

City of Toronto
Northwest PATH EA Addendum
Environmental Study Report

Issue | October 16, 2018



This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Summary of Revisions for Issued Documents

Issue Number	Issued Date	Summary of Revisions since last issue
01	April 30, 2018	Original issued copy.
02	Oct 16, 2018	Added one table row and corresponding details regarding the mitigation of below Water Table construction to Section 4, Page 59, per feedback on the originally issued ESR from the Ministry of Environment, Conservation and Parks (received Oct 9 2018).

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Executive Summary

Background

This Environmental Study Report (ESR) describes the planning process and conclusions for an Environmental Assessment (EA) Addendum to complete the Northwest PATH (NW PATH) project, originally approved under a Municipal Class, Schedule C Environmental Assessment framework in 2008.

The purpose of the NW PATH project is to improve connections between Union Station and destinations to the north and west of the station. It will relieve congestion within the PATH network and at street level, support growth downtown, and allow the station to maximize its capacity. The original EA recommended that both surface and underground route improvements be implemented for the project.

The first section of the new underground NW PATH tunnel (known as Phase 1) opened in spring 2015. Following Phase 1 construction (across Front Street), City Council directed staff to find an alternative solution and investigate additional opportunities to reduce construction costs. For this purpose, the City of Toronto retained Arup to complete an updated EA Addendum study that began in early 2017. To provide additional cost certainty and advance design, Hatch was retained to provide technical support and develop conceptual design reports that focused on the feasibility of proposed solutions, existing structural and geotechnical conditions, as well as subsurface impacts (a major factor in cost escalation throughout Phase 1 of the NW PATH Project).

EA Addendum Scope

As EA Addenda are inherently linked to the original EA, the team has made every effort to retain consistency with the original framework. However, it has been approximately ten (10) years since then and the analysis required updates. A summary of changes between the original report and this Addendum are summarized in Section 2 of this report. It should be noted that the Lapse of Time privilege does not apply (per the Ministry of Environment and Climate Change), as the NW PATH project has been partially completed.

The evaluation in this Addendum aims to be as transparent as possible. To achieve this, criteria include quantitative analysis (where possible) and all criteria have a published, detailed scoring scheme. The final evaluation table also reports results by criterion instead of aggregated by category. The technical development of each alignment in the EA Addendum has been advanced beyond the original EA, including more detailed level of design than was done as part of the previous EA.

Subsurface Utility Engineering (SUE) investigations are advanced to Quality Level B from D and all alignments are developed to concept design stage (>10%).

This additional technical detail allows the team to develop Class D cost estimates. Beyond technical updates, the EA Addendum also updates the pedestrian planning analysis to a 2031 horizon year to reflect new developments in the area, updates population and employment forecasts, and updates transit services in the area (in operation or expected to be). While no consultation is explicitly required under Municipal Class EA Addendum guidelines, the team has engaged with the indigenous community, local landowners, public sector technical experts, stakeholder and community groups, and the broader public throughout the project as part of the assessment process.

The EA Addendum evaluates three tunnel alignments in comparison to the previously preferred York Street (known as Alignment 1 in the new study). All three (3) alternate alignments start from the previously completed Phase 1 section of the NW PATH tunnel. Alignment 2 heads west along Front Street and connects into a new development at 160 Front Street West. Irrespective of the final alignment choice of the NW PATH project, the new development will connect to the existing west-side PATH network via a new tunnel to Simcoe Place. Alignment 3 heads east into the Royal York Hotel concourse then turns north, repurposing space to create a new PATH tunnel connection across Piper Street, connecting to the existing PATH network in the TD Centre South at 95 Wellington Street West (via the basement of 55 York Street). Alignment 4 is a variant of an alignment studied in the original EA, which involves heading northwest from Phase 1 through a partially repurposed underground TPA lot. Alignment 4 will convert some of the space into a new PATH tunnel, which maintains parking functionality of the two (2) level underground garage while adding retail space. It will connect to 55 University Avenue.

EA Addendum Results

The updated multi-criteria alignment evaluation recommends that Alignment 4 be taken forward as the new preferred alignment to complete the NW PATH project. It is the highest performing tunnel from a pedestrian perspective and minimizes construction and utility impacts by partially repurposing an existing underground structure. It represents a hybrid solution, balancing the needs of multiple stakeholder groups and is expected to save approximately \$30M in construction costs compared to Alignment 1.

The technical feasibility of different design alternatives was also studied following consultation. The team looked at options for removing the intermediate slab or the retail, how to eliminate the elevator at the north-end of the tunnel, and how additional building connections could be made. In the end, the base case tunnel design (for Alignment 4) is being recommended for final approval and advancement as the alternatives present several challenges that should be further evaluated, pending council direction in future project stages (see Section 3.3).

1 Introduction and Background

1.1 Project History

The Union Station Master Plan (2004) and Union Station District Plan (2006) advocate strong pedestrian connections leading to, through, and from the station. They define parameters for specific studies to identify opportunities and improve the overall pedestrian amenities within and near the station.

As a part of Union Station revitalization efforts, the City identified the need for additional pedestrian infrastructure to improve station connectivity to the surrounding area and alleviate congestion along surface routes and in the existing PATH network. The underground PATH pedestrian walkway network is an integral part of the City of Toronto's downtown core, providing linkages to public transit, businesses, services, and entertainment for commuters, residents, and tourists.

Today, Union Station is directly connected (via the PATH network) to destinations to the north, north-east, south, and southwest. However, there is a gap in the network for destinations to the northwest and west of the station (see Figure 1). This gap results in pedestrians travelling to destinations via the PATH network through circuitous routes, multiple changes of grades/levels, and/or accessing destinations via limited and congested sidewalk space at surface level.

The Northwest PATH extension (NW PATH) was envisioned with the aim of adding direct and barrier-free connections to the north, north-west, and west of the station. It serves to relieve existing pedestrian congestion and support projected future growth to destinations in the surrounding area.

1.1.1 2008 Environmental Assessment

The original Municipal Class Environmental Assessment (EA) process for the NW PATH project was initiated in December 2006. It followed the Municipal Class EA process and was classified as Schedule C as it includes the "construction of underpasses for pedestrian use" with a cost exceeding \$1.5 million.

The original EA first considered underground and/or surface level improvements to pedestrian infrastructure, followed by an analysis of the different alignments that would achieve the goals of the project. Based on consultation and the results of the evaluation, Alternative 6 "New Underground Routes in Parallel to Surface Improvements" was taken forward as the preferred planning solution. Following this, five underground alignments were evaluated (see Figure 2) in addition to the "Do Nothing" scenario. In the end, "Alternative 3 – York" for underground alignments and "Alternative 3 – Two travel lanes (One-way northbound) with lay-by" for surface improvement was taken forward and approved under the Municipal Class EA process in 2008. It included the possibility of future

connections to the Royal York Hotel, 1 University Ave., 70 York Street, and 100 Wellington Street West (see Figure 3) and surface improvements along York Street (see Figure 4). The 2008 Environmental Study Report can be found in Appendix A.

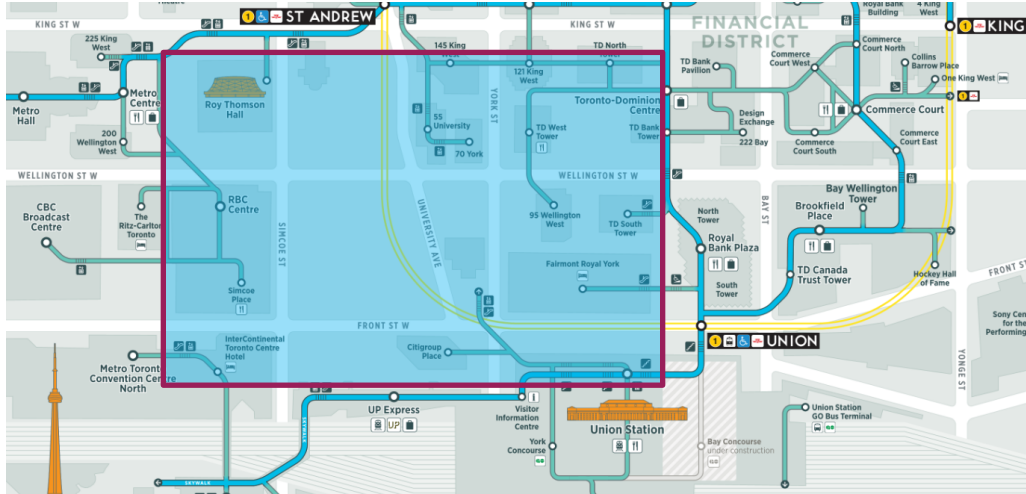


Figure 1 – PATH network gap to the northwest of Union Station. Image courtesy of City of Toronto

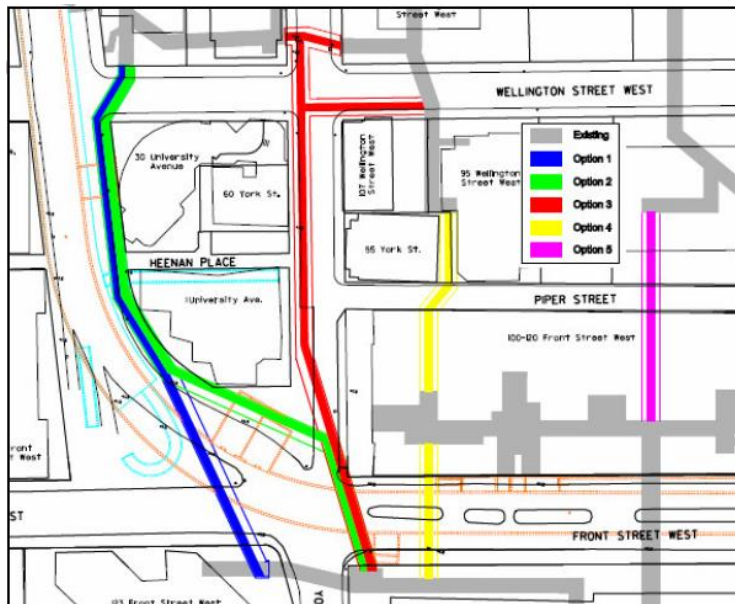


Figure 2 – Underground alignments considered as part of the 2008 EA

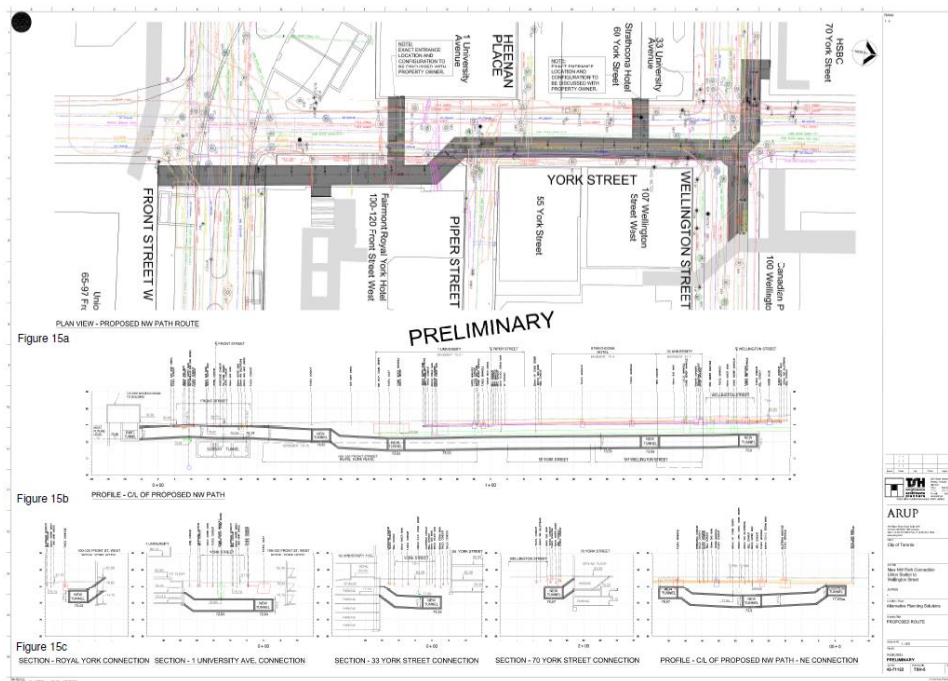


Figure 3 – 2008 EA approved preliminary underground York tunnel drawings

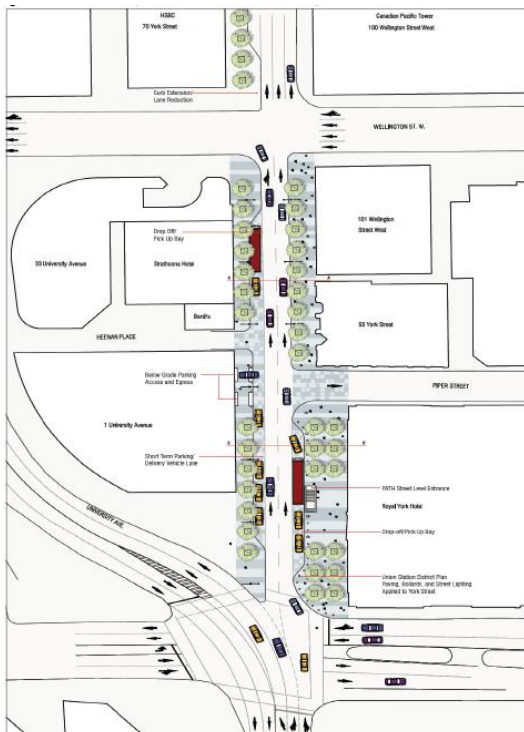


Figure 4 – 2008 EA Preliminary Proposed York Street Surface Improvements

1.1.2 2012-2015 Phase 1 Construction

Following the approval of the Environmental Study Report (ESR), the City awarded the detailed design and construction contracts for each phase separately. In Q4-2010, Hatch was awarded the contract for design and construction contract administration for the first section of the NW PATH project (herein referred to as Phase 1).

Phase 1 included the construction of an underground tunnel from the northwest corner of the Union Station moat (adjacent to the York Concourse) to a new AODA (Accessibility for Ontarians with Disabilities Act) compliant surface portal at the north corner of the University Avenue-Front Street-York Street intersection. The tunnel also includes knock-out panels for future extensions to the NW PATH to the north underneath York Street and east into the Royal York Hotel (see Figure 5).

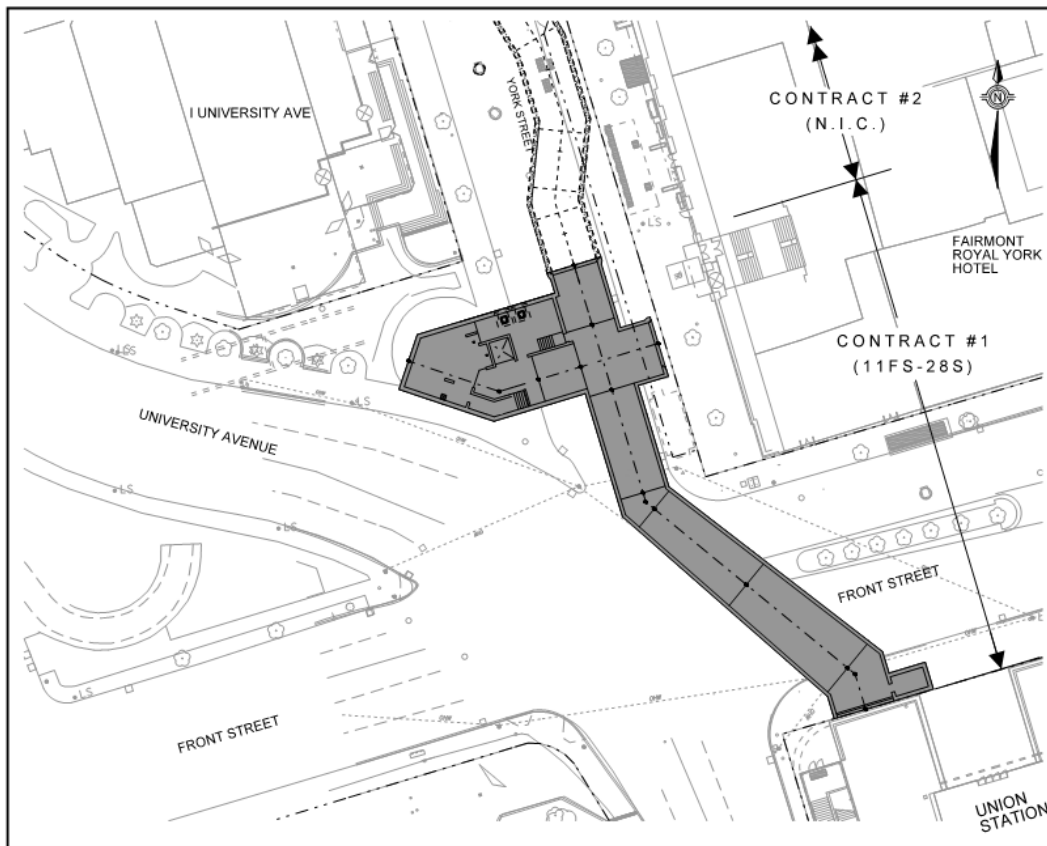


Figure 5 – Plan view of NW PATH Phase 1 tunnel and surface portal. Image courtesy of Hatch

NW PATH Phase 1 opened to the public April 2015. It took approximately 2 years to design and tender, followed by 2 years to complete construction. Construction was complicated (see Figure 6) due to the density of utilities in the area (see Figure 7) while maintaining existing buildings and structures, the

simultaneous construction of the second subway platform at Union Station, and ongoing transportation operations requirements in the area.



Figure 6 – Phase 1 construction. Photo courtesy of Hatch

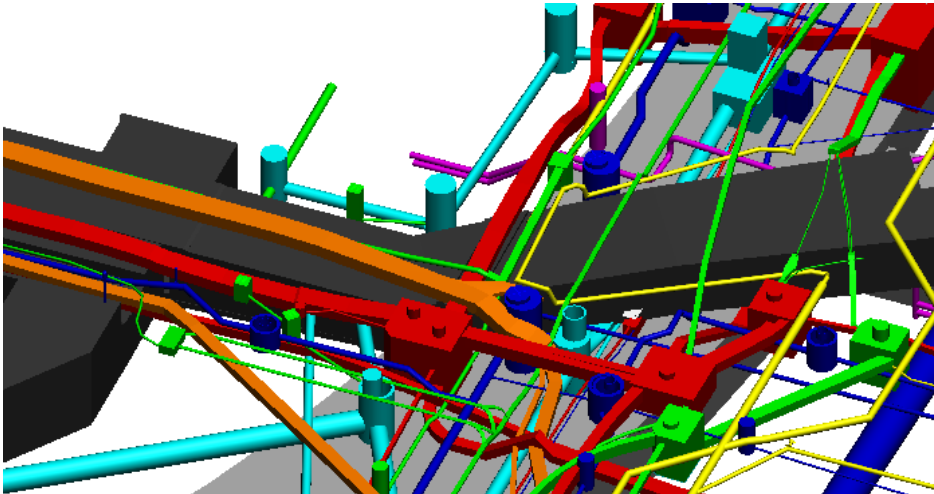


Figure 7 – 3D Model of subsurface utilities at Front Street intersection as part of Phase 1 design. Image courtesy of Hatch

In the spring of 2015, the City of Toronto commissioned Hatch to complete an “Alignment Options Study” to develop six different alignment configurations along York Street connecting Phase 1 to various buildings on Wellington Street West. Based on technical feasibility, performance, and cost reduction, the study recommended that the York Street alignment should be connected to 100 Wellington Street West via a shallow tunnel.

1.1.3 2015 Council Direction

In summer 2015, Government Management Committee and Toronto City Council were given an update regarding the NW PATH project following the completion

of Phase 1 as part of a general update on the status of the Union Station Revitalization Project. Staff were directed to find an alternative solution, investigate additional opportunities to reduce construction costs, and report back for the 2018 capital budget process.

1.2 2018 EA Addendum

The City of Toronto retained Arup in late 2016 to manage the EA Addendum process to evaluate the performance and potential cost savings of several new alternative tunnel alignments.

To increase cost certainty and better understand the feasibility of each new alignment, City Staff retained Hatch to develop conceptual designs and study potential structural and subsurface impacts. This study provided >10% design completion, 3D scanning and modelling of adjacent buildings and structures, a Quality Level B Subsurface Utility Engineering (SUE) investigation, and a Class D cost estimate; whereas the initial Class C EA Study provided only high-level details based on existing information.

The project team contacted the Ministry of Environment and Climate Change (MOECC) in spring 2017 to discuss the project schedule, plans for consultation, the Environmental Study Report (ESR) for the EA Addendum, and the potential for the Lapse of Time clause from the Municipal Class EA guide to apply. The 10-year Lapse of Time clause does not apply to the NW PATH project as it has been partially constructed and completed (per Phase 1). The team also contacted the City of Toronto's Municipal Capital Infrastructure Coordination (MCIC) office.

1.2.1 Project Team

The NW PATH EA Addendum is being led by the City of Toronto's Real Estate Services department with input (as part of the project team) from Community Planning, Transportation Services, and Urban Design. The consulting team includes:

- Arup – Project planning and execution including process management, pedestrian planning and modelling, and public consultation.
- Hatch – Engineering lead including 3D scanning of existing conditions, subsurface utility engineering (SUE), concept design development/drawings for each alignment, and cost estimation.

1.2.2 Scope of Work

This Addendum requires maintaining consistency (as much as possible) with the original EA as the NW PATH project has been partially completed.

The Addendum revisits some of the decisions of the previous EA and is therefore inherently linked to it.

As part of the direction to revisit design and costing, this EA Addendum develops and evaluates three (3) alternate alignments against the existing preferred York Street alignment. Each alignment is evaluated based on the most up-to-date pedestrian planning assumptions and forecasts available by using an updated Union Station area pedestrian microsimulation model. This allows for the assessment of the effectiveness of each alignment for pedestrian needs including criteria such as congestion, capacity creation, and journey time savings. The alignment designs are progressed to a sufficient degree of technical detail to improve cost certainty (compared to the original EA) and include quality level B utility investigation details. Design variants are considered for one (preliminary preferred) alignment to further optimize the recommended.

The EA Addendum includes consultation with the indigenous community, City of Toronto technical leads, local landowners, community groups and stakeholders, and the broader public at appropriate stages to share the progress of the Addendum study and to receive feedback.

1.2.3 Study Phasing and Schedule

The EA Addendum commenced in January 2017. The phases and approximate timeline are as follows. The information is summarized in Figure 8 below.

- Phase 1 – winter 2017 – Study scoping; review of project history and existing materials; data gathering; establishing assumptions; MOECC consultation; updating of P&O statement; defining alignments to be considered; and establishment of consultation plan.
- Phase 2 – spring 2017 to winter 2018– Consultation and reach-out to the indigenous community, landowners, technical advisory committee, and stakeholders; utility investigations; design development; pedestrian modelling; costing; updating evaluation; and selection of preliminary preferred alignment.
- Phase 3 – winter 2018 – Consultation with landowners and broader public; preferred alignment design refinement; revising project evaluation to provide more clarity and additional analysis based on consultation; study finalization; and reporting updated costing to City of Toronto 2018 capital budget process.
- Phase 4 – spring 2018 – Writing of Environmental Study Report (ESR) and submission to Toronto City Council for consideration prior to submission to the MOECC.

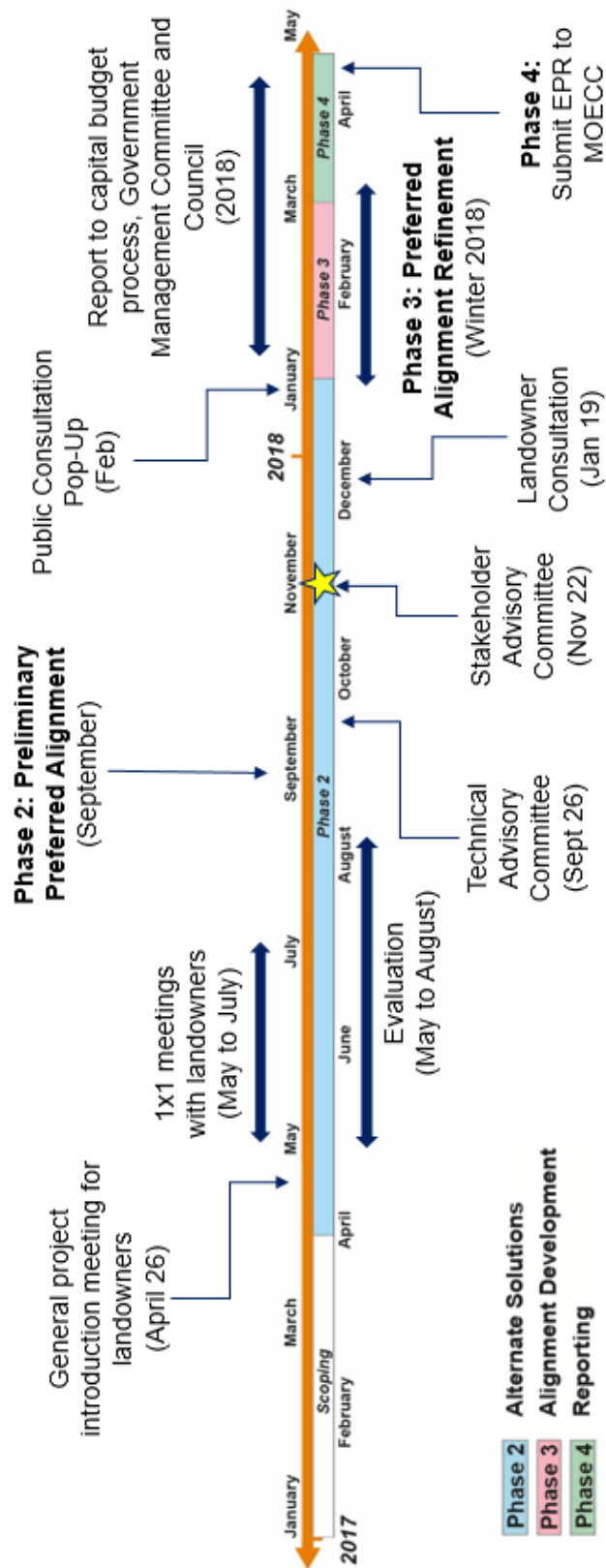


Figure 8 – EA Addendum Schedule

2 EA Addendum Changes and Updates

Table 1 in this section provides a summary of the differences between the original Environmental Assessment (EA) and what is included/updated in this EA Addendum.

Table 1 – Summary of changes

Item	Original 2008 EA	2018 EA Addendum	Reason for the change
Municipal Class EA Guideline	Year 2000 version	Year 2000 version, as amended in 2007, 2011 & 2015	Used the most recent available version of the guide at time of publication of the Environment Study Report (ESR)
Planning Solutions Considered	Considered above-ground and underground options for improving connectivity and pedestrian access to Union Station.	Focuses on revisiting and updating underground alignments to a greater degree of technical detail than in the original EA.	<p>Council directed staff to proceed with NW PATH tunnel design development and to look for options to reduce and/or recover costs while meeting the original goals of the NW PATH project (improved connectivity from destinations to/from Union Station).</p> <p>By investing in a more detailed technical analysis up front in the planning phase, the City hopes to provide more design and costing uncertainty while achieving similar goals and outcomes of the originally envisioned NW PATH project</p>
Horizon Year	2021	2031	Nearly 10 years has elapsed since the original study. Pedestrian planning assumptions are based on the most recent forecasts provided by the City of Toronto for population and employment projections. The team has used the latest

Item	Original 2008 EA	2018 EA Addendum	Reason for the change
			signal timing plans available for the area and incorporates the latest transit plans where sufficient schedule data is available.
Problem & Opportunity Statement	Referred to future York Concourse at Union Station	Union Station York Concourse opened to the public April 2015. The P&O statement is amended to remove reference to the “proposed new” and “planned” York Concourse as a result.	Statement is updated to make it current by removing reference to future facilities (from the perspective of the original 2008 ESR).
EA Scope	The original EA looked at whether above-ground, below-grade, or a combination of both would be the best solution for improving pedestrian infrastructure around Union Station. The study recommended that both above-ground and below-grade improvements be built.	The addendum focused on re-evaluating the underground alignment recommendation only.	City Council directed that the NW PATH project look for opportunities for cost reduction. The underground tunnel is the most expensive component. The City of Toronto is investing in more detailed utility and engineering studies during the Addendum to provide more cost certainty and determine whether the York Street underground alignment is still the best value for money given the additional detail studied in the Addendum.
Subsurface Utility Engineering (SUE)	Class D	Class B	Toronto City Council requested that design costing proceed for the NW PATH and to seek cost recoveries (and savings) where possible. The City is investing in more detailed utility investigations for all alignments under consideration to provide more cost certainty and upfront awareness of utility conflicts as they tend to be a major cost driver for underground infrastructure.

Item	Original 2008 EA	2018 EA Addendum	Reason for the change
Level of Design	<10% (feasibility)	>10% (concept design)	As with SUE investigation, Council directed design costing to proceed and to seek opportunities for cost recovery. Developing each underground tunnel alignment to a concept design level allows for greater cost certainty and impacts the evaluation of each alignment.
Utility Modelling	Single 2D drawing	3D utility model	The City is investing in concept design for all alignments (including a SUE level B). This allows detailed technical considerations (typically not available in planning stage) to be included in the evaluation of alignments and design alternatives.
Pedestrian Analysis	Preliminary analysis of EA alignments based on the most up to date City model at the time	Broad range of tests undertaken using the updated City pedestrian model, with detailed analysis of congestion, capacity, and network-level access to jobs benefits. The City Union Station area model has been expanded to include microsimulation level detail of the surface street network surrounding the proposed alignments rather than the previous node-branch system.	Due to advances with the City's Union Station area pedestrian model and planning forecasts/assumptions since 2008, the modelling scope is increased to match the heightened degree of accuracy placed into the decision-making process for selecting a preferred alignment, including updated assumptions.
Costing Methodology	Unit pricing for material and labour produced for tunnel improvements at a planning level-of-detail (<10% design)	Class D cost estimate. Includes an estimate on cost drivers for inflation, construction delays, currency exchange rates (materials sourced from the US), potential cost increases for materials during project, consideration of premiums	The increased level of design compared to the original EA coupled with additional information gleaned from Phase 1 construction allows the team to consider more factors and provide a more certain

Item	Original 2008 EA	2018 EA Addendum	Reason for the change
		and market conditions for downtown Toronto construction, rehabilitation of existing structures, road closures and decking costs, utility works, and reconstruction of any streetcar tracks.	(and conservative) cost estimate based on the worst-case.
Costing Timeframe	2007 dollars	2021 costing horizon year (anticipated mid-point of construction)	The original EA estimated construction costs at the time of the EA. To provide more cost certainty to decision makers and plan for inflation in budgeting discussions, the team has projected costs forward to 2021 dollars.
Alternative Alignment Solutions	Five underground alignments were considered as part of Phase 3 of the broader EA (which looked at both above and below ground improvements)	Underground alignments are considered as part of Phase 2 of the EA Addendum. Three additional alignments are evaluated versus the York Street base case (previously preferred and approved alignment).	Design development of each alignment proceeds beyond the level of the original EA. As such, it makes sense to consider alignments as part of Phase 2, followed by refining the preferred alignment as part of a new Phase 3.
Alternative Design Concepts (for the preferred alignment)	Phase 3 in the original EA only considered the general routing for above and below grade infrastructure improvements (following the findings in original EA Phase 2 that both above and below grade improvements are recommended) and potential building connections that could be made from the York Street alignment	Alternative design concepts are evaluated as a standalone Phase 3, following consultation with stakeholders and the selection of a preliminary preferred alignment in Phase 2.	The EA Addendum evaluates all alignments to a greater level of technical detail than the original EA. This allows the team to evaluate the feasibility and costs of design options as part of the EA process while optimizing the recommended solution.
York Street Alignments Considered	In Phase 3, five alternative alignments were considered, three with tunnels heading north under York Street. Two of the York Street tunnels would use the concourse level of the Royal York Hotel.	A single York Street alignment is considered in the EA Addendum as the base case (as the previously preferred and approved alignment). Building	The EA Addendum considers an optimized York Street alignment as the base case which the other alignments in the study were compared against. All

Item	Original 2008 EA	2018 EA Addendum	Reason for the change
	Alternative 3 (connecting directly to the northwest corner of Union Station) was ultimately recommended and partially constructed.	connections are investigated for technical feasibility and cost.	Addendum options make use of the previously constructed Phase 1 portion.
University Avenue Alignments Considered	Two University Avenue alignments were evaluated as part of the original EA (Alternative 2a and 2b). Both alignment variations assumed that all parking would be removed from the lot to build the new pedestrian tunnel.	Alignment 4 in the EA Addendum most closely matches Alternative 2b of the original EA, however it considers a hybrid solution where a retail-lined PATH tunnel would be constructed within a partially repurposed parking lot. This alignment retains parking spaces while also making use of the existing structure for tunnel construction.	One of the oppositions to Alternative 2a and 2b in the original EA was the removal of parking. The hybrid solution (in the Addendum) reduces costs, addresses stakeholder concerns, meets city building objectives, maintains parking revenue, and leverages an existing underground structure for tunnel construction.
Royal York Hotel Alignments	Two alternatives for routing the NW PATH through the Royal York Hotel were considered (Alternative 4a and 4b). Both options would connect Union Station to the Royal York Concourse and then exist the west side of the hotel and turn north along York Street.	The Royal York alignment (#3) in the EA Addendum branches east off the knock-out panel in the existing NW PATH Phase 1 tunnel, connecting into the Concourse level. A new tunnel would be built from the Concourse north, across Piper Street, through the lower levels of 55 York St. and 95 Wellington St. W, connecting into the PATH network at Piper Wellington Street W.	This alignment was not considered in the original EA as the Phase 1 PATH connection did not exist. The direct tunnel connection between Union Station and the Royal York Hotel has since been filled in and is no longer available.
Evaluation Criteria	Included multiple sets of evaluation criteria and tables based on the project phase. Tunnels were evaluated in Phase 3.	Maintains evaluation criteria as consistent with the original EA.	The EA Addendum includes more detail (technical and pedestrian planning) than the original EA. Tunnels are evaluated using the Phase 2 evaluation criteria from the original EA to provide more granularity, detail, and transparency to the various transportation, geotechnical/engineering, and social

Item	Original 2008 EA	2018 EA Addendum	Reason for the change
			environment criteria. The broader scope of the original EA's Phase 2 criteria is more appropriate for looking at the comparative advantages and disadvantages of each alignment.
Evaluation Criteria Measures	Evaluation criteria measures included a mix of qualitative and quantitative evaluation measures for each criterion. Results were reported in the summary tables as aggregated by broader category.	Evaluation criteria measures are updated based on the latest available technical and quantitative data available. A transparent numerical rating scale and description is included for each criterion and reported in this report.	This Addendum provides increased transparency to the decision-making process for the EA Addendum and wished to leverage the additional level of detail available by providing rating scales, results and narrative for each criterion.

3 Assessment and Evaluation of Impacts

3.1 Phase 1 – Scoping

The first phase of the EA Addendum focuses on:

- Establishing an internal working group at the City of Toronto for the project,
- Developing the scope for the EA Addendum based on project history and existing materials (as described in Section 1.2),
- Defining assumptions,
- Determining which alignments to evaluate (described in detail in Section 3.2.1),
- Forming a consultation plan,
- Updating the Problem & Opportunity Statement, and
- Consulting on the above with the Ministry of Environment and Climate Change (MOECC).

3.1.1 Internal Working Group

The project is being led and managed by the City of Toronto Real Estate Services team. Representatives from Community Planning, Urban Design, and Transportation Services also formed the core project team from the City. The City procured Arup's services to manage the EA Addendum process and for pedestrian planning and analysis. Hatch was procured by the City of Toronto to perform investigations, design development, and cost estimation (subcontracted to Hanscombe). Dillon Consulting was engaged by Arup for Public Consultation.

3.1.2 Consistency with the Original EA

The intention of the EA Addendum is to update the evaluation of each tunnel alignment based on current environmental context and the latest available projections available at the start of the study in spring 2017. As the Addendum provides updates on specific components of the original EA (and is inherently linked to it as the project has been partially constructed), the team will maintain consistency as best as possible.

3.1.3 Evaluation Criteria

The EA Addendum evaluates underground alignments using the evaluation criteria set out in Phase 2 of the original EA. While a subset of that criteria was used for tunnel evaluation in Phase 3 of the original EA, some of the granularity regarding transportation, social, and geo-technical/engineering impacts was lost as

a result. With the additional investment into a more detailed technical analysis for the Addendum, the original Phase 2 criteria will allow for a more thorough (and differentiated) comparison between options.

In terms of criteria weighting, the original EA did not weight any specific evaluation criteria or category, and so the EA Addendum will maintain this. This is consistent with the City of Toronto's policy to not weight evaluation criteria.

3.1.4 Pedestrian Planning

For pedestrian planning, the team built on the existing Union Station MassMotion microsimulation model that was previously developed by Arup for the City of Toronto.

The model extents include an area bounded by:

- Queens Quay to the south,
- King Street to the north,
- Spadina Avenue to the west, and,
- Church Street to the east.

The City model is a dynamic agent-based model, spawning individual pedestrians based on transit ridership and schedules and land use generators and attractors (residential and employment lands). More details about the MassMotion model can be found in Appendix C. A screenshot of the model is below in Figure 9. For the purposes of this study, the model evaluates pedestrian activity in the area based on a 2031 horizon year during the AM peak hour only.

The City of Toronto has previously provided Arup with residential and employment projections to 2031 consistent with their latest planning estimates. This information is provided at the block-level where possible. New buildings and future developments that have progressed to a sufficient level of design/planning to have population and/or employment estimates available (typically site plan application stage) have been included as part of the model. Due to the timing of the NW PATH EA Addendum study, the TOCore report recently published by the City of Toronto is not considered in the analysis.

From a transit perspective, future service changes (capital or operational) that have detailed schedule information available are included in the pedestrian analysis. Pedestrian movements in the Union Station area are typically transient and origin-destination driven. Pedestrian routing in the model is dynamic and therefore sensitive to the unloading of transit vehicles at specific times (on specific platforms).

Due to insufficient details at this time, impacts of other long-term major transit projects such as the GO-RER program, Relief Line, and Waterfront Transit are not explicitly represented in this model.

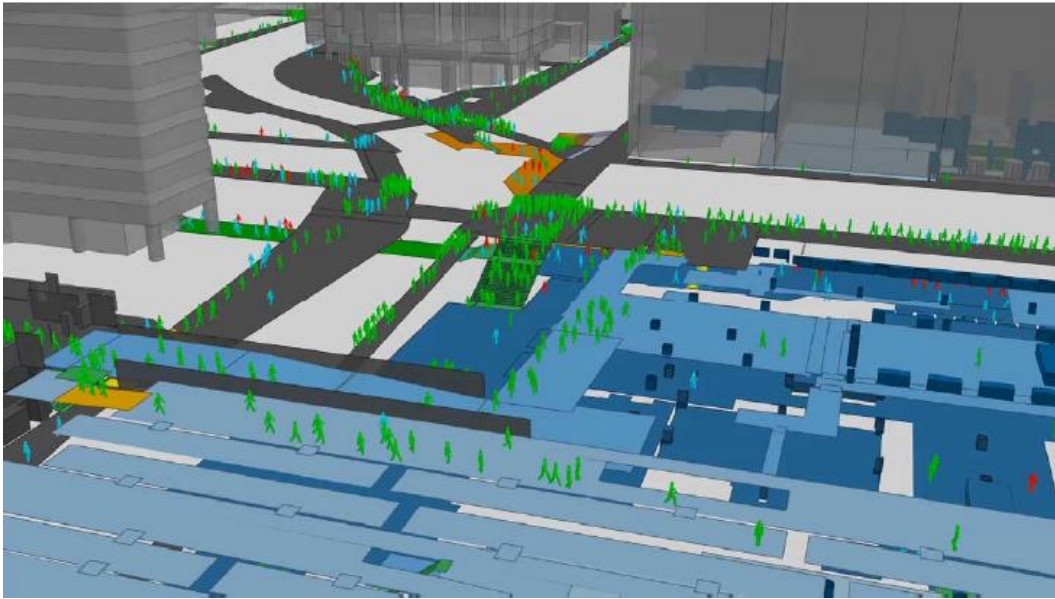


Figure 9 – Screenshot of the Union Station MassMotion pedestrian planning microsimulation model looking northwest along York Street and University Avenue from Union Station. Green agents represent GO commuters, red TTC users, and blue ambient foot traffic.

3.1.5 Consultation Plan

Unlike typical Municipal Class Schedule C EAs, the published guidelines do not prescribe any required consultation for Addenda as Addenda can range from small updates (e.g. the filing of a single page letter) through to full reports that mimic a full EA. Given the subject Addendum included scope to potentially change the recommended alignment, the team planned consultation at multiple touch points with stakeholders based on the stage of design development. Details of the consultation plan are included in Appendix E with a summary below:

- Consultation with the Indigenous Community
 - Alerted Indigenous Communities with interest in the project (based on study area) about the Addendum
 - Provided the Indigenous Community the opportunity to engage in any aspects or stages of the EA Addendum process that they were interested in participating in
- Two general landowner information sessions
 - (1) Reintroduced the project, the alignments under consideration, and the evaluation framework
 - (2) Shared the results of the alignment evaluation and elicited feedback on design alternatives and areas of concern regarding construction impact mitigation

- One-on-one landowner meetings during Phase 2
 - Offered and held one-on-one meetings with landowners in the study area to answer questions regarding design development, construction impacts, and the evaluation with respect to their building/property
- Technical Advisory Committee (TAC) meeting
 - Invited department representatives from the City of Toronto, TTC, and Metrolinx to a meeting following the results of the Phase 2 evaluation. Shared details regarding the Preliminary Preferred Alignment, focusing on any technical (design, construction, and/or engineering) challenges that may need to be clarified and/or addressed pending finalization of the preferred alignment
- Stakeholder Advisory Committee (SAC) meeting
 - Invited local councillors, business important areas, community and advocacy groups, and accessibility organizations to comment following sufficient design development and technical analysis
 - Asked for comments (by SAC members) on the clarity of the evaluation and any conclusions or results that were unclear. Asked for input on areas of concern in the local area with respect to the construction process
- Public Consultation
 - Opened the project to the broader public for comment, following sufficient design development and the preliminary evaluation
 - Posted project details to a City website and updated at the end of each project phase
 - Held three public information centre pop-ups (instead of a typical town-hall) within the PATH network and Union Station
 - Pop-up allowed the project team to engage with pedestrians that may not regularly be involved in the City's typical planning process
 - Engaged directly with regular PATH and Union Station users (typically commuters)
 - Provided information about the project and share the results of the evaluation.
 - Online guided survey
 - Hosted an online survey to share NW PATH project details and allow the public to provide feedback, comments, and questions.
 - Social Media promotion

- Used City of Toronto Facebook and Twitter accounts to promote the timing and location of the project pop-ups as well as making a survey available for at least two (2) weeks for comment.

3.1.6 Problem & Opportunity Statement

Problem & Opportunity (P&O) Statements in Municipal Class EAs outline the problem or opportunity that the subject project is intended to address. The considerations in the remainder of the EA should seek to justify the advantages and disadvantages of each alternative in the context of the P&O Statement.

For the purposes of the EA Addendum, the original P&O Statement is being left as-is besides removing reference to a future, planned York Concourse as it opened to the public in 2015 (i.e. after the completion of the original 2008 EA but before the start of this Addendum). A blackline copy of the updated P&O Statement is provided below. The words to be removed are formatted with red text, strikethrough, bold, and underline accents for clarity and emphasis:

The current pedestrian facilities and operations will not meet projected pedestrian demands nor provide any opportunity for redistribution of other existing PATH users who may be oriented north and west of the Station. Based on the results of pedestrian studies, there is a clear need for new northwest pedestrian connections to relieve current congestion and provide increased pedestrian capacity to accommodate the ~~proposed~~ ~~new~~ GO York Street Concourse and destinations northwest of Union Station. Numerous planning documents also support the need for these connections, including the City of Toronto Official Plan, the Union Station District Plan and Union Station Master Plan.

New northwest pedestrian connections would serve to provide alternate routes from the ~~planned~~ GO Transit York Street concourse, thereby providing operational redundancy and flexibility in the PATH network. These connections would also reduce the peak-period bottleneck effect that currently exists at various locations throughout the PATH while serving to disperse underground pedestrian activity that is currently oriented to the east.

3.2 Phase 2 – Alternative Solutions

This EA Addendum focuses on revisiting and updating the analysis regarding underground alignments with the explicit goal of reducing costs while maintaining the goals and intent of the original EA. As described above, the City of Toronto is investing in a more detailed study than was done in the previous EA to provide more clarity on key EA decision criteria and to increase cost certainty. Each

alignment is developed to a concept design level (>10%), including detailed utility investigations and the modelling of all alignments in three dimensions.

It should be noted that while only one alignment will be chosen as the preferred alternative as part of this EA Addendum, no alignment will preclude the construction of additional connections or alignments in the future, including any alternative alignment considered in this Addendum.

3.2.1 Alignment Descriptions

In addition to the base case alignment (York Street), three (3) alignments were evaluated in the EA Addendum. Figure 10 below provides a schematic overview and summary of the base alignment and the three (3) alternate alignments. A text description is included below for figure for clarity.

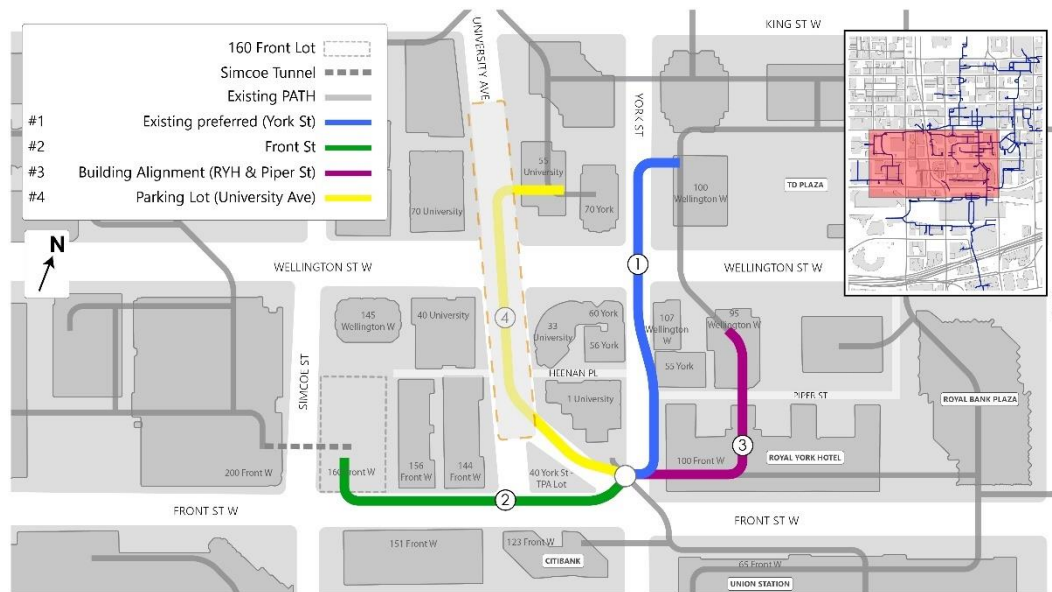


Figure 10 – Schematic diagram of tunnel alignments under consideration for the EA Addendum

Alignment 1/York Street is the 2008 EA approved York Street alignment. It connects through the north side of the existing NW PATH Phase 1 tunnel at the corner of University Avenue and Front Street, and continues north under York Street to connect into the PATH concourse at 100 Wellington Street West.

Alignment 2/Front Street branches off to the west of the existing NW PATH Phase 1 tunnel, crossing over the TTC subway structure, and running west under the north-side of Front Street. It connects into a new development at 160 Front Street West.

Alignment 3/Building Alignment branches to the east of the existing NW PATH Phase 1 tunnel entering the Royal York Hotel concourse level. It turns north

creating a new PATH tunnel connection across Piper Street to connect into 55 York St. and 95 Wellington Street W, via the lower levels of 55 York Street.

Alignment 4/University (Parking Lot) branches off to the west of the existing NW PATH Phase 1 tunnel and heads north underneath University Avenue through a partially repurposed underground parking lot. The alignment connects to the existing PATH network at 55 University Avenue.

Alignments 2 and 3 were not previously considered in the original EA. Alignment 4 in the EA Addendum is similar to Alternative 2b in the original EA, however the EA Addendum alignment is a hybrid approach where some parking lot functionality/uses remain alongside a separated (and climate controlled) new PATH tunnel.

Engineering concept design drawings for each alignment are available in Appendix D.

3.2.2 Evaluation Methodology

As described in Section 3.1.3 above, the EA Addendum maintains as much consistency as possible with the Evaluation Criteria categories from the original EA.

Following consultation during the EA Addendum, some minor changes were made to criterion descriptions to provide more clarity to the public on what was being evaluated and to make the descriptions current. Each criterion was also provided with an index number to aid readers. The following criterion descriptions were updated:

TE1, TE2, TE3, TE5, TE7, GE4, GE5, GE9, SE4, SE5, and SE7.

The underlying measures for each criterion were updated to be quantifiable wherever possible, reflecting the additional detailed technical information available during the alignment evaluation stage of the project. Both quantifiable and qualitative evaluation criterion now include an absolute rating scale for scoring each alignment in each category.

Table 2 below provides full transparency in how each evaluation criterion description has been updated in blackline format (red font for new text, removed text is bolded with strikethrough accents), including the rating scale each criterion will be assessed against.

Table 2 – Summary of evaluation measures

Index	Evaluation Criteria	Criteria Description	Measure(s)
Policy and Planning Environment			
PP1	Conformity with policies of City of Toronto Official Plan	Assesses consistency with City of Toronto Official Plan policies & schedules	<p>This criterion will be measured using an average of 3 measures:</p> <p>PP1a: Does the alignment support the Official Plan policies regarding transportation & land use, role of Union Station, enhanced public realm, and protection of the natural environment and heritage system?</p> <p>Qualitative scoring of alignments based on connectivity to employment, arts and culture, public spaces, education, recreation, and health care destinations, and streetscaping/public realm improvement opportunities. Alignments that connect to more and a larger variety of destinations will score better. The Official Plan is available online here: https://www1.toronto.ca/planning/chapters1-5.pdf</p> <p>PP1b: Is the underground tunnel barrier-free and AODA compliant? Pass/fail ranking of alignments. 5 for pass, 1 for fail.</p> <p>PP1c: Does the alignment meet the design guidelines for the PATH network?</p> <p>Quantitative analysis of proposed tunnel width and height and qualitative analysis of whether each alignment is pleasant, convenient and comfortable; connects to public places; improves orientation and wayfinding; provides public amenities; has high quality finishes, features & lighting; and is safe and secure. Alignments that meet more of the criteria above and have larger cross-sections will score better than alignments with a smaller tunnel and/or meet fewer of the criteria. PATH design guidelines are here - https://www1.toronto.ca/city_of_toronto/city_planning/transportation_planning/files/pdf/path_design_guideline16feb12.pdf</p>

Index	Evaluation Criteria	Criteria Description	Measure(s)
PP2	Conformity with policies of Central Waterfront Secondary Plan	Assesses consistency with Central Waterfront Secondary Plan policies & schedules	<p>Does the alignment support the Central Waterfront Secondary Plan ("Making Waves")?</p> <p>Qualitative analysis of whether each alignment removes barriers and makes connections; contributes to building a network of parks and public spaces; promotes a clean and green environment; and creates dynamic and diverse new communities. Alignments that meet more of these criteria will score higher than those that only meet some of the criteria. "Making Waves" is available at the following link - http://www1.toronto.ca/city_of_toronto/waterfront_secretariat/files/pdf/making_waves_summary.pdf</p>
PP3	Agreement with the objectives of Union Station Master Plan	Assesses consistency with Union Station Master Plan policies & schedules	<p>Does the alignment support the Union Station Master Plan (USMP) policies and actions regarding transportation; enhancing the public realm; creating pedestrian priority measures; and supporting "Big Moves."</p> <p>Qualitative analysis of how well each alignment supports the USMP. Alignments that meet more of these criteria will score higher than those that only meet some of the criteria. The USMP is available at the following link - https://www.toronto.ca/legdocs/2006/agendas/committees/plt/plt060601/it005.pdf</p>
PP4	Agreement with direction from Toronto City Council	Assesses consistency with City Council direction	<p>Does the alignment meet council's direction and partnership obligations to improve connections to the north and west of Union Station?</p> <p>Qualitative analysis of the proposed tunnel and alignment. Alignment that meet all objectives will score higher than those that only meet some of the objectives.</p>
Transportation Environment			
TE1	Pedestrian flow diverted from existing PATH network	Assesses the ability to divert users number of pedestrians diverted from existing PATH routes	<p>Quantitative analysis of the anticipated number of people that are diverted from existing PATH connections north of Union Station: focusing on the Royal Bank Plaza, Brookfield Place, and the Skywalk. The aim is to demonstrate that the new PATH connection serves existing underground demand.</p> <p>Scoring is as follows: 1: 0 - 299 anticipated diverted pedestrians</p>

Index	Evaluation Criteria	Criteria Description	Measure(s)
			2: 300 - 599 anticipated diverted pedestrians 3: 600 - 899 anticipated diverted pedestrians 4: 900 - 1199 anticipated diverted pedestrians 5: >= 1200 anticipated diverted pedestrians
TE2	Pedestrian flow capacity where required	Assesses potential for fluid pedestrian movement in highly travelled corridors Assesses the amount of time people spend congested on the street network around Union Station	<p>Quantitative measure of the time that people spend congested on the street network adjacent to Union Station. The measure assesses how many people using Front St, Bay St, and York St near Union Station have their average Fruin LOS (City of Toronto congestion standard) improved above the LOS C threshold in the AM Peak hour (8:00 AM - 9:00 AM).</p> <p>The baseline (Phase 1 only) figure has 82% of people experiencing some congestion in the peak hour on these streets. The scoring for additional reduction of congestion on these streets is as follows:</p> <p>1: 0 - 2.4% anticipated reduction 2: 2.5 - 4.9% anticipated reduction 3: 5 - 7.4% anticipated reduction 4: 7.5 - 9.9% anticipated reduction 5: >= 10% anticipated reduction</p>
TE3	Ease of use for pedestrians	Assesses directness of pedestrian connections/ routes and degree of vertical circulation (i.e., stairs, elevators, etc.)	<p>Quantitative analysis of average ease of use for people using Front St, Bay St, and York St, based on industry metrics.</p> <p>Congestion, time on stairs vs escalators, and long routes are blended to provide an overall 'cost' score. London Underground Limited (LUL) generalized journey costs have been generated for all alignments and the baseline (Phase 1 only). Analysis will be limited to agents using key routes adjacent to Union Station (Front Street, Bay Street, and York Street) in the AM peak hour (8:00 AM – 9:00 AM).</p> <p>The baseline result is a value of 1.07: reduction from this baseline have been used for scoring purposes. The scoring for additional reduction in percent from the baseline is:</p>

Index	Evaluation Criteria	Criteria Description	Measure(s)
			1: 0% additional reduction 2: 1 - 3% additional reduction 3: 4 - 6% additional reduction 4: 7 - 9% additional reduction 5: >= 10% additional reduction
TE4	Protection of pedestrians against inclement weather	Assesses the degree of enclosure or separation from the natural elements	Does the alignment allow for a comfortable, climate controlled environment for pedestrians? Pass/Fail criteria with scores of 5 for pass and 1 for fail.
TE5	Potential for Overcrowding	Assesses the ability to provide a spacious pedestrian environment Assesses pedestrian demand relative to width of the proposed tunnel	Quantitative analysis of congestion along each alignment, based on City of Toronto and industry standards. Across the AM Peak hour (8:00 AM - 9:00 AM), Fruin experienced LOS was calculated across each alignment. The predominant LOS has been reported on and scored. If there is persistent LOS F along any section of an alignment this has major implications on its technical feasibility and would disqualify an alignment. Scoring ranges based on predominantly experienced LOS: 1: LOS E or F 2: LOS D 3: LOS C 4: LOS B 5: LOS A

Index	Evaluation Criteria	Criteria Description	Measure(s)
TE6	Safety of Pedestrians	Assesses the opportunities to provide public animation and interaction	<p>Type of pedestrian animation/interaction available.</p> <p>Qualitative analysis of the possibilities in each alignment for public art, private art, new retail/public space, amenity, and/or through existing building concourses. Quality of finishes is evaluated in SE4. Alignments that have more possibilities for the above will score higher.</p>
TE7	Connectivity with the existing PATH Network	<p>Assesses the ability of connecting to the current pedestrian network</p> <p>Assesses access to jobs and the number of new PATH connections for each alignment</p>	<p>This criterion will be evaluated using an average of 2 measures:</p> <p>TE7a: Quantitative analysis of number of jobs within a 15-minute climate-controlled walk catchment from Union Station are added by the new NW PATH tunnel.</p> <p>This analysis uses a calibrated walking network that considers signal timing delays to encourage PATH use. This measure quantifies the benefits to the wider PATH network of a new alignment. Scoring is based on jobs added to the catchment versus the base case as follows:</p> <ul style="list-style-type: none"> 1: 0 - 4999 jobs added 2: 5000 - 9999 jobs added 3: 10000 - 14999 jobs added 4: 15000 - 19999 jobs added 5: >=20000 jobs added <p>TE7b: Number of potential connections to the existing PATH network.</p> <p>Quantitative analysis of the existing PATH network connections in the current design and the potential to create additional connections from the new tunnel to the existing PATH in the future. Alignments with more connections (and potential future ones) into the PATH network will score better than tunnels with fewer.</p>
Geotechnical and Engineering Environment			

Index	Evaluation Criteria	Criteria Description	Measure(s)
GE1	Potential effect on existing structures and operation	Assesses the potential impact to surrounding buildings	<p>Qualitative measure of perceived impact to existing structures and buildings for creating the connection.</p> <p>Knock-out panels and building retrofit will score better than new construction from the Phase 1 tunnel.</p> <p>Scoring:</p> <p>5: No impacts</p> <p>4: No structural impacts + 1 landowner</p> <p>3: Structural impacts + 1 landowner OR no structural impacts and multiple landowners</p> <p>2: Structural impacts and two landowners</p> <p>1: Structural impacts and >2 landowners</p>
GE2	Ease of Construction	Assesses the complexity of constructing new pedestrian connections	<p>Qualitative evaluation of the construction methodology.</p> <p>Scoring is as follows:</p> <p>5: Retrofit/ refurbishment/ rehabilitation, may have some minor cut-and-cover</p> <p>4: Partially new construction (cut and cover) alongside partial retrofit/ rehabilitation</p> <p>3: Tunnel is primarily cut-and-cover construction</p> <p>2: Any mined construction as part of tunnel building</p> <p>1: Cannot be built</p>
GE3	Limited staging costs and delays during construction	Assesses the potential for impediments to the construction process	<p>Determine whether any/all alignments will conflict with other major projects in the area as determined by MCIC office.</p> <p>Qualitative evaluation of expected construction impacts.</p> <p>5: None or limited conflict with other major projects</p> <p>4: None or limited conflicts with other projects but partial rerouting of one road and utility conflicts</p>

Index	Evaluation Criteria	Criteria Description	Measure(s)
			<p>3: None or limited conflicts with other projects but multiple partial rerouting of roads, and utility conflicts</p> <p>2: Other projects that could conflict or be complementary or if recent major works in area and/or if road rerouting required in addition to utility conflicts</p> <p>1: Major disruption (road closures) and conflicts with multiple projects</p>
GE4	Potential effect on public transit during construction	Assesses the potential for interruptions to operation of the subway system TTC during construction	<p>Are there potential impacts to existing public transit operations?</p> <p>Qualitative evaluation of risks to public transit operations, and the possibility of route changes during construction. Scoring is as follows:</p> <p>5: No anticipated impacts to regular subway, streetcar, or bus operations</p> <p>4: Anticipated impact to regular bus operations (that can be rerouted) and/or risk of potential subway closure</p> <p>3: Anticipated impact to regular streetcar operations and/or risk of potential subway closure</p> <p>2: Anticipated impact to multiple transit routes (includes streetcar and/or bus) and/or risk of potential subway closure.</p> <p>1: Would require a subway shutdown</p>
GE5	Potential effect on vehicular traffic during construction	Assesses the potential for interruptions to traffic including buses and streetcars during construction	<p>Are there lane closures required on major roads?</p> <p>Qualitative evaluation of anticipated road closures and/or rerouting required. Scoring will be based on:</p> <p>5: No road closures</p> <p>4: Partial closures and/or re-routing of 1-2 minor roads</p> <p>3: Partial closures and/or re-routing of at least 2 roads (at least 1 must be major)</p> <p>2: Partial closures and/or re-routing of at least 3 roads (at least 2 must be major)</p> <p>1: Major long-term full closure of a road or impacts to 3+ roads</p>
GE6	Potential effect on station	Assesses the potential for	Evaluates whether construction of the alignment will involve temporary closures of Phase 1 and/or any impacts to surface pedestrian infrastructure around Union Station.

Index	Evaluation Criteria	Criteria Description	Measure(s)
	pedestrian flow during construction	interruptions to pedestrian movements at Union Station during construction	Qualitative evaluation based on anticipated interruptions, scored as follows: 5: No impacts 4: Minimal impacts to surface 3: Major impacts to surface 2: Any closures of existing Phase 1 tunnel 1: Major disruption to Union Station operations to the north-west of station
GE7	Frequency of Maintenance	Assesses how often pedestrian connections and their associated features would have to be maintained	<p>This criterion will be measured using an average of 2 measures:</p> <p>GE7a: Quantifies the number of vertical transportation features (escalators and elevators) that will need to be maintained under a given alignment. Scoring as follows: 5: 0 additional mechanical components maintained by City 4: 1 escalator maintained by City 3: 1 elevator maintained by City 2: >1 component to be maintained by City (max of 1 elevator) 1: >1 elevators to be maintained by City</p> <p>GE7b: What is the length of the tunnel to be maintained in metres? Quantitative evaluation of tunnel length as corollary for ongoing cleaning/maintenance costs. Scoring is ranked 1 to 5 based on tunnel lengths as follows: 5: 0m of tunnel to maintain 4: <50m of tunnel to maintain 3: 50 - 100m of tunnel to maintain 2: 100 - 150m of tunnel to maintain 1: 150m+ of tunnel to maintain</p>

Index	Evaluation Criteria	Criteria Description	Measure(s)
GE8	Minimize cost of implementation	Assesses relative cost of constructing pedestrian connection	<p>Cost estimate of alignment design.</p> <p>Quantitative costing based on the following cost bands:</p> <p>5: <\$45M 4: \$45 - 60M 3: \$60 - 75M 2: \$75 - 90M 1: \$90M+</p>
GE9	Potential conflicts with existing utility services	<p>Assesses the potential for intersecting with a utility (hydro, phone lines, etc.)</p> <p>Assesses the potential for conflicts with utilities (e.g. hydro, combined sewer, EnWave etc.)</p>	<p>This criterion will be measured using an average of 2 measures:</p> <p><u>GE9a:</u> Length of utility conflicts in metres.</p> <p>Quantitative assessment of total length of utility conflicts (removals, supports, and relocations) based on current alignment design. Scoring as follows:</p> <p>5: 0m of utility conflicts 4: <400m of utility conflicts 3: >400m and <800m of utility conflicts 2: >800 and <1200m of utility conflicts 1: >1200m of utility conflicts</p> <p><u>GE9b:</u> Number of major utility conflicts.</p> <p>Quantitative assessment of number of utility conflicts based on current alignment design. Scoring as follows:</p> <p>5: 0 major conflicts 4: 1 major conflict</p>

Index	Evaluation Criteria	Criteria Description	Measure(s)
			3: 2-3 major conflicts 2: 4-5 major conflicts 1: >5 major conflicts
Social Environment			
SE1	Potential nuisance effects on adjacent uses during construction	Assesses potential impacts of construction (noise, dust, vibrations, etc.)	Qualitative measure of anticipated noise and vibration impacts/nuisances during construction. Scoring is as follows: 5: No anticipated impacts 4: Some impacts expected 3: Major impacts expected in specific areas (related to construction method and cut-and-cover lengths) and/or landowner concerns 2: Major impacts for entire length of tunnel and landowner concerns 1: Local land uses could be shutdown due to noise and vibration disruption.
SE2	Potential effects on existing land uses and proposed developments	Assesses the potential for businesses to benefit from their proximity to the pedestrian connection	Does the PATH tunnel offer the potential for future connections to existing buildings that don't currently have PATH, and/or to proposed future developments in the area? Quantitative evaluation of the number of potential new PATH connections to interested property owners, or towards new residential or office developments. 5: >3 planned developments or future connections near new PATH tunnel 4: 3 planned developments or future connections near new PATH tunnel 3: 2 planned developments or future connections near new PATH tunnel 2: 1 planned development or future connection near new PATH tunnel 1: No planned developments near new PATH tunnel
SE3	Minimize acquisition of	Assesses the potential for	Does the NW PATH design require any easements?

Index	Evaluation Criteria	Criteria Description	Measure(s)
	private property for public use	acquiring private property to construct the pedestrian connection	Qualitative evaluation based on alignment design. Scoring as follows: 5: No acquisitions required 4: Temporary easements 3: Small/minor permanent easements and/or agreements with landowners 2: Major permanent easements and/or more complex agreements with landowners 1: Expropriation
SE4	Improvements to aesthetic experience of pedestrians	Assesses the potential to make the pedestrian connection a pleasant pedestrian environment Assesses the quality of finishes for the new tunnel alignment	Describes the quality of finishing for the tunnel. All alignments under City ownership will score a 5 as they are expected to meet and exceed the minimum PATH guidelines. Private owned aspects of the NW PATH will score a 4 as they are expected to meet the PATH guidelines, but specifics will be left to landowners. Other aspects of the tunnel, such as safety and cross-section size have been addressed in PP1 and TE6 above.
SE5	Pedestrian draw/attraction	Assesses the likelihood that pedestrians will use the new connection. Assesses the likely pedestrian	Quantitative analysis of projected pedestrian throughput or draw for each alignment. The City's microsimulation model has been used to determine likely numbers of pedestrians using each alignment in the 2031 planning design year. Scoring is based on the projected pedestrians to use the new NW PATH connection as follows: 1: 0 - 999 projected pedestrians 2: 1000 - 1999 projected pedestrians 3: 2000 - 2999 projected pedestrians

Index	Evaluation Criteria	Criteria Description	Measure(s)
		demand for the new tunnel	4: 3000 - 3999 projected pedestrians 5: >4000 projected pedestrians
SE6	Retail development opportunities	Assesses the potential for providing new retail opportunities	Total square metres of potential retail opportunities (in current alignment design). Quantitative scoring based on: 5: 300+ m ² of public owned retail 4: 200 - 300m ² of publicly owned retail 3: 100 - 200 m ² of publicly owned retail or any private retail 2: 0 - 100m ² of public owned retail 1: No provisions for retail
SE7	Public amenity opportunities	Assesses the potential to provide amenities such as washrooms, telephone booths, and drinking fountains, bike stations, information kiosks, way-finding, and public wi-fi access.	Does the new PATH tunnel have additional space for public amenities? Qualitative assessment of space for public amenities through the NW PATH. Scoring as follows: 5: Major new public amenities as part of the new PATH connection 4: Some publicly owned amenities as part of the new PATH connection 3: Substantial privately owned amenities as part of the new PATH connection 2: Some privately owned amenities as part of the new PATH connection 1: No additional space for public amenity
Cultural Environment			

Index	Evaluation Criteria	Criteria Description	Measure(s)
CE1	Potential effects on designated heritage features	Assesses the potential of new pedestrian connections intersecting with designated heritage properties	<p>Will any heritage properties be permanently impacted?</p> <p>Qualitative analysis of expected impacts to heritage properties. Scoring as follows:</p> <p>5: No anticipated impacts to heritage elements</p> <p>4: Minor anticipated impacts to heritage elements</p> <p>3: Medium anticipated impacts to heritage elements</p> <p>2: Major anticipated heritage impacts</p> <p>1: Alignment cannot be built without loss of heritage elements</p>

3.2.3 Summary of Pedestrian Analysis

Building on a longstanding partnership between the City of Toronto and Arup regarding pedestrian modelling in and around Union Station, the City tasked Arup with providing a pedestrian assessment of four proposed alignments to extend the Northwest PATH beyond its current completed stage, to fulfil the original aim of reducing pressure on the existing surface street network and providing an alternative route to the north and west for Union Station passengers. Union Station is the heart of Toronto's transportation network and is a critical node for the City; ensuring that pedestrian amenity is provided for is critical for passengers.

Arup contributed pedestrian planning advice to the original EA in 2008 and have significantly expanded the investigation into the new proposed alignments based on the latest information and assumptions available. The City's pedestrian microsimulation model has been updated and expanded to include increased detail of the surrounding street network and signal timing information. Tests have been conducted aiming to quantify the benefits of each alignment for pedestrians across a range of metrics. These include the following:

- Number of projected users in the AM peak hour;
- Level of congestion for each alignment;
- Potential for overcrowding;
- Directness of connection; and,
- Access to jobs.

Based on these analyses, Alignment 4/University (Parking Lot) provides the highest projected bidirectional flow in the AM peak hour, unlocks the highest access to jobs within a 15-minute walking catchment, and performs well in terms of all other metrics. A summary of results for these metrics is shown in Table 3.

Table 3 – Summary of pedestrian findings

Alignment	Peak Hour pedestrian volumes	Total jobs within a 15-min walking catchment
Alignment 1	4300	3400
Alignment 2	3100	17000
Alignment 3	1100	2700
Alignment 4	5000	15600

In summary, Alignment 4 provides the highest benefit of the alternatives from a pedestrian perspective. However, it is clear from the range of analyses that all Alignments provide some degree of benefit and should be considered as positive additions to the PATH network if supported. Additional details on the pedestrian planning analysis can be found in Appendix C.

3.2.4 Summary of Subsurface Utility Engineering (SUE) Investigations

The impact of utility works is considered as part of criterion GE9 in the evaluation table. Utilities works can be a significant component of construction costs in this part of the city due to the extreme levels of utility congestion. The additional details provided as part of a Quality Level B SUE investigation in the EA Addendum allowed the team to develop a 3D model of existing underground conditions, which was used as an input to tunnel design. Table 4 below summarizes the length and type of major utility conflicts for each alignment.

Alignment 3 has the least utility impacts followed by Alignment 4. This is not surprising as construction for these options primarily occurs inside existing structures.

Table 4 – Summary of SUE findings by alignment.

	Alignment 1	Alignment 2	Alignment 3	Alignment 4
Length of utility relocations	589m	566m	91m	222m
Length of utility removals	157m	155m	23m	105m
Length of utility supports in place required	706m	326m	34m	253m
Total length of utility conflicts	1452m	1047m	148m	580m
Major utility conflicts	6	6	1	4

3.2.5 Summary of Consultation Findings

Using a variety of tools and activities, engagement for the NW PATH EA Addendum project reached more than 1000 members of the public, local community, PATH users, stakeholders, and landowners. The engagement activities and tools used to consult with these interest groups allowed the project team to gather insightful feedback, confirm direction, and accomplish the goal of informing, education, and involving these groups in the identification and evaluation of the alternative alignments for the NW PATH. A summary of consultation engagement is provided in Figure 11 below.

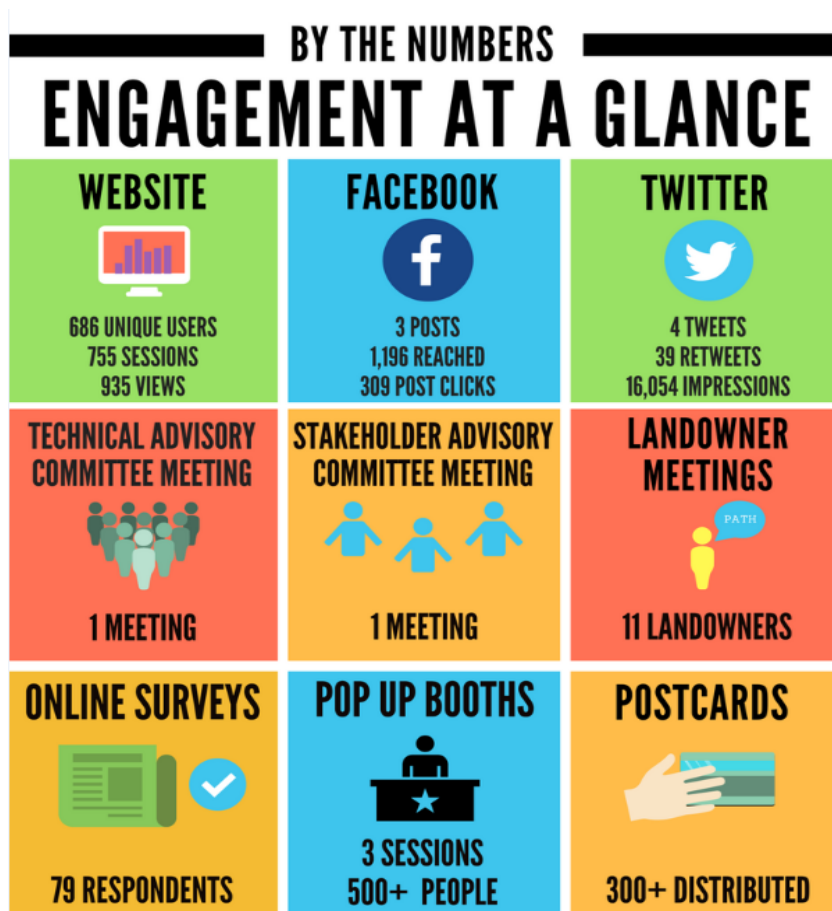


Figure 11 – Consultation engagement at a glance

Generally, the project is well received and supported by the public. PATH users recognize the need for additional network to increase connectivity to Union Station (especially for destinations to the north and west) and to reduce congestion along existing PATH routes and on the surface network. Many people expressed interest in more than one alignment being built, but understood that this PATH project would be publicly built, owned, and maintained, which may result in a staged buildout (unlike other segments of the PATH that are built by the private sector when new developments come online). Retail was also seen as an attractive measure for PATH tunnel connections that would draw further users.

From the perspective of construction mitigation, feedback was focused on how existing pedestrian and vehicle access and infrastructure (i.e. capacity) could be maintained within the project area. There was concern expressed regarding maintaining access to buildings and businesses, wayfinding during the construction process (especially for those with mobility and visual impairments), and for projects to be coordinated with other major works in the area.

Overall, the NW PATH project is a positive project with broad public support. The evaluation as presented had clear conclusions that were generally accepted by the public.

3.2.6 Summary of Costs

Evaluation criterion GE8 provides an assessment and scoring of the estimated construction costs of each alignment. The original EA used a unit costing method based on 2007 dollars, which resulted in several increases to cost estimates during detailed design due to timeline inflation, additional utility conflict information, and a variety of other factors.

Costing methods for the EA Addendum are more sophisticated than the original EA due to the additional detail provided by the SUE Quality Level B investigations and the concept level design drawings for each drawing. EA Addendum costs are provided in 2021 dollars (the anticipated mid-point of construction) and reflect changes and updates to previously costed alignments and their variants (specifically Alignment 1 and 4). A summary of the factors included for the updated cost estimates include:

- Improved Analysis & Estimation Accuracy
 - Improved cost estimation techniques (as opposed to unit costing)
 - Improved utility investigations (Quality Level B) and conflict assessments
- Increased Level of Design Development
 - Significantly increased level of design development (3D concept design vs. single 2D drawing)
- Global Factors
 - Cost escalation from delay in construction
 - Non-competitive conditions for utility works in downtown Toronto
 - Proportional increases (contingency)
 - Currency exchange rates (primarily for materials that can only be sourced from the US)
- New Requirements
 - Decking for all road closures is assumed to be required (and therefore reduces long-term impacts of congestion during construction)
 - Allowance for public art (typically at least 1% of capital costs per City policy)
 - Completion of legacy utility relocations from Phase 1
 - Alignment specific broader considerations

- Parking Lot changes for Alignment 4 – structural rehabilitation, partial removal of intermediate slab, and elevator installation
- Reconstruction of impacted streetcar tracks – Alignment 2 and 3

A summary of the construction cost for each alignment, including the delta versus updated Alignment 1 costs are in Table 4 below. Alignment 3 is the cheapest, Alignment 2 and 4 have similarly costs in the middle of the range for all alignments, and Alignment 1 is the most expensive.

Table 5 – EA Addendum cost estimates. Data courtesy of Hatch

Alignment	EA Addendum 2017 (values in 2021\$ rounded to the nearest hundred thousand)	% Delta from Alignment 1
Alignment 1 – York Street (Base case)	\$98.7M	0%
Alignment 2 – Front Street	\$63.7M	-35%
Alignment 3 – Building	\$33.6M	-66%
Alignment 4 – University Ave & Parking Lot	\$69.3M	-32%

3.2.7 Alignment Evaluation Results

All alignments were evaluated through the evaluation methodology described in Section 3.2.2. Based on a combination of policy considerations, transportation impacts including pedestrian planning, geotechnical, engineering, and utility considerations, longer term social impacts, and heritage considerations, Alignment 4 is recommended as the new preliminary preferred alignment following the Phase 2 evaluation in this EA Addendum. A high-level, text-based summary of the advantages and disadvantage for each alignment is included in Table 6 below.

Table 6 – Summary of advantages and disadvantages by alignment

Alignment	Advantages	Disadvantages
Alignment 1 York Street	<ul style="list-style-type: none"> • No escalator or elevator needed • Strong pedestrian demand for new tunnel 	<ul style="list-style-type: none"> • Most expensive option • Requires temporary lane closures on Front Street and York Street • Longest length of utility conflicts (i.e., sewer, hydro, gas, etc.) of all alignments (1450 m); tied with Alignment #2 for the most major utility conflicts (six in total) • Requires reconstruction of TTC streetcar tracks on Wellington • No retail opportunities

Alignment	Advantages	Disadvantages
Alignment 2 Front Street	<ul style="list-style-type: none"> • Least impact to existing buildings • Direct connection to the western PATH network • Excellent connection to jobs • No escalator or elevator needed 	<ul style="list-style-type: none"> • Requires foundation support for the Toronto Club • 2nd longest length of utility conflicts (1047 m); tied with Alignment #1 for the most major utility conflicts (six in total) • Highly disruptive cut-and-cover surface construction on major roads, requiring temporary lane closures on University Avenue & Front Street • Retail space very difficult and expensive to construct • Very long tunnel with limited animation opportunities
Alignment 3 Building	<ul style="list-style-type: none"> • Lowest cost option • Good pedestrian animation • Fewest construction impacts at surface • Minimal heavy construction and utility disruptions to road users – shortest length of utility conflicts of all alignments (148 m), and only one major conflict. 	<ul style="list-style-type: none"> • Does not provide a new PATH connection and offers limited improvements to service to the existing PATH network and north-west core • Requires elevators and/or escalators • Significant disruption and modification to the existing buildings • Narrow route in places (3.2 m width) may impact pedestrian flows • Requires reconstruction of TTC streetcar tracks on Wellington Street • Requires agreements with multiple landowners
Alignment 4 University Parking Lot	<ul style="list-style-type: none"> • Best balance of performance and cost • Widest & tallest tunnel • Provides strong pedestrian connectivity and animation opportunities • Strong pedestrian demand for new tunnel • Direct north and west PATH network connections • New city-owned retail opportunities (approximately 4300 sq. ft.) • Excellent connection to jobs • New elevator makes parking lot barrier-free (AODA compliant) 	<ul style="list-style-type: none"> • Requires temporary lane closures on University Avenue • Extension connects to both levels of the existing underground parking lot that will continue to operate, but it reduces lot capacity by approximately 185 parking spaces • Structural rehabilitation and modification of parking lot required • Moderate utility conflicts – 3rd for length of conflicts (580 m) and four major conflicts.

The evaluation summary shared with stakeholders during consultation is in Figure 12, with the detailed evaluation results and explanation by criteria included as Table 7.

NW PATH EA Addendum Evaluation Criteria				
	Alignment 1 York Street	Alignment 2 Front Street	Alignment 3 Building Alignment	Alignment 4 University University (Parking Lot)
Policy and Planning Environment				
Conformity with policies of City of Toronto Official Plan. Assesses consistency of NW PATH alignment with City of Toronto Official Plan policies and schedules.	●	●	●	●
Conformity with policies of Central Waterfront Secondary Plan. Assesses consistency of NW PATH alignment with Central Waterfront Secondary Plan policies and schedules.	●	●	●	●
Agreement with the objectives of Union Station Master Plan. Assesses consistency of NW PATH alignment with Union Station Master Plan policies and schedules.	●	●	●	●
Agreement with direction from Toronto City Council. Assesses consistency of NW PATH alignment with City Council direction.	●	●	●	●
Transportation Environment				
Pedestrian flow diverted from existing PATH network. Assesses the number of pedestrians diverted from existing PATH routes to use new NW PATH alignment.	●	●	●	●
Pedestrian flow capacity. Assesses the amount of time people will spend congested on the streets around Union Station, and the benefit that the alignment will have on the pedestrian network.	●	●	●	●
Ease of use for pedestrians. Assesses how the NW PATH alignment contributes to connectivity and efficiency of pedestrian routes, and the need for vertical circulation (ie. stairs, escalators, elevators, etc.)	●	●	●	●
Protection of pedestrians against inclement weather. Assesses the degree of enclosure or separation the NW PATH alignment has from the natural elements.	●	●	●	●
Potential for overcrowding. Assesses pedestrian demand relative to width of the proposed tunnel.	●	●	●	●
Safety for Pedestrians. Assesses the opportunities to provide public animation and interaction.	●	●	●	●
Connectivity with the existing PATH network. Assesses access to jobs and the number of new PATH connections for each alignment.	●	●	●	●
Geotechnical / Engineering Environment				
Potential effect on existing structures and operations. Assesses the potential impact the NW PATH alignment may have on surrounding buildings.	●	●	○	●
Ease of construction. Assesses the complexity of constructing new pedestrian connections for NW PATH.	●	●	●	●
Limited potential for construction delay. Assesses the potential for impediments to the construction process for the NW PATH.	●	●	●	●
Potential effect on public transit during construction. Assesses the potential for interruptions to operation of the TTC during construction of NW PATH.	●	●	●	●
Potential effect on vehicular traffic flow during construction. Assesses the potential for interruptions to traffic during construction of NW PATH.	●	●	●	●
Potential effect on station pedestrian flow during construction. Assesses the potential for interruptions to pedestrian movements at Union Station during construction of NW PATH.	●	●	●	●
Frequency of maintenance. Assesses how often the NW PATH pedestrian connections and their associated features would have to be maintained.	●	●	●	●
Minimize costs of implementation. Assesses relative cost of construction of NW PATH.	○	●	●	●
Potential conflicts with existing utility services. Assesses the potential for conflicts with utilities (e.g. hydro, combined sewer, EnWave, etc.) during construction of the NW PATH.	○	●	●	●
Socio-Economic Environment				
Potential for nuisance effects on adjacent uses during construction. Assesses potential impacts of construction (noise, dust, vibrations, etc.) of the NW PATH.	●	●	●	●
Potential effects on existing land uses and proposed developments. Assesses the potential for businesses to benefit from their proximity to the NW PATH pedestrian connection.	●	●	●	●
Minimize acquisition of private property for public use. Assesses the potential for acquiring private property to construct the NW PATH pedestrian connection.	●	●	●	●
Improvements to aesthetic experience of pedestrians. Assesses the quality of finishes for the new tunnel alignment.	●	●	●	●
Pedestrian draw/attraction. Assesses the likely pedestrian demand for the new NW PATH.	●	●	●	●
Retail development opportunities. Assesses the potential for new retail opportunities in NW PATH.	○	○	●	●
Public amenity opportunities. Assesses the potential to provide amenities such as washrooms, drinking fountains, bike stations, information kiosks, way-finding, and public wireless access.	○	○	●	●
Cultural Environment				
Potential effects on designated heritage features. Assesses the potential of new pedestrian connections intersecting with designated heritage properties.	●	●	●	●

Figure 12 – Summary of evaluation criteria by alignment, presented in pie chart format

Table 7 – Detailed evaluation results

#	Evaluation Criteria	Overall Description	#1 - York St (Benchmark)	#2 - Front St	#3 - Building (RYH/Piper)	#4 - University/TPA
Policy and Planning Framework						
PP1	Conformity with policies of City of Toronto Official Plan	Assesses consistency with City of Toronto Official Plan policies & schedules	<ul style="list-style-type: none">Provides a new, safe linkage to the financial district and employment to the north of Union StationSome additional streetscaping opportunity along York St. during street rebuild, over and above surface improvements identified in the original EANew tunnel design is AODA compliant and barrier-free.Safe, accessible, and climate controlled public spaceConnections to Wellington St. and existing PATH via 100 Wellington St W.Tunnel height may not meet PATH guidelines in some locations	<ul style="list-style-type: none">Provides a new, safe linkage to the employment to the west of Union StationShortens the PATH connection to arts and culture venues such as Roy Thompson hall and theatres along King St, as well as public spaces at David Pecaut Square and Simcoe Park.Streetscaping opportunity along north side of Front St.New tunnel design is AODA compliant and barrier-free.Safe, accessible, and climate controlled public spaceConnection to Wellington St. and the existing PATH via 160 Front St W, and new Simcoe Place tunnel connection.Tunnel height and width is close to but will not meet PATH minimum guidelines.	<ul style="list-style-type: none">Provides a new, safe linkage to the existing PATH at the TD Centre through the Royal York hotelNo streetscaping opportunities as construction is primarily inside buildingsNew tunnel design is AODA compliant and barrier-free.Safe, accessible, and climate controlled public spaceConnection to Wellington St. and existing PATH via the RYH, 55 York, and 95 Wellington.Smallest tunnel width and height of the alternatives in several locations that will not meet PATH minimum guidelines	<ul style="list-style-type: none">Provides a new, safe linkage to employment to the north and west of Union StationImproves connectivity to TTC Subway St. Andrew StationImproves PATH access to arts and cultural destinations along King St.Most direct connection to health care facilities along University Ave.Streetscaping improvement opportunities for the traffic island parkettesNew tunnel design is AODA compliant and barrier-free.Safe, accessible, and climate controlled public spaceConnections to Wellington St and the existing PATH via the TPA lot and 55 University.Largest tunnel cross-section, which generally meets PATH guidelines
		PP1 Scores:	4.3	4	3.3	5
PP2	Conformity with policies of Central Waterfront Secondary Plan	Assesses consistency with Central Waterfront Secondary Plan policies & schedules	<ul style="list-style-type: none">Alignment expands PATH Network which improves and increases Union Station roleImproves pedestrian facilities and accessibility which promotes sustainable transportationConnects to employment centresCreates new, city-owned public PATH network	<ul style="list-style-type: none">Alignment expands PATH Network which improves and increases Union Station roleImproves pedestrian facilities and accessibility which promotes sustainable transportationConnects to employment centresCreates new, city-owned public PATH network	<ul style="list-style-type: none">Alignment is a small expansion of the PATH Network which improves and increases Union Station roleProvides redundant pedestrian facilities and accessibility to the existing RYH concourse and TD CentreConnects to employment centres	<ul style="list-style-type: none">Alignment expands PATH Network which improves and increases Union Station roleImproves pedestrian facilities and accessibility which promotes sustainable transportationConnects to employment centresCreates new, city-owned public PATH networkCreates new, retail community and public space
		PP2 Scores:	4	4	3	5

#	Evaluation Criteria	Overall Description	#1 - York St (Benchmark)	#2 - Front St	#3 - Building (RYH/Piper)	#4 - University/TPA
PP3	Agreement with the objectives of Union Station Master Plan	Assesses consistency with Union Station Master Plan policies & schedules	<ul style="list-style-type: none">Encourages active transportation and pedestrian priority to the existing PATH Network at the TD CentreUnlocks underutilized land underneath York St. to create a new public realm spaceImproves connections to the north of Union Station	<ul style="list-style-type: none">Encourages active transportation and pedestrian priority by creating a new PATH link to the west of Union StationUnlocks underutilized land underneath Front St. to create a new public realm spaceImproves connections to the west of Union Station and creates a new PATH connection to the existing western PATH network at Simcoe Place (and Metro Hall)	<ul style="list-style-type: none">Encourages active transportation and pedestrian priority by providing a redundant PATH connection to the RYH and TD CentreCreates new privately owned public spacesImproves connections to the existing PATH network to the north of the station.	<ul style="list-style-type: none">Encourages active transportation and pedestrian priority by creating a new PATH link to the north and west of Union StationRehabilitates the TPA lot underneath University Ave. to create a new public realm space.Improves connections to the north and west of Union Station including the most direct connection to the PATH node at St. Andrew TTC subway station
		PP3 Scores:	3	4	2	5
PP4	Agreement with direction from Toronto City Council	Assesses consistency with City Council direction	<ul style="list-style-type: none">Will meet council's direction and contractual obligations with Metrolinx regarding a new NW PATH connection at least as far as Wellington St.	<ul style="list-style-type: none">Will meet council's direction, however the connection to Wellington is indirect via the existing PATH at Simcoe Place.	<ul style="list-style-type: none">Will meet council's direction, however the new tunnel reaches Wellington indirectly, by creating a new connection to the existing PATH at TD Centre (south of Wellington) that will be refurbished.	<ul style="list-style-type: none">Will meet council's direction and contractual obligations with Metrolinx regarding a new NW PATH connection at least as far as Wellington St.
		PP4 Scores:	5	3	4	5
Transportation Environment						
TE1	Pedestrian flow diverted from existing PATH network	Assesses the number of pedestrians diverted from existing PATH routes	<ul style="list-style-type: none">Alignment 1 diverts <500 pedestrians from the existing PATH connection.	<ul style="list-style-type: none">Alignment 2 diverts 1001 - 1500 pedestrians from the existing PATH connection.	<ul style="list-style-type: none">Alignment 3 diverts 1001 - 1500 pedestrians from the existing PATH connection.	<ul style="list-style-type: none">Alignment 4 diverts 500 - 1000 pedestrians from the existing PATH connection.
		TE1 Scores:	2	5	5	3
TE2	Pedestrian flow capacity where required	Assesses the amount of time people spend congested on the street network around Union Station	<ul style="list-style-type: none">Overall percentage congested in key areas is 73%, which signifies a 9% improvement of agents experiencing LOS C or better throughout their journey	<ul style="list-style-type: none">Overall percentage congested is 77%, which signifies that an improvement 6% of agents experiencing LOS C or better throughout their journey.	<ul style="list-style-type: none">Overall percentage congested is 75%, which signifies that an additional 7% of agents experiencing LOS C or better throughout their journey.	<ul style="list-style-type: none">Overall percentage congested is 76%, which signifies that an additional 6% of agents experiencing LOS C or better throughout their journey.
		TE2 Scores:	4	3	3	3
TE3	Ease of use for pedestrians	Assesses directness of pedestrian connections/routes and vertical circulation	<ul style="list-style-type: none">Overall reduction in generalized journey time for the key areas is 1%	<ul style="list-style-type: none">Overall reduction in generalized journey time for the key areas is 3%	<ul style="list-style-type: none">Overall reduction in generalized journey time for the key areas is 4%	<ul style="list-style-type: none">Overall reduction in generalized journey time for the key areas is 12%
		TE3 Scores:	2	2	3	5
TE4	Protection of pedestrians against inclement weather	Assesses the degree of enclosure or separation from the natural elements	<ul style="list-style-type: none">Yes, the new NW PATH tunnel will be underground and climate controlled.	<ul style="list-style-type: none">Yes, the new NW PATH tunnel will be underground and climate controlled.	<ul style="list-style-type: none">Yes, the new NW PATH tunnel will be underground and climate controlled.	<ul style="list-style-type: none">Yes, the new NW PATH tunnel will be underground and climate controlled.
		TE4 Scores:	5	5	5	5

#	Evaluation Criteria	Overall Description	#1 - York St (Benchmark)	#2 - Front St	#3 - Building (RYH/Piper)	#4 - University/TPA
TE5	Potential for Overcrowding	Assesses pedestrian demand relative to width of the proposed tunnel	<ul style="list-style-type: none">Predominant experienced average LOS is B.	<ul style="list-style-type: none">Predominant experienced average LOS is C.	<ul style="list-style-type: none">Predominant experienced average LOS is B.	<ul style="list-style-type: none">Predominant experienced average LOS is C.
		TE5 Scores:	4	3	4	3
TE6	Safety of Pedestrians	Assesses the opportunities to provide public animation and interaction	<ul style="list-style-type: none">New publicly owned tunnelAnimation/interaction will be limited to public art	<ul style="list-style-type: none">New publicly owned tunnelAnimation/interaction will be limited to public art	<ul style="list-style-type: none">New tunnel connection owned by private developersExisting RYH concourse has retail as does TD Centre- Art on the walls is up to CF/KingSett	<ul style="list-style-type: none">New publicly owned tunnelLargest tunnel cross-section includes room for retail and amenitiesPublic art is a possibility
		TE6 Scores:	3	3	4	5
TE7	Connectivity with the existing PATH Network	Assesses access to jobs and the number of new PATH connections for each alignment	<ul style="list-style-type: none">There are 3400 jobs added compared to the base case within a 15-minute walkTunnel will connect to existing PATH at 100 WellingtonCould connect to existing PATH in 70 York in the future if AODA requirements can be satisfied by landowners	<ul style="list-style-type: none">There are 17000 jobs added compared to the base case within a 15-minute walkTunnel will connect to new CF development at 160 Front.CF is planning a tunnel connection to the existing PATH at Simcoe Place, which will connect this alignment to the existing network	<ul style="list-style-type: none">There are 2700 jobs added compared to the base case within a 15-minute walkTunnel creates a redundant connection into existing PATH at RYH and TD Centre	<ul style="list-style-type: none">There are 15600 jobs added compared to the base case within a 15-minute walkTunnel will connect to 55 University and provide a connection to the PATH network just south of TTC St. Andrew Station
		TE7 Scores:	3	4	1.5	4.5
Geotechnical and Engineering Environment						
GE1	Potential effect on existing structures and operation	Assesses the potential impact to surrounding buildings	<ul style="list-style-type: none">Alignment could require underpinning Toronto ClubWill require coordination with at least two landowners.	<ul style="list-style-type: none">Alignment will have minimal impacts to existing buildings as it is under the public right-of-wayCoordination with one landowner who is planning for the connection in the design and site plan application of their building.	<ul style="list-style-type: none">Alignment requires structural and non-structural retrofit/ rehabilitation of four buildingsRequires coordination with multiple landowners	<ul style="list-style-type: none">The University/TPA alignment will only impact the TPA, which is an agency of the City. It will require shutting the parking lot during construction.
		GE1 Scores:	2	5	1	3
GE2	Ease of Construction	Assesses the complexity of constructing new pedestrian connections	<ul style="list-style-type: none">New tunnel to be built using cut-and-cover	<ul style="list-style-type: none">New tunnel to be built using cut-and-cover	<ul style="list-style-type: none">Primarily retrofit/ refurbishment/ rehabilitationSmall cut-and-cover section for new tunnel at Piper St.	<ul style="list-style-type: none">Tunnel will be built through a mix of cut-and-cover and retrofit/ refurbishment/ rehabilitationConstruction for most of the length to occur within existing TPA structureConstruction will occur above the operating subway tunnel which could result in schedule impacts, including construction outside TTC operating hours.
		GE2 Scores:	3	3	5	4

#	Evaluation Criteria	Overall Description	#1 - York St (Benchmark)	#2 - Front St	#3 - Building (RYH/Piper)	#4 - University/TPA
GE3	Limited staging costs and delays during construction	Assesses the potential for impediments to the construction process	<ul style="list-style-type: none">Recent construction on Wellington St.Project could conflict with or be complimentary to planned HydroOne Duct bank constructionWill require partial closure of York St.Will require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection	<ul style="list-style-type: none">Will require a partial road rerouting of Front St. and University Ave.No other projects along Front St.Will require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection	<ul style="list-style-type: none">Limited to no impacts as construction is primarily inside the buildingConstruction of new elevator will require partial shutdown of Wellington St.Will require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection	<ul style="list-style-type: none">Will require a partial road rerouting of University Ave.No other projects along University Ave.Will require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection
		GE3 Scores:	2	3	4	4
GE4	Potential effect on public transit during construction	Assesses the potential for interruptions to operation of the TTC during construction	<ul style="list-style-type: none">Closure of York & Wellington intersection due to cut-and-coverRebuilding of streetcar tracksImpacts to 503 and 504 streetcar operations	<ul style="list-style-type: none">Partial closure of Front St., University Ave., and York St.No anticipated impacts to streetcar/ subway operations, however alignment must cross the TTC subway box.121 bus may need to be rerouted temporarily	<ul style="list-style-type: none">Construction of new elevator will impact 503 and 504 streetcar operations on Wellington St.	<ul style="list-style-type: none">Partial closure of University Ave. and York St.No anticipated impacts to bus/ streetcar/ subway operations
		GE4 Scores:	2	3	2	4
GE5	Potential effect on vehicular traffic during construction	Assesses the potential for interruptions to traffic during construction	<ul style="list-style-type: none">York St. will require partial closure and re-routing until decking is in placeIntersection of York and Wellington will require rebuildingWill require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection	<ul style="list-style-type: none">North-side of Front St. will be partially closed then reopened following deckingWill require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection	<ul style="list-style-type: none">Piper St will be closed temporarily during construction until decking is put in placeConstruction of new elevator will require partial closure of Wellington StWill require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection	<ul style="list-style-type: none">Will require temporary partial closure and re-routing at two locations along University Ave until decking is in placeWill require rebuilding sewer from Phase 1 project, which will impact York St. and Front St. intersection
		GE5 Scores:	2	2	3	2
GE6	Potential effect on station pedestrian flow during construction	Assesses the potential for interruptions to pedestrian movements at Union Station during construction	<ul style="list-style-type: none">Will use existing knock-out panel in Phase 1 tunnelWill have major surface impacts as built using cut-and-cover	<ul style="list-style-type: none">Phase 1 tunnel will require a closure to create a new western tunnel branchPartial (short-term) closures/re-routing on Front and University will impact pedestrians who use those sidewalks until decking is in place	<ul style="list-style-type: none">Will use existing knock-out panel in Phase 1 tunnelWill have minor surface impacts on Piper St. and Wellington St.	<ul style="list-style-type: none">Phase 1 tunnel will require a closure to create a new western tunnel branchPartial (short-term) closures/re-routing on University will impact pedestrians who use those sidewalks until decking is in place
		GE6 Scores:	3	2	4	2
GE7	Frequency of Maintenance	Assesses how often pedestrian connections and their associated features would have to be maintained	<ul style="list-style-type: none">0 vertical transportation components to complete tunnelTunnel length = 218 m	<ul style="list-style-type: none">0 vertical transportation components to complete tunnelTunnel length = 163 m	<ul style="list-style-type: none">Alignment requires a new escalator and a new elevator in the TD Centre and the Royal York hotelThe City will negotiate costs with landownersTunnel length = 138 m	<ul style="list-style-type: none">1 new elevator at north end of tunnel alignment to connect to 55 University food court levelTunnel length = 189 m
		GE7 Scores:	3	3	2	2

#	Evaluation Criteria	Overall Description	#1 - York St (Benchmark)	#2 - Front St	#3 - Building (RYH/Piper)	#4 - University/TPA
GE8	Minimize cost of implementation	Assesses relative cost of constructing pedestrian connection	<ul style="list-style-type: none">\$98.7M	<ul style="list-style-type: none">\$63.7M	<ul style="list-style-type: none">\$33.6M	<ul style="list-style-type: none">\$69.3M
		GE8 Scores:	1	3	5	3
GE9	Potential conflicts with existing utility services	Assesses the potential for conflicts with utilities (e.g. hydro, combined sewer, EnWave etc.)	<ul style="list-style-type: none">6 major conflicts (combined sewer & Enwave)Conflicts across 1450 m	<ul style="list-style-type: none">6 major conflicts (2x HydroOne, 1x T.h.E.S., 3x combined sewer)Conflicts across 1047 m	<ul style="list-style-type: none">1 major conflict (combined sewer)Conflicts across 148 m	<ul style="list-style-type: none">4 major conflicts (3x combined sewers and HydroOne duct bank)Conflicts across 580 m
		GE9 Scores:	1	1.5	4	2.5
Social Environment						
SE1	Potential nuisance effects on adjacent uses during construction	Assesses potential impacts of construction (Noise, dust, vibrations, etc.)	<ul style="list-style-type: none">Cut-and-cover construction for entire lengthToronto Club expressed concerns regarding vibration impacts	<ul style="list-style-type: none">Cut-and-cover construction for entire length	<ul style="list-style-type: none">Mostly internal construction with some surface impacts on Piper	<ul style="list-style-type: none">Cut-and-cover construction in segments will have noise and vibration impacts
		SE1 Scores:	2	3	4	3
SE2	Potential effects on existing land uses and proposed developments	Assesses the potential for businesses to benefit from their proximity to the pedestrian connection	<ul style="list-style-type: none">Landowners at Strathcona hotel, 55 York, and 70 York have may be interested in a future PATH connection	<ul style="list-style-type: none">Will connect to the new CF development at 160 Front StCreates PATH network towards The Well, new planned Spadina GO Station on Barrie Line, and Station St. Office Tower	<ul style="list-style-type: none">Will connect to the RYH and TD Centre which already have PATH accessThere may be potential in the future to connect to 55 York	<ul style="list-style-type: none">Will connect to 55 UniversityMay be potential in the future for connections to 40 University and 160 Front St.
		SE2 Scores:	4	5	2	3
SE3	Minimize acquisition of private property for public use	Assesses the potential for acquiring private property to construct the pedestrian connection	<ul style="list-style-type: none">No acquisitions or easements expected	<ul style="list-style-type: none">No acquisitions or easements expected	<ul style="list-style-type: none">Easement expected with 55 York, Royal York hotel, 95 Wellington, and 100 WellingtonNegotiations with landowners expected regarding ownership of new Piper St. tunnel	<ul style="list-style-type: none">No acquisitions or easements expectedRequires agreement with TPARequires construction agreement with the TTC for any demolition or construction work above the subway structure
		SE3 Scores:	5	5	2	3
SE4	Improvements to aesthetic experience of pedestrians	Assesses the quality of finishes for the new tunnel alignment	<ul style="list-style-type: none">New tunnel will be publicly owned with high-quality finishes	<ul style="list-style-type: none">New tunnel will be publicly owned with high-quality finishes	<ul style="list-style-type: none">New tunnel will be privately owned with guidance provide for high-quality finishes	<ul style="list-style-type: none">New tunnel will be publicly owned with high-quality finishes
		SE4 Scores:	5	5	4	5
SE5	Pedestrian draw/attraction	Assesses the likely pedestrian demand for the new tunnel	<ul style="list-style-type: none">The York St. alignment is expected to have approximately 4 300 bidirectional peak-hour pedestrians	<ul style="list-style-type: none">The Front St. alignment is expected to have approximately 3 100 bidirectional peak-hour pedestrians	<ul style="list-style-type: none">The Building/RYH alignment is expected to have approximately 1 100 bidirectional peak-hour pedestrians	<ul style="list-style-type: none">The parking lot alignment is expected to have approximately 5 000 bidirectional peak-hour pedestrians
		SE5 Scores:	5	4	2	5

#	Evaluation Criteria	Overall Description	#1 - York St (Benchmark)	#2 - Front St	#3 - Building (RYH/Piper)	#4 - University/TPA
SE6	Retail development opportunities	Assesses the potential for providing new retail opportunities	<ul style="list-style-type: none">None	<ul style="list-style-type: none">None	<ul style="list-style-type: none">Existing privately owned retail in the RYH and TD Centre	<ul style="list-style-type: none">390.9 m² of potential retail space in this alignment
		SE6 Scores:	1	1	3	5
SE7	Public amenity opportunities	Assesses the potential to provide amenities such as washrooms, drinking fountains, bike stations, information kiosks, way-finding, and public Wi-Fi access.	<ul style="list-style-type: none">None	<ul style="list-style-type: none">None	<ul style="list-style-type: none">Some - privately owned amenities offered through existing services at RYH and TD Centre	<ul style="list-style-type: none">Yes, along alignment there will be substantial public amenities and retail
		SE7 Scores:	1	1	3	5
Cultural Environment						
CE1	Potential effects on designated heritage features	Assesses the potential of new pedestrian connections intersecting with designated heritage properties	<ul style="list-style-type: none">No short or long-term heritage impacts or alterations expected	<ul style="list-style-type: none">No short or long-term heritage impacts or alterations expected	<ul style="list-style-type: none">No short or long-term heritage impacts or alterations expected	<ul style="list-style-type: none">No short or long-term heritage impacts or alterations expected
		CE1 Scores:	5	5	5	5

Table 8 below provides a summary of how the individual criterion scores were converted to the pie chart summary format.

Table 8 – Scoring representation in the summary table versus detailed results

Criterion Score	Description	Pie Chart Equivalent
4.1 < Score ≤ 5	Very Good	Full Pie
3.2 < Score ≤ 4.1	Good	¾ Pie
2.3 < Score ≤ 3.2	Average	½ Pie
1.4 < Score ≤ 2.3	Poor	¼ Pie
Score ≤ 1.4	Very Poor	Empty Pie

Table 9 below uses the conversion table to summarize the relative performance of each alignment and allows them to compare at a high-level across all criteria.

Alignment 4 performs the best across the multi-criteria evaluation and costs are middle of the road compared to the other alignments.

Table 9 – Criterion performance by alignment and costs

Criterion Performance	Alignment 1	Alignment 2	Alignment 3	Alignment 4 (preferred)
Very Good	7	7	5	13
Good	4	5	9	3
Average	6	10	6	9
Poor	7	4	7	3
Very Poor	4	2	1	0
Cost Estimate	\$98.7M	\$63.7M	\$33.6M	\$69.3M

3.3 Phase 3 – Alternative Designs

The evaluation results from Phase 2 indicate that Alignment 4 should proceed as the preliminary preferred alternative for further design refinement. A base concept was presented to the Technical Advisory Committee (TAC), Stakeholder Advisory Committee (SAC), the broader public, and landowners for feedback on the evaluation as well as potential design options that could be evaluated to enhance the base tunnel design.

3.3.1 Base Alignment Description

The base case for Alignment 4 involves a new tunneled connection from the west wall of the NW PATH Phase 1 tunnel connecting via the underground Toronto Parking Authority (TPA) lot below University Avenue to a new tunnel connection

at the food court level at 55 University Avenue (see plan-view excerpt in Figure 13).

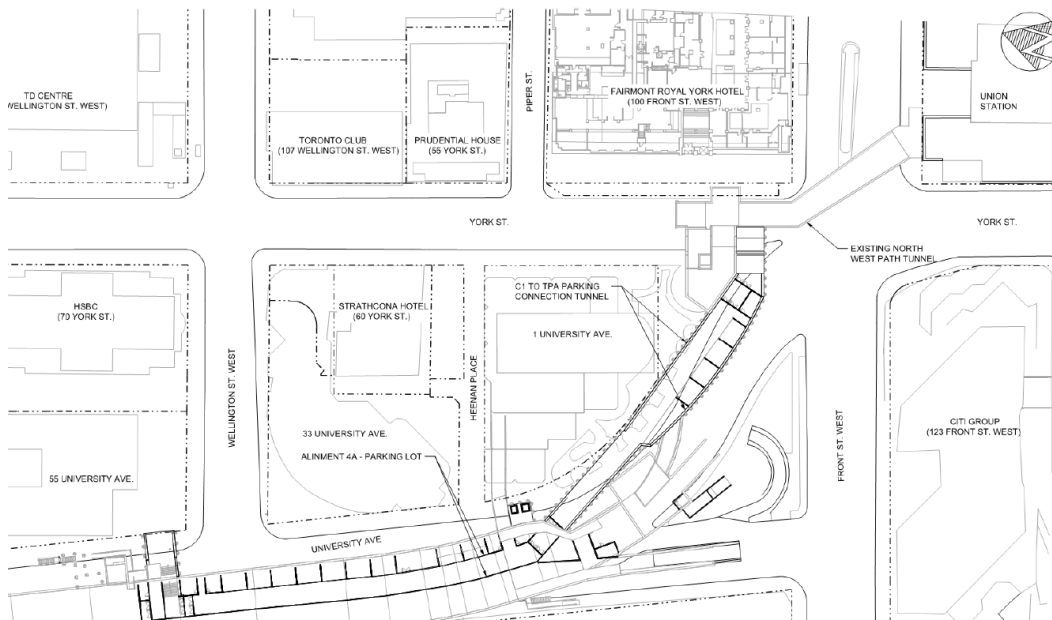


Figure 13 – Alignment 4 plan-view. Image courtesy of Hatch

Within the parking structure, the base alignment results in removing the intermediate slab along the east wall of the parking lot. This would provide a large PATH network cross-section (both horizontally and vertically), provides space for retail, retains parking uses, and makes use of reduced ceiling height areas in case a structural liner is required as part of rehabilitating the parking structure. The base structure results in the permanent removal of 185 parking spaces, leaving 137 parking spaces in the functioning parking lot. It provides for approximately 390 square metres of retail.

When the project proceeds to the next stage, the base tunnel alignment will include knock-out panels placed at strategic locations to protect for future connections and/or extensions to the NW PATH. This includes locations mentioned in this section that are not currently recommended, but may be possible in the future.

Figure 14 provides a sample cross-section to give more context to the space available in the existing TPA lot under the reconfiguration and rehabilitation explored in Alignment 4. It does not include final tunnel dimensions and is provided for information only as part of the evaluation.

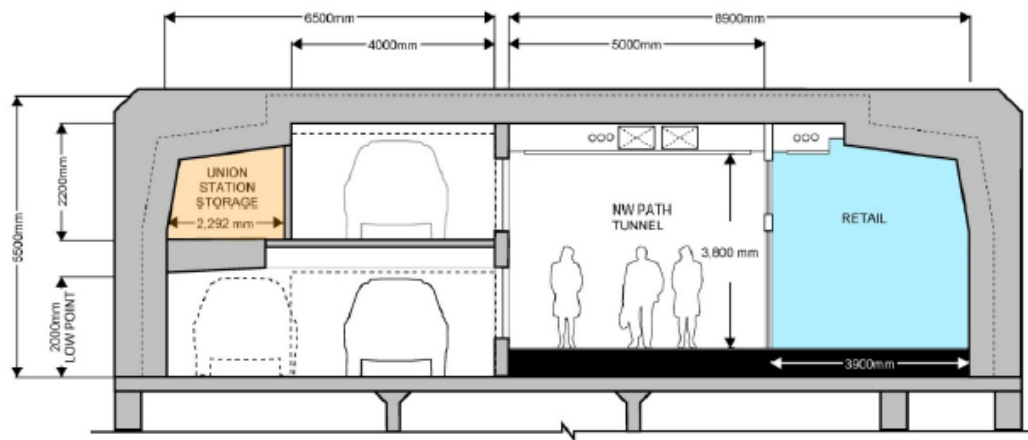


Figure 14 – Sample potential cross-section of Alignment 4. Image courtesy of Hatch

At the north end of the new PATH tunnel, connections between the PATH tunnel and 55 University Avenue would occur via staircase and an elevator for AODA compliance for both parking levels and the tunnel itself.

3.3.2 Conceptual Design Changes Evaluated

Following initial consultation and feedback from stakeholders, the team considered several design refinements to the base tunnel design to optimize the recommended alignment.

3.3.2.1 Intermediate Slab Designs

The team considered an option that completely removed the intermediate slab, similar to Alignment 2b in the original EA. That design variant was not pursued further as the complete removal of parking was already considered in the original EA, and the team felt that the hybrid approach was a reasonable starting point for the design, balancing the needs for new pedestrian infrastructure and new retail to partially offset the lost parking revenue.

3.3.2.2 Potential Additional Building Connections

During consultation, stakeholders and landowners expressed interest in additional building connections between the base Alignment 4 tunnel design and properties along the west-side of University Avenue. The team evaluated potential connections from Alignment 4 to 40 University Avenue, 70 University Avenue, and to a new development at 160 Front Street West via Heenan Place.

In all instances, there are challenges to meeting PATH network design guidelines as the new tunnel would require a new access across an active driving lane and the ceiling height of any potential connection from either level to shallow basements

on the west-side of University would be low. Additionally, the width of a new tunnel connection via the Heenan Place alleyway is very narrow. Connections to the new development at 160 Front Street would also have resulted in significant design changes to the lower levels of the new development, which was not supported by the landowner.

3.3.2.3 Retail Proposals

Modifications to the amount of retail within the new PATH tunnel were also considered in optimizing the design. By removing the retail entirely, an additional 85 parking spaces could be retained. However, this would negatively impact the pedestrian environment and potentially change demand projections as long tunnels without active animation are less attractive to users.

This alternative was not pursued further as the availability of retail animation in Alignment 4 is a key differentiator of the alignment compared to other alternatives in the EA Addendum and provides support for the hybrid approach where some parking is maintained alongside the creation of new, high-quality public space.

3.3.2.4 Building Connection to 55 University Avenue

The team evaluated several possibilities for connections between the new PATH tunnel within the parking structure and 55 University Avenue at the north-end of the alignment.

The variants included the removal of elevators and staircases and completing the connection via sloped floors. Due to major utility conflicts, the negative pedestrian experience of having long stretches of the alignment on a gradient, reduced ceiling heights, and/or impacts through elevator implementation, none of these alternatives were considered an improvement upon the base tunnel design.

3.3.3 Final Recommended Alignment Solution & Design

Following technical consideration of various design alternatives based on consultation feedback, the team settled on the base tunnel configuration for advancement in the EA Addendum. It provides a balance of all stakeholder interests, as the TPA's parking lot is rehabilitated and upgraded for AODA compliance in exchange for the creation of public space. If the City wishes to facilitate connections to the west-side of University Avenue, then there could be additional variations from PATH design guidelines, which should be explored in the next (detailed design) phase of the project. Renders of the NW PATH are included below in Figure 15, Figure 16, and Figure 17 with more detailed plan-view drawings based on space usage in Figure 18 and Figure 19.



Figure 15 – View from Phase 1 looking north west towards parking lot. Image courtesy of Hatch.



Figure 16 – Render of vertical circulation at north-end of new PATH tunnel. Image courtesy of Hatch.



Figure 17 – View looking north adjacent to parking levels on west-side. Image courtesy of Hatch.

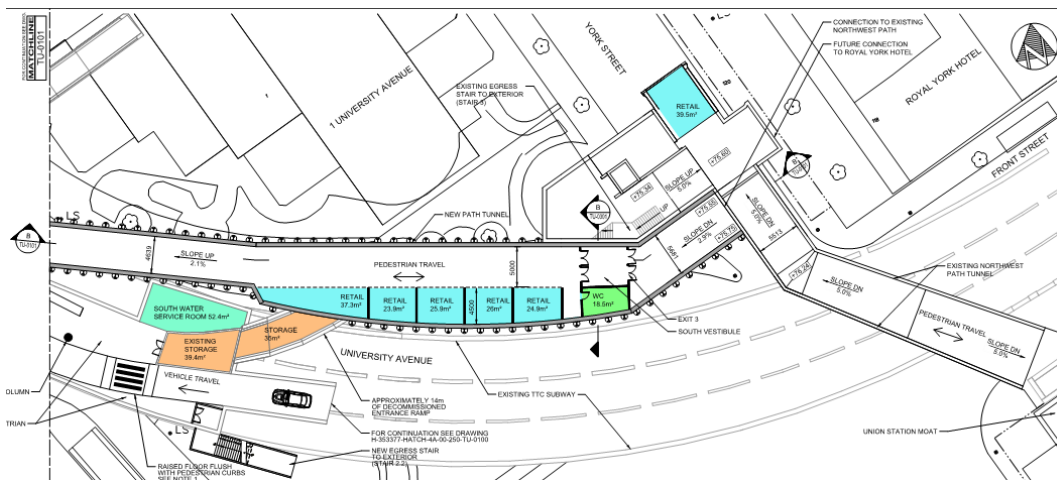


Figure 18 – Plan view of the south section of the new NW PATH tunnel, connecting to Phase 1. Drawing courtesy of Hatch.

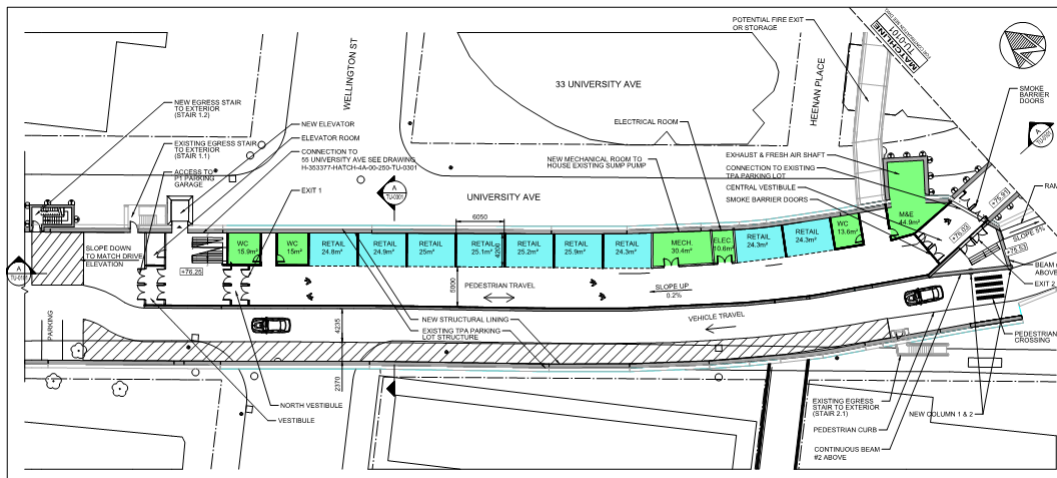


Figure 19 – Plan view of the north section of the new NW PATH tunnel, connecting to Phase 1. Drawing courtesy of Hatch.

4 Proposed Measures for Mitigating Impacts

Advancing the design for Alignment 4 to the concept level (>10%) has provided the team with insight into the next steps for advancing the alignment through detailed design to construction procurement.

Table 10 below summarizes additional items for further study or consideration over and above those detailed in Section 9 of the original EA (attached to this report as Appendix A).

Table 10 – Summary of mitigation and future commitments

Anticipated Effects	Mitigation/Future Commitments
EA Addendum Filing	Following approval by City Council, the team will issue a Notice of Commencement in local papers (per Municipal Class EA Guidelines) regarding the filing of the EA Addendum with the MOECC. The team will attempt to contact all stakeholders and departments involved in the original EA as well as the Addendum to inform them of the location of the ESR and to provide them with an opportunity to comment on the study.
Architectural and historical significance	The team contacted the Mississaugas of the New Credit First Nation (MNCFN) early in the project to inform them of the EA Addendum study and the alignments under study. They replied in summer 2017 indicating that they anticipate a low-level of risk for this project from an architectural or historical perspective. This is consistent with the team's expectations given the built form of the study area. If this changes, the MNCFN will be contacted immediately.
Vehicular and pedestrian congestion	Plans and costing for Alignment 4 assumes that no long-term road closures will be permitted, given the current focus to reduce congestion within the City of Toronto. The construction method will be a combination of cut and cover and structural rehabilitation of the TPA Lot. For cut-and-cover portions, the team has assumed construction will proceed under decking so all road closures will be as short-term as possible; allowing enough time for excavation and shoring before re-opening the road/sidewalk for regular operations. Most of the alignment will take place inside the existing TPA Lot, minimizing surface impacts.
Utility impacts – support, removal, and/or relocation	SUE Quality Level B investigations were completed as part of the EA Addendum. This provided the team with a comprehensive understanding of 3D utility locations (short of earthworks to physically excavate and check the study area). The team used this information to design each alignment to minimize utility impacts (as much as possible) with the goal of reducing costs. Additional information about utility impacts are found in Appendix B.
York Street Surface Improvements	Stakeholders expressed concern that surface pedestrian improvements identified in the original EA for York Street had not yet been implemented. Some surface improvements have been

Anticipated Effects	Mitigation/Future Commitments
	<p>made as part of the York Street Pilot Project. These included creating a bumper pedestrian space, delineated by planters.</p> <p>City of Toronto staff have been waiting for the results of the NW PATH EA Addendum and the identification of a project construction timeline before proceeding with changes to minimize right-of-way rebuilds due to construction of the NW PATH. Further changes to the surface route are expected later in 2018.</p>
Impacts to the TPA Parking Lot and TTC subway structure	<p>The Toronto Parking Authority (TPA) and Toronto Transit Commission (TTC) have been involved throughout the project as key technical stakeholders. Costing and design for Alignment 4 assumes that significant structural rehabilitation will be required prior to completing the new NW PATH tunnel, however costing is based on typical construction hours.</p> <p>Additional non-destructive testing will be undertaken in future stages of the project to identify the structural condition and to plan next steps. Both agencies are aware of plans for the PATH tunnel and continue to be engaged in the design development. The TPA lot would become AODA compliant through the introduction of the elevator at the north-end of the parking lot.</p> <p>The TTC will be included in the team for further design development. This will include a detailed technical review of the TPA lot demolition methodology, detailed design, construction methodology, and any other item as specified in the TTC Developers Guide. These items would be required by the TTC prior to the commencement of any demolition or construction work.</p>
Impacts to the structure at 55 University Avenue	<p>Landowners and property managers at 55 University Avenue have been involved in discussions on the connection from the Alignment 4 NW PATH tunnel to their building throughout the project. The team (as part of the alternative design evaluation) considered several possible connections to the building to optimize (and minimize) impacts. The resulting design represents a balance of advantages and disadvantages to the building owner (as well as the TPA) in completing the connection.</p>
PATH Design Guidelines	<p>While Alignment 4 provides the largest possible cross-section for the NW PATH alignments under consideration, the PATH Design Guidelines identify 6m wide x 3m high as the minimum ideal cross-section. The guidelines are not codified in the Ontario Building Code, so the City must confirm that the Alignment 4 design (which is slightly narrower than the guidelines suggest) is acceptable. A wider Alignment 4 tunnel is possible but it would further reduce parking uses of the TPA Lot. It is noted that most of the existing PATH network does not adhere to the PATH Guidelines, and of the alignments considered in the Addendum, Alignment 4 most closely reflects the height and width targets.</p>
Sloped Threshold	<p>The connection between the new Alignment 4 tunnel at the existing NW PATH Phase 1 tunnel is expected to occur at a 5% gradient instead of being flat at this intersection. Redoing the existing floor slab of the Phase 1 tunnel could be problematic and result in additional costs to the project. The team anticipates that</p>

Anticipated Effects	Mitigation/Future Commitments
	the building department will accept the sloped threshold and will file a variance if need be. The team can add railings should this be a concern. The future design consultant will engage early on with the building department to discuss the need for a variance.
Elevator Installation	The elevator required at the north-end of the TPA lot may require an elevator code variance and approval from Transportation Services as the elevator structure will need to be incorporated with the road structure. Elevator headroom for maintenance is below the recommended 4.0m threshold (set by TSSA); however, the application will improve accessibility and provide an AODA compliant legacy structure, like other TTC legacy retrofits. The team will engage early on with TSSA.
Water table	Based on the City's construction experience during the first contract of the North West PATH (area northwest of Union Station), construction will take place below the water table. Following the approval of this EA Addendum, subsequent phases of detailed design will include a geotechnical and hydrological investigation to confirm the groundwater regime and any requirements for dewatering, including the need for EASR (Environmental Activity and Sector Registry) registration and/or a PTTW (Permit to take water).

5 Conclusions and Recommendations

The EA Addendum revisits the original EAs recommendation to build an underground PATH tunnel underneath York Street to improve connectivity to Union Station to maximize its potential and to reduce congestion within the PATH network and at street level. This was driven by Toronto City Council's desire to complete the project but also search for opportunities to reduce costs.

The City of Toronto has invested into a comprehensive technical review of the existing recommendation as well as the evaluation of three (3) additional alignments to update costs and determine whether a more cost-effective solution could achieve and/or exceed the York Street tunnel pedestrian performance metrics. The EA Addendum develops all four alignments to a concept design level (>10%), including more detailed Quality Level B utility investigations, updating the pedestrian planning model (based on an updated planning horizon and the latest planning data) and updating the project estimate by adjusting for inflation and using specialized cost consultants with access to additional costing data.

Following a multi-criteria evaluation of all alignments, the University Avenue Parking Lot Alignment (#4) is recommended to complete the NW PATH project. It represents an estimated cost saving of nearly \$30M over the previously recommended York Street Alignment (#1) and exceeds the pedestrian performance of that solution. Alignment 4 represents an improvement upon the original Alignment 2B from the original EA as it is a hybrid solution that addresses the needs of multiple stakeholder groups and is the most consistent with City of Toronto policy.

Following consultation, additional design refinements were evaluated as part of the study, however technical limitations, the desire for a hybrid solution, AODA compliance, and the PATH design guidelines prevent the alignment (at this time) from being refined further without additional input from Toronto City Council. The team recommends proceeding with the base tunnel design for Alignment 4.

6 References

- [1] Municipal Engineers Associations, “2015 Version of Municipal Class Environmental Assessment,” Published 2015, Mississauga, Ontario
- [2] City of Toronto and Arup, “Municipal Class Environmental Assessment Study (Schedule “C”) for a New Northwest PATH Connection (Union Station to Wellington Street) – Environmental Study Report,” Published April 2008, Toronto, Ontario
- [3] City of Toronto (via Urban Strategies Inc.), “Design Guidelines for PATH and Other Climate-Controlled Pedestrian Networks,” Published February 2012, Toronto, Ontario
- [4] City of Toronto, “PATH Network Map,” URL - <https://www.toronto.ca/wp-content/uploads/2018/03/8d6c-path-network-map.pdf>, Retrieved - April 1, 2018, Unknown publishing date, Toronto, Ontario
- [5] City of Toronto (via Hatch & NORR), “North West PATH tunnel – from Front Street to Wellington Street Contract Drawings – Linear – Book 1 of 2 Contract No. 11FS-28S,” Sept 2012, Toronto, Ontario
- [6] City of Toronto (via Hatch & NORR), “North West PATH tunnel Contract Drawings – Facilities – Book 2 of 2 Contract No. 11FS-28S,” Feb 2013, Toronto, Ontario
- [7] City of Toronto, “Official Plan,” URL - <https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/official-plan/>, Retrieved – April 1 2018, Published June 2015, Toronto, Ontario
- [8] City of Toronto, “Central Waterfront Secondary Plan,” URL - <https://www.toronto.ca/wp-content/uploads/2017/11/99c8-CWSP07.pdf>, Retrieved – April 1 2018, Published 2007, Toronto, Ontario
- [9] City of Toronto, “Union Station Master Plan,” URL - <https://www.toronto.ca/legdocs/2006/agendas/committees/plt/plt060601/it005.pdf>, Retrieved – April 27 2018, Published 2006, Toronto, Ontario
- [10] Fruin, John and George Strakosch, “Pedestrian Planning and Design,” Metropolitan Association of Urban Designers and Environmental Planners Inc., 1971
- [11] Transport for London, “Business Case Development Manual,” 2013

Appendix A

2008 Municipal Class
Environmental Assessment for a
new Northwest PATH
Connection

Appendix B

Subsurface Utility Engineering (SUE) Report

Appendix C

Pedestrian modelling and analysis report

Appendix D

Alignment drawings

Appendix E

Public consultation record