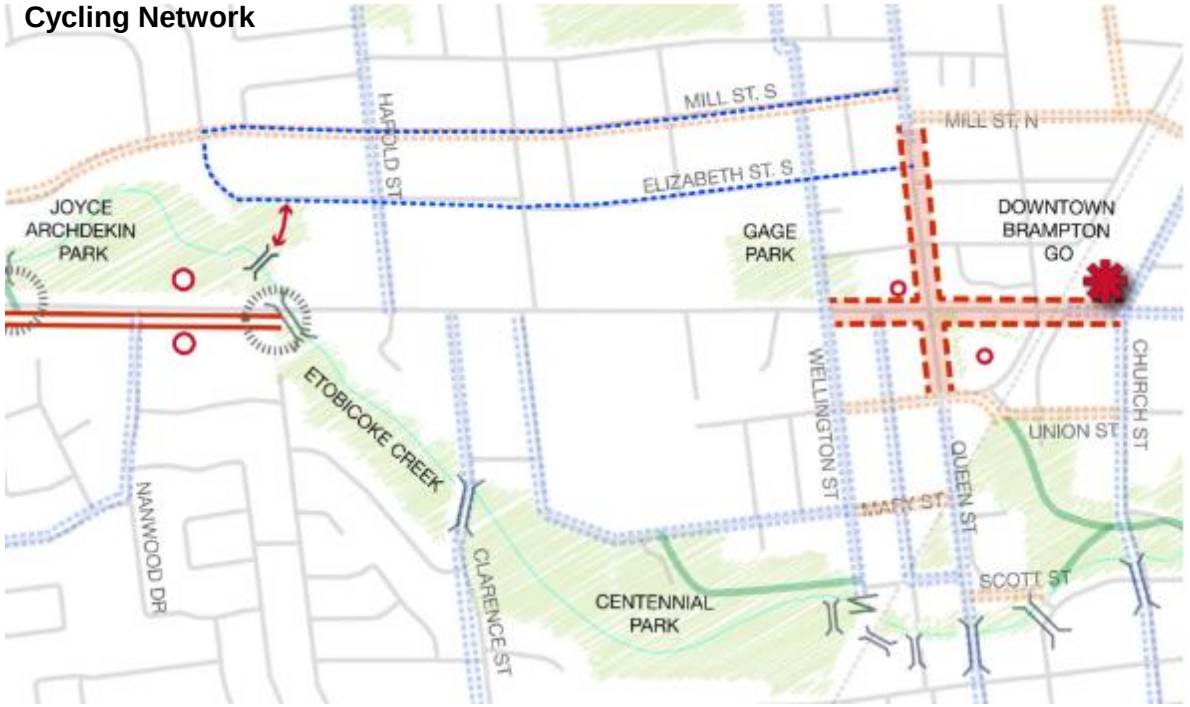
Future vehicular LOS F at:
- Steeles Ave
- Elgin Dr
- Nanwood Ave
- Woodbrook Dr
- Glen Eagle Cs
- Church St

1 TRANSPORTATION IMPACTS

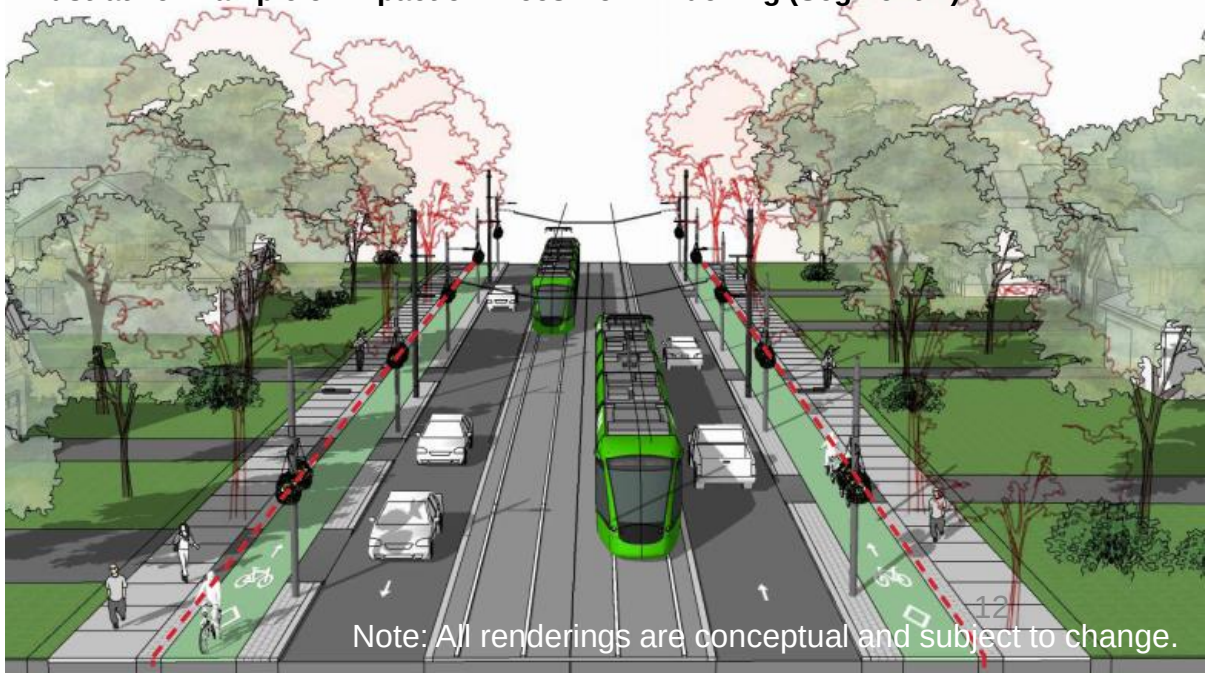
Cycling Network Gap

- Cycling in Segment B was considered but is not feasible without widening the right-of-way:
  - Widening to accommodate cycling was not advanced because of additional 6,180 m² of property needed, removal of 148 trees and injury to 111 trees
  - The project team reviewed additional options. LRT in mixed traffic in curb lanes was investigated but not advanced due to significant impacts on transit time (+50%) and ridership (-10%).
- To mitigate the gap, three parallel cycling connections with connections to Main St have been identified:
  - Mill Street South: on-street, one-way cycling facility (new)
  - Elizabeth Street South: on-street, one-way cycling facility (new)
  - Existing Etobicoke Creek Recreational Trail
- An additional bridge crossing Etobicoke Creek is recommended through Steacy Park to connect the trail network to Main Street.

Cycling Network



Illustrative Example of Impact on Trees from Widening (Segment B)

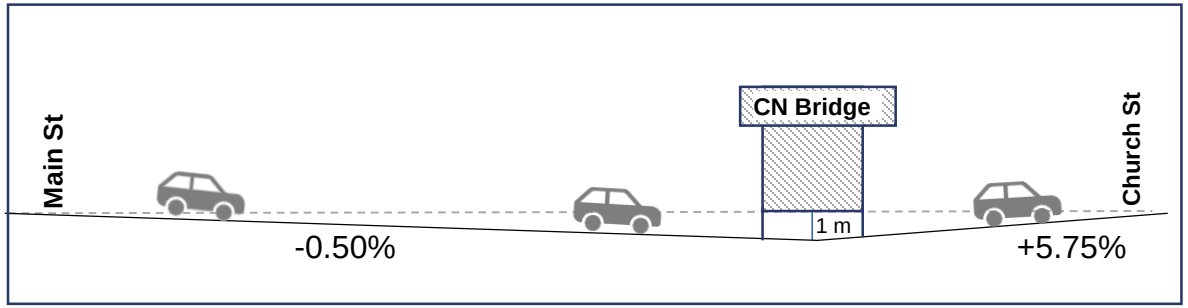


Note: All renderings are conceptual and subject to change.

2 IMPACTS TO DOWNTOWN

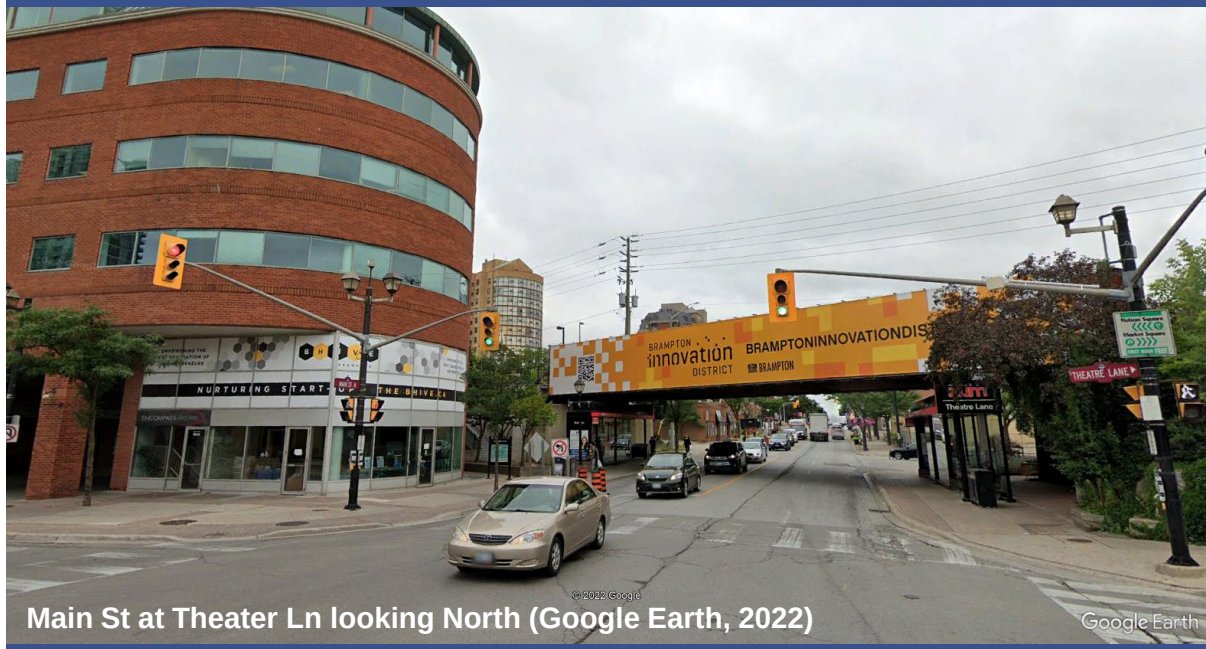
Lowering of Main St under CN Bridge

- To accommodate LRT overhead catenary system (OCS), Main St must be lowered by ~1 m under CN bridge.
- Results in impacts between Queen and Church St, including ramps and railings at intersections and a constrained pedestrian environment.
- Requires regrading of side streets (on Nelson St E/W and Theater Ln).



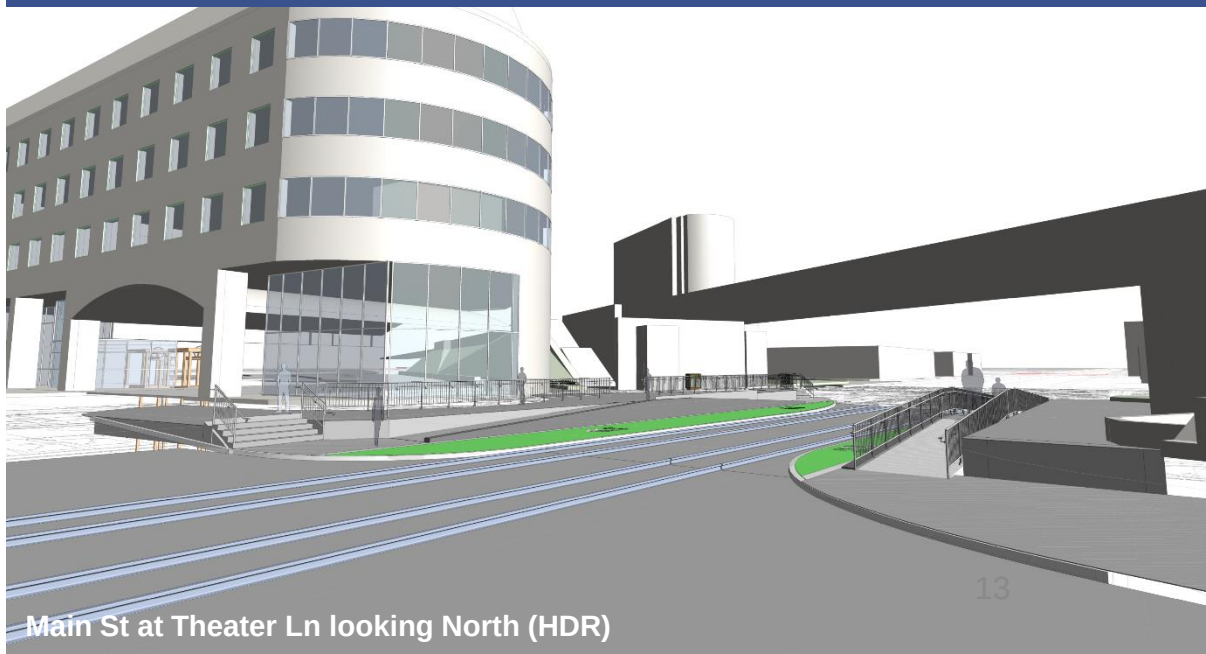
Note: All renderings are conceptual and subject to change.

Existing Condition



Main St at Theater Ln looking North (Google Earth, 2022)

Future Condition



Main St at Theater Ln looking North (HDR)

2 IMPACTS TO DOWNTOWN

Lowering of Main St under CN Bridge

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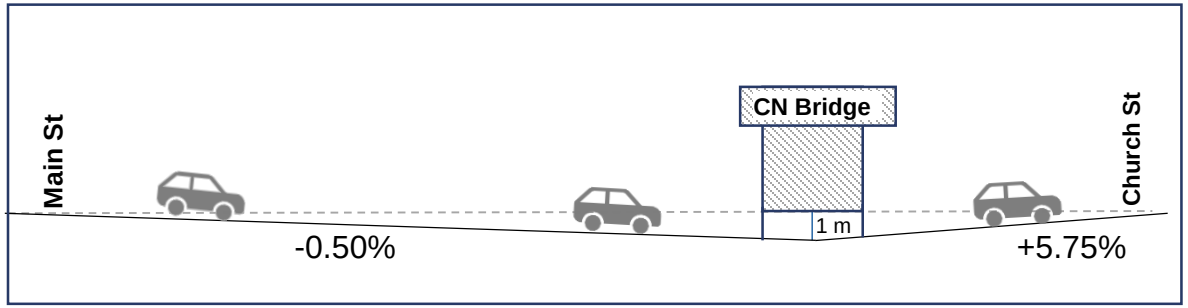


Note: All renderings are conceptual and subject to change.

Existing Condition

Main St at Theater Ln looking South (Google Earth, 2022)

Future Condition

Main St at Theater Ln looking South (HDR)

2 IMPACTS TO DOWNTOWN

Changes to Downtown Revitalization Cross-section

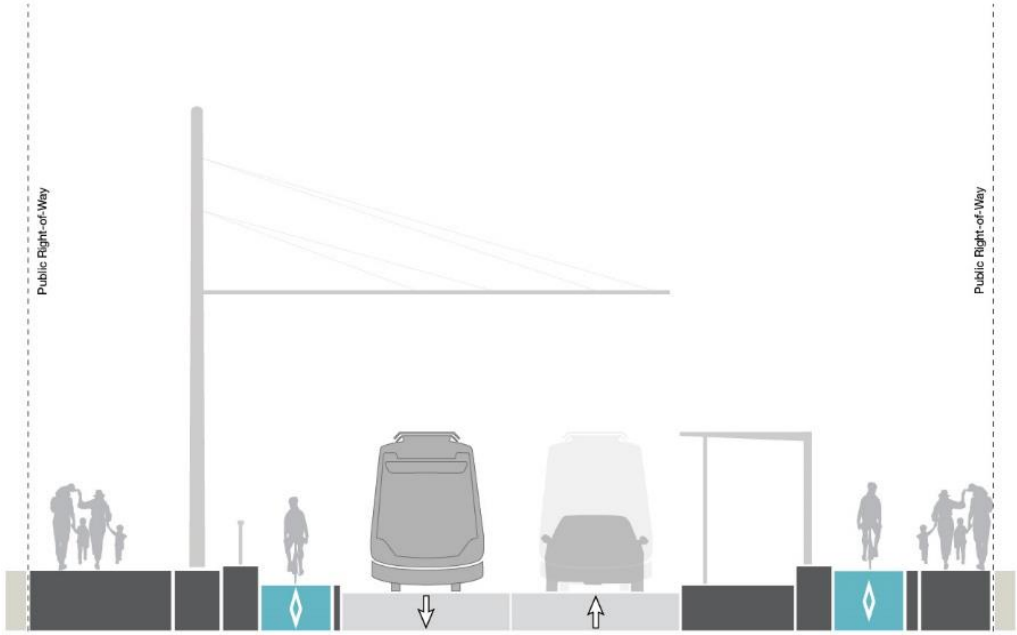
As a result of the lowering of Main St and the introduction of LRT at the surface in Downtown, changes to the Downtown Revitalization cross-section elements are required:

- **Pedestrian clearway reduced**
  - 3 m to 1.5 m at station platforms
- **Furnishing/planting zone eliminated/reduced**
  - Eliminated where station platform exists
  - Reduced from 1.2 to 1 m elsewhere
- **Buffer to cycling facility reduced**
  - Sub-optimal buffer to travel lane (and LRT)
  - Adjacent to sidewalk (higher potential for conflicts)

Note: All renderings are conceptual and subject to change.

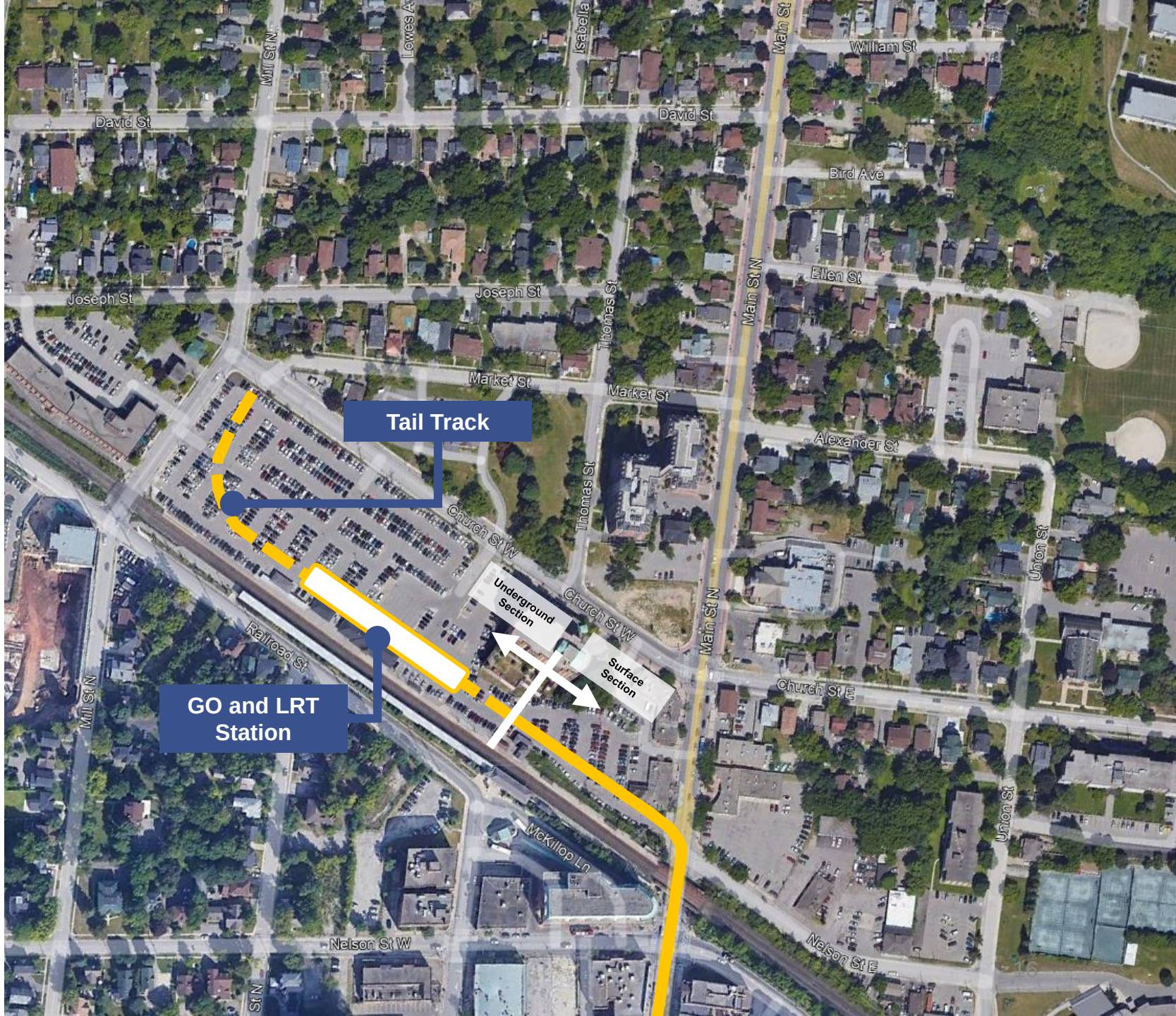
Downtown Revitalization Cross-Section (2022)

LRT Extension Cross-Section (2022)



3 FUTURE EXTENSION

- Options to extend the LRT north in the future are limited due to track geometry and the LRT being underground at its terminus



4 OPERATION & MAINTENANCE RISKS

Operating LRT in a constrained corridor presents several O&M risks:

- Potential LRT service disruptions due to:
  - mode conflicts (vehicular traffic especially in mixed traffic conditions)
  - maintenance activities (utilities, streetlighting, etc)
  - emergency services (fire, EMS)
- Difficulty in accommodating adequate clearances between overhead catenary system (OCS) conductors and street light infrastructure for maintenance. Would require change to approach for maintenance agreements between Brampton and LRT operator.

5 MAJOR PROPERTY IMPACTS

Location	Description	Mitigation
Guest St	• Potential impact on listed heritage property due to location of TPSS near Guest Street.	• Mitigation measures range from in-situ retention of the building, adaptive re-use, relocation within and outside of the property or demolition and salvage. • Coordination with affected property owner.
Brampton GO Station Area	• Permanent property taking for LRT track and TPSS. • Temporary property taking at Brampton GO for construction of LRT station and tail track.	

Note: Consultation with affected property owners to occur once a preferred option is selected.

Example of TPSS Unit (HuLRT)

Brampton GO Station Area

6 BRAMPTON GO LRT TERMINUS STATION

- Through design development it was determined that the Brampton GO LRT terminus station would have to be built underground (cut and cover) due to:
  - updated track geometry pushing the station further west
  - provision for connections to Brampton GO Station
  - maintaining the GO Station surface parking lot
- Integrating the LRT and GO stations was not contemplated in previous designs.
- Assumptions made in the 2014 Hurontario-Main LRT TPAP do not reflect the constraints of the currently under construction Hurontario LRT.

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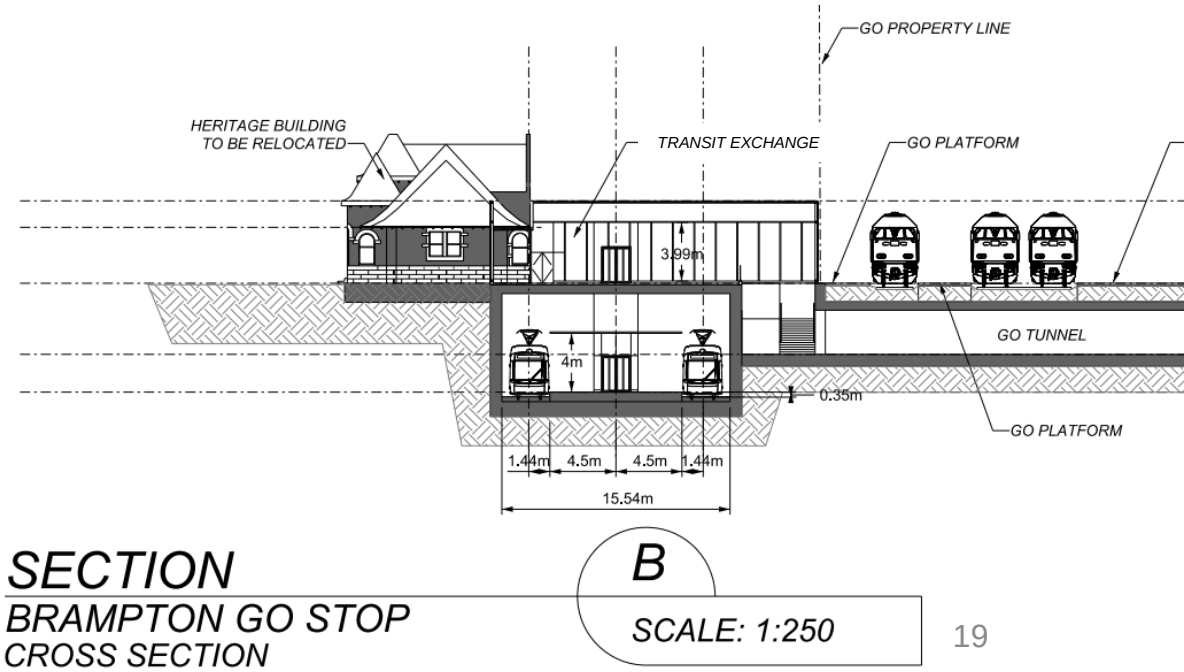
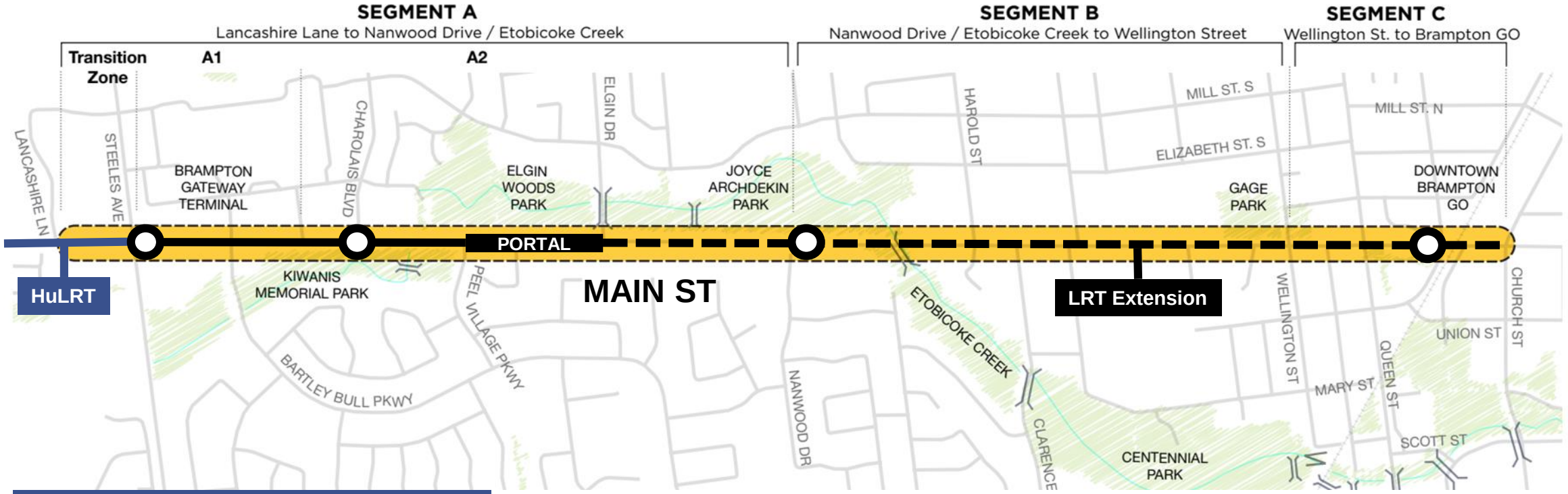


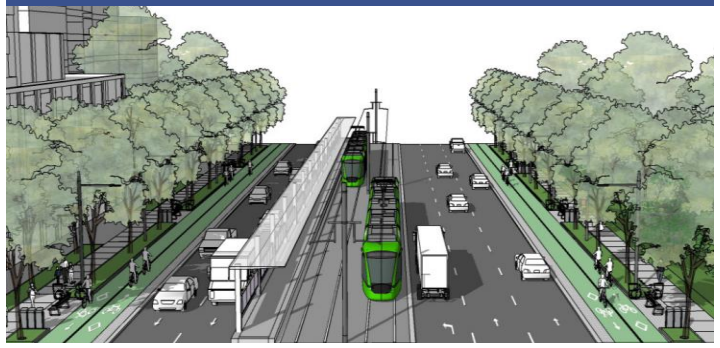
03

Preferred Underground Option

Preferred Underground Option

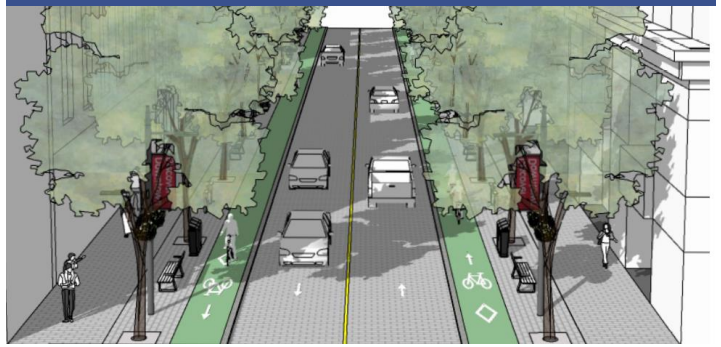


Segment A: LRT in Dedicated Lanes
(up to 10 lanes, cycle tracks)



Segment B: LRT Underground
(4 lanes, existing bike lanes)

Segment C: LRT Underground
(2 lanes, cycle tracks)



Note: All renderings are conceptual and subject to change.

Underground Option: Key Design Considerations

1

TUNNELING APPROACH

Construction methodology

2

UNDERGROUND STATIONS

Property requirements and design updates at Nanwood Station and Downtown Brampton

3

PORTAL RELOCATION

Increased tunnel length and portal size due to portal relocation out of floodplain

1 TUNNELING APPROACH

Construction methodology

- Cut and cover construction proposed between tunnel portal (south of Elgin Drive) to Nanwood Drive
- Nanwood Station to be constructed via open cut construction partially within the existing street right-of-way
- Sequential Excavation Mining (SEM tunnelling) north of Nanwood Station to the Brampton GO Station terminating at Church St
- Opportunity for a second mining operation has been protected for at the Brampton GO Station to fast-track work, to be determined if required in future phases of work

2 UNDERGROUND STATIONS

Design Updates

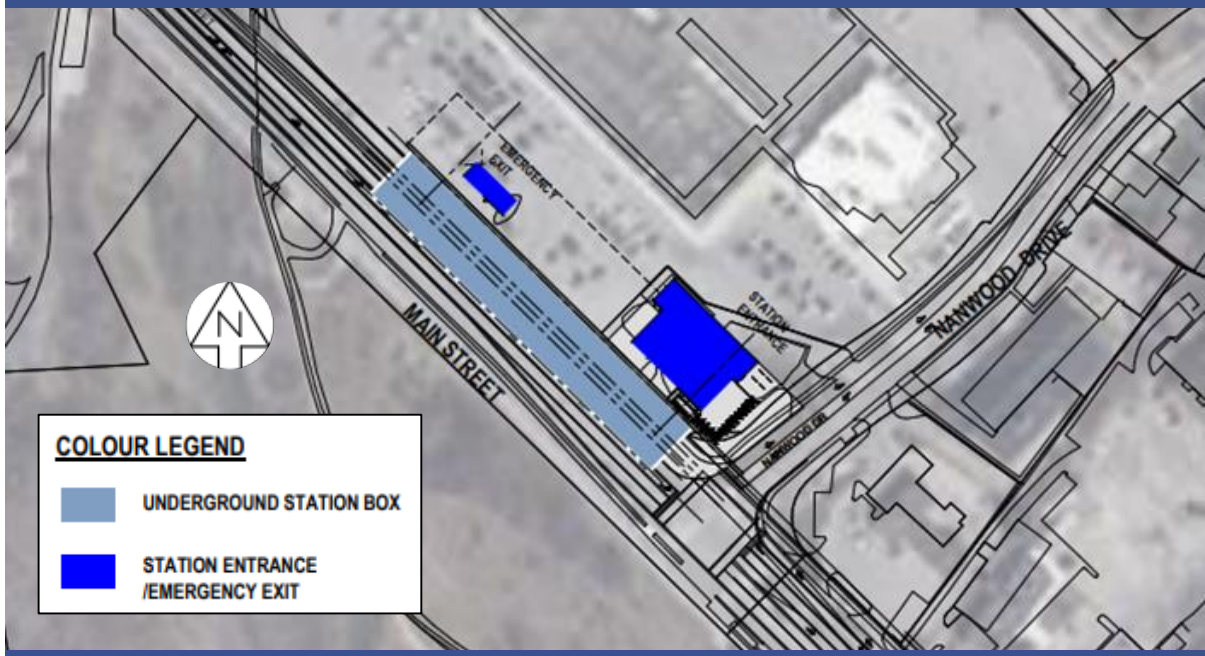
Nanwood Station

- Increase in size of station footprint due to design development

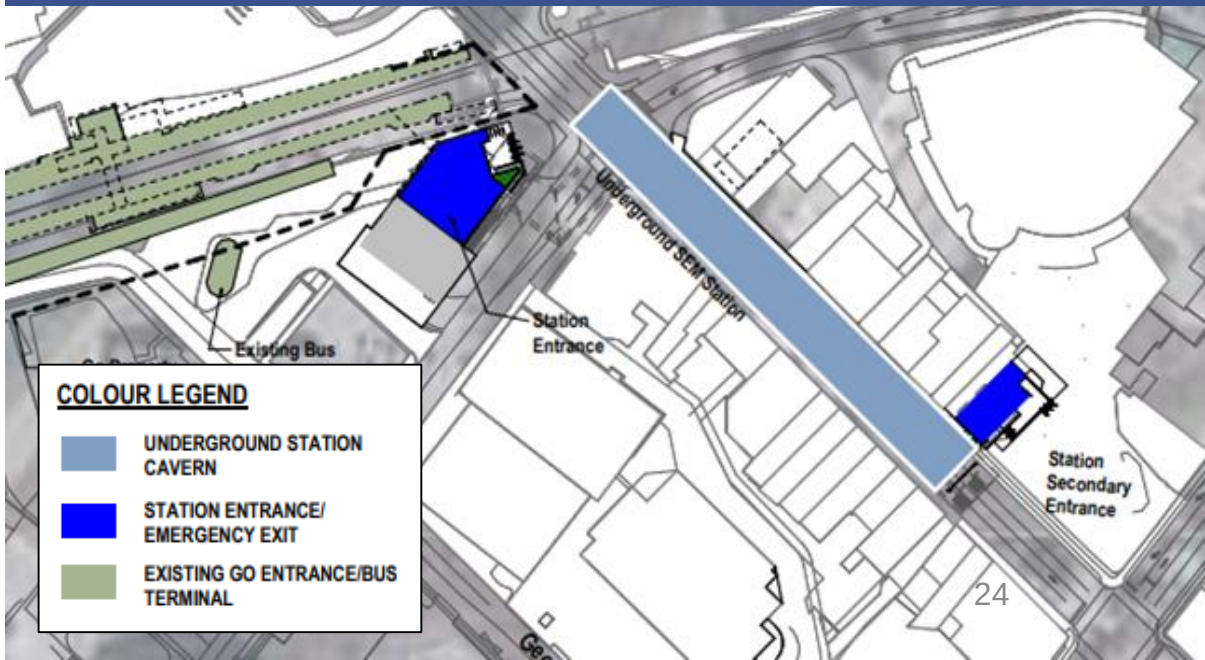
Downtown Brampton Station

- Increase in size of station due to design development and inclusion of secondary station entrance/exit (with stairs and escalators) to serve Queen/Main intersection

Nanwood Station – Site Plan



Downtown Brampton Station – Site Plan



2 UNDERGROUND STATIONS

Property Requirements

Location	Description	Mitigation
Nanwood Station	• Permanent and temporary takings required for station entrance building, emergency exit building, active transportation improvements and for construction staging area (tunneling activities)	• Coordination with affected property owners as a result of temporary and permanent impacts.
Downtown Brampton / Brampton GO Station	• Permanent property taking required for station buildings and potential additional construction staging area related to tunneling activities.	

Note: Consultation with affected property owners to occur once a preferred option is selected.

Nanwood Station

Downtown Brampton / Brampton GO Station

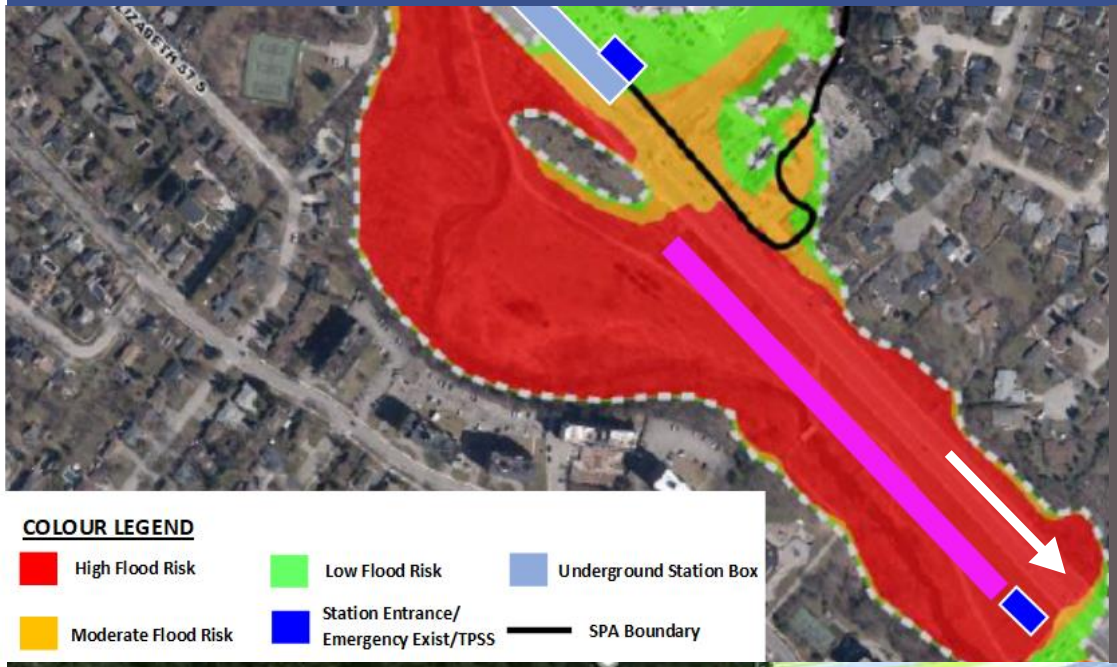
3 PORTAL RELOCATION

Increased tunnel length due to portal relocation out of floodplain

- The TRCA requested the portal be relocated south outside of the Etobicoke Creek floodplain to minimize risk to loss of property / life.
- This resulted in a 270 m longer underground tunnel which increased the underground option capital cost.
- Additional mitigation measures to protect the portal from intrusion will be investigated in future phases of work.

Note: All renderings are conceptual and subject to change.

Previous Portal Location within Floodplain



04

Cost Update

Surface Option — Cost Drivers

1. Increase in length of trackworks to accommodate tail tracks (vehicle storage allows for enhanced flexibility in operations).

2. Inclusion of Brampton Gateway Station Relocation Costs (previously not included in 2021 cost estimate).

3. Design updates at Brampton GO LRT terminus (underground station, including connections to GO*).

4. Lowering of Main Street required under the CN bridge to accommodate overhead catenary system (OCS) for LRVs.

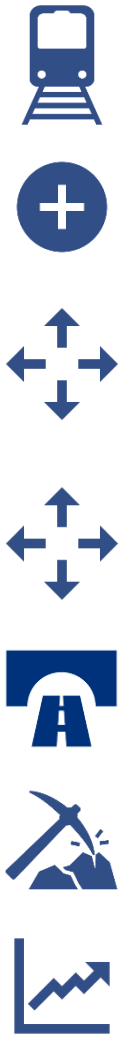
5. High Inflation for Major Construction Projects (e.g. Ontario Line costs going from $10B in 2019 to $19B in late 2022)

* Note: Cost sharing with other stakeholders could be explored to reduce the financial impact to the project.

Cost Update – Surface Option

	Item	Class 4/5 Estimate
	Previous Cost Estimate	**$ 422 M**
	Design Updates	+ $ 310 M
1	Tail tracks	$ 42 M
2	Gateway Terminal Station relocation cost	$ 9 M
3	Brampton GO LRT Terminus Station	$ 216 M
4	Lowering of Main Street between Church and Queen St	$ 43 M
	Inflation and New Cost Data Obtained	+ $ 201 M
	Current Cost Estimate	**$ 933 M**

Underground Option — Cost Drivers



1. Increase in length of trackworks to accommodate tail tracks (vehicle storage allows for enhanced flexibility in operations).
2. Inclusion of Brampton Gateway Station relocation costs (previously not included in 2021 cost estimate).
3. Design updates at Brampton GO terminus (larger station footprint, additional entrance/exit).
4. Design updates at Nanwood Station (larger station footprint).
5. Relocation of tunnel portal (increase in portal length, increase in tunneling length).
6. Increase in cost related to earthworks, bridge works, streetscaping, utility works and allowances as a result of more advanced design.
7. High Inflation for Major Construction Projects
(e.g. Ontario Line costs going from $10B in 2019 to $19B in late 2022)

Cost Update – Underground Option

	Item	Class 4/5 Estimate
	Previous Cost Estimate	**$ 1,700 M**
	Design Updates	+ $ 460 M
1	Tail tracks	$ 92 M
2	Gateway Terminal Station relocation	$ 9 M
3	Brampton GO Station	$ 75 M
4	Nanwood Station	$ 46 M
5	Portal Relocation	$ 167 M
6	Other Costs	$ 71 M
	Inflation and New Cost Data Obtained	+ $ 644 M
	Current Cost Estimate	**$ 2,804 M**

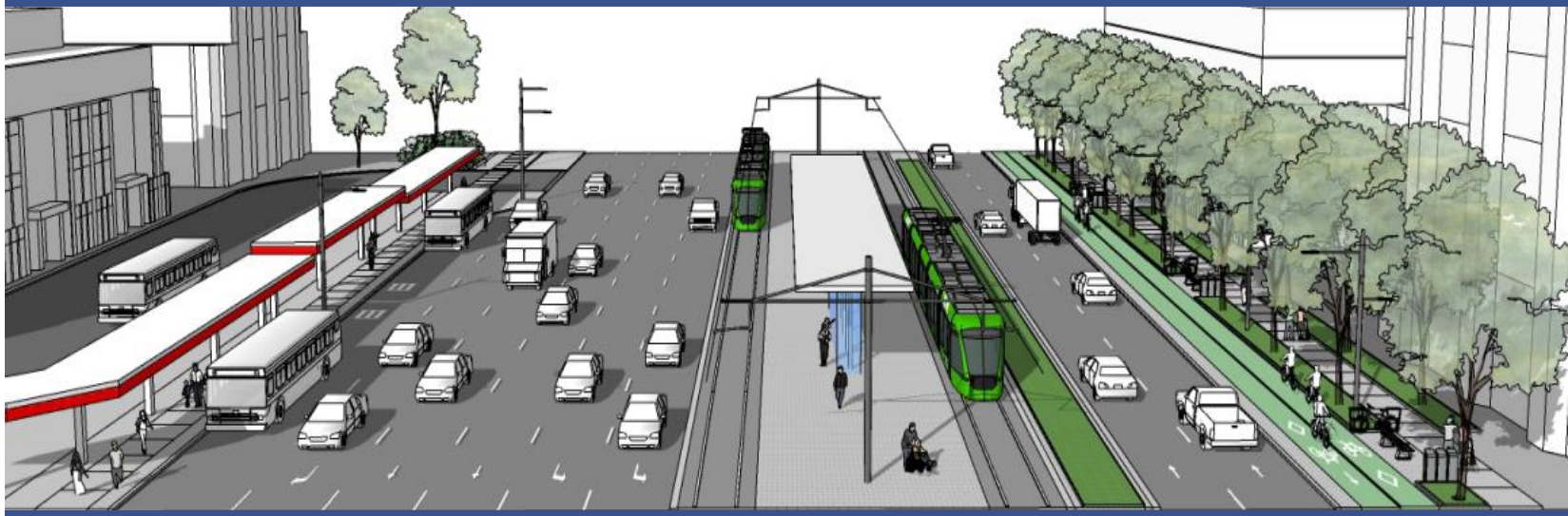
05

Summary Comparison

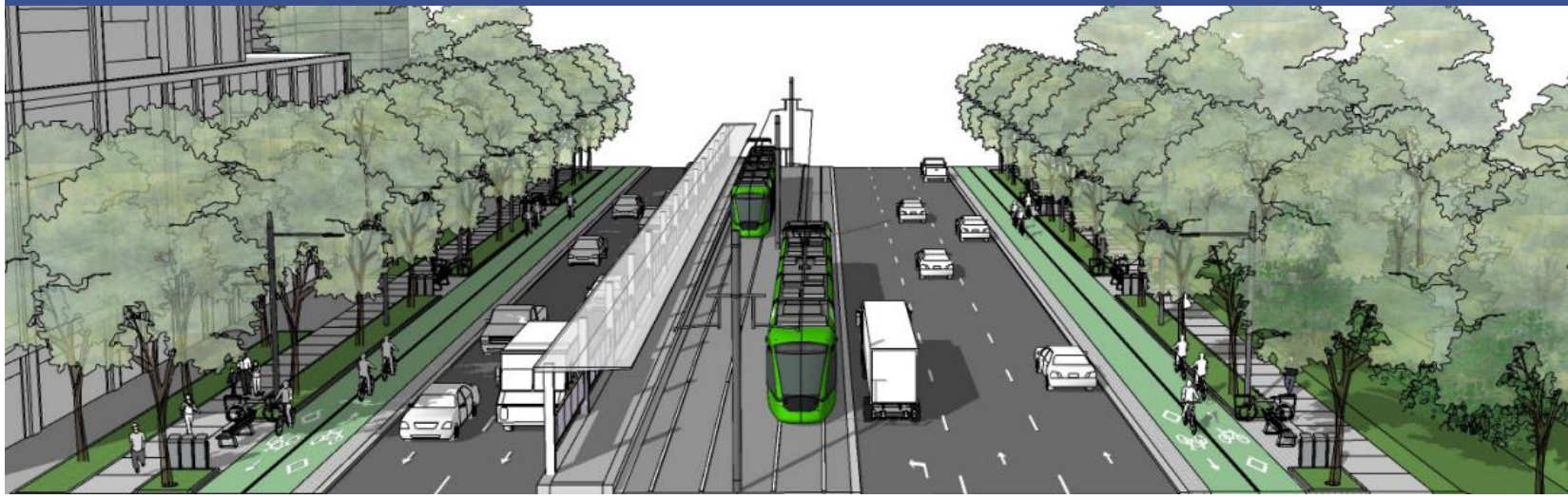
Segment A Comparison

- The design is generally the same for the surface and underground options in Segment A.
- The underground option has the portal in Segment A and an underground station at Nanwood as compared to the surface option.

Main Street and Steeles Avenue (Steeles Gateway)



Main Street Typical Section (North of Bartley Bull Parkway)



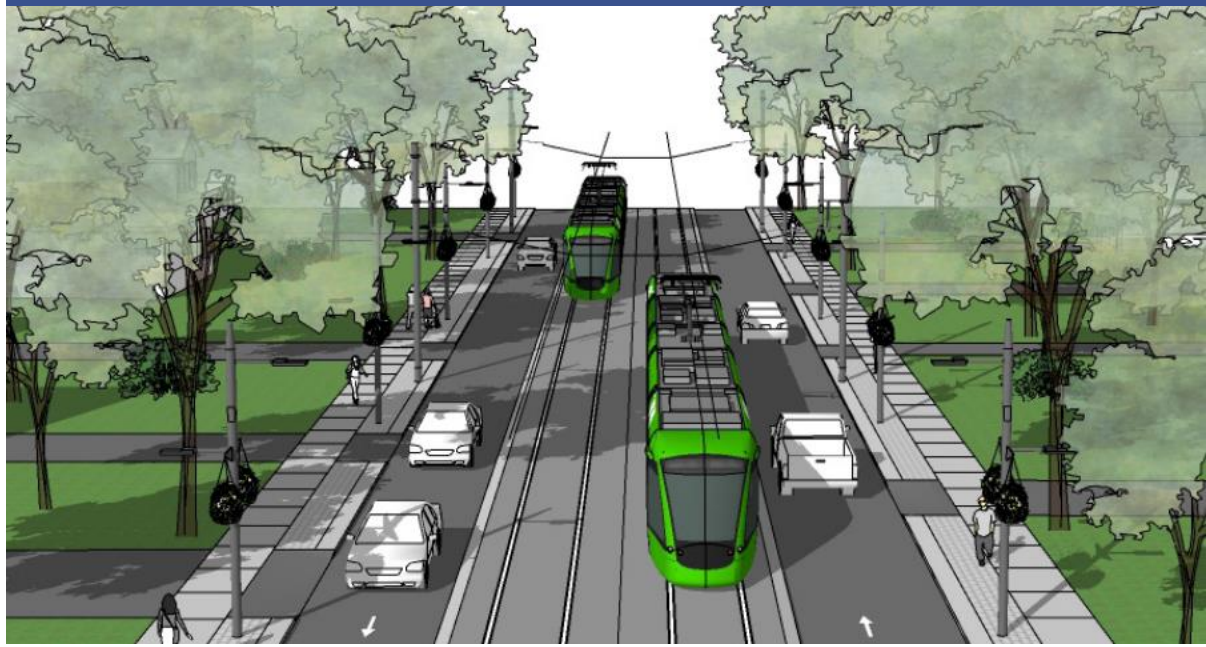
Note: All renderings are conceptual and subject to change.

Segment B Comparison

- Underground option results in faster travel times for autos/transit and fewer access restrictions.
- Surface option cannot accommodate cycling lanes on-street; where as, the underground option can.
- Surface option TPSS #2 impacts a “listed” heritage property.
- Underground option has no operating and maintenance risks compared to the surface option.

Note: All renderings are conceptual and subject to change.

Surface Option



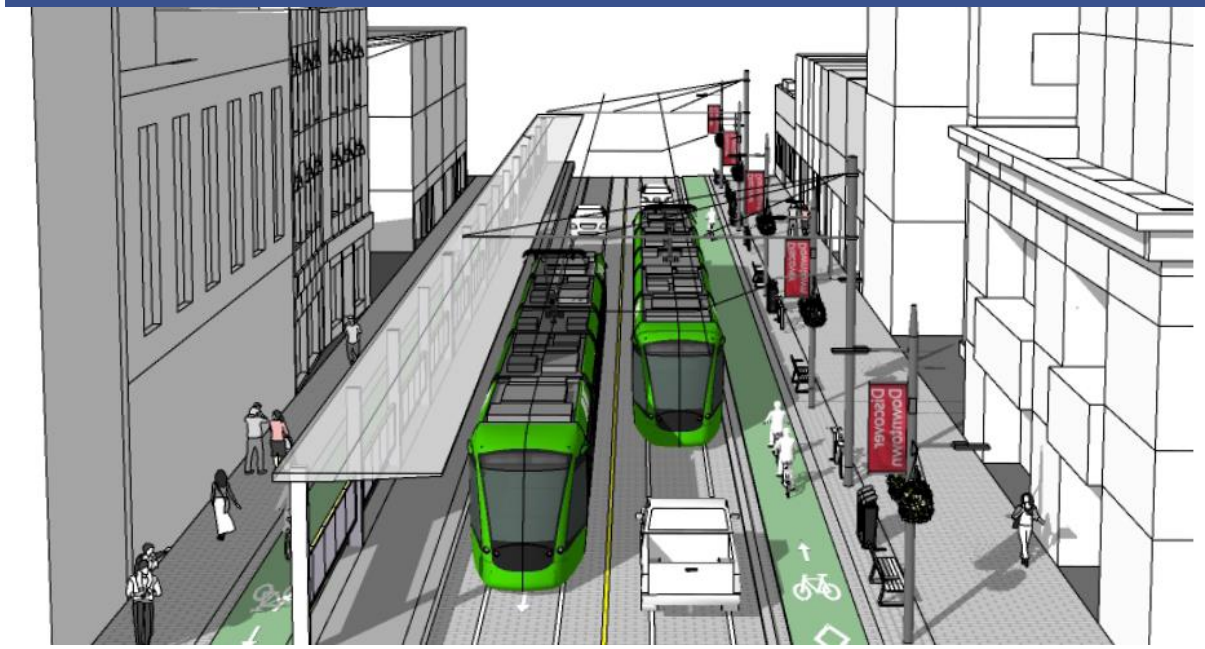
Underground Option

Segment C Comparison

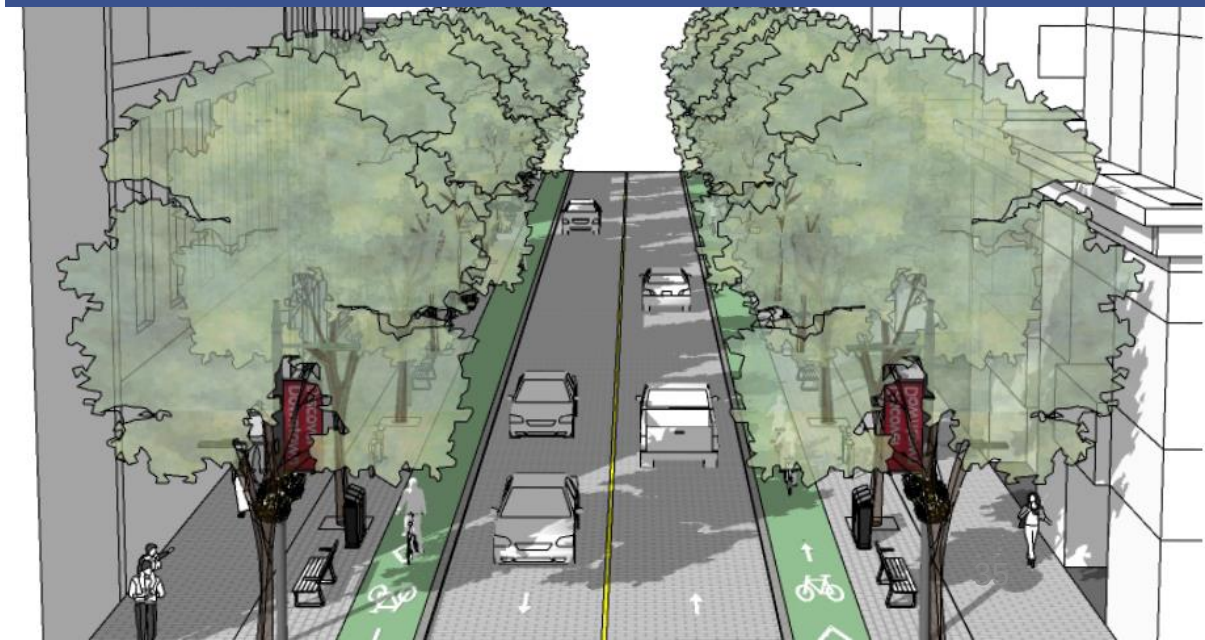
- Underground option results in faster travel times for autos/transit and fewer access restrictions.
- Surface option results in a condition that is not optimal and does not achieve the vision set out in Downtown Reimagined.
- Underground option has no operating and maintenance risks as compared to the surface option.
- Surface option is more complex to extend in the future compared to underground.

Note: All renderings are conceptual and subject to change.

Surface Option



Underground Option



Summary Comparison

Worse	Comparable	Better

Key Differentiators		Surface Option	Underground Option
Transportation Impacts	**Transit Travel Time**	Higher (~ 9 – 10 min)	Lower (~ 7 min)
	Auto Travel Time	Higher (~ 7 – 24 min)	Lower (~ 7 min)
	Daily Ridership	Lower (29,500)	Higher (30,400)
	Access Restrictions	RIRO restrictions and banned left turns	RIRO restrictions in Segment A only
	Bridge Modifications	Required for Etobicoke Creek North and South Bridge	Required only for Etobicoke Creek South Bridge
	Cycling Infrastructure	No cycling in Segment B	Continuous cycling facilities on Main St
Impacts to Downtown	**Lowering of Main Street**	Results in constrained cross-section, ramps/railings	No lowering, no impacts
	Downtown Revitalization	Does not achieve Downtown Revitalization vision	Accommodates Downtown Revitalization design
Future Extension	**Ease of Extension**	Challenges in extending the LRT line in the future	No challenges in extending the LRT line in the future
Operations & Maintenance	**O&M Risks**	Risks to LRT service (disruption), roadway maintenance activities (illumination), emergency services (fire, EMS).	LRT underground, minimal risks
Property Impacts	**Heritage Impacts**	TPSS2 impacts “listed” heritage property	Minimal impact to built and cultural heritage
	Permanent and Temporary Takings	Fewer Permanent Property Takings Higher Temporary Property Takings	Higher Permanent Property Takings Fewer Temporary Property Takings
Other	**Cost**	Lower ($933 M)	Higher ($2.8 B)
	Schedule	Shorter total implementation schedule (6 years)	Longer total implementation schedule (7 to 8 years)

Summary Comparison

- While the surface option is one-third the cost of the underground option, it has significant disbenefits in terms of travel time, ability to achieve the vision for Downtown Brampton, operations/maintenance risks, and heritage impacts.

- Although the underground option is more costly, it provides real travel time savings for transit riders, pedestrians, cyclists, and motorists and allows the City to achieve its vision for Main St and Downtown Brampton while limiting risks for implementation and operation.

Next Steps

- Receive feedback from key stakeholders.
- A single option would be selected to take through the final Transit Project Assessment Process (TPAP).