

ATTACHMENT 3

WATERFRONT EAST LRT: CONSTRUCTABILITY ASSESSMENT SUMMARY

Project Background & Project Objectives

The Waterfront East Light Rail Transit (WELRT) is a proposed transit line that will provide improved infrastructure and expand the TTC streetcar network to serve the Lower Yonge, East Bayfront, Lower Don Lands, and the Port Lands. It includes the expanded underground link running from Union Station to the foot of Bay Street and a new streetcar track right of way on Queen's Quay East, Cherry St, and Commissioners St.

The WELRT will connect with the broader network at Union Station, providing through service to the 509 Harbourfront streetcar line, connect to the 504A King Streetcar line, and deliver service to the new developments on Villiers Island. The WELRT will also provide a connection to other high-order transit services, including the Ontario Line, Union Station, and Line 1 (Yonge-University). The WELRT will improve transit reliability for Eastern Waterfront residents, support the development of new communities on Villiers Island, and improve sustainable transit options across the Toronto Waterfront. As noted in the *PH2.9 - Villiers Island Affordable Housing Update*, the WELRT is essential for the area's development into a mixed-used community and regional destination filled with parks and cultural, civic, and retail amenities.

Constructability Assessment Overview

The WELRT Constructability Assessment (Assessment) has been developed as per City Council's June 2022 direction in *EX 33.2 Advancing City Priority Transit Expansion Projects – Eglinton East Light Rail Transit and Waterfront East Light Rail Transit*, to provide an independent review and recommendation on the optimal phasing, scheduling, and risk mitigation for the WELRT.

The scope of the Assessment identifies project sequencing, risks, cost estimates and procurement options. The assessment divided the project into three distinct segments, shown in Figure 1, providing targeted insight and recommendations for each segment.

Multiple phasing and procurement plans were reviewed, accounting for the impacts of interfacing projects, to identify the best approach for delivering early operation of segments of the LRT. The Assessment also provided cost estimates and allocation strategies for the project's life cycle, based on the recommended phasing plan.

The Constructability Assessment is based on information from April 2023. Subsequent data has become available which has been considered for the October 2023 WELRT City Council report, resulting in different outcomes and recommendations on project schedule and costs. This document specifically highlights the findings of the Constructability Assessment.

The Assessment and evaluation of approaches were intended to align with two key goals:

1. Minimize conflicts with interfacing projects.

2. Maximize the opportunity to expedite the operation of segments of the Waterfront East LRT (WELRT) that are complete while the remaining sections are constructed.

WELRT Segments Identified in the WELRT Constructability Assessment

Segment 1 – Union Station Streetcar Loop; Queens Quay Ferry Dock Station and Queens Quay West Portal reconfiguration and new LRT Portal proposed East of Bay Street;

Segment 2 – Queens Quay from Bay Street to Cherry Street; and

Segment 3 – Cherry Street from Distillery to Commissioners, and Commissioners to Villiers Loop.

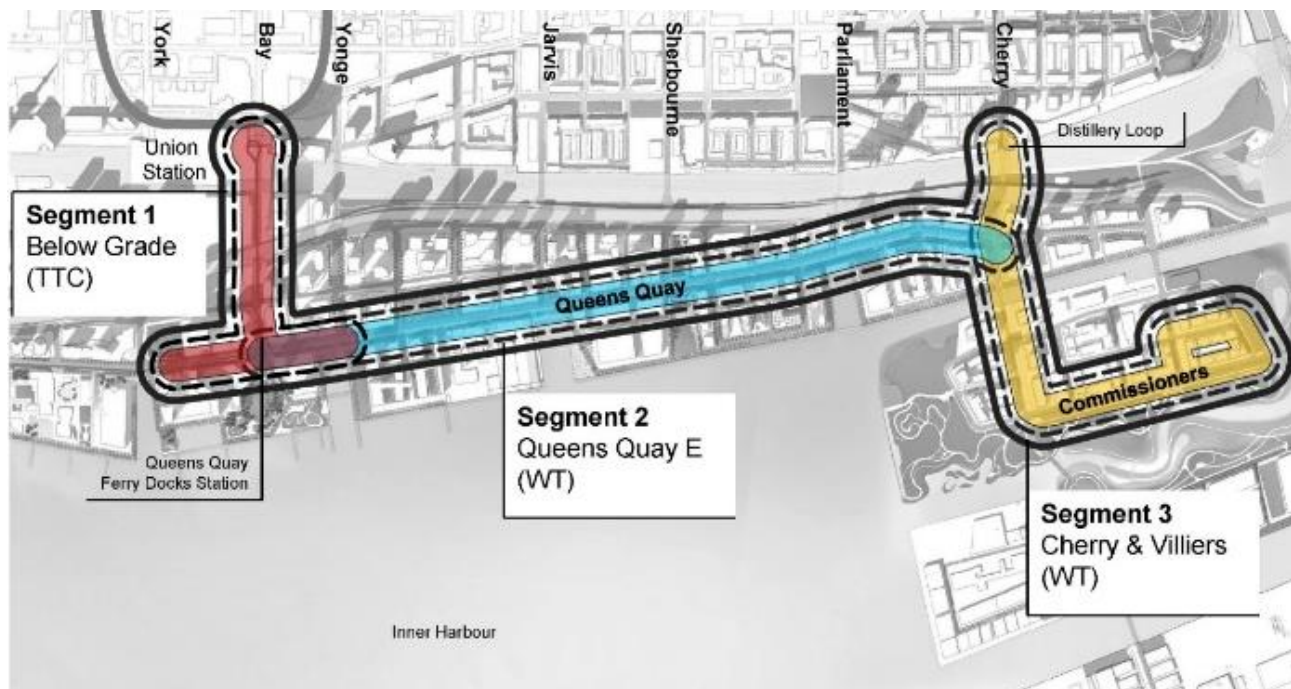


Figure 1 – WELRT Segments

Project Risks & Mitigations

A risk assessment for the WELRT was included in the Constructability Assessment, including risks associated with interfacing projects. Risks more directly associated with the design and construction were generally omitted because they are managed by project teams during those project stages. The analysis considered how the risks impacted the key goals, along with other standard weighted criteria. The assessment suggested high-level mitigation approaches, which informed the development of Phasing and Sequencing plans. The risk themes and areas identified are noted below.

Transit Project Assessment Process (TPAP) Approval

Risk: Any delays to the TPAP approval will likely affect the completion date of WELRT. The TPAP process has very specific time periods for each step, and the shortest possible time is 185 days. Any delays in the process would likely affect the procurement of the WELRT work.

Mitigation: The TPAP process should be initiated immediately following approval to proceed with the project.

Critical Early Works – Yonge Street Slip Infill

Risk: The Yonge St Slip Infill work, including the new Westin Harbour Castle entrance, must be fully completed to enable the LRT work on Queens Quay and East Portal. There are challenges with commencing the work for the infill, including the need for an agreement with the Westin Harbour Hotel, the completion of a geotechnical report with recommendations to finalize the design. There are risks related with the ground settlement that will likely require some form of preloading or ground improvement. An Agreement with Ports Toronto is also required for any impacts to their properties.

Mitigation: To mitigate the impacts of potential delays and the risk of unforeseen issues at the Yonge Street Slip Infill, it is suggested that it should be extracted into a separate project and delivered on an accelerated timeframe. While the infilling of the Yonge Street Slip could certainly remain as part of the larger WELRT project, the risks posed in executing this work could result in risk of significant delay costs to the larger project.

Property Acquisition

Risk: Risks with timely acquisition of property and access agreements are highlighted as a key concern in the Assessment. Failure to obtain property access in a timely manner is considered a significant risk.

Mitigation: Project teams should maintain and manage an inventory of all property access and acquisitions in the project's risk register to avoid or minimize delays in acquiring property or access. To provide enhanced management and coordination of property access and acquisition, consideration should be given to centralizing property acquisition responsibilities to the WELRT implementation team.

Permitting and Approvals

- Risk:** There are a large number permits and approvals required for the WELRT to proceed. A list of several key permits and approvals are noted below:
- Metrolinx (Mx) Safety Board approval of bridge design;
 - Building permits;
 - Water discharge permits;
 - Toronto Regional Conservation Authority (TRCA) permits;
 - Right-of-way (ROW) permits;
 - Toronto Hydro approvals; and
 - Department of Fisheries and Oceans Canada (DFO) / Aquatic Habitat Toronto (AHT).
- Mitigation:** Early and frequent consultation with the permitting or approval authorities should be undertaken. A pre-consultation, design and documentation review period should be developed and included in the project schedule, to accurately determine review timelines.

Cherry Street Connection

- Risk:** The Cherry St Connection presents several unique challenges:
- The HONI Utility Bridge relocation project at Cherry Street fails to make provisions for the integration of the LRT;
 - If the Cherry St Portal (Portal) is to commence in advance of the Gardiner Expressway & Lake Shore Boulevard East (LSBE) Reconfiguration project, it could cause delays to the Gardiner/LSBE project with potentially substantial delay cost impacts;
 - Undertaking the Cherry Street Connection while the Gardiner/LSBE is still in active construction would further contribute to construction conflicts and challenges in the area, particularly along LSBE.
 - Track construction and LRT connection at Distillery cannot be initiated until the Gardiner/LSBE Realignment is completed;
 - Construction laydown space limitations for the Portal installation; and
 - There is potential for conflict with the Ontario Line Emergency Exit Building (EEB) construction.
- Mitigation:** The Cherry Street Portal should be installed before the commencement of the Gardiner Expressway & Lake Shore Boulevard East Reconfiguration. Alternatively, the Portal should be included in the Gardiner project due to space constraints. In recognition of the conflict severity, the analysis concluded that, in order not to delay the remaining segments of the WELRT, consideration should be given to the delivery of the Portal as a separate sub-project in a separate phase, until the risks either pass or have progressed to a point where the impacts can be better mitigated. This would mitigate the risk of delay in delivering the remainder of the WELRT as well as avoid impacting on other critical projects.

Volume of Interfacing Projects in Lower Yonge Precinct

- Risk:** There are many public and private projects planned within the Lower Yonge Precinct during the anticipated construction phase of the WELRT. The layering of these projects, combined with the construction of the WELRT, is expected to compound traffic impacts and construction inefficiencies.
- Mitigation:** Continuous and consistent collaboration and monitoring with other projects should be undertaken. Further, a coordination team should be considered. In addition, a detailed traffic management analysis should be taken for each year of construction to minimize traffic impacts as much as possible.

Quayside - Queens Quay Extension from Bonnycastle to Silo St

- Risk:** The delivery of road and public realm of Queens Quay Extension (QQE) between Bonnycastle Street and Silo Street are committed to be delivered by Quayside under a separate construction contract. The transitway is to be completed under the WELRT project. This results in the risk of delay and project conflicts at the project interface points and along the transitway. If the WELRT is to be delivered as a single project, this area effectively creates a conflict for the WELRT construction.
- Mitigation:** Consideration could be given to creating a buffer time in the WELRT project to mitigate any delay that may occur in the road and public realm work, although this would create a gap in the project timelines. Regular communication and collaboration between the different teams will be needed during design and construction, to avoid errors at the project interface and conflicts during construction.

Traffic Management, particularly during Gardiner Expressway & Lake Shore Boulevard East Reconfiguration

- Risk:** Multiple infrastructure projects are occurring in the same areas and during the same time periods as the WELRT, resulting in challenging traffic management scenarios, and creating a high risk of significant schedule impacts. Contributing projects include the construction of the shafts for the Inner Harbour West Tunnel, impacts from the removal of the Gardiner on-ramp and shortening of the Gardiner off-ramp, Gardiner Expressway and Lake Shore Boulevard East Reconfiguration.
- Mitigation:** Further traffic analysis will facilitate construction planning that minimizes the traffic impact. Significant coordination between the Project Teams is required. Particular attention to tie-in points and utility relocations will be needed.

Interfacing Projects

Interfacing projects, as defined within the Assessment, are those projects that have the potential to have a direct impact on the delivery of the WELRT. Projects which interface with the WELRT either have a direct touchpoint with or are in close enough proximity to the project to present risk. The overall delivery of the WELRT may be impacted or have conflicts with the delivery of those interfacing projects. The nature of the potential impacts or conflicts include:

1. Additional traffic congestion;
2. Impacts to pedestrian movement;
3. Impacts to construction equipment movement;
4. Impacts to construction material deliveries; and
5. Direct conflict in construction operations.

These interfacing projects are also shown in the implementation strategy, Figure 2 below, along with a list of those projects in Table 1.

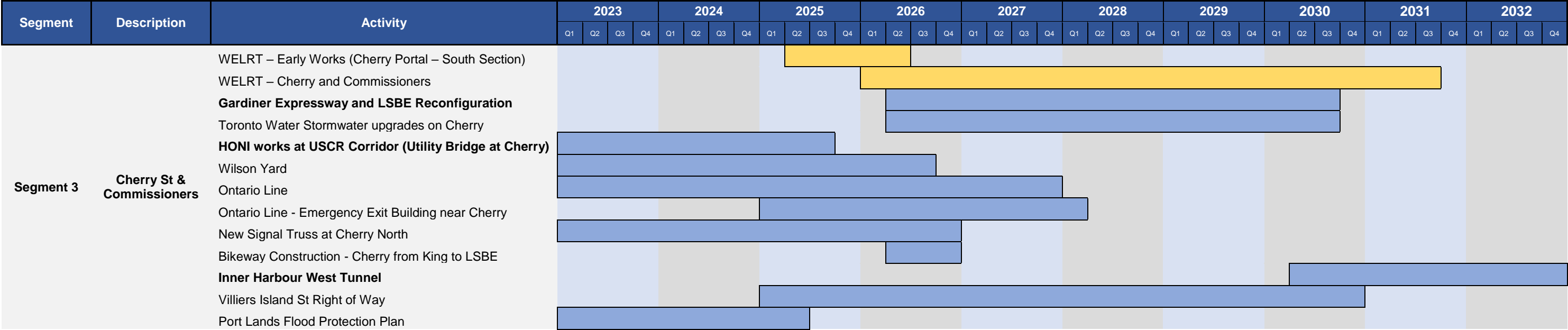


Figure 2 – Interfacing Projects Schedule

Note: The schedules included in this document and shown in Figure 9; Table 3 and Table 4 were produced based on the 30% work-in-progress documents available in April 2023. Subsequently available information impacted the project schedule, which is reflected in the October 2023 WELRT City Council report.

Stakeholder	Associated Projects
Metrolinx	Union Station Enhancement Project (USEP) – ONTrack Alliance contractor
	ONCorridor – ONExpress Transportation Partners contractor
	Ontario Line
Waterfront Toronto	Quayside Development
	Yonge St Slip Infill
	Parliament St Slip Infill
	Villiers Island St Right-of-Way (ROW), Design & Phasing
	Port Lands Flood Protection Project
	Queens Quay Extension
	3C Development
City of Toronto – Transportation Services, Transportation Planning, Engineering and Construction Services	Gardiner Off-Ramp Shortening & On-Ramp Removal
	Conversion of Harbour St
	Gardiner Expressway & Lake Shore Boulevard East Reconfiguration
Toronto Water	Toronto Water Stormwater upgrades on Cherry St
	Inner Harbour West Tunnel
	Yonge St to Cooper St Watermain
	Harbour St Watermain
Private Developer	Bay St Private Developments
City of Toronto	Bay St Developments (30 Bay St)
CreateTO	Bay St Developments (11 Bay St)
Hydro One	Hydro One realignment of lines across Cherry St
Private Developer	Queens Quay East Private Developments
Private Developer	Lakeshore Blvd East Private Developments
Private Developer	Cherry St Private Developments

Table 1 – Key Projects Interfacing with WELRT

Proposed Phasing & Sequencing

Scenario Analysis

In considering the key goals of the Constructability Assessment, five different scenarios were developed for delivering the WELRT project. The development of the scenarios considered the impacts of interfacing projects and risks.

All five scenarios generally favour consolidating scope into several distinct contracts to minimize coordination issues. Delivering the WELRT as smaller projects was not considered an appropriate approach to achieve the shortest project delivery and optimized early East-West service. Scenarios 3, 4 and 5 proposed that the Cherry St Connection be delivered as a separate project in a later phase when the risks with interfacing projects at the Cherry Street connection were either no longer relevant or better understood. The Cherry Street Connection work is still to be considered as part of the delivery of the WELRT, only there is no fixed tie to the projects delivering the remainder of the WELRT until the risks either pass or have progressed to a point where the impacts can be better mitigated.

All the scenarios present the Yonge Street Slip Infill as an early works project. In addition, for the first two scenarios, the Cherry Street South Portal is recommended for an early works project. To achieve the proposed project scheduling, utility relocation work was recommended to proceed as early as possible. For third-party utilities, engagement with the utility stakeholders on relocations should commence as soon as project approval is received.

The five scenarios assessed are noted below:

Scenario 1



Figure 3 – Scenario 1 - Entire Project delivered as a single contract. It will maximize coordination within the project.

Scenario 2



Figure 4 – Scenario 2 - Union Loop as a single sub-project and the remainder of WELRT delivered as a single sub-project. It will increase contractor specialty at Union Station.

Scenario 3



Figure 5 – Scenario 3 - To address complexity and specialization while achieving early

operation, the Union Loop and the rest of the WELRT (except for the Cherry St connection) will be delivered as two distinct sub-projects. Cherry St connection will be delivered as a separate phase in the future.

Scenario 4

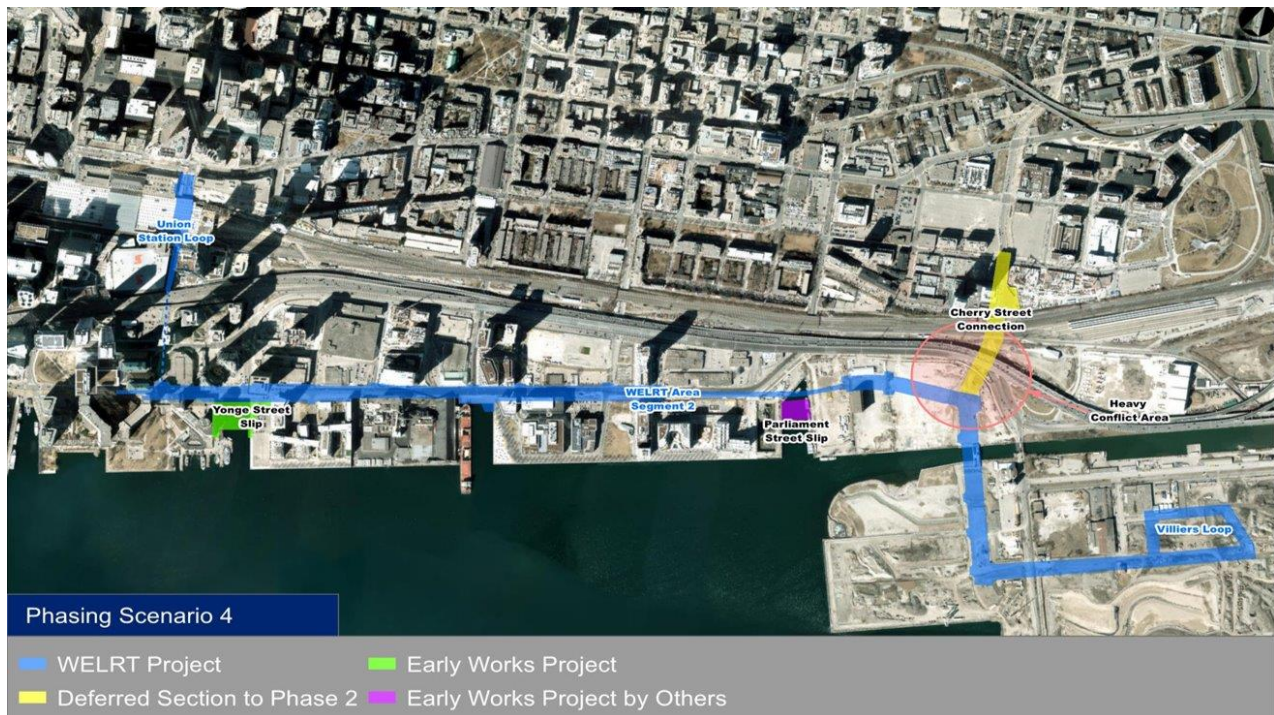


Figure 6 – Scenario 4 - The WELRT, including the Union Loop, is delivered as a single project, with the Cherry St connection delivered as a separate phase in the future to address the Cherry St connection complexity.

Scenario 5



Figure 7 – Scenario 5 - Union Loop, East-West portals and Queens Quay Ferry Docks Station are delivered as a sub-project to maximize underground works specialization. The remainder of the WELRT will be delivered as a sub-project. The Cherry St connection complexity will be addressed by delivering it as a separate phase in the future.

The scenarios were evaluated against the stated goals and key criteria. A heavier weighting was applied to the achievement of the two key project goals to emphasize their importance.

The result of the assessment of the scenarios was as follows:

	Wt	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Likelihood of Early East-West Service	20	2	3	4	2	1
Least Project Conflicts	20	3	2	4	3	2
Simplicity	5	1	3	3	3	2
System Integrations	5	4	2	2	3	2
Market Competition	5	2	3	4	2	4
Mitigation of Project Delays	5	1	3	4	2	1
Total Score		140	155	225	150	105

Table 2 – Scenario Scoring Scale

The Assessment recommended Scenario 3, which divides the WELRT scope into three sub-projects:

- Sub-project 1 - Union Station Loop.
- Sub-project 2 – WELRT along Queens Quay East, Cherry St and Commissioners St, including East-West Portals at Queens Quay; Ferry Docks Station and Villiers Loop.
- Sub-Project 3 – Cherry Street North connection from Lakeshore Blvd East to Distillery Loop – delivered as a separate contract in a later phase.

Scenario 3 recommends two large-scale projects (sub-project 1 and 2), to occur simultaneously but independently. A third sub-project, Cherry Street North, is recommended to be delivered in a later phase.

For this scenario, the Yonge Slip Infill is recommended to advance as early works.



Figure 8 – WELRT Recommended Phasing, Scenario 3

Recommended Phasing and Sequencing

The recommended project phasing (Scenario 3) separates the Union Station LRT Loop from the broader project, as a sub-project and separate contract. In addition, this Scenario provides for delivery of the Cherry Street North Connection as a separate contract at a later phase. Creating a separate sub-project and contract for the Cherry Street Connection helps address the many risks in this area.

Delivering the Union Loop as a sub-project is recommended because of the unique and complex nature of the work proposed at Union Station. While the main WELRT along Queens Quay is mostly linear infrastructure, the Union Loop construction has more in common with buildings and vertical projects.

The Union Loop is anticipated to have a longer construction duration than the rest of the WELRT project. However, by separating out the Union Station Loop from the rest of the project, there is an opportunity to provide an interim East-West LRT service along Queens Quay using temporary power. While the future connection of the completed Union Loop to the WELRT network will cause some service disruptions, the advantages and opportunity to provide earlier service are significant. As advised by the TTC, the service level of the expedited portion will not run at full-capacity, and it shall be considered an interim service condition until construction at Union Station is completed.

The delivery of sub-project 2, which encompasses Queens Quay East, Cherry St South, Commissioners St and Villiers Loop, still requires a high degree of coordination with adjacent projects.

The Cherry Street North connection presents unique challenges and risks from the larger project. The conflict with the Gardiner Expressway /LSBE Reconfiguration work would necessitate either advancing the South Cherry Street Portal or including that work with the Gardiner/LSBE Reconfiguration. There are significant challenges and risks with either approach. To complete the Cherry St Portal, the Cherry Street Heritage Signal Tower will need to be relocated, new Mx signaling systems will need to be installed, as well as decommissioning of existing tower infrastructure.

The proximity of the existing Distillery Loop to the Cherry St/Queens Quay platform means transit riders can connect to the WELRT easily, allowing them to benefit from the early East-West WELRT service. Table 5 summarizes the advantages and disadvantages of the recommended phasing and sequencing.

The recommended phasing and sequencing will enable a connection to the Union Loop and Villiers Loop in 2032. Cherry Street North and the connection at Distillery would follow in an subsequent project potentially completing in 2034. The timelines for each sub-project are listed on Figure 9, and Tables 3 and 4 below.

Note: The schedules included in this document and shown in Figure 9; Table 3 and Table 4 were produced based on the 30% work-in-progress documents available in April 2023. Subsequently available information impacted the project schedule, which is reflected in the October 2023 WELRT City Council report.

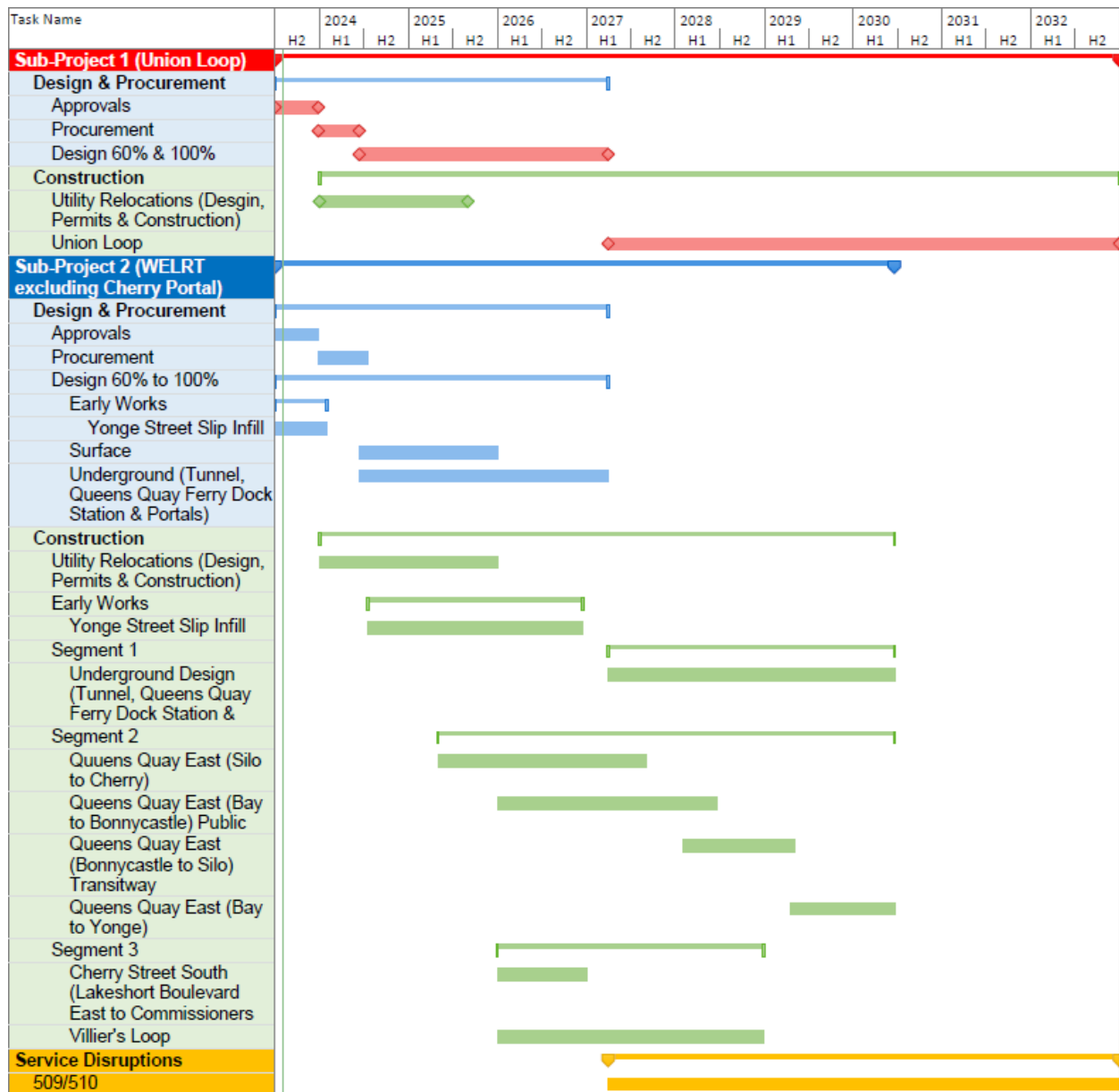


Figure 9 – Scenario 3 schedule for WELRT

Overall WELRT	2023 Q3	2032 Q4
Approvals (TPAP)	2023 Q3	2023 Q4
Procurement	2024 Q1	2024 Q3
Design		
Design of WELRT - Underground (Union Loop)	2024 Q3	2027 Q1
Construction		
Utility Relocations (Design, Permits & Construction)	2024 Q1	2025 Q4
Segment 1	2027 Q2	2032 Q4

Service Disruptions		
509/510 – Full	2027 Q2	2030 Q2
509/510 – Partial	2030 Q2	2032 Q4

Table 3 – Recommended Sequencing for Union Loop (Sub-Project 1)

Project Name	Project Start	Project Finish
Overall WELRT	2023 Q3	2032 Q4
Approvals (TPAP)	2023 Q3	2023 Q4
Procurement	2024 Q1	2024 Q3
Design		
Design of WELRT - Underground (E-W Portals)	2024 Q3	2027 Q1
Design of WELRT - Surface	2024 Q2	2025 Q4
Design of WELRT - Early Works	2023 Q3	2025 Q2
Construction		
Utility Relocations (Design, Permits & Construction)	2024 Q1	2025 Q4
Early Works	2024 Q3	2026 Q4
Segment 1	2027 Q2	2030 Q2
Segment 2	2025 Q2	2030 Q2
Segment 3	2026 Q1	2028 Q4
Service Disruptions		
509/510 – Full	2027 Q2	2030 Q2
509/510 – Partial	2030 Q2	2032 Q4

Table 4 – Recommended Sequencing for WELRT (Sub-Project 2)

Advantages	Disadvantages
<ul style="list-style-type: none"> Provides early East-West LRT service to Villiers Loop. Separates the complexity of the Union Loop from the remainder of the East-West LRT. Separates the Cherry Street connection considering the many risks and challenges until after Ontario Line & Gardiner East/LSBE Reconfiguration. 	<ul style="list-style-type: none"> A Union Station connection is not provided until the completion of the Union Station project (although no real appreciable difference in time). Service interruption of the existing Streetcars (509/510) to accommodate system connections and commissioning as Union Station Loop is being brought online. Connection to Distillery Area may be delayed to a later phase. May require Cherry St Portal to only be installed from the Northside, due to insufficient space on the south side due to completion of Gardiner/LSBE Project.

Table 5 – Advantages and Disadvantages for the Recommended Phasing & Sequencing

Advantages and Disadvantages of Cherry Street North Delivery as a Separate Sub-Project

Table 6 below outlines the advantages and disadvantages of separating Cherry Street North from the current WELRT phase.

The Assessment suggests the commencement of a separate contract or phase should be initiated when the risks associated with the Cherry Street connection are better understood. The Cherry Street connection work should still be considered as part of the delivery of the WELRT, However, this approach isolates the risks from other contracts and allows project delivery to wait until the risks either pass or have progressed to a point where the impacts can be better mitigated.

Advantages	Disadvantages
<ul style="list-style-type: none"> Challenges and risks with Cherry St connection will be faced once they are better understood after Ontario Line & Gardiner East/LSBE Reconfiguration are completed. Reduces WELRT schedule delay risks associated with the many interfacing projects and the interdependencies. Since the connection to Cherry St would not occur until Gardiner/LSBE is completed, a separate phase has a low time and cost impact. Reduces WELRT schedule delay risks associated with the Cherry Signaling Tower relocation. Tower relocation cannot start until Metrolinx decommission the old signaling system in the Tower. Avoids potential schedule overlaps with OnCorr works (OCS, track reconfigurations, etc. along USRC). Reduces Public Transportation service interruptions during WELRT Project. 	<ul style="list-style-type: none"> Loss of momentum with completing this section while 30% design is already complete. Risk of expiry of EPR. Risk of not getting funding for a separate phase. Risk of price escalation. Connection to Distillery Area to be delivered as a separate contract in a later phase. May require Cherry St Portal to only be installed from the north side, due to insufficient space on the south side due to completion of Gardiner/LSBE Project.

Table 6 – Advantages and Disadvantages of Cherry Street North Deferral

Cost Estimates

The Constructability Assessment also includes a review of the cost estimates for the different project components.

From these estimates, base costs were extracted and then combined. The approaches for allowances, contingencies and escalation were reviewed with some modifications applied. Costs for land acquisition, park maintenance and similar costs have been excluded from the combined estimate shown in this report. No provisions were made for project financing. The estimates also do not include provisions for City Divisions Staff resourcing or for the cost of the LRT vehicles. All these costs may be substantial and will need to be considered as part of the full project funding commitment.

With the combined base costs, revised allowances and contingencies, the Assessment estimated the project cost (allowing for escalation over the course of the project timeline) at \$2,036M, based on costs as assessed in April 2023, under the assumption of the project fully fund in Q1 2024. This estimate includes the costs for the Cherry Street connection. The Cherry Street connection may need to be delivered as a separate project in a later phase, potentially after the WELRT project completion. The value of this work, as planned for 2029-30, is \$230M. The escalated value (assuming 4.5% annual escalation) if the work is deferred to 2031-2032 is approximately \$262M.

The estimates were based on a Class 3 estimate. For the purposes of the WELRT Constructability Assessment review, an accuracy range of -20% and +30% is assumed. Considering the very significant risks and the lengthy delivery timeframe, it is appropriate to acknowledge a wider accuracy range. Accepting this accuracy range would mean the total project cost would range from \$1,629M to \$2,647M.

The cost model was applied to proposed project delivery scenario. Project phasing and funding were analyzed both by year and cumulatively. The funding was also detailed by cost category for each year. A detailed cost breakdown is provided in Table 7 below.

Note: This document was produced with the 30% work-in-progress documents available in April 2023. Subsequently available information resulted in refined cost information produced by TTC and Waterfront Toronto, which is reflected in the October 2023 WELRT Staff Report to City Council.

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	Segment 1		Segment 2				Segment 3						Total
	Union Station Loop	East-West Portals and Queens Quay Ferry Docks Station	QQE Bay to Bonnycastle	Yonge St Slip	QQE Bonnycastle to Silo (Transitway only)	QQE Silo to Cherry	Cherry St QQ to Cherry St Portal	Cherry St South Portal	Cherry St Portal North to Mill St	Cherry St QQ to Commissioners (Transitway only)	Commissioners St (Transitway Only)	Villiers Loop (Transitway Only)	
Structures and Facilities	\$591.25	\$223.50	-	-	-	-	-	-	-	-	-	-	\$814.8
Transitway (tracks etc.)	\$45.02	\$17.24	\$62.73	-	\$32.75	\$22.40	\$10.63	\$80.64	\$93.02	\$26.38	\$35.71	\$33.49	\$460.0
Roadway	-	-	\$75.87	\$10.58	-	\$29.92	\$2.30	\$0.65	\$15.11	\$8.59	\$4.95	\$1.83	\$149.8
Public Realm	-	-	\$118.71	\$17.60	-	\$51.56	\$4.15	\$1.03	\$14.81	\$13.46	\$14.39	\$3.62	\$239.3
Utilities	\$36.95	\$14.15	\$26.80	-	-	\$11.93	-	\$1.10	\$1.47	\$1.37	-	-	\$93.8
Other (Includes Wavedecks, TPSS, Dockwalls, Aquatic Habitat, etc.)	-	-	\$6.57	\$61.98	\$24.63	-	-	-	-	-	-	-	\$93.2
Allowances (Public Art, Wayfinding, Interim Intersections)	-	-	\$5.89	\$0.28	\$0.16	\$0.79	\$0.11	-	\$0.32	\$0.49	\$0.28	\$0.13	\$8.5
<u>Subtotal (without HST)</u>	\$673	\$255	\$297	\$90	\$58	\$117	\$17	\$83	\$125	\$50	\$55	\$39	\$1,859
<u>HST non-refundable (1.76%)</u>	\$155.5	\$4.5	\$5.2	\$1.6	\$1.0	\$2.1	\$0.3	\$1.5	\$2.2	\$0.9	\$1.0	\$0.7	\$176.4
TOTAL	\$829	\$259	\$302	\$92	\$59	\$119	\$17	\$85	\$127	\$51	\$56	\$40	\$2,036

Table 7 – Combined WELRT Estimate, noted in Millions (M). Direct cost provided by TTC and Waterfront Toronto.

Note: This document was produced with the 30% work-in-progress documents available in April 2023. Subsequently available information resulted in refined cost information produced by TTC and Waterfront Toronto, which is reflected in the October 2023 WELRT Staff Report to City Council.

Procurement Options

The Assessment reviewed procurement options for each sub-project against set criteria. The procurement models assessed were:

- Design-Bid-Build (DBB)
- Design-Build (DB)
- Construction Management At-Risk (CMAR)
- Construction Management General Contractor (CM/GC)
- Progressive Design Build (PDB)
- Alliance/Integrated Project Delivery (Alliance)

Within each proposed scenario, where there are sub-projects, each sub-project was evaluated for the Project Delivery model.

Each project or sub-project was evaluated for each of the above project delivery methods against the following 13 criteria with the weighting for each criterion noted in brackets:

- Collaboration (5)
- Owner's Design Control/Preconstruction Services (5)
- Early Contractor Involvement (5)
- Efficient Risk Allocation (5)
- Cost Certainty (3)
- Market Appetite (3)
- Sponsors (CoT, TTC, WT) Support (3)
- Interfacing Project Integration (5)
- Flexibility (5)
- Schedule Certainty (5)
- Work Packaging & Staging (3)
- Competitive Bid Evaluation (5)
- Likelihood of Early East/West Service (3)

For the recommended Scenario 3 the evaluation indicated that the Union Station Loop be delivered as a Progressive Design Build model. For the WELRT along QQE including the East-West Portals as well as the Queens Quay Ferry Docks Station, the evaluation concluded delivery as a CM/GC model. Lastly, the results identified the early work for both the Yonge Street Slip Infill and the Cherry Street North Connection to be delivered as CM/GC or traditional Design Bid Build.

Sub-Project 1 – Procurement Options Evaluation for Union Loop

Table 8 shows the results of the procurement option evaluation of this sub-project. Therefore, Progressive Design Build (PDB) has the highest score for Sub-Project 1, with the CM/GC model as the preferred alternative.

Scoring Results							
Criteria	Weight	DBB	DB	CMAR	CM/GC	PDB	Alliance
Collaboration	5	0	0	3	5	5	5
Owner's Design Control/Preconstruction Services	5	5	2	5	5	4	4
Early Contractor Involvement	5	0	0	4	5	5	5
Efficient Risk Allocation	5	3	2	2	4	5	4
Cost Certainty	3	2	2	3	4	4	4
Market Appetite	3	4	2	3	3	5	3
Sponsors (CoT, TTC, WT) Support	3	3	1	4	4	4	2
Interfacing Project Integration	5	2	2	4	4	5	5
Flexibility	5	2	1	2	3	4	4
Schedule Certainty	5	2	3	3	4	5	5
Work Packaging & Staging	3	2	1	5	4	5	5
Competitive Bid Evaluation	5	5	5	0	3	0	0
Likelihood of Early East/West Service	3	3	3	5	5	5	5
Total Score		137	102	175	225	234	217

Table 8 – Procurement Options Scoring Results for Sub-Project 1

Sub-Project 2 – Queens Quay East and Villiers Loop

The exclusion of Cherry St North from Sub-Project 2 does not have a significant impact on the procurement evaluation result of this sub-project. Table 9 below identifies CM/GC as the highest score for this sub-project, with the Progressive Design Build (PDB) model as the preferred alternative.

Scoring Results							
Criteria	Weight	DBB	DB	CMAR	CM/GC	PDB	Alliance
Collaboration	5	0	0	3	5	5	5
Owner's Design Control/Preconstruction Services	5	2	2	5	5	4	4
Early Contractor Involvement	5	0	0	4	5	5	5
Efficient Risk Allocation	5	3	2	3	4	5	4
Cost Certainty	3	2	2	3	4	4	4
Market Appetite	3	4	2	3	4	5	2
Sponsors (CoT, TTC, WT) Support	3	3	1	5	5	2	2
Interfacing Project Integration	5	3	1	3	4	4	5
Flexibility	5	2	3	3	3	4	4
Schedule Certainty	5	2	2	3	4	5	5
Work Packaging & Staging	3	4	1	5	5	4	5
Competitive Bid Evaluation	5	5	5	0	3	0	0
Likelihood of Early East/West Service	3	3	3	5	5	5	5
Total Score		133	102	183	234	220	214

Table 9 – Procurement Options Scoring Results for Sub-Project 2 without Cherry Street North

Sub-Project 3 – Cherry Street North

Since the Assessment recommends deferring this work to a later time, and the risks, interfacing project status, and market conditions of that time are unknown, scoring and quantitative procurement evolution was not seen as an appropriate method to determine the preferred procurement model. Instead, based on a qualitative assessment, CM/GC is proposed as the best delivery method, with PDB as the preferred alternative.

This work has some complexity, especially associated with installing the Portal using the Push Box (Box Jacking) technology or other accelerated construction methods. The work at Cherry Street North will require a model that can manage those challenges, eliminating or mitigating them, preferably during the detail design project stage.

Further Study

The Constructability Assessment has also highlighted several areas for further review and study. It is suggested to undertake these exercises to further enhance and optimize the project value and minimize risks. The following are areas recommended for further consideration:

Value Engineering

The project teams have undertaken several value engineering exercises for the individual project segments. There is merit to performing a value engineering exercise considering the WELRT project. Combining the project segments and following a decision on a project delivery model will help achieve uniformity in what is to be delivered. In addition, a value engineering exercise should be considered to potentially unlock areas where additional innovation, efficiency and value can be optimized.

The value engineering exercise should focus on:

- a) Risk apportionment aligned with the project delivery model
- b) Higher level constructability approach (i.e., identification of laydown areas, opportunities for parallel work, etc.)
- c) Cost saving analysis/life cycle analysis
- d) Standardization and modularization for construction efficiency
- e) Traffic management strategies
- f) Public Realm components (i.e., Pavement Surfaces and Landscaping)
- g) Additional scope streamlining

Traffic Analysis

Traffic management throughout the WELRT project will be very challenging to address. It is therefore recommended that advanced traffic modelling be undertaken for each year of the WELRT project, incorporating impacts from interfacing projects.

Procurement Model Development and Validation

To validate the screened procurement model approaches for the project, it is recommended procurement model development and validation sessions be initiated. Participation of the main stakeholders is encouraged to ensure that the screened procurement models meet and exceed the project needs, and the Contracting Authority benefits from the innate advantages of the selected procurement models. The development process may benefit with the participation of knowledgeable facilitator(s).

Conclusion

A wide range of constructability and coordination risks have been identified with multiple infrastructure projects in the vicinity of the WELRT.

The scope of the WELRT project has been reviewed and assessed through different scenarios and project scope. The resulting recommendation was for Scenario 3, whereby there are three sub-projects: Sub-project 1 - Union Station Loop, Sub-project 2 - Queens Quay to Villiers Loop, and Sub-project 3 - Cherry Street North. For this scenario, the Assessment recommended that Yonge Street Slip Infill would be advanced as early works.

The procurement recommendation of the Constructability Assessment is to deliver the Union Station Streetcar Loop as a single project under the Progressive Design Build (PDB) model. For Sub-project 2, Queens Quay Ferry Docks Station and Villiers Loop, the recommendation is to utilize a CM/GC approach. It is recommended that the Cherry Street North connection be delivered as a separate project phase to mitigate interfacing project risks. For the early work for both the Yonge Street Slip Infill and the Cherry Street North Connection, the recommendation is for these to be delivered as CM/GC or traditional Design Bid Build.

Lastly, it is recommended that the utility work should proceed as quickly as possible, starting with the external utility companies and then with appropriate utility relocations to be completed under the sub-project under the sub-project contracts.

The estimated project value is between \$1,629M and \$2,647M, which includes the cost of the Cherry Street North connection. The project completion date was identified as 2032.