EAST BAYFRONT TRANSIT
CLASS ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL STUDY REPORT

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MARCH 2010

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1. INTRODUCTION

Waterfront Toronto (formerly the Toronto Waterfront Revitalization Corporation), was formed with the mandate and responsibility for developing Toronto's waterfront, including the East Bayfront area. The Corporation, which is jointly owned by the City of Toronto, the Province of Ontario and the Government of Canada, undertakes its work based on strong principles of excellence in environmental sustainability and urban design.

Waterfront Toronto is the proponent for all redevelopment activities in the East Bayfront area and the *East Bayfront Transit Environmental Assessment Study* has been carried out under its auspices by the Toronto Transit Commission (TTC) in partnership with the City of Toronto. Waterfront Toronto has funded the study and plans to implement the recommendations of the study as part of its mandate, including all design and construction costs related to transit facilities required to service the East Bayfront area.

1.1 Context

The East Bayfront development precinct is a 22-hectare (55 acre) area located generally between Lower Jarvis Street to the west, Parliament Street to the east, Lake Shore Boulevard to the north and Inner Harbour shoreline to the south. The area ultimately will have 6,000 housing units and 230,000 square metres of office and retail space. George Brown College plans to locate a campus accommodating up to 3,500 full-time and 1,000 part-time students in the area. When fully occupied, these developments are expected to generate additional 4 million riders per year for the TTC.

Sustainable redevelopment and revitalization of Toronto's Waterfront will require an effective transportation system to service the large number of planned residential and employment opportunities. While roads will provide some of the transportation capacity in and out of the area, high transit usage is absolutely essential to achieve Waterfront Toronto's and the City's objectives.

The formal framework for achieving these objectives was set out in the *Central Waterfront Secondary Plan*. The Secondary Plan was approved by City Council in 2003 to establish guiding principles for the redevelopment of brown-field sites such as the East Bayfront area. It identifies a transportation strategy to provide for travel within and to/from the waterfront communities with a particular focus on encouraging walking, cycling, transit use, and water transportation in the newly developing areas. A number of policies are noted including:

1. A "Transit First" approach to provide for the early construction and operation of planned higher-order transit services at an early stage of development so that frequent and reliable transit services are in place when the first developments are occupied, thereby encouraging non-auto travel patterns from the outset.;
2. The provision of the rights-of-way required to accommodate the proposed waterfront transit network over time as shown in **Figure 1-1**. The rights-of-way are to accommodate travel lanes, transit, pedestrian and cycling requirements and are to be refined through further detailed study;
3. The existing transit network will be extended into the waterfront area providing numerous connections north-south to connect the waterfront with existing nearby communities;
4. New streetcar routes will operate in dedicated rights-of-way on existing and proposed streets to ensure efficient transit movement; and

5. Waterfront streets will be developed as "places" with distinct identities; Streets will act as lively urban connections as well as traffic arteries. The needs of motorists will be balanced with efficient transit service and high-quality amenities for pedestrians and cyclists.

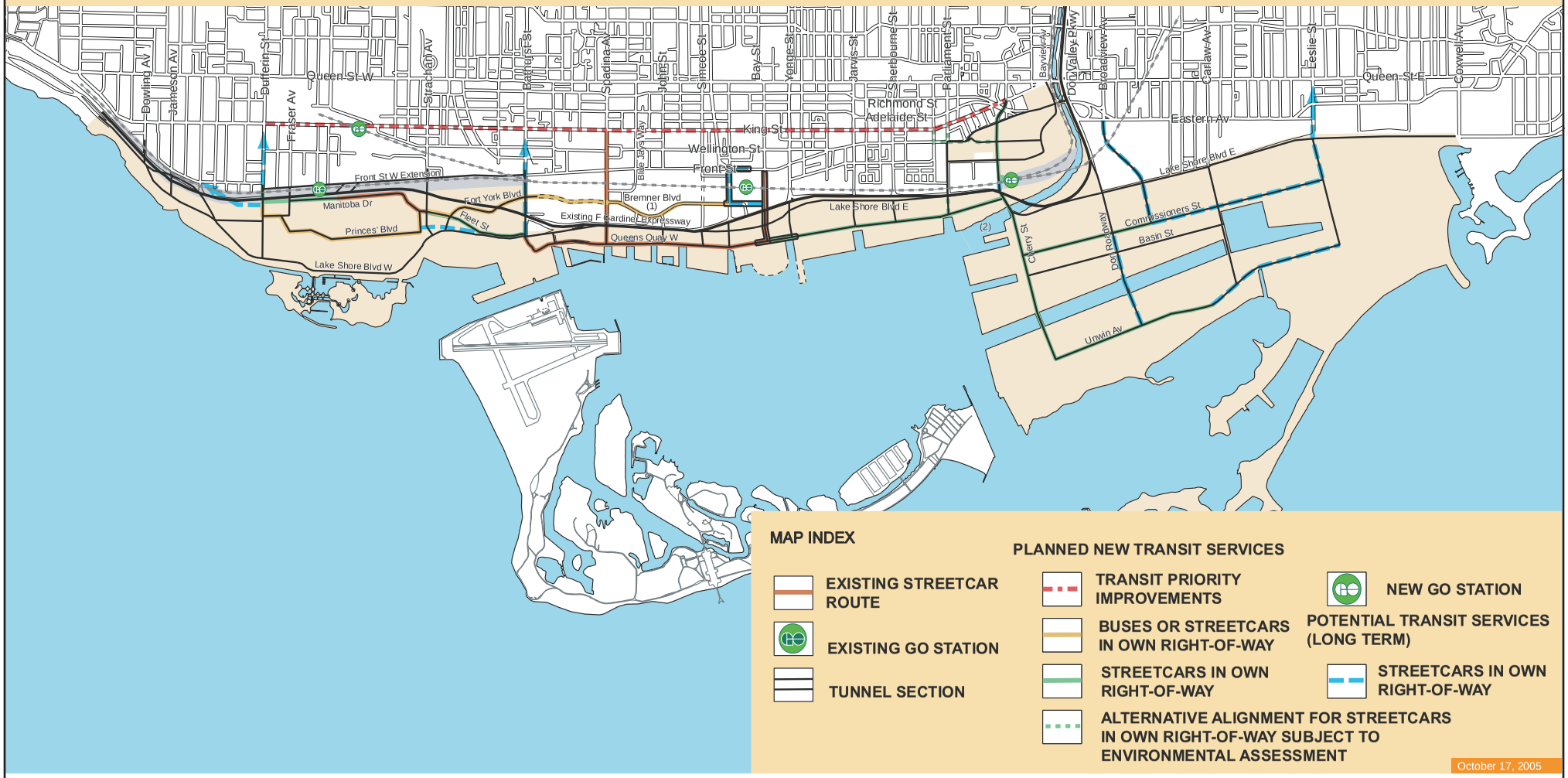
In December 2005, City Council approved the *East Bayfront Precinct Plan* and the *East Bayfront Class Environmental Assessment Master Plan*. The area subjected to policies in the Precinct Plan extends from Lower Jarvis Street to the west, Parliament Street Slip to the east, Lake Ontario to the south, and Lake Shore Boulevard to the north. The Class EA Master Plan addresses the same area as the Precinct Plan plus the area between Parliament Street and Cherry Street. Both plans included the provision of exclusive transit rights-of-way on the roadways identified in the Secondary Plan.

Concerns were raised at that time that the resulting roadway was too wide on Queens Quay East. As a result, direction was given by Council to minimize curb-to-curb distance within the public right-of-way to improve pedestrian access. Although the Precinct Plan and the Class EA Master Plan provide a strong framework for the assessment of options and the selection of a preferred approach to providing transit service to East Bayfront, it was recognized that a formal Environmental Assessment study would be required for the approval of the construction of a transit right-of-way. As a result, Council approved the Precinct Plan and the EA Master Plan subject to, among others, the following conditions:

- "the recommended preferred and alternate cross-section design options for Queens Quay East between Lower Jarvis Street and Small Street be identified as 'preliminary, subject to further evaluation' in the context of the upcoming Transit EA Study."
- "the TTC and the TWRC be directed , in the transit EA, to revisit whether smaller rights-of-way are technically feasible and desirable; and
- "the TTC and the TWRC consult with community stakeholders on this matter."

It should be noted that Council approval of the Precinct Plan and the Class EA Master Plan covers only a portion of the full study area of the East Bayfront Transit EA as described in Section 1.2 of this report.

In June 2005, the TTC authorized TTC staff to undertake Environmental Assessment studies for transit projects in the Eastern Waterfront, including a study of transit needs in the East Bayfront area on behalf of Waterfront Toronto.



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EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

Central Waterfront Secondary Plan
Map B: Transit Plan

Figure No.

1-1

1.2 Study Area

The initial study area extended from west of Bay Street in the west to Cherry Street in the east and encompasses the area between Union Station to the north and Lake Ontario to the south, as shown in **Figure 1-2**. This study area was developed in consultation with key stakeholders and reflects the fact that:

- the increase in travel demand for the area will be created by new development in the East Bayfront and these lands are captured within the study area;
- the alternative solutions would consider reasonable alternatives that utilize existing corridors such as Queens Quay Boulevard, Lake Shore Boulevard, and Bay Street; and
- the recommended design must connect to the existing transit network (Queens Quay to the west and Union Station to the north) as well as the future network (on Cherry Street – West Don Lands and Port Lands)

As the EA evolved, the eastern study limit was reduced to Parliament Street and the area between Parliament Street and Cherry Street was incorporated into the *Lower Don Lands Class EA Master Plan* initiated by Waterfront Toronto in April 2008.

In September 2007, Waterfront Toronto initiated the *Queens Quay Revitalization Class EA* to address transportation and public realm improvements on Queens Quay Boulevard between Bathurst Street and Lower Jarvis Street. As a result of the overlap and the close collaboration between the two EA studies, the surface portion of Queens Quay Boulevard west of Yonge Street was incorporated into the *Queens Quay Revitalization EA*, while the underground portion of Queens Quay east of Bay Street and Bay Street south of Union Station remained in the *East Bayfront Transit EA*.

1.3 The Purpose of this Study

The TTC, Waterfront Toronto, and the City of Toronto have undertaken this Class Environmental Assessment (Class EA) study to identify the transportation improvements and the roadway right-of-way required to support planned development in the East Bayfront Precinct. The overall purpose of the undertaking is:

> *"To determine the transit facilities appropriate to serve the long term residential, employment, tourism and waterfront access needs in the study area while achieving the City's and Waterfront Toronto objectives for land use, design and environmental excellence."*

In the spring of 2006, the TTC, Waterfront Toronto, and the City of Toronto commenced an Individual Environmental Assessment in support of this undertaking. A project team made up of representatives of each of these agencies was formed to guide the EA process. A consortium of consultants led by McCormick Rankin Corporation undertook the environmental assessment studies in the Eastern Waterfront, under the direction of the Project Team. In accordance with the Environmental Assessment Act a Terms of Reference (ToR) was filed and subsequently approved by the Ministry of the Environment. Based on the approved ToR, the project planning commenced in the winter of 2007 with the intent of filing an Individual Environmental Assessment for the East Bayfront Transit.

In the fall of 2007, the Ministry of the Environment approved an amendment to the Municipal Class Environmental Assessment to permit transit projects to be undertaken under the Municipal Class EA process. In October 2007, the TTC formally advised the MOE that this undertaking would be converted to the Class EA process for transit projects.

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Title:

Study Area

Figure No.

1-2

1.4 The EA Process

This Environmental Study Report (ESR) has been prepared to fulfill the requirements of the Municipal Class Environmental Assessment (Municipal Engineers Association) as approved by the Minister of Environment under the Environmental Assessment Act for municipal infrastructure projects. It describes the project, its purpose, the need, the evaluation of alternatives and the likely environmental effects and mitigation measures associated with the preferred alternative.

The proposed project has been categorized as a schedule "C" project under the Municipal Class EA based on the expected cost of the project and magnitude of its anticipated environmental impact.

The Municipal Class EA process involves five-phase planning and design process summarized as follows:

Phase 1 – Problem Identification: identify the problem or opportunity that the study is to address (documented in Chapter 3 of this Environmental Study Report).

Phase 2 – Alternative Solutions: identify alternative solutions to address the problem and opportunity by taking into consideration the existing environment (Chapter 4), and establish the preferred solution taking into account public and review agency input (Chapter 5).

Phase 3 – Alternative Design Concepts for Preferred Solutions: examine alternative methods of implementing the preferred solution, based upon the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects (Chapter 5, 6 and 7).

Phase 4 – Environmental Study Report: document, in an Environmental Study Report a summary of the rationale, and the planning, design and consultation process of the project as established through the above phases, and make such documentation available for scrutiny by review agencies and the public.

Phase 5 – Implementation: complete contract drawings and documents, and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

An EA study must allow a reviewer to trace each step of the process. The analysis and documentation should explain the reasons for the criteria used to identify and assess the alternatives; the proponent's weighting of these criteria and the decision making process that was followed.

An essential feature of successful planning and approval, under the Act, involves early consultation with the affected parties. Hence, the study was organized so that affected parties were:

- Involved throughout the study at appropriate times
- Provided access to information
- Provided sufficient time to respond to questions and data requested
- Encouraged to participate in issue identification

Government agencies, as well as the public, have had the opportunity to examine the study findings at each phase of the process. The public and agency consultation process is documented in detail in Chapter 2 of this report. Based on the review of alternatives, and input received from the public and agencies, a preferred solution was selected, including appropriate mitigation measures.

1.5 Class EA Approval Process

The ESR is prepared for the public record and provides the opportunity for the public to review the planning process. At the culmination of the planning and decision-making process, the ESR is placed on the public record with the Toronto Transit Commission, Waterfront Toronto, and the City of Toronto for a 30-day review period. If members of the public have concerns that cannot be resolved in discussions with the proponents, they may request that the Minister of the Environment grant a "Part II Order" which would elevate the project's approval process to an Individual Environmental Assessment. A "Part II Order" is a decision by the Minister of the Environment that the environmental significance of a project is of such importance that the procedures for environmental assessment under the Class EA process are not sufficient and that an individual EA is required. Such requests shall be forwarded to the Minister of the Environment at the following address:

The Honourable John Gerretsen

Minister of the Environment

77 Wellesley Street West

11th Floor, Ferguson Block

Toronto, ON

M7A 2T5

A copy of the request must also be forwarded to the Toronto Transit Commission at 1900 Yonge Street, Toronto, ON M4S 1Z2.

If at the end of the 30-day review period, no Part II orders have been received, the proponent will proceed with design and construction in accordance with this Environmental Study Report (ESR).

2. CONSULTATION

Waterfront Toronto has established a high standard for public and community involvement in its work, and has been successful in engaging both the local community and a wider range of interested community groups and individuals in the planning process for the waterfront. This approach has been incorporated into the planning process for the *East Bayfront Transit EA*. In addition, consultation was carried out in conjunction with the *Queens Quay Revitalization Class EA*, which has a study area that overlaps with the Transit EA.

This chapter documents the consultation process. The integration of the results of this process into the technical assessment is reflected in the later chapters of the report, addressing the various phases of the EA.

2.1 Overview of the Public Participation Process

The Class Environmental Assessment document sets out a combined technical and consultative process that must be followed for this type of study. This process includes identifying the problem, alternative solutions and designs, the analysis and evaluation of the alternatives and their impacts, and study documentation. Public involvement in each phase of the EA process has been integral to this study. The study process reflected the needs and concerns of various stakeholders along Queens Quay East, including property owners, business associations and residential groups through on-going consultation.

This extensive consultation program with stakeholder and community groups was undertaken in parallel with the technical work and formal meetings, in order to facilitate meaningful two-way dialogue between the Project Team and all affected parties, including:

- The project website (accessed from www.waterfrontoronto.ca) provided interested visitors with up-to-date study information, background materials, meeting notification, project newsletters, and information on how to participate, contact details and online commenting opportunities
- Letters were sent to property owners potentially affected by the *East Bayfront Transit EA* and one-on-one meetings were held
- The Project Team met with agencies and key stakeholders to foster a collaborative planning process
- Ongoing outreach through community, stakeholder, and interest groups meetings
- Three rounds of formal public meetings were held encompassing all phases of the project. All formal consultation rounds were advertised in the Toronto Star in accordance with the requirements as set out in the Municipal Class EA process.

Results from these discussions helped guide the development and selection of the preferred design alternative.

2.2 Public Consultation

Three formal public workshop/information centres and a drop-in style information centre were held as part of the public input process. The feedback provided through the public input process has resulted in conclusions and a refined design concept that addresses the concerns and issues brought forward by the community.

2.2.1 Public Meetings and Community Workshop

The Project Team provided information panels and visual presentations for viewing at each of the public workshop/information centres held during the course of this EA (see **Appendix A** for details). Members of the Project Team were in attendance to answer questions regarding the Transit EA. Members of the public were encouraged to review the information panels and discuss with the Project Team. All events were hosted in publicly accessible locations with the Study Area.

The first round of Public Consultation (March 28, 2007) obtained input on:

- Long-list of planning alternatives considered (corridor, transit technology/right-of-way)
- Selection of the Preferred Corridor Alternative
- Selection of short-listed transit technology/right-of-way alternatives for further analysis
- Design issues to be considered during the Design Alternatives stage of the EA study

A summary of the specific comments received and how they were addressed as part of the EA process can be found in **Section 5.4.1** of this report.

The second round of Public Consultation (June 21, 2007) obtained input on:

- Short-listed transit technology/right-of-way alternatives considered
- Selection of the Preferred Transit Technology
- Tunnel portal locations selected for further analysis

A summary of the specific comments received and how they were addressed as part of the EA process can be found in **Sections 5.4.2 and 6.4.1** of this report.

The third and final round of Public Consultation (March 25, 2009) provided an overview of:

- Selection of the Preferred Portal Location
- Analysis of Queens Quay Design Alternatives
- Selection of the Preferred Queens Quay Design Alternative

A summary of the specific comments received and how they were addressed as part of the EA process can be found in **Section 6.4.2** of this report.

All meetings gave the public and stakeholders the opportunity to comment on issues of concern regarding the existing environment and to obtain information on project progress. These meetings also gave the Project Team an opportunity to understand the community's concerns and suggestions, and to discuss the potential 'trade-offs' within each of the alternatives for proposed improvements.

2.2.2 Community Liaison Committee (CLC)

A thirteen-member Community Liaison Committee (CLC) was established to discuss and receive feedback from key stakeholders on a continuous basis. (See **Appendix B** for meeting minutes). This group met seven times during the course of the EA study and offered valuable input regarding local issues and provide advice on the conclusions being reached. The specific groups represented on the CLC are as follows:

- St. Lawrence Neighbourhood Association
- Central Waterfront Neighbourhood Association

- Queens Quay Harbourfront Business Improvement Association
- York Quay Neighbourhood Association
- Gooderham and Worts Neighbourhood Association
- Office of Councillor Pam McConnell
- Task Force to Bring Back the Don
- West Don Lands Committee
- Port Lands Action Committee
- Feet on the Street
- Waterfront Action
- Rocket Riders
- Transit Advocate

2.3 Technical Consultation

Government agencies and other departments within the City of Toronto provided input related to compliance issues (laws, regulations, policies and programs) and other areas of concern within their jurisdiction.

A Technical Advisory Committee (TAC) was established to assist in the preparation of this EA. The specific agencies represented on the TAC were as follows:

- City of Toronto Fire Services
- Toronto Hydro
- GO Transit
- Toronto Economic Development Corporation
- Toronto and Region Conservation Authority
- Toronto Port Authority
- Ontario Realty Corporation
- Ministry of the Environment
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources

Consultation with the TAC involved in reviewing, commenting and providing input to the environmental assessment study, the technical analysis and the ongoing comment/input to the consultation process. A total of five TAC meetings were held to coincide with key study stages/milestones. Additional meetings were held with individual agencies during the ESR's as required to assist in agency specific issues (See **Appendix C** for details).

No involvement with federal agencies occurred as there were no CEAA triggers or issues of federal jurisdiction identified during the course of this ESR.

2.4 First Nations Consultation

The 1991 Statement of Political Relationship with First Nations of Ontario confirmed the right of First Nations in Canada to have an inherent right to self-government. While the study area is urbanized and disturbed, they encompass lands related to Lake Ontario and the mouth of the Don River. The Don River and associated tributaries and ravines functioned as major portage and transportation routes up until the late 18th century. The Lake Ontario shoreline functioned as a source of fishing, area of aboriginal occupation and transportation routes. In addition, the study area may have been an area of traditional land use.

First Nations were invited to participate in all rounds of consultation. Follow up calls were made to each First Nation and they were asked for comments on the ToR. They were also asked for their advice on how they wish to be consulted during the Individual EA. The Iroquois and Allied First Nation participated in the second workshop and a follow-up one on one meeting was convened. Other First Nations were invited to attend. These included:

- Alderville First Nation
- Mississaugas of Scugog Island First Nation
- Mississaugas of the
- New Credit First Nation
- Six Nations of the Grand Territory
- Hurons-Wendat First Nation
- Metis Nation
- Beausoliel First Nation
- Chippewas of Georgina Island
- Chippewas of Rama
- Curve Lake First Nation
- Hiawatha First Nation

Discussions with First Nations occurred from the outset of the Class Environmental Assessment and continue during the study process. Consultation activities were adjusted during the Class EA's to meet particular needs of specific First Nations as those needs were made apparent. As a minimum, each First Nation was asked to comment at each benchmark, before decisions are made pertaining to planning and design alternatives.

3. TRANSPORTATION PROBLEM

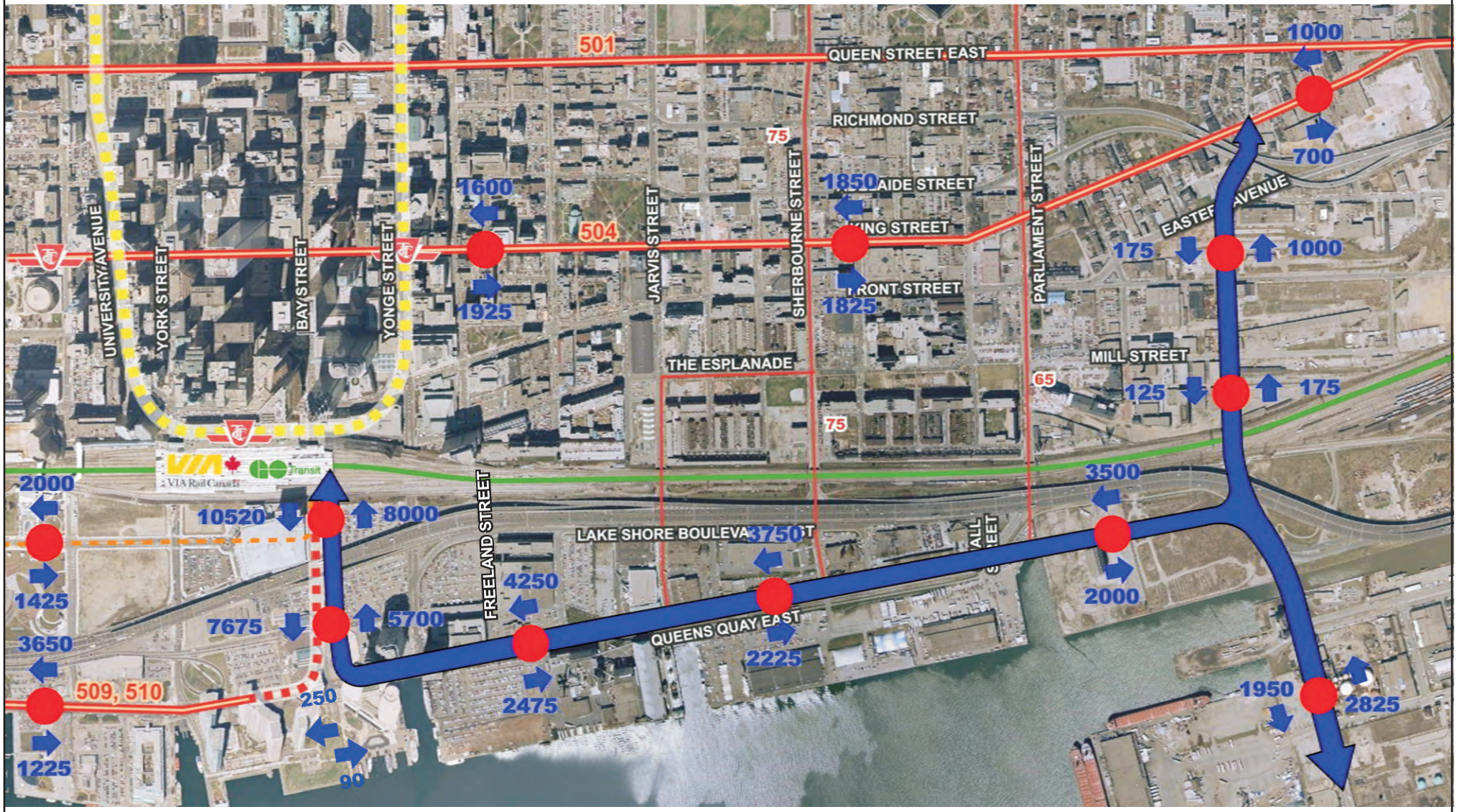
Based on the approved *East Bayfront Precinct Plan* and *EA Master Plan*, Waterfront Toronto is proceeding with the development of the 22-hectare site. The redevelopment plans are based on the assumption that an appropriate transportation network will be developed that will satisfy the resultant demand generated by all proposed waterfront development initiatives. The *East Bayfront Class EA Master Plan* outlined the transportation network improvements required to support the East Bayfront development, as well as other waterfront initiatives. A fundamental principle of the City and Waterfront Toronto, the approach to transportation planning for the area is to strongly encourage non-auto life styles including placing a strong reliance on encouraging a high level of transit use in the area.

On this basis, the transportation problem addressed by this Environmental Assessment is to determine the preferred approach to providing the transit facilities required to serve the planned long term residential, employment, tourism and waterfront developments in the study area while achieving the City's and Waterfront Toronto objectives for land use, design and environmental excellence. Although not part of the core transportation problem, the establishment of the roadway design to accommodate all transportation modes and the confirmation of the associated right-of-way width are also being addressed under this EA study.

3.1 Future Travel Demands in the Eastern Waterfront

A significant first step in the needs assessment was the undertaking of travel demand forecasts to better-understand travel needs in the community and, in particular, the need for transit capacity through the study area. A key assumption in the analysis was that an enhanced network of high-quality transit services will be provided in and around the Eastern Waterfront area that will be successful in attracting a high mode-split to transit. **Appendix F** of this report contains the demand forecast analysis prepared by the Demand Forecasting Sub-Group of the Waterfront East EA study. This report contains the travel demand forecasts for future Eastern Waterfront road and transit base networks under the future land use for the Waterfront, with a specific focus on the eastern precincts of East Bayfront, West Don Lands, and the Port Lands.

The City of Toronto's GTA Travel Demand Forecasting Model – which was developed and reflects the transportation planning basis for the City's *Official Plan* – was used to estimate future auto and transit trips on a GTA wide level. Forecasts were also developed at the precinct level. The forecasts predict the degree of use for roads and transit lines from the trips that are generated from and attracted to each precinct. The travel demand analysis concluded that, assuming full redevelopment in the Eastern Waterfront area, up to 4,250 people will be traveling through the East Bayfront area on transit in the peak direction during a typical weekday morning peak hour (illustrated in **Figure 3-1**). The conclusion was a key input in the selection of the preferred corridor and transit technology.



Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

Eastern Waterfront Transit Ridership Forecast (2021)
(Weekday Morning Peak Hour)

Figure No.

3-1

3.2 Challenges to Encouraging Transit Use

Based on extensive research and a good understanding of how people choose to travel in the city (see **Figure 3-2**), the TTC and the City of Toronto focus on two main principles to create an environment that fosters a high transit mode split in the city:

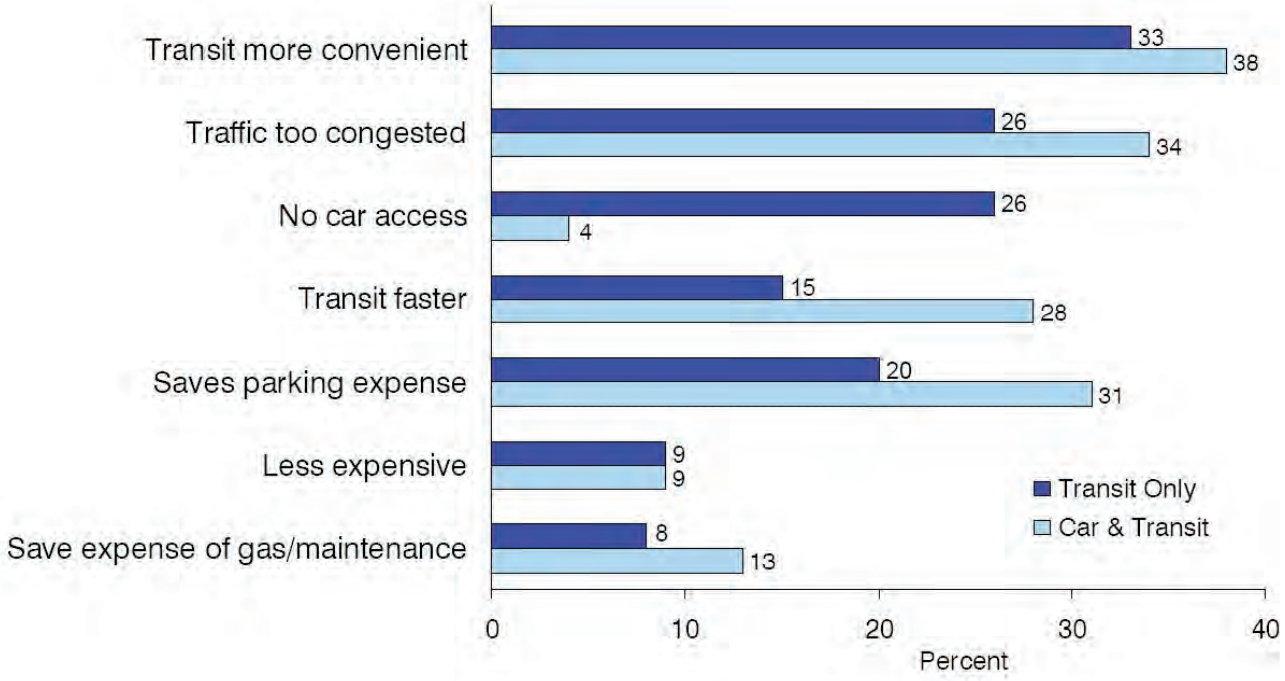
- Transit must be convenient and close to residences, employment locations and other travel destinations
- Transit must offer fast and reliable service

Providing good transit service at the outset of the development of a new community allows people to selectively choose to live in the transit-oriented neighbourhoods and have a less auto-oriented lifestyle. The City's 'Transit First' policy for the Waterfront and the *East Bayfront Precinct Plan* established the goal of providing frequent and reliable transit service within a 5-minute walk of most residents of the East Bayfront area at the initial stages of the development of the community. Transit services must also provide barrier free access, so that individuals with mobility difficulties can use the service.

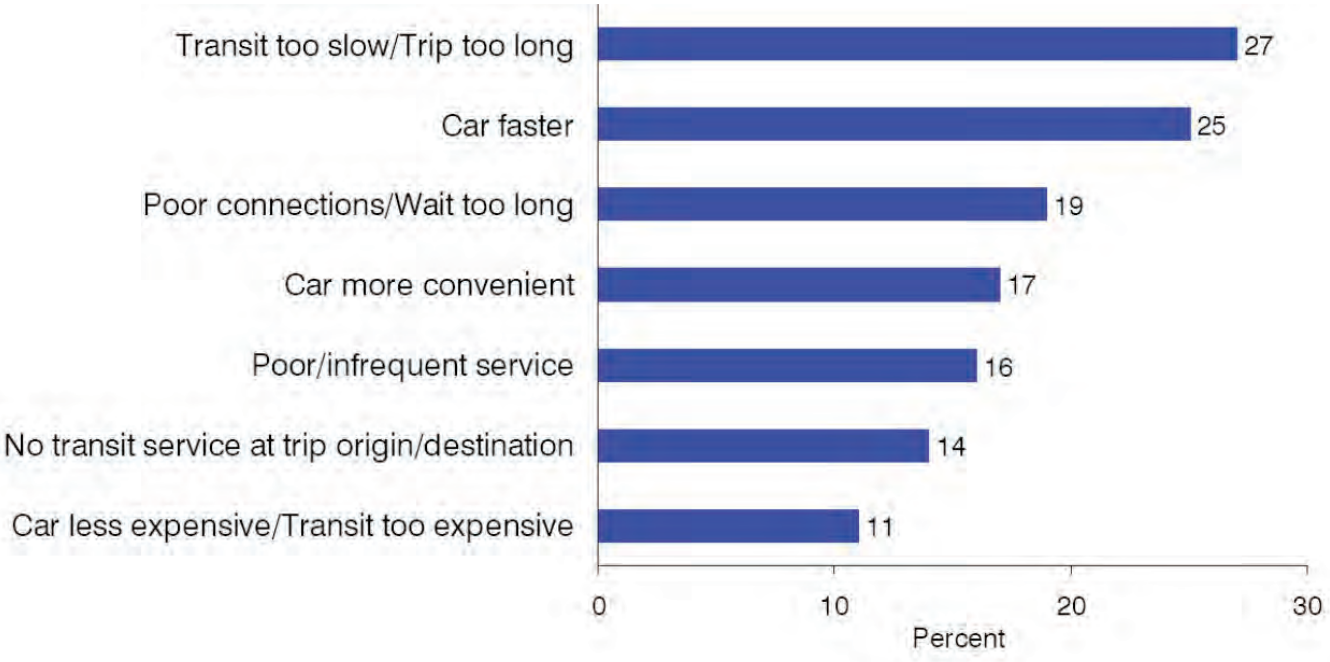
At present, the existing transit service in the East Bayfront precinct does not satisfy these aforementioned objectives. Current transit services in the area are beyond a convenient walk for most of the large numbers of travelers expected to and from the new developments planned for the new East Bayfront community.

In addition, existing streetcar services serving the Central Waterfront area are not currently accessible for many people with mobility problems or passengers who use mobility aids. The Accessibility for Ontarians with Disabilities Act (AODA) requires the TTC to ensure that its services are accessible to people with mobility limitations. The TTC is in the process of purchasing replacement streetcars that will have low floors, which will help to address this problem, but passenger platforms are also an important element in making transit services fully accessible. The provision of passenger platforms is a requirement for any newly constructed streetcar/light rail line through the East Bayfront area.

Why People Choose Transit



Why People Don't Choose Transit



Project:
EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Figure No.
3-2

Title:
Public Opinion Polls Regarding Transit Choice

3.3 Other Influences on Transit Demand in the East Bayfront

The East Bayfront development is not occurring in isolation. Other major development includes:

West Don Lands:

- Total area – approximately 32 hectares
- Land use type – employment and residential functions
- Population – approximately 5,500 housing units
- Employment – approximately 1,400 employees in office and retail space

Lower Don Lands

- Total area – approximately 80 hectares
- Land use type – employment and residential functions
- Population - approximately 12,000 housing units
- Employment – approximately 8,500 to 10,500 employees in office and retail space

Port Lands

- Total area – approximately 350 hectares
- Land use type – employment and residential and functions
- Population - approximately 19,000 housing units
- Employment – approximately 25,000 employees in office and retail space

A fundamental principle of the broader planning for the waterfront area is the need to tie future development into the fabric of the city by encouraging linkages between existing communities and future communities. From a transit perspective this is achieved by providing an integrated network of transit services that link both north-south and east-west into and through the community. As illustrated in **Figure 3-3**, transit services in the East Bayfront need to be integrated with redevelopment plans for the West Don Lands, Lower Don Lands, and Port Lands areas to achieve the overall benefits of the broader integrated planning approach being taken in the waterfront area.

The development of this network evolved through the Secondary Planning process, which determined that the major destinations for the future residents of the East Bayfront are predicted to be:

- Into the Central Business District
- Union Station to connect with GO Rail and the TTC subway system

Less significant travel desire lines will be facilitated through bus services on Sherbourne Street and Parliament Street to the Bloor-Danforth subway.

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Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

Future Transit Network in the Eastern Waterfront

Figure No.

3-3

3.4 Problem Statement: Need for Higher-Order Transit in the East Bayfront

The redevelopment of the City's brown field waterfront sites, and in particular the East Bayfront precinct, represents a significant opportunity to attract people and jobs to the City as envisioned in the City's *Official Plan*. The *Official Plan* calls for an intensification of land uses in the city to make best-use of existing infrastructure and to achieve the large environmental and sustainability benefits of a compact urban form. Transit plays a critical role in achieving this objective if it, along with pedestrian and cycling modes of travel, can provide a reasonable alternative to auto travel.

Studies of existing higher-density mixed-use communities in the City indicate that, if an effective transit system is in place, at peak times, non-auto mode splits of 50% to 60% are achievable in mixed-use communities comparable to what is planned for the East Bayfront. Forecasts for the East Bayfront area call for this level on non-auto travel with 40% of all trips are expected to use transit services specifically. This is based on a number of factors including location, proposed land uses and the plan for an integrated transit network in the Eastern Waterfront. When fully developed, the approximate 6,000 residential units, 230,000 square metres of office and retail space, and a college campus accommodating up to 4,000 full-time students, are expected to generate an additional 4 million riders per year for the TTC.

The redevelopment plans are based on the assumption in the *Central Waterfront Secondary Plan* that a high proportion of all travel to and from the community will be made by transit. To achieve this objective, it is essential that a high-quality transit service be provided. Transit service speed and reliability are important, as is the fundamental requirement for new streetcar facilities to have passenger platforms to provide access for passengers with mobility limitations.

The purpose of the *East Bayfront Transit Environmental Assessment Study* has been to determine the transit facilities required to serve the long-term needs of the study area which achieve the City's and Waterfront Toronto's objectives both for high-quality, reliable transit services and urban design and environmental excellence.

In addition, an integrated network of transit services will be required to integrate development in the East Bayfront into the fabric of the city. Linkages, both north-south and east-west, will need to integrate the East Bayfront community with future communities planned for the West Don Lands, Lower Don Lands, and the Port Lands areas to achieve the overall benefits of the broader integrated planning approach being taken in the waterfront area.

4. EXISTING CONDITIONS IN THE STUDY AREA

This chapter describes existing conditions for each component of the environment along Queens Quay Boulevard east of Bay Street. "Environment" includes natural, social and economic nature of the area.

Based on the approved *East Bayfront Precinct Plan* and the *East Bayfront Class Environmental Assessment Master Plan*, Waterfront Toronto is proceeding with approvals, design and construction of a number of elements of the plan including:

- widening of the right-of-way of Queens Quay East to improve public realm and transportation functions
- construction of the streetcar right-of-way and implementation of streetcar service along Queens Quay East to support development; and
- building of new sewer, watermain, and stormwater infrastructure

In considering the introduction of a new surface transit connection serving the East Bayfront Precinct area, it is necessary to understand the environment in which the improvements are being considered.

The majority of the data used in this Class EA was obtained in support of the Precinct Plan and the Class EA Master Plan. This includes the physical and operational characteristics of the various roads and streets within the Study Area vicinity today and in the future including candidate corridors for potential new transit linkages. A series of improvements and modifications are planned to the area road network in conjunction with the development of the East Bayfront Precinct, as determined by the Precinct Plan and the Class EA Master Plan.

4.1 Natural Environment

The natural environment within the study area has been described in the *East Bayfront Class EA Master Plan*. This report notes that the study area is an extensively-developed environment dominated by roadway, abandoned rail spurs, a major expressway, and a major rail corridor. It is an urban brownfield site containing several buildings occupied by industrial or commercial uses, with large areas of vacant or underused sites. There are no watercourses traversing the study area. There are negligible batches of vegetation with no significant natural environment features within the study area.

4.1.1 Terrestrial Environment

The study area is an extensively developed urban brownfield site with sparse vegetation. Vegetation observed in the area consists of urban trees along the sidewalk areas, as well as scattered and sparse herbaceous vegetation that occur throughout vacant lots and alongside fence lines of buildings. The native soils along Queens Quay are largely lake-fill of miscellaneous origin, which is not ideal for growing conditions. A row of relatively healthy and sizable Norway Maples – an invasive and non-native species – is present along the frontage of Redpath Sugar. There are no other significant terrestrial environmental features that occur in this area.

4.1.2 Aquatic Environment

There is no surface water present and there are no watercourses traversing the study area. There are no aquatic resources within the study area. The eastern boundary of the study area is west of the Don River, which originates in York Region and discharges into Lake Ontario via the Keating Channel located east of Cherry Street. The inner harbour shoreline of Lake Ontario – highly modified by urban development beginning in the 1920's – forms the southern boundary of the study area.

Due to extensive urbanization in the area and numerous shoreline alterations in the past, there is limited diversity of the aquatic habitat in the vicinity of the study area. The north shore of the Inner Harbour is hard-edged and relatively deep with little, if any, aquatic vegetation and little in the way of fish habitat. However, aquatic vegetation is found in sheltered areas provided by inlets and quays such as the York Harbour Square and the Spadina Quay.

The *East Bayfront Class EA Master Plan* reports limited fish communities and aquatic habitat in Lake Ontario along the inner harbour shoreline. The TRCA performed fish community sampling in the spring, summer and fall of 2002 and 2003 at three locations in the vicinity of the East Bayfront Precinct. These sampling locations include the Keating Channel and two sheltered areas: the York Harbour Square and the Spadina Quay. Although these areas have been modified in a manner that has reduced habitat diversity, fish community sampling by the TRCA resulted in the capture of 17 species including sport fish and forage fish communities.

The Keating Channel consists primarily of species that are associated with open water in large lakes, with the exception of northern pike which prefers sheltered bays with moderate to dense aquatic vegetation. The high sediment load and habitat alterations found in the Lower Don are major factors that limit the fish community in the Keating Channel.

The York Harbour Square and the Spadina Quay consist primarily of the sport fish community which prefers warmer water and sheltered conditions. The TRCA indicates that the shoreline located within the York Harbour Square provides moderate shore and in-water cover with clear water and slow current. The Spadina Quay provides limited cover consisting of submergent vegetation with a sand/detritus dominated substrate.

The Parliament Street Slip and the Jarvis Street Slip, located within the East Bayfront Transit EA study area, have the potential to provide similar shelter habitat conditions to the Spadina Quay and York Harbour Square.

4.1.3 Wetlands

There are no provincially significant or non-provincially significant wetlands located within the study area.

4.1.4 Species at Risk

There are no provincially significant or non-provincially significant species at risk located within the study area.

4.1.5 Subsurface Conditions

A review of subsurface conditions was carried out as part of this Class EA Study. Details can be found in **Appendix M**.

The study area is located south of the natural shoreline of Lake Ontario and within the filled areas created to construct the Toronto waterfront and its working piers. Since the mid- to late-1800s, the shoreline of Toronto has been extended into Lake Ontario by as much as 1 km. The

subsurface conditions in the area are likely dominated by the presence of miscellaneous fill materials. The project is situated in a filled area and buried wharfs have been found nearby. It is expected that above bedrock, the subsurface materials will consist of a melange of building debris (wood, concrete, brick, glass, etc.), reworked native soils, aged municipal debris and ashes, among other materials.

The bedrock surface found within the study area is generally between Elevation 63 m and 68 m. The water surface of Lake Ontario typically varies from approximately Elevation 74.5 m to 75.3 m. Groundwater within the fill materials may be within about 1 m of the ground surface in this area.

4.1.6 Potential Contamination

According to the *East Bayfront Class EA Master Plan*, soil impacted by environmental contaminants exists within the East Bayfront area. Based on the available information, the contaminants are generally adsorbed to soil particles and are present at concentrations that sometimes exceed the currently applicable MOE standards but not by a wide margin. Limited intrusive investigations within the land south of Queens Quay East detected surface or near-surface soil impacted at levels exceeding the MOE industrial/commercial standards. Underground fuel storage tanks were observed to be present within this area, and it can be expected that some degree of petroleum hydrocarbon contamination had occurred in the proximity of the tanks. However, while soil impacts exist within the area south of Queens Quay East, the impacts are limited in extent.

Most of the land north of Queens Quay East has been used in the past for storage of products. The storage facilities included chemical storage warehouses. While it is possible that chemical spills have occurred in the vicinity of the warehouses, it can be expected that care was taken to minimize losses given the economic value of the products. Underground fuel storage tanks existed in the area, and it can be expected that some degree of petroleum hydrocarbon contamination had occurred in the proximity of the tanks. However, while soil impacts exist within the area north of Queens Quay East, it does not appear that the land has been extensively impacted by environmental contaminants.

4.1.7 Groundwater Conditions

According to the *East Bayfront Class EA Master Plan*, there is limited groundwater quality information available at present. Although no liquid petroleum hydrocarbon lenses have been detected, it is possible that such lenses could exist in the vicinity of the underground storage tanks found in the study area. The results of groundwater sampling programs conducted in the past have indicated that heavy metals and PAHs may be dissolved in groundwater at concentrations that exceed applicable MOE standards.

4.2 Socio-Economic Environment

The East Bayfront precinct is predominantly an underused brownfield site featuring low-rise buildings occupied by industrial and commercial uses. The area has been considered a prime candidate for revitalization for decades. Within the precinct area, lands along the south side of Queens Quay East from Lower Jarvis Street to Parliament Street are in public ownership. The land north of Queens Quay East is owned, in part, by private interests and in part by Waterfront Toronto.

Land uses along Queens Quay, from Bay Street easterly, vary widely from high-density residential and commercial uses west of Freeland Street, to low-density commercial and industrial uses east of Freeland Street. Redpath Sugar Refinery is located on the south side of Queens Quay East between Freeland Street and Lower Jarvis Street. A rail spur formerly serving the plant has been terminated. East of Lower Jarvis Street, the area contains a variety of businesses occupying low-rise buildings surrounded by large paved and concrete surfaces mainly used for surface parking, storage, and loading.

4.2.1 Land Use Designations

Current land use designations are prescribed in the *Central Waterfront Secondary Plan*. Three types of land uses and one special study area are designated. They are described below and illustrated in **Figure 4-1**.

Parks and Open Space Areas – these are areas designated for parks, open spaces, natural areas, and plazas. Acceptable land uses can include compatible community, recreation, cultural, restaurant, and entertainment facilities.

Regeneration Areas – these are lands that may be subdivided into smaller blocks for mixed-use development ranging from industries, housing, community services, parks, offices, and commercial/retail uses. These lands are subject to Precinct Implementation Strategies.

Existing Use Areas – these are areas governed by existing *Official Plan*, zoning controls, and other related Planning Act processes and they are consistent with directions set out in the Central Waterfront Secondary Plan. These lands are not subject to Precinct Implementation Strategies.

Foot of Yonge Special Study Area – the land on both sides of the Yonge Street Slip are to be designed to include major public amenities, distinctive cultural buildings, appropriate tourist facilities, and a range of public uses and other development. The Yonge Street Slip is envisioned as a new public plaza and a tourist destination.

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Figure No.
4-1

Title:
Central Waterfront Secondary Plan
Land Use Plan

4.2.2 Residential

Existing residential uses within the study area are concentrated west of Yonge Street. There are currently no residential uses east of Yonge Street; however, there is an active application for a residential development on the south side of Queens Quay East just east of Yonge Street Slip. The major residential uses in the study area are described below and illustrated in **Figure 4-2**.

Harbour Square Condominium – Harbour Square Condominium is major residential complex featuring four high-rise residential towers located at 33, 55, 65, 77, and 99 Harbour Square. There are multiple vehicular entrances to the site, one of which is located at the foot of Bay Street on the south side of Queens Quay West. This private driveway runs underneath a city park to the west of Toronto Island Ferry Dock and emerges in the rear of the residential complex close to the inner harbour shoreline.

World Trade Centre Condominium – World Trade Centre Condominium is a residential complex featuring two high-rise towers located at 10 Queens Quay West and 10 Yonge Street. Main vehicular entrances are located off Queens Quay West just west of Yonge Street and Yonge Street just north of Queens Quay Boulevard.

MT 27 – There is an active application for a residential development, featuring four mid-rise residential towers, on the south side of Queens Quay East between Yonge Street Slip and Redpath Sugar. As part of the development plan, Freeland Street will be extended southerly across Queens Quay East to provide vehicular access to the development site.

4.2.3 Business Activities

The entire East Bayfront area is currently undergoing transition from the current low-density commercial/retail uses to future higher-density commercial, institutional, residential, and other mixed-use developments. Therefore, existing business activities east of Lower Jarvis Street are expected to be replaced by redevelopment in the future. However, west of Lower Jarvis Street there are several major business activities that are expected to remain in the foreseeable future. These features are described below and illustrated in **Figure 4-3**.

Westin Harbour Castle Hotel and Convention Centre – The Westin Harbour Castle Hotel and Convention Centre is located at 1 & 2 Harbour Square on Queens Quay West between Bay Street and the Yonge Street Slip. Main vehicular and pedestrian entrance to the hotel is located on the south side of Queens Quay West. A second entrance, which leads to the hotel's service/loading dock, is located on the east side of the hotel off Toronto Island Ferry Terminal Road.

Liquor Control Board of Ontario (LCBO) – The LCBO operates a retail location on the north side of Queens Quay East between Freeland Street and Cooper Street. Vehicular access points are located off Freeland Street and Cooper Street. A major distribution centre is located north of the retail store.

Redpath Sugar – Redpath Sugar is located at 95 Queens Quay East on the south side of Queens Quay East west of Jarvis Slip. The complex houses the storage and refinery facilities as well as the Redpath Sugar Museum. There are two vehicular access points and one gated access located off Queens Quay East: the western driveway serves as the main entrance for employees and large tractor trailers serving the facilities; the middle driveway serves as a secondary access for tractor trailers; the gated access on the east side is only used occasionally during the shipping season to move cranes around the complex.

The facilities were formerly served by an industrial rail spur that runs along the south side of Queens Quay East between Redpath Sugar and the Keating rail yard located on the east side of

the Don River. In July 2008, Redpath Sugar agreed to give up the use of the rail spur in an effort to support public realm improvements in the East Bayfront area. The rail spur has been terminated.

Loblaws – LobLaws operates a retail location in the northwest corner of Queens Quay East and Lower Jarvis Street. There are four vehicular access points on this site: a two-way driveway off Queens Quay East that provides access and egress for Loblaws patrons; an one-lane ramp adjacent to the Queens Quay driveway that provides access for delivery trucks servicing the loading dock on the second level of the Loblaws store; a two-way driveway off Lower Jarvis Street that provides access and egress for Loblaws patrons; and an one-lane, outbound-only ramp for delivery trucks exiting out to Lake Shore Boulevard from the loading dock.

First Waterfront Place – Construction is currently underway on the south side of Queens Quay East just east of Lower Jarvis Slip for an 8-storey building with 450,000 square feet of commercial and office space.

4.2.4 Institutional Activities

A planned new campus of George Brown College is slated to open in 2011 on a 0.83 hectare site in the East Bayfront Precinct. The new campus will be situated east of Lower Sherbourne Street on the south side of Queens Quay East, adjacent to First Waterfront Place. The new campus will house the college's Centre for Health Sciences, the first student residences, and a recreational complex. When opened, the campus is expected to accommodate 3,500 full-time and 1,000 part-time students.

1

33, 55, 65, 77, 99, Harbour Square

2

10 Queens Quay West
10 Yonge Street

3

MT 27

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Figure No.

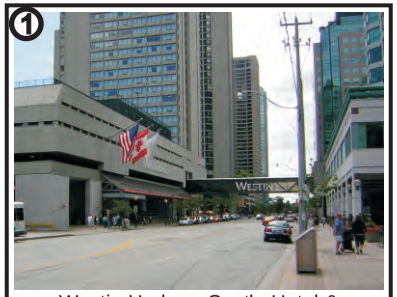
4-2

Title:

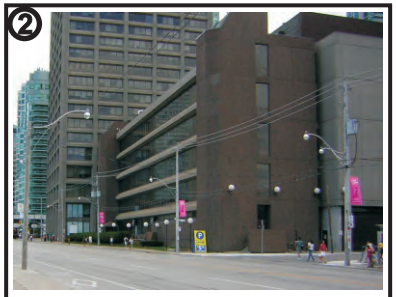
Major Residential Developments in the Study Area

6 First Waterfront Place

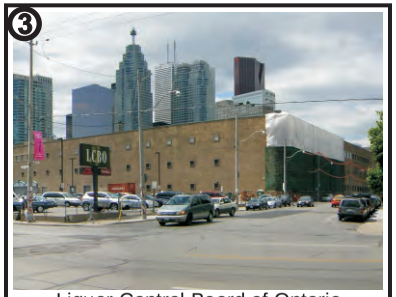
5 Loblaws



1 Westin Harbour Castle Hotel & Convention Centre



2 Toronto Star



3 Liquor Control Board of Ontario (LCBO)

4 Redpath Sugar

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EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:
Major Business Activities in the Study Area

Figure No.
4-3

4.3 Cultural Environment

4.3.1 Built Heritage and Cultural Heritage Features

A Cultural Heritage Resource Assessment was carried out as part of this Class EA study. The complete assessment can be found in **Appendix N** of this report. In order to make a preliminary identification of existing built heritage and cultural heritage features within the study area, the Ministry of Culture's Ontario Heritage Properties Database and the City of Toronto's *Inventory of Heritage Properties* were consulted. A field review was undertaken to confirm the location and condition of previously identified resources and to identify any additional cultural heritage resources.

Results from the heritage assessment indicate that there are two built heritage resources within the study area that are listed under the City of Toronto's *Inventory of Heritage Properties*. These features are outlined in **Table 4-1** and illustrated in **Figure 4-4**.

Table 4-1 – List of Built Heritage Features within the Study Area

Feature	Circa	Designation
55 Lake Shore Blvd. East (LCBO Office and Warehouse)	1947	Listed (City of Toronto)
95 Queens Quay East (Redpath Sugar)	1957	Listed (City of Toronto)

In addition to the two listed built heritage features, a commercial building at 143 Lake Shore Blvd East, which dates back to the 1960s, was identified during field review as being a well preserved example of this type of mid 20th century commercial structure.

It is noted that the northwest portion of the study area – bounded by Yonge Street to the east and Harbour Street to the south – is situated within the boundaries of the Union Station Heritage Conservation District which is a cultural heritage landscape designated under Part V of the *Ontario Heritage Act*. Field review identified two additional sites within the study area – the Gardner Expressway and the remnants of a rail line crossing Parliament Street – that may have cultural heritage value.

1 LCBO Office & Warehouse

2 Redpath Sugar

3 143 Lake Shore Blvd. East

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Figure No.
4-4

Title:
Built Heritage Resources in the Study Area

4.3.2 Recreational Features

The lands in the East Bayfront Precinct are generally not accessible for public uses. There are no existing parks or open spaces. The Royal Canadian Yacht Club, with its main facility located on the Centre Island, operates a ferry out of Parliament Street Slip (263 Queens Quay East) to transport its staff and guests to/from the island. Other recreational features in the area include restaurants, night clubs, and tour boat operations though these features are expected to disappear as development occurs in the area. West of Lower Jarvis Street, Redpath Sugar operates a museum inside its refinery complex and is used to display the history of the sugar industry.

Toronto Island Ferry Services

The Toronto Island Ferry, operating out of ferry docks at the foot of Bay Street, provides three ferry services to the Centre Island, Ward's Island, and Hanlan's Point in the City's Inner Harbour. The services operate year-round, with the exception of the Centre Island service which does not operate during the winter.

Martin Goodman Trail

Martin Goodman Trail is a multi-use off-road facility that runs for 22 km along Lake Ontario and forms part of the 900 km Waterfront Trail. Within the East Bayfront precinct, the trail runs eastwards from Richardson Street along the south side of Queens Quay East. The facility continues along Parliament Street and Lake Shore Boulevard East to Cherry Street, where it connects to trail systems running into the Port Lands, north along the Don Valley corridor, and eastwards along Lake Shore Boulevard East.

Planned Parks and Public Spaces

Several parks and public spaces have been planned within the study area as part of the redevelopment of the East Bayfront precinct. Planning policies and guidelines for these open spaces are set out in the *Central Waterfront Secondary Plan* as well as the *East Bayfront Precinct Plan*. These recreational facilities are described as follows:

Water's Edge Promenade – the Water's Edge Promenade is conceived as an active pedestrian, year-round, multi-use water-related public passage along the shoreline of the East Bayfront Precinct between Jarvis Slip and Parliament Slip. Non-residential uses are encouraged at ground level frontages along the water's edge promenade. The overall promenade width will be 19 metres plus a 5 metre boardwalk with piers to accommodate commercial boating activities.

Jarvis Slip – the head of Jarvis Slip and the area adjacent to it are designated as a "special use site" for indoor and outdoor public activities along the two water edges. The public open space is envisioned for large-scale gatherings for the East Bayfront precinct and a civic public square for the city at large.

Sherbourne Park – Sherbourne Park will be situated on a 1.5 hectares (3.6 acres) site on the east side of Lower Sherbourne Street between Lake Shore Boulevard and Lake Ontario, bisected by Queens Quay East. It is envisioned as an urban park land for large public gatherings, and as such the park will be designed to integrate with the continuous Water's Edge Promenade.

Aitken Place Park – Aitken Place Park will consist of two neighbourhood open spaces located on both sides of Queens Quay East between Bonnycastle Street and Small Street.

4.3.3 Archaeological Features

A Stage 1 Archaeological Assessment of the study area was carried out as part of this Class EA study. The key findings are summarized below. The complete assessment can be found in **Appendix L** of this report.

The Toronto waterfront is an area in which massive landscape changes have occurred. In the vicinity of the study area, the most dramatic changes began during the mid-19th century, in association with the development of the railway facilities along the edge of the harbour.

At present, the lands that make up the study area are variably built-upon. Existing structures are either built as slab-on-grade or are supported by piles driven to bedrock. Substantial portions of the study area are taken up by parking lots. The various roads that traverse the study area are underlain by services such as sewers, water, etc. Other forms of infrastructure, such as underground storage tanks, etc. may be expected throughout the area.

Results from the Stage 1 assessment indicate that, in addition to the modern shoreline, there are eight complexes of potential archaeological features within the study area. These features are listed in **Table 4-2** and illustrated in **Figure 4-5**:

Table 4-2 – List of Potential Archaeological Features within the Study Area

Feature	Circa	Significance
The head of the Don Breakwater	1870-1886	Grade 2
A small area of fill at the former mouth of the Don River	1900	Grade 3
The 1893-1910 shoreline, including various wharf and shorewall structures, lakefill to their landward sides and related industrial and warehousing buildings	1893-1910	Grades 2 and 3
The 1910-1923 shoreline, including various wharf and shorewall structures, lakefill to their landward sides and related industrial and warehousing buildings	1910-1923	Grades 2 and 3
The probable final resting place of Knapp's roller boat		Grade 2
The Bulkhead/Pierhead line and contemporary shorewall constructions	1925	Grade 3
The Air Harbour site	1929-1939	Grade 3
The Royal Canadian Air Force Equipment Depot No. 1	1940-1946	Grade 3

As listed in Table 4-2 and described in more detail in **Appendix L**, several of the inventoried features within the study area are ranked as Grade 2 resources which are considered historically important. These features include the head of the Don Breakwater, the buried Knapp's roller boat, and the various wharfs, shorewall structures, and industrial warehouse buildings dating back to the late 19th century. However, the majority – if not all – of the Grade 2 resources are likely to occur only as deeply buried remains. The upper portions of the wharf features may be expected to occur roughly two metres below current grade. None of the Grade 2 resources are expected to occur within the Queens Quay right-of-way. The remaining inventoried features are ranked as Grade 3 resources which are of little historical significance, or for which the significance is not apparent.

Regarding potential aboriginal archaeological resources, results from the Stage 1 assessment indicate that the potential for recovering pre-contact aboriginal material within the study area is nil. The study area is likely situated in the approximate position of the circa 5,000 to 3,000 B.P. shore. Although the Toronto area lakeshore, and particularly the mouths of the creeks and rivers flowing into it, would have been extremely attractive to pre-contact aboriginal peoples, sites dating to the circa 5,000-3,000 B.P. period are unlikely to have survived the historic

development activities (i.e., dredging, filling, etc.) that have disturbed the original topography of the lake-bottom. Therefore, there is no potential for the survival of pre-contact Aboriginal archaeological resources.

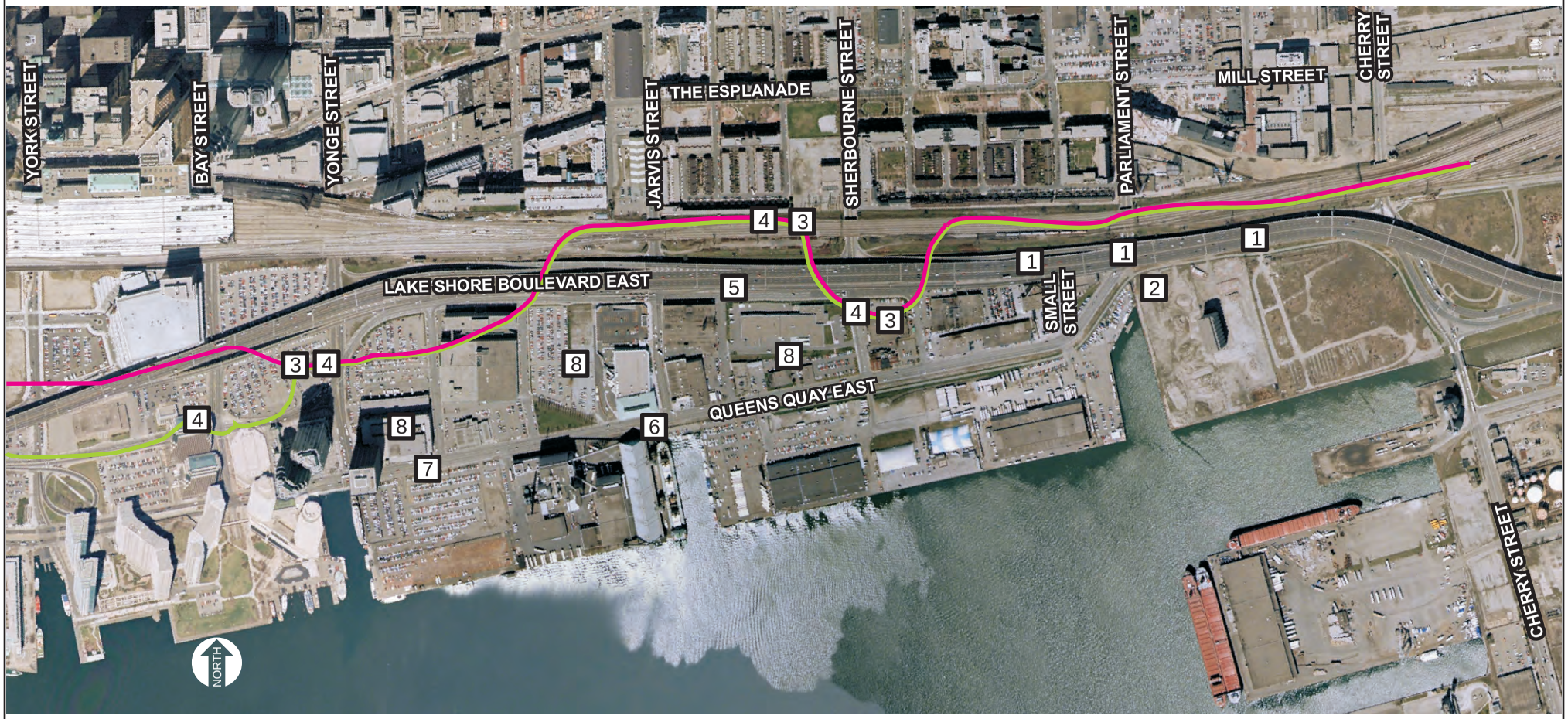
4.3.4 First Nations Interests

From the end of the first millennium A.D. until the end of the 1600s the dominant aboriginal group in the Toronto area seems to have been culturally Iroquoian. After 1690, the Mississauga took over the villages and camps of the Iroquoians and was the culture of record when the land treaties were enacted following 1788.

There are several references to the Mississauga occupation of the Humber, Don and Rouge Rivers and the use of the river systems as routes into and out of the backcountry and the Upper Lakes region. Although no sites have been identified, excavated or analyzed in the study area, there are late 18th and early 19th century references to the presence of persistent encampments between the forks of the Don and the lands around the mouth. (Archaeological Services Inc., 2004).

The Toronto Purchase (1787 and 1805) appears to be the only Treaty within the study area whereby the Mississauga Nation surrendered the lands north of Lake Ontario, not including the Toronto Islands. (www.newcreditfirstnation.com).

There is no apparent current use of the lands by First Nations for traditional uses.



☐ Approximate Site of Archaeological Resource

1 - circa 1870-1886 Don Breakwater
2 - circa 1900Don Mouth Fill zone
3 - circa1893-1910 Shoreline Development
4 - circa 1910-1923 Shoreline Development
5 - Knapp's Roller Boat
6 - circa 1925 Bulkhead/Pierhead Line and Co.
7 - circa 1929-1939 Air Harbour
8 - circa 1940-1946 RCAF Equipment Depot No. 1

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Title:
Archaeological Resources in the Study Area

Figure No.
4-5

4.4 Transportation Systems

The East Bayfront area is served by a multi-modal transportation network that forms part of the greater transportation system of the Central Waterfront.

4.4.1 Local Transit Network

The TTC operates several bus and streetcar routes in and around the study area. These services are described below and illustrated in **Figure 4-6**.

510 SPADINA streetcar route

This streetcar route operates between Union Station and Spadina Station on the Yonge-University Subway via Bay Street, Queens Quay West, and Spadina Avenue. Starting at Union Station, the route operates in a streetcar tunnel under Bay Street and services an underground streetcar stop at the intersection of Bay Street and Queens Quay West. The route then turns west and emerges from the tunnel through a portal on Queens Quay located west of Bay Street. From there, the route operates in a dedicated right-of-way in the middle of Queens Quay West and continues north on Spadina Avenue. Current service level at Union Station is one streetcar every 6-8 minutes during peak hours and one streetcar every 6 minutes during off peak hours. Typical weekday ridership is approximately 43,000 passengers per day (2006 figure, combined with 509 Harbourfront).

509 HARBOURFRONT streetcar route

This streetcar route operates between Union Station on the Yonge-University Subway and Exhibition Loop in an east-west direction. Current service level at Union Station is one streetcar every 8 minutes during peak hours and one streetcar every 9 minutes during off peak hours. Typical weekday ridership is approximately 43,000 passengers per day (2006 figure, combined with 510 Spadina).

97B YONGE bus route

The 'B' branch of 97 YONGE bus route operates mainly north-south on Yonge Street, providing peak-hours services between the area of Queens Quay / Yonge Street and the area of Steeles Avenue / Yonge Street. This route services 7 stations on the Yonge-University Subway, including St. Clair Station, Union Station, Bloor-Yonge Station, Davisville Station, York Mills Station, Sheppard-Yonge Station, and Finch Station. Current service level in the Queens Quay / Yonge Street area is one bus every 30 minutes during peak hours. Typical weekday ridership is approximately 3,600 passengers per day (2006 figure).

6 BAY bus route

This bus route operates mainly north-south on Bay Street between the area of Queens Quay East / Lower Jarvis Street and the area of Dupont Street / Bedford Road. The route serves Bay Station on the Bloor-Danforth Subway and Union Station on the Yonge-University Subway. Current service level in the Queens Quay / Lower Jarvis area is one bus every 5-6 minutes during peak hours and one bus every 10-17 minutes during off peak hours. Typical weekday ridership is approximately 10,000 passengers per day (2006 figure). This route operates 7 days a week.

75 SHERBOURNE bus route

This bus route operates mainly north-south on Sherbourne Street between the area of Queens Quay East / Lower Jarvis and the area of South Drive / Glen Road just north of Sherbourne Station on the Bloor-Danforth Subway. Current service level in the Queens Quay / Lower Jarvis area is one bus every 11-12 minutes during peak hours and one bus every 15-20 minutes during

off peak hours. Typical weekday ridership is approximately 4,800 passengers per day (2006 figure). This route operates 7 days a week.

4.4.2 GO Transit

GO Transit operates several inter-regional commuter rail services along the main rail line to the north of the study area. The nearest station is Union Station which is the largest transportation hub in the Greater Toronto Area. GO Transit also operates numerous bus routes out of its main bus terminal located just east of Union Station, south of Front Street, between Bay Street and Yonge Street.

4.4.3 Bicycle and Pedestrian Facilities

On-street bike lanes are provided in both directions on Queens Quay east of Yonge Street and on Lower Sherbourne Street. An off-street multi-use pathway, part of the Martin Goodman Trail, runs eastwards from Richardson Street along the south side of Queens Quay East.

Sidewalks are provided on all existing public streets within the study area except on the south side of Queens Quay East and on sections of Richardson Street and Bonnycastle Street. East of Richardson Street, pedestrians walking on the south side of Queens Quay East can use the Martin Goodman Trail. West of Richardson Street, however, pedestrians need to walk along the existing Redpath rail spur or cross to the north side of Queens Quay in order to proceed westward.

4.4.4 Road Network

The key streets and roadways in the study area are described in the following sections and illustrated in **Figure 4-7**.

Expressways

Gardiner Expressway – the Gardiner Expressway is an east-west oriented, basic 6-lane elevated roadway with on / off ramps at Lower Sherbourne Street and Lower Jarvis Street. The Gardiner Expressway is one of the principal roadways providing regional access to the central area of Toronto and links to the Queen Elizabeth Way (QEW) west of the City and to both the Don Valley Parkway and Lake Shore Boulevard East east of Don River. It carries high traffic volumes and operates as a controlled access, free-flow facility. The posted speed limit is 90 km/h.

Major Arterial Streets

Lake Shore Boulevard East – Lake Shore Boulevard East is an east-west oriented, basic 6-lane divided roadway that runs through the East Bayfront Precinct parallel to and either beneath or to the south of the Gardiner Expressway. Lake Shore Boulevard East carries relatively large volumes of traffic. Lake Shore Boulevard East connects with each of the main north-south streets in the study area. (Bay Street, Yonge Street, Lower Jarvis Street, Lower Sherbourne Street, Parliament Street and Cherry Street) at a series of signalized intersections. The local streets north of Queens Quay East also connect with Lake Shore Boulevard East. The posted speed limit is 60 km/h.

Jarvis Street – Jarvis Street north of Lake Shore Boulevard East is an arterial street that runs northwards, through an underpass structure, below the main rail-line to Front Street. North of Front Street, Jarvis Street extends all the way north to Bloor Street East. Lower Jarvis Street is a basic 4-lane roadway that provides a key linkage between the waterfront and the downtown. The posted speed limit is 50 km/h.

Minor Arterial Streets

Queens Quay East – Queens Quay is an east-west oriented, basic 4-lane roadway that runs parallel to Lake Shore Boulevard across central Toronto. Queens Quay connects from Lake Shore Boulevard West west of the downtown at Bathurst Street and runs through the East Bayfront Precinct area to connect back to Lake Shore Boulevard East at Parliament Street. The posted speed limit is 50 km/h.

Lower Sherbourne Street – Lower Sherbourne Street is a north-south oriented, basic 4-lane roadway (3 lanes south of Lake Shore Boulevard East) that extends from Queens Quay East northwards to just north of Bloor Street East. There are on-street bicycle lanes provided in each direction. The posted speed limit is 50 km/h.

Parliament Street – Parliament Street is another north-south oriented, basic 4-lane roadway that extends from Lake Shore Boulevard East, passing beneath the main rail-line, to Bloor Street East. Parliament Street has a posted speed limit of 50 km/h.

Collector Streets

Lower Jarvis Street – The section of Lower Jarvis Street south of Lake Shore Boulevard East and within the East Bayfront Precinct is a 4-lane collector street. The intersection of Queens Quay East and Lower Jarvis Street is signalized and is located just over 200 metres south of the Lake Shore Boulevard East traffic signal. The posted speed limit is limit is 50 km/h.

Local Streets

There are five local north-south oriented streets linking between Lake Shore Boulevard East and Queens Quay East. These are as follows:

- Freeland Street
- Cooper Street
- Richardson Street
- Bonnycastle Street
- Small Street

They are all 2-lane roads with a 20.0 metre right-of-way. The posted speed limits are 50 km/h. Their intersections with Lake Shore Boulevard East and Queens Quay East operate under two-way (side street) STOP control. Access to Lake Shore Boulevard East is limited to right turns only except a Bonnycastle Street where the westbound (inbound) left turn is permitted.

Local Private Accesses

There are six local private accesses off Queens Quay East. They are as follows:

- Redpath Sugar Plant Driveways (south side of Queens Quay between Freeland Street and Cooper Street)
- Loblaws Driveways (north side of Queens Quay between Cooper Street and Lower Jarvis Street)
- MT 27 Parking lot Driveways (south side of Queens Quay east of Yonge Street)
- Gemess Investments (north side of Queens Quay between Richardson Street and Lower Sherbourne Street)

- 1617774 Ontario Ltd. (north side of Queens Quay between Richardson Street and Lower Sherbourne Street)
- Queens Quay Investments (north side of Queens Quay between Bonnycastle Street and Small Street)

Planned Roads

Several approved future road connections have been planned in the study area as part of the precinct plan and Class EA master plan processes for the East Bayfront Precinct. These future connections are described below.

Street 'A' – A new public street is contemplated on the northside of QueensQuay East approximately mid-block between Richardson Street and Lower Sherbourne Street.

Lower Sherbourne Street – Lower Sherbourne Street is to be extended south of Queens Quay East along the west side of the future Sherbourne Park. The extension will provide a direct connection from north to the Water's edge as well as providing access to Sherbourne Park.

Street 'D' (Aitkin Place) – A future signalized four legged intersection is contemplated between existing Bonnycastle Street and Small Street. This proposed signalized intersection will provide access to the proposed development blocks of East Bayfront located between Lower Sherbourne Street and Parliament Street.

Other Planned Roads

A future signalized driveway is contemplated across the existing Freeland Street, south of Queens Quay East. This proposed signalized access will provide access to the proposed residential development (MT 27) located between Yonge Street and Redpath Sugar, south of Queens Quay East.

Existing Intersection Control and Turn Restrictions

Existing area intersection control measures (i.e., traffic signal or STOP control) and turn restrictions are illustrated in Figure 4-7.

4.4.5 Existing Traffic Volumes – Study Area Vicinity

Existing unadjusted base traffic volumes for the morning and afternoon peak hours are illustrated in **Figure 4-8**. Traffic volumes at the area intersections within the study area vicinity are based upon recent traffic count information collected by the City of Toronto and Arup Canada Incorporated. Turning movements at un-signalized driveways along Queens Quay were also counted.

Available historical traffic counts within the study area were reviewed for general consistency of volume and to provide an understanding of existing traffic volume trends.

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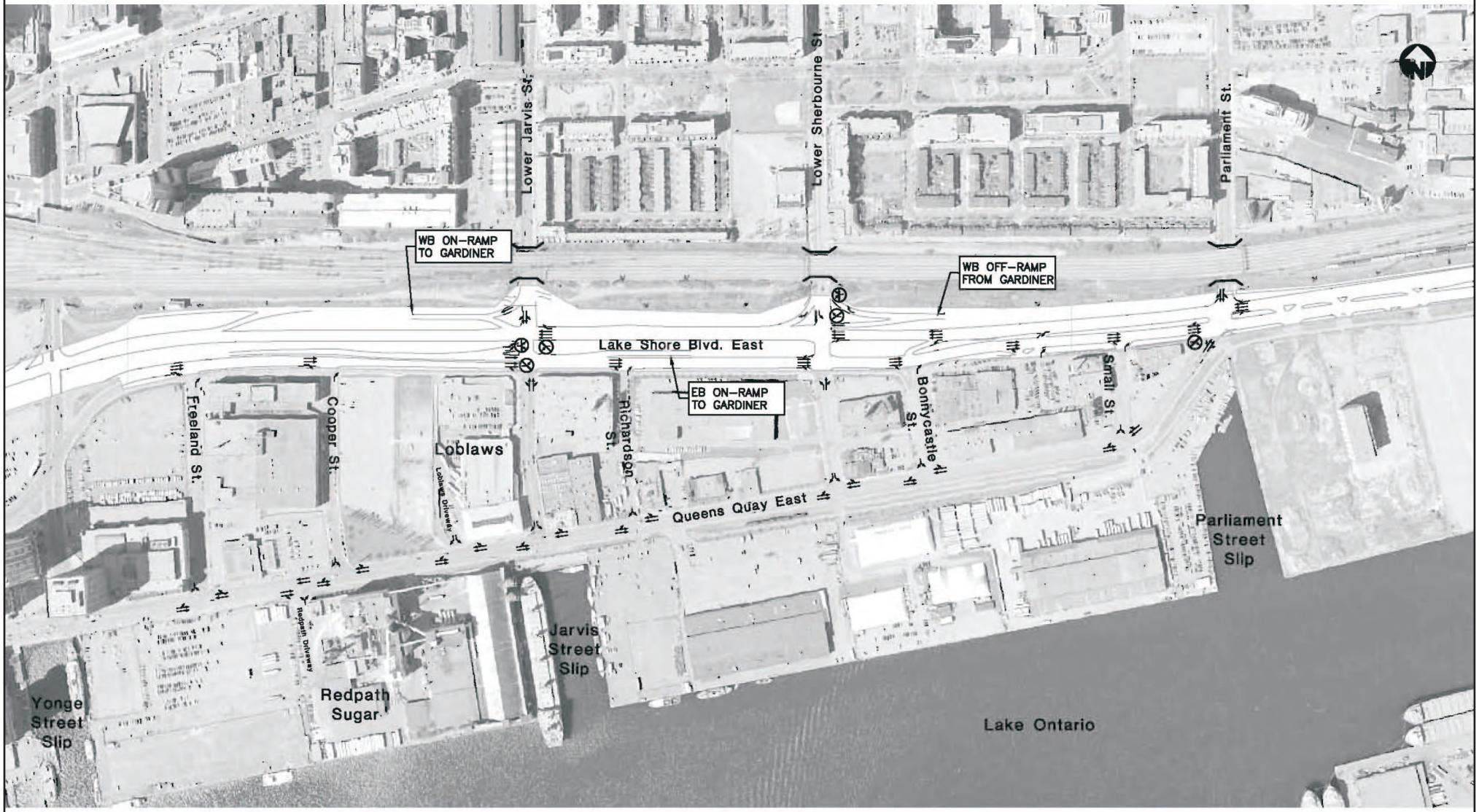
Title:

Existing Local Transit Network

Figure No.

4-6



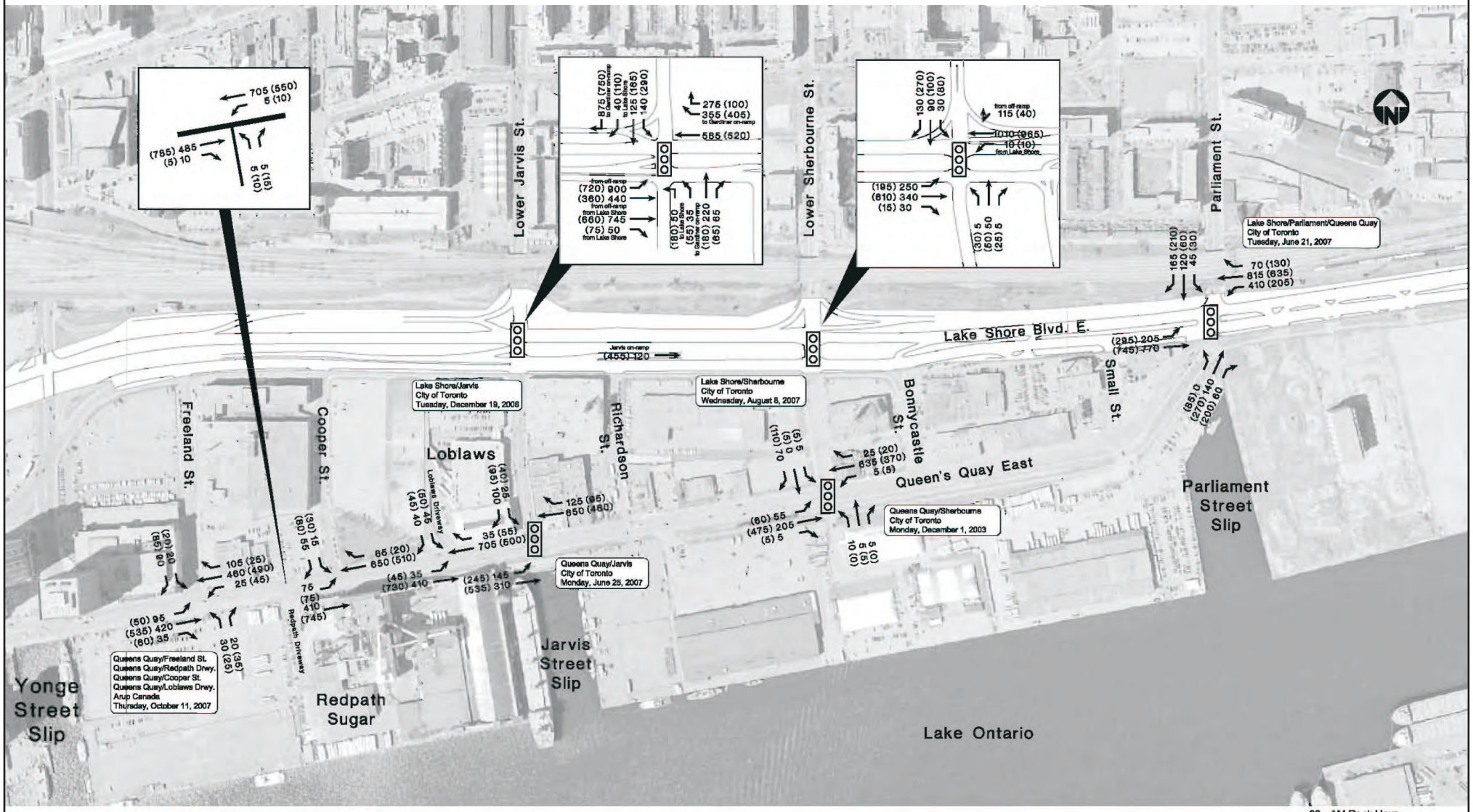
EXISTING ROAD NETWORK, LANE CONFIGURATIONS / TURN RESTRICTIONS

Notes: 1. Lake Shore Boulevard East shown below the Gardiner Expressway.

Intersection lane configuration

Turn Restriction

	Project: **EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT**	Figure No. **4-7**
	Title: Existing Road Network, Lane Configurations / Turn Restrictions	



EXISTING TRAFFIC VOLUMES

00 AM Peak Hour

(00) PM Peak Hour

Existing Traffic Signal

Notes: 1. All traffic volumes are rounded to the nearest 5 vehicles.
2. Lake Shore Boulevard East shown below the Gardiner Expressway.

	Project: **EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT**	Figure No. **4-8**
	Title: Existing Traffic Volumes	

5. PLANNING ALTERNATIVES

As part of the Class EA planning process, all reasonable alternative solutions were identified and evaluated while taking into account public and review agency input.

In consideration of all the reasonable alternative transportation solutions to provide a much faster and more reliable surface transit connection for commuters, the solutions, which most effectively address the following objectives, were carried forward for further investigation:

- Provides the best overall transit service to serve the long term residential, employment, tourism, and waterfront access.
- Respects other road users, adjacent properties and the natural environment.
- Can be implemented quickly at a reasonable cost.
- Supports other City and Waterfront Toronto objectives such as good urban design and more attractive walking and biking environment.

Alternative solutions or the basic planning alternatives considered as part of this EA included corridors and technologies. Both are described in greater detail in the following section.

5.1 Evaluation Criteria for Planning Alternatives

The Municipal Class Environmental Assessment process requires a proponent to consider all reasonable alternatives. As part of the Terms of Reference prepared and approved by the Ministry of the Environment in support of this undertaking – prior to conversion from the Individual EA process to the Class EA process – planning alternatives were to be assessed through a screening process. The criteria were set so that all alternatives must be able to address key project objectives and must be consistent with the proponent's policies and standards. Those screening criteria had been developed in consultation with key stakeholders and agencies, as well as the public in response to the transportation problem statement and were:

- Must be capable of accommodating travel demand – In order to support the development aspirations of the City and Waterfront Toronto, the proposed transit systems must be able to satisfy the anticipated transit demand resulting from the forecasted development.
- Must meet City's Official Plan Policies and Principles – This project builds on considerable planning and policy decisions that have already been made for the area and therefore a solution that is in conflict with one or more of these previous decisions is not considered reasonable.
- Must promote high transit mode splits - Must promote transit modal splits at least as good as comparable communities (such as the St. Lawrence neighbourhood).
- Must provide service to future inhabitants for the East Bayfront Precinct – In order to be considered as "well served by transit" the majority of future inhabitants must be within a 5-minute walk of existing or future transit.
- Must be able to connect to other planned Waterfront Precincts at boundaries of study area – For the East Bayfront, this means that a corridor must have the possibility of connecting to the east to Cherry Street in order to connect to the West Don Lands and the Port Lands.

- Must accommodate people with mobility difficulties – whichever corridor or technology selected, service must be fully accessible / of a barrier free design.

These criteria have been applied to both the alternative corridors and technologies as documented in the following sections.

5.2 Planning Alternatives: Corridor

Providing a convenient link to Union Station, while serving the long term residential, employment, and waterfront access needs in the East Bayfront area, is a key requirement of the study. There are two possible options in the study area that could serve the existing and future development and provide connections to Union Station, the Port Lands, and the West Don Lands. The potential corridors considered as part of the East Bayfront Transit EA included:

1. **'Queens Quay Only':** One transit facility along the Queens Quay East/Bay Street corridor. Transit users travelling to/from the East Bayfront and Port Land areas would be served by transit on Queens Quay East.
2. **'Queens Quay Local plus Lake Shore Express':** One transit facility along the Queens Quay East/Bay Street corridor to serve local demands and a second transit facility along Lake Shore Boulevard to provide an express bypass for customers passing through the study area.

The alternative corridors are illustrated in **Figures 5-1 and 5-2**.

Queens Quay East Corridor

The Queens Quay East corridor bisects the future East Bayfront development and provides the most direct service to and from the study area. It also connects directly to the existing streetcar tunnel under Bay Street. An expansion of the Union Station Loop will be required as part of the undertaking to accommodate future transit services in the Eastern Waterfront as well as future growth in the existing transit services in the Central Waterfront.

Lake Shore Corridor

The Lake Shore corridor is on the northern edge of the study area and, while providing a possible bypass route for transit users passing through the study area, it would provide only limited direct service to development in the East Bayfront area. As determined in the review of this option, transit vehicles operating in the Lake Shore corridor would connect to Union Station from Lake Shore Boulevard in a one-way loop via York Street, Front Street, and Bay Street. An at-grade facility was considered to be the most feasible solution, whereas a grade-separate facility, given the physical constraints surrounding Union Station, would be difficult to achieve and prohibitively expensive to construct.

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Title:

Corridor Alternatives - 'Queens Quay Only"
(Option 1)

Figure No.

5-1

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Title: Corridor Alteratives - 'Lake Shore Express plus Queens Quay Local' (Option 2)

Figure No.

5-2

5.2.1 Screening of Corridor Alternatives

Screening criteria were applied against the corridors under consideration, and as illustrated in **Table 5-1**, both corridor options passed the screening analysis and carried forward for further consideration.

Table 5-1: Screening of East Bayfront Corridor Alternatives

Corridor Considered / Minimum Requirement	Queens Quay Only	Queens Quay Local plus Lake Shore Express
The alternative must be capable of accommodating travel demand from forecast development.	Yes	Yes
Must meet City's Official Plan Policies and Principles.	Yes	Yes
Must promote transit modal splits at least as good as comparable communities (such as the St. Lawrence neighbourhood).	Yes	Yes
Must provide transit service to majority of future inhabitants within 500 m of transit.	Yes	Yes
Must be able to connect to other planned Waterfront Precincts at boundaries of study area	Yes	Yes
Must accommodate people with mobility difficulties.	Yes	Yes
Recommendation	**Carried**	**Carried**

5.2.2 Assessment of Corridor Alternatives

A detailed assessment of the corridor alternatives was carried out based on a formal process and a comprehensive set of criteria, indicators, and measures identified for the categories of land use, transportation, socio-economic environment, natural environment, cultural environment, and cost. Results of the analysis can be found in **Appendix G** of this report. Key decision-relevant factors were outlined. Factors that had no effect on the selection of the preferred alternative were dropped from further consideration.

5.2.3 Evaluation of Corridor Alternatives

The corridor alternatives were evaluated against the project objectives and the key net environmental impacts and benefits were identified. The detailed evaluation matrices are contained in **Appendix G**. A summary of the relative performance of each alternative to the undertaking is presented in **Table 5-2**.

As a result of minimal cultural and natural environment features within the study area, both categories of factors were considered not to be a major issue in deciding on the preferred transit technology option. The key differences between the two corridor alternatives are summarized in the following sections.

Passenger Travel Patterns

A follow-up travel demand analysis was carried out to assess the potential transit demand that could be generated by a 'Lake Shore Express' service as well as the effect on demand in the Queens Quay corridor.

For the purpose of the analysis, 'Lake Shore Express' was assumed to be a form of higher-order transit service. The assumption is consistent with the Problem Statement discussed in Section 3.4 of this report, that a high quality transit service, in terms of speed and service reliability, is required in order to help achieve planning objectives in the Eastern Waterfront. The service would operate from the Beaches (Neville Loop) to Union Station through the Port Lands, serving customers who otherwise would have used services operating in the Queens Quay corridor to get to Union Station.

Using the same approach described in Section 3.1 of this report, the transit demand forecast showed that the 'Lake Shore Express' could potentially generate up to 2,300 riders in the peak direction during the morning peak hour. On the other hand, demand on Queens Quay East could potentially reduce to approximately 2,000 riders in the peak direction during the same time period.

Right-of-Way Availability

For Option 1 **Queens Quay Only**, the planned right-of-way widths on Queens Quay East, as per the Central Waterfront Secondary Plan and the East Bayfront Precinct Plan, are capable of accommodating the required facility for pedestrians, cyclists, transit users, and car users.

For Option 2 **Queens Quay Local plus Lake Shore Express**, even though the 'Queens Quay Local' service could be accommodated within the planned right-of-way on Queens Quay East, the Lake Shore Express service would require conversion of a traffic lane on York Street, Front Street, Bay Street, and Lake Shore Boulevard into transit-only lanes, resulting in a reduction of transportation capacity needed to support planned developments in the Eastern Waterfront.

Traffic impact

For Option 1 **Queens Quay Only**, there is adequate non-auto and auto capacity, within the planned right-of-way widths on Queens Quay East, to support planned development activities in the Eastern Waterfront.

For Option 2 **Queens Quay Local plus Lake Shore Express**, even though there is adequate capacity within Queens Quay East to accommodate all users, the reduction of traffic capacity on York Street, Front Street, Bay Street, and Lake Shore Boulevard – as required for Lake Shore Express – would result in a reduction of transportation capacity needed to support planned developments in the waterfront. There would be a capacity reduction in the westbound Lake Shore Boulevard East (800 vehicles/hour), northbound York Street (500 vehicles/hour), and southbound Bay Street (400 vehicles/hour) during the peak hour.

Attractiveness of Service

For Option 1 **Queens Quay Only**, the combination of a redesign Queens Quay East and the existing Bay Street Tunnel would provide a fast and reliable transit service for transit users travelling to and from the Eastern Waterfront.

For Option 2 **Queens Quay Local plus Lake Shore Express**, despite transit-only lanes on existing streets, transit service would continue to be impeded by delay at Union Station as a result of high volume of pedestrian activities on Front Street. Although the 'Lake Shore Express' service could theoretically attract more than 2,000 trips in the peak direction, the actual demand level will be affected by the quality and attractiveness of the service. Without the possibility to provide a dedicated transit right-of-way along the corridor, it is unlikely that the projected level of transit demand will materialize. Transit users would be more inclined to choose the Queens Quay East corridor where the quality and attractiveness of service would be higher.

Capital Cost

For Option 1 **Queens Quay Only,** since it would require one transit facility to serve the projected demand, it is less expensive to construct Option 1 than Option 2.

For Option 2 **Queens Quay Local plus Lake Shore Express**, since it would require two transit facilities – transit-only lanes for Lake Shore Express in addition to transit facility on Queens Quay East – Option 2 is considered to be more expensive to construct than Option 1.

5.2.4 Recommendation of the Preferred Corridor Alternative

The option involving both Queens Quay East and Lake Shore Boulevard was identified as being less cost-effective than the option of providing service on Queens Quay East alone with respect to serving the East Bayfront area specifically. The 'Queens Quay Local plus Lake Shore Express" option would create two parallel facilities in close proximity which would, in turn, reduce service frequency on Queens Quay East while incurring higher capital cost. The need for 'Lake Shore Express' to negotiate through traffic on Lake Shore Boulevard and around Union Station, as determined in the review of this option, would also result in transit operational delays and create adverse impacts on Front Street from transportation, public realm, and urban design perspectives.

The 'Queens Quay Only' option of providing service to Union Station is preferred because it will fully serve developments in the East Bayfront and Port Land areas, provide higher service frequency on Queens Quay East, and result in lower capital cost.

The assessment confirmed the need for transit services on Queens Quay in the East Bayfront to connect with planned services on Cherry Street in the West Don Lands area and to the Port Land area to the south. These connections are elements of the *Lower Don Lands Class EA Master Plan*, which is being undertaken by Waterfront Toronto. The preferred design for these connections will be addressed in that study.

Table 5-2: East Bayfront Corridor Alternatives Evaluation Summary

OBJECTIVES	Queens Quay Only	Queens Quay Local plus Lake Shore Express
Land Use	●	◕
Transportation	●	◑
Socio-Economic	●	◕
Natural	Not a Decision-Relevant Factor	Not a Decision-Relevant Factor
Cultural	●	●
Cost	●	◑
OVERALL	●	◑

5.3 Planning Alternatives: Transit Technology

There is a wide range of transit technologies available to consider. As part of the early planning process, the technologies considered were limited by the anticipated demand in the corridor, as discussed in **Section 3.1** of this report. Therefore, it was determined that a fully grade separated facility, such as a subway, is not warranted to serve this level of demand and was not considered further (**Figure 5-3**).

A number of bus propulsion technologies were identified including those that would eliminate local emissions such as electric or fuel-cell technology buses. The assessment was done based on the best future technology. Therefore, for this comparison, it was assumed that buses, in the future, will have zero local emissions (assuming fuel cell or electric propulsion).

The technology options assessed within the Queens Quay East corridor are as follows:

1. bus in mixed-traffic
2. streetcar in mixed-traffic
3. bus in dedicated right-of-way (Bus Rapid Transit)
4. streetcar in dedicated right-of-way (Light Rail Transit)

Bus in Mixed-Traffic

With this option, transit service in the East Bayfront would continue to be provided by existing bus routes operating on Queens Quay East and the surrounding road network. Buses would continue to travel in general traffic lanes shared with automobiles and other road users. Passenger boarding and alighting would take place curb-side in the sidewalk.

Streetcar in Mixed-Traffic

With this option, transit service in the East Bayfront would be provided by a new streetcar route on Queens Quay East and by existing bus routes in the area. Streetcars operating in mixed-traffic would travel in the centre lanes shared with general traffic, as is the case predominantly across the existing TTC streetcar network. Passengers boarding and alighting would take place at an island platform located between the curb lane and the centre lane that protects passengers from the adjacent general traffic.

Bus in Dedicated Right-of-Way (BRT)

With this option, transit service in the East Bayfront would be provided by a new bus route operating on Queens Quay East and by existing bus routes in the area. A dedicated bus right-of-way would provide a two-lane transit-only facility on Queens Quay East, with general traffic lanes operating to the outside. The right-of-way would be segregated from the adjacent general traffic lanes by either a protective curb or a raised median on each side of the right-of-way. No uncontrolled turns are allowed across the transit right-of-way. Where there is enough roadway right-of-way available, the raised medians may be wide enough for landscaping and street trees or other features. Bus stops would be located at signalized intersections and take the form of sheltered side platforms on the raised medians.

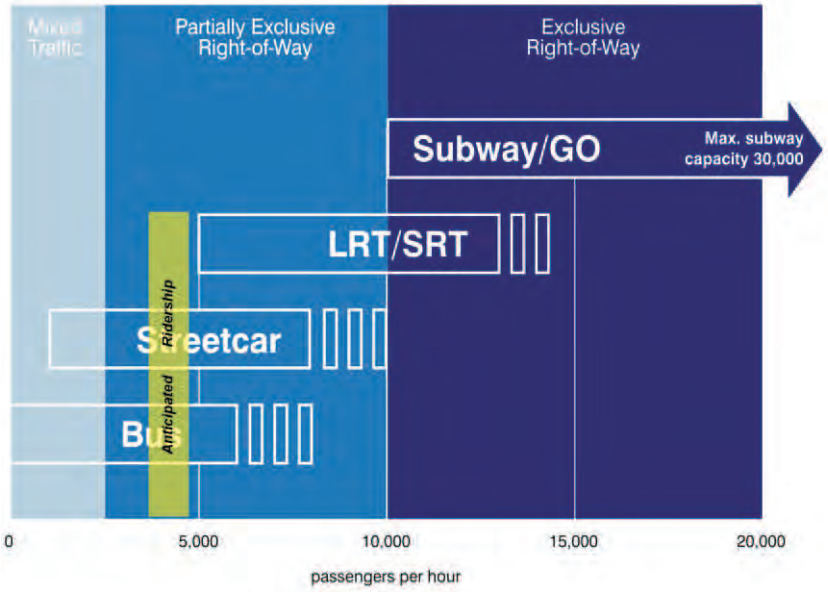
Buses move through intersections together with the adjacent general traffic. Left turns by general traffic across the transit right-of-way are accommodated on exclusive protected signal phases only. Signal phases may also be provided for buses to turn into or out of the right-of-way at intersections. Alternatively, buses can slip in or out of the right-of-way by way of mid-block slip lanes, and make their turns from the general traffic lanes.

Streetcar in Dedicated Right-of-Way (LRT)

With this option, transit service in the East Bayfront would be provided by a new streetcar route on Queens Quay East and by existing bus routes in the area. A dedicated streetcar right-of-way would provide a two-lane transit-only facility on Queens Quay East, with general traffic lanes operating to the outside. Examples from around the City of Toronto include Queens Quay Avenue west of Bay Street, Spadina Avenue south of Spadina Subway Station, and St. Clair Avenue west of Yonge Street. The right-of-way would be segregated from the adjacent general traffic lanes by either a protective curb or a raised median on each side of the right-of-way (e.g. Spadina Avenue), or by raising the streetcar track bed that is level with the pavement at intersections (e.g. St. Clair Avenue). No uncontrolled turns are allowed across the transit right-of-way. Where there is enough roadway right-of-way available, the raised medians may be wide enough for landscaping and street trees or other features. Streetcar stops would be located at signalized intersections and take the form of sheltered side platforms on the raised medians.

Streetcars move through intersections together with the adjacent general traffic. Left turns by general traffic across the transit right-of-way are accommodated on exclusive protected signal phases only. Signal phases may also be provided for streetcars to turn into or out of the right-of-way at intersections.

Transit ROW's and Technologies



Streetcar in Mixed Traffic (with Platforms)

Bus in Mixed Traffic

Streetcar/LRV in Dedicated Right-of-Way

Bus in Dedicated Right-of-Way

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Figure No.

5-3

Title:

Technology/ROW Alternatives

5.3.1 Screening of Technology Alternatives

As identified in **Table 5-3**, mixed-traffic operations (buses and streetcars) were screened out as they do not provide a high enough quality of transit service (reliability and speed) to compete effectively with the automobile, attract a high mode-split to transit, and address projected significant future travel demand in the Eastern Waterfront area.

Table 5-3: Screening of East Bayfront Transit Technology Alternatives

Technology Considered / Minimum Requirement	Bus in Mixed Traffic	Streetcar, with platforms in Mixed Traffic	Streetcar in Dedicated Right-of-Way (LRT)	Buses in Dedicated Right-of-Way (BRT)
The alternative must be capable of accommodating travel demand from forecast development.	No	No	Yes	Yes
Must meet City's Official Plan Policies and Principles.	No	No	Yes	Yes
Must promote transit modal splits at least as good as comparable communities (such as the St. Lawrence neighbourhood).	No	No	Yes	Yes
Must provide transit service to majority of future inhabitants within 500 m of transit.	Yes	Yes	Yes	Yes
Must accommodate people with mobility difficulties.	Yes	Yes	Yes	Yes
Recommendation	**Not Carried**	**Not Carried**	**Carried**	**Carried**

5.3.2 Assessment of Short-Listed Transit Technology Alternatives

A detailed assessment of the short-listed transit technology alternatives was carried out based on a formal process and a comprehensive set of criteria, indicators, and measures identified for the categories of land use, transportation, socio-economic environment, natural environment, cultural environment, and cost. Results of the analysis can be found in **Appendix G** of this report. Key decision-relevant factors were outlined. Factors that had no effect on the selection of the preferred alternative were dropped from further consideration.

5.3.3 Evaluation of Short-Listed Transit Technology Alternatives

The short-listed transit technology alternatives were evaluated against the project objectives and the key net environmental impacts and benefits were identified. The detailed evaluation matrices are contained in **Appendix G**. A summary of the relative performance of each alternative to the undertaking is presented in **Table 5-4**.

As a result of minimal cultural and natural environment features within the study area, both categories of factors were considered not to be a major issue in deciding on the preferred transit technology option.

The key differences between streetcars and buses are summarized in the following sections.

Network Continuity/Connectivity

Given the existing streetcar services at Union Station and on Queens Quay west of Bay Street, as well as the planned streetcar service on Cherry Street to King Street and the future transit network in the Port Lands, a LRT on Queens Quay East will fit seamlessly with the established streetcar network in the downtown area, maintain network continuity with the approved planned streetcar line serving the West Don Lands area, and help expand higher-order transit into the Port Lands area as envisioned by the *Central Waterfront Secondary Plan*.

A BRT on Queens Quay East, on the other hand, does not integrate well with existing and future transit network in the area which is primarily streetcars. A bus facility would preclude opportunities to connect directly with existing streetcar services to the west and future streetcar services to the east.

Service Reliability

As discussed in Section 3.1 and illustrated in Figure 3-1 of this report, demand forecast analysis indicated that, assuming full redevelopment in the Eastern Waterfront, up to 4,250 people will be travelling through the East Bayfront area in the peak direction during a typical weekday morning peak hour.

Streetcars, with larger passenger capacity than buses, can easily accommodate the projected level of demand. Based on the standard load of the TTC's new light rail vehicle – which will be purchased to replace the existing streetcars – the projected level of demand will require one two-car train every 3.5 minutes during the peak periods. This level of service is manageable and comparable to existing streetcar services on Spadina Avenue and part of St. Clair Avenue.

Buses, on the other hand, are smaller and carry fewer passengers than modern light rail vehicles. Based on a typical standard load of an articulated bus – not currently operated by the TTC – the projected level of demand will require approximately one bus every minute during the peak periods. The large number of buses entering the underground terminal, above and beyond future growth on the existing Queens Quay West streetcar services and, potentially, future light rail service on Bremner Boulevard, will result in significant bunching and delays at Union Station, affecting the reliability and attractiveness of the services.

Capital Cost

Although a LRT line generally costs more to build than a BRT line, there are cost savings associated with utilizing the existing Bay Street Tunnel to get to Union Station from Queens Quay.

A BRT line for the East Bayfront, on the other hand, would require widening and repaving of the existing Bay Street Tunnel which would incur significant capital costs. Buses require wider lanes to operate on than streetcars as buses have less maneuverability compared to streetcars which operate on rails. Because the existing Bay Street Tunnel was designed for streetcars, with narrow tunnels and unpaved track bed, it would be necessary to reconstruct the tunnel in order to accommodate buses. In addition, the large number of buses that would be needed to operate the Queens Quay East line, combined with future growth on the existing Queens Quay West streetcar services as well as the potential future Bremner Boulevard LRT, will require more loading areas and more by-pass lanes at Union station Loop than what would be required than a LRT line.

Operating Cost

Although the exact operating plan for the Queens Quay East service will be determined at a later stage in the implementation process, it is expected a LRT on Queens Quay East will be less expensive to operate than a BRT. Transit vehicle operators account for 60% to 75% of all operational costs of transit systems and the LRT, with much higher passenger capacity per vehicle than buses, as well as the ability to operate in multiple-units, can meet the projected level of demand with fewer operators and lower cost. Operator cost savings will be partly offset by the added cost of maintaining LRV infrastructure but the net operating cost to carry the forecast passenger loads is expected to be less for LRT service than the equivalent bus service.

Assuming similar operating conditions (e.g. speed, travel time), a BRT on Queens Quay East will likely require 3 to 4 times more vehicles to operate than a LRT, requiring more operators and incurring more operating cost.

5.3.4 Recommendation of the Preferred Transit Technology Alternative

Results of the evaluation are summarized in Table 5-4. The recommended technology alternative to serve the East Bayfront is streetcars in dedicated right-of-way (LRT) on Queens Quay East. The preferred alternative was selected for the following reasons:

- LRT can adequately accommodate the projected level of demand, whereas BRT cannot
- BRT would require short bus headways will result in low service reliability – not possible in practice to maintain reliable bus service operation
- BRT cannot integrate well with the existing downtown transit network, which is primarily streetcars, or the planned future streetcar line on Cherry Street serving the West Don Lands and the Port Lands. LRT is preferred because of the ability to maintain network continuity and improve transit connectivity with existing and future transit networks in the area
- The facility costs for buses would be significantly more expensive than streetcars due to the need to both widen/rebuild and pave the entire Bay Street tunnel to support bus operation

Table 5-4: East Bayfront Transit Technology Alternatives Evaluation Summary

OBJECTIVES	Streetcar in Dedicated ROW (LRT)	Buses in Dedicated ROW (BRT)
Land Use	●	◕
Transportation	●	○
Socio-Economic	◕	●
Natural	Not a Decision-Relevant Factor	Not a Decision-Relevant Factor
Cultural	Not a Decision-Relevant Factor	Not a Decision-Relevant Factor
Cost	●	◑
OVERALL	●	○

5.4 Public Consultation: Planning Alternatives

Consultation activities in support of selecting the preferred planning alternatives involved numerous meetings with key stakeholders and two rounds of public consultation:

- Public Information Centre (PIC) #1 on March 28, 2007 at Novotel Hotel (6:00pm to 9:30pm)
- Public Information Centre (PIC) #2 on June 21, 2007 at Novotel Hotel (6:00pm to 9:30pm)

5.4.1 Summary of First Round of Public Consultation (PIC #1)

The first round of public consultation (PIC #1) was held on March 28, 2007 at Novotel Hotel (6:00pm to 9:30 pm). 49 attendees signed in at the event.

The purpose of this workshop was to:

- Provide an update on the study progress since completion of the Terms of Reference in July 2006
- Review planning alternatives analysis to date (corridor, transit technology/right-of-way)
- Review the alternatives recommended to be carried forward for additional analysis
- Review key design issues to be considered during the next stage (Design Alternatives stage) of this EA study
- Invite the public to provide their input on the Project Team's recommendations

Notification

A notice of the workshop was advertised in the Toronto Star on Wednesday, March 7, 2007. A postcard invitation to the workshop was also distributed to over 9000 condo units along the Central Waterfront from Stadium Road to Cherry Street. In addition, an email notification was sent to over 4000 contacts on the Project Mailing List.

Summary of Key Issues

The workshop was held as an open house during which those who arrived could review the available display panels and discuss the study with Project Team staff. Following the open house session, Waterfront Toronto, the TTC, and the Consultant made a formal presentation.

The presentation was followed with a workshop group discussion session. The discussion session provided an opportunity for the public to provide their views on the Project Team's recommendations on the Planning Alternatives proposed to be carried forward.

Approximately 50 people participated in this workshop and the attendees formed 5 working groups for discussion. The responses to four key questions are summarized in **Table 5-5**:

Additional comments were provided on key considerations for the alternative design phase (see **Appendix A** for details).

Table 5-5: Summary of Key Responses to PIC #1 Workshop Questions

Question	Summary of Key Responses
1. What are your views on 'Queens Quay only' being recommended as the preferred corridor for providing transit service to the East Bayfront? (Please identify perceived strengths, weaknesses, and questions)	**Key Strengths:** • Less costly • Higher frequency of service along Queens Quay East • Better serves the needs of future local population • Simple connection/transfer at Union Station • Consistent with the *East Bayfront Precinct Plan* and the *Central Waterfront Secondary Plan* • Provides flexibility for future transit service expansion in the area **Key Weaknesses:** • Not as direct as 'Lake Shore Express' for trips between Port Lands and Union Station • Does not provide an alternate route for trips between Port Lands and Union Station • Noise due to higher transit activities along Queens Quay East • Potential for bottleneck at Union Station
2. What are your views on transit (i.e. streetcar/light rail vehicle or bus) in a dedicated right-of-way along Queens Quay East being recommended as the preferred approach for providing service to the East Bayfront? (Please identify perceived strengths, weaknesses, and questions)	**Key Strengths:** • Offers a reliable service • Provides the required capacity to meet future demand • Encourages use of TTC and allows for a more regular service **Key Weaknesses:** • ROW width • Reduction of traffic lanes and the effects on traffic • Costs to implement dedicated transit lanes • Does not provide for express service within the dedicated transit ROW

3. Regardless of which transit technology is carried forward (i.e. streetcar/light rail vehicle or bus), when designing the right-of-way along Queens Quay East there are various considerations which have implications for the appearance and width of the right-of-way. Of the design considerations, which would you say are of greatest relative importance?	**Key Suggestions:** • Barrier between car and bike lane for a safe cycling environment • Wider and longer platforms to accommodate forecast demand • Trees **Key Considerations:** • Wide sidewalks • Pedestrian-friendly transit facility that accounts for user safety and convenience • Separation between the Martin Goodman and the general traffic (safety consideration) • Reduce conflicts between crossing pedestrians and turning traffic
4. What are your views on options for getting transit users to Union Station from Queens Quay East?	• Utilize the existing Bay Street tunnel – add a portal somewhere east of Yonge Street and use the existing streetcar tracks to connect to Union Station • Eliminate the existing portal on Queens Quay West and eliminate tunneling • Widen the existing Bay Street tunnel and convert it for buses • Construct a SkyTrain-type service connecting Queens Quay and Union Station

5.4.2 Summary of Second Round of Public Consultation (PIC #2)

The second round of public consultation (PIC #2) was held on June 21, 2007 at Novotel Hotel (6:00pm to 9:30 pm). 52 attendees signed in at the event.

The purpose of this workshop was to discuss the following:

- The assessment of alternative transit technologies and related recommendations regarding the use of streetcar or bus for providing transit service along Queens Quay East and north to Union Station
- Potential locations for transit vehicles travelling to/from Queens Quay East to enter the existing Bay Street tunnel and connect to the Union Station loop. These locations were to be assessed in detail at the next stage of the study

Workshop attendees were invited to provide their input on these topics and the Project Team's recommendations.

Notification

A notice of the workshop was advertised in the Toronto Star on Thursday, June 7, 2007. A postcard invitation to the workshop was also distributed to over 9000 condo units along the Central Waterfront from Stadium Road to Cherry Street. In addition, an email notification was sent to over 4000 contacts on the project's general mailing list.

Summary of Key Issues

The workshop was held as an open house during which those who arrived could review the available display panels and discuss the study with Project Team staff. Following the open house session, the Waterfront Toronto, the TTC, and the Consultant made a formal presentation.

The presentation was followed with a workshop group discussion session. The discussion session provided an opportunity for the public to provide their views on the Project Team's recommendations on the alternatives proposed to be carried forward.

52 people participated in this workshop and the attendees formed 4 working groups for discussion. The responses to key questions are summarized in **Table 5-6**:

Additional comments were provided on key considerations for the alternative design phase (see **Appendix A** for details).

Table 5-6: Summary of Key Responses to PIC #2 Workshop Questions

Question	Summary of Response
What are your views on Streetcar/Light Rail Vehicle (LRV) being recommended as the preferred technology for providing transit service to the East Bayfront? (Please identify perceived strengths, weaknesses, and questions)	**Key Strengths** Streetcar/LRV can provide the capacity to accommodate the forecast demands and will offer a more reliable service compared to bus. Other perceived strengths: better connectivity with local transit network, no need to widen the tunnel, can operate as multiple units, better sustainability **Key Weaknesses** Track obstruction due to vehicle breakdown and the inability to bypass on the same track. Streetcar perceived by some to be slower than bus. Noise, vibration, and its dependence on electricity from the grid.

During the course of the study leading up to PIC #2, suggestions were made by the Community Liaison Committee to investigate the possible elimination of the current streetcar connection between Queens Quay and Union Station and its replacement by a 'moving walkway' or a 'people mover'. Under this concept, transit vehicles would only operate east-west on Queens Quay and passengers heading north to Union Station would have to transfer at Queens Quay and Bay Street and use the underground 'moving walkway' to get to Union Station.

Although the concept would improve streetscape on Queens Quay by eliminating the existing tunnel portal west of Bay Street, the need to transfer between the 'moving walkway' and transit vehicles would create a major inconvenience to transit users, resulting in reduced quality of service and reduced ridership – contrary to the purpose of this EA study. As the concept does not provide a high enough quality of transit service and will adversely impact the ability to attract a high mode-split to transit, the 'moving walkway' option was screened out from further consideration.

6. DESIGN ALTERNATIVES

Alternative designs are different ways of achieving the preferred plan selected through the Planning Alternative phase. Alternative designs considered cross-section elements including lane widths, transit right-of-way alignment, boulevard treatment, sidewalks, and bike paths.

This stage of the EA process builds upon the information obtained from the Planning Alternatives stage and involves a comparative analysis of the advantages and disadvantages of the Design Alternatives considered to select a Preferred Alternative.

This chapter describes the development, analysis and evaluation of Design Alternatives. The process used to ultimately select a preferred design follows the steps as identified for Phase 3 of the Municipal Class EA process.

Two types of design alternatives were examined in this EA study:

- Tunnel Portal Location – location of the entrance to the existing Bay Street Tunnel for the proposed Queens Quay East streetcar line
- Streetcar Alignment – location of the proposed transit facility within the proposed Queens Quay East right-of-way

6.1 Evaluation Criteria for Design Alternatives

In consultation with key Stakeholders and the public, the following screening criteria were developed to identify reasonable alternative designs:

- Develop the new transit infrastructure required to encourage transit use and reduce auto dependence. Specifically, the alternative must provide Transit Priority:
    - East / west transit operations must be given at least as much “green time” at signals as east-west traffic (to minimize delay to transit vehicles at intersections);
    - Designs should not create situations where vehicles have the potential to block streetcar operations.
- Develop new infrastructure in accordance with the TTC, Toronto and Waterfront Toronto design criteria/guidelines. This includes provision for bicycles, platforms for barrier free design, an improved pedestrian realm, provision for emergency vehicles and sufficient road capacity to address future traffic demand.
- Minimize pavement and right-of-way (ROW) widths.
- Establish transit network connections to integrate the recommended services with the existing transit system in accordance with an integrated systems plan. This includes a connection to Union Station and protection for connection to the West Don Lands and the Port Lands.
- Avoid, or where this is not possible, minimize impacts to natural systems with particular emphasis on natural features, functions, systems and communities.

For the purposes of this EA, all design alternatives must be able to address the aforementioned key considerations. These key considerations were refined to develop specific screening criteria to focus the range of design alternatives that should be carried forward to more detailed analysis and evaluation. The results of the screening process are summarized in Table 6-1.

6.2 Design Alternatives: Tunnel Portal Location

The Project Team examined a wide range of options for the location of the transition from the existing streetcar tunnel under Bay Street to a surface right-of-way. The options considered included: Yonge Street, Bay Street, York Street, Harbour Street, and Queens Quay. The options are described below.

Yonge Street

As illustrated in **Figure 6-1**, the tunnel portal would be located on Yonge Street between Harbour Street and Queens Quay, serving the existing Harbourfront streetcars and the proposed Queens Quay East streetcars. A new tunnel would be constructed to connect the portal into the existing Bay Street Tunnel. Because of existing developments in the area, it would be necessary to locate the new tunnel within the road right-of-way. The new tunnel would connect with the existing Bay Street Tunnel at the Bay/Harbour intersection. The existing portal on Queens Quay west of Bay Street would be abandoned and filled. The existing Bay Street Tunnel would require extensive modification to accommodate the new tunnel, while the section south of Harbour Street would be abandoned. All streetcars operating to and from Union Station would enter through the Yonge Street/Queens Quay intersection at-grade in mixed traffic.

Bay Street

As illustrated in **Figure 6-1**, the tunnel portal would be located on Bay Street between Lake Shore Boulevard and Queens Quay. Two options are possible: (1) between Lake Shore Boulevard and Harbour Street, and (2) between Harbour Street and Queens Quay Boulevard. Both options would connect directly into the existing streetcar tunnel under Bay Street. All streetcars operating to and from Union Station would enter through the Bay Street/Queens Quay intersection at-grade in mixed traffic. There would be one tunnel portal on Bay Street serving the existing and the proposed streetcar lines. The existing portal on Queens Quay west of Bay Street and the underground streetcar station at Queens Quay / Bay Street (Queens Quay/Ferry Docks Station) would be demolished and filled. Extensive reconstruction of the existing Bay Street Tunnel would be required to accommodate the new portal.

York Street

As illustrated in **Figure 6-2**, the tunnel portal would be located on York Street between Harbour Street and Queens Quay, serving both the existing Queens Quay West streetcars and the proposed Queens Quay East streetcars. A new tunnel would be required to connect the portal into the existing Bay Street Tunnel. The portal would bisect Harbour Street as a result of the short distance between Harbour Street and Queens Quay West. The new tunnel would run easterly from York Street along the south side of the Gardiner Expressway and connect into the existing tunnel at Bay Street. The existing portal on Queens Quay west of Bay Street would be replaced. Extensive modification to the existing Bay Street Tunnel would be required. All streetcars operating to and from Union Station would enter through the York Street/Queens Quay intersection at-grade, mixed with surface traffic and pedestrian movements.

Harbour Street

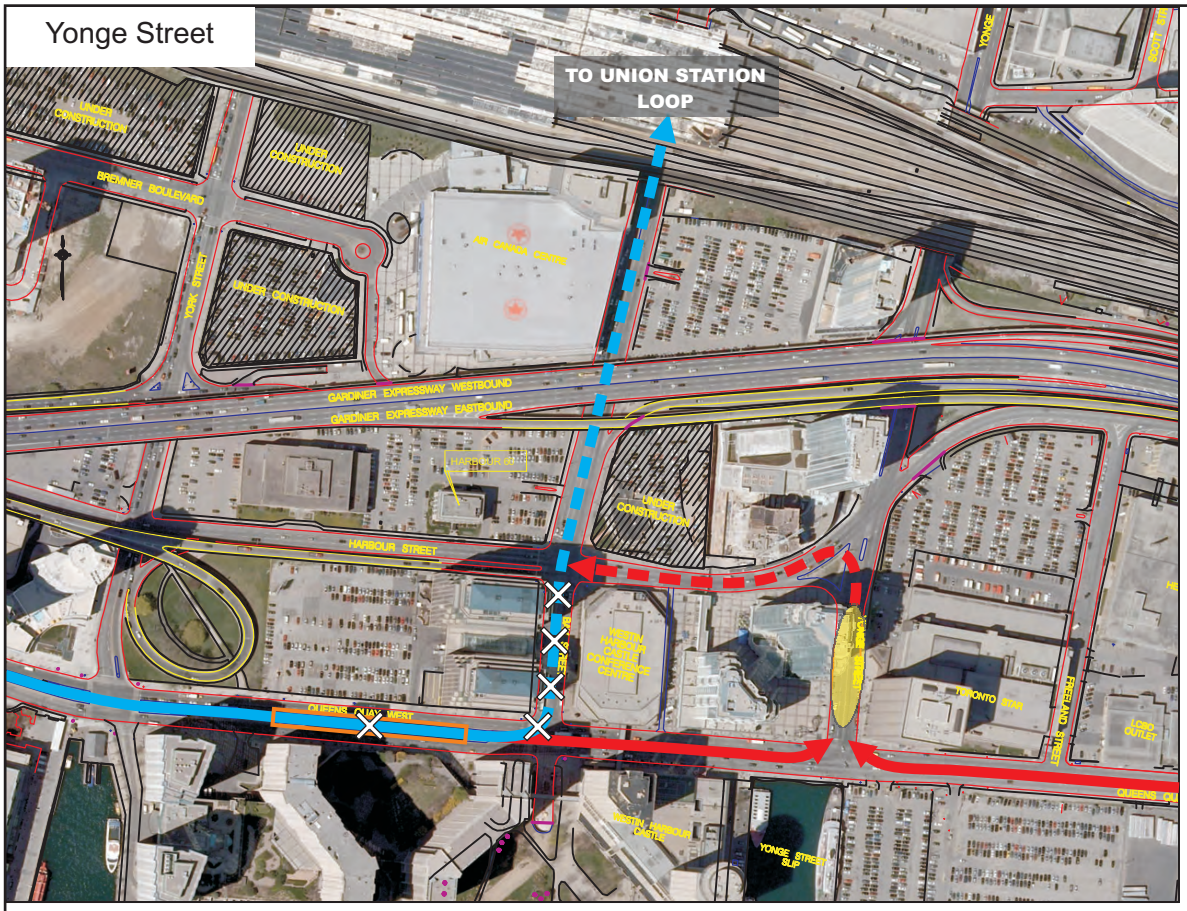
As illustrated in **Figure 6-2**, the tunnel portal would be located on Harbour Street between York Street and Bay Street. The portal would serve both the existing Queens Quay West streetcars as well as the proposed Queens Quay East streetcars. The existing portal on Queens Quay would be replaced. The portal would be situated within the Harbour Street right-of-way and the portal structure would take up at least two traffic lanes from the road. A new tunnel would be needed to connect the portal into the existing Bay Street Tunnel. All streetcars operating to and from

Union Station would enter through the York Street/Queens Quay intersection at-grade, mixed with surface traffic and pedestrian movements.

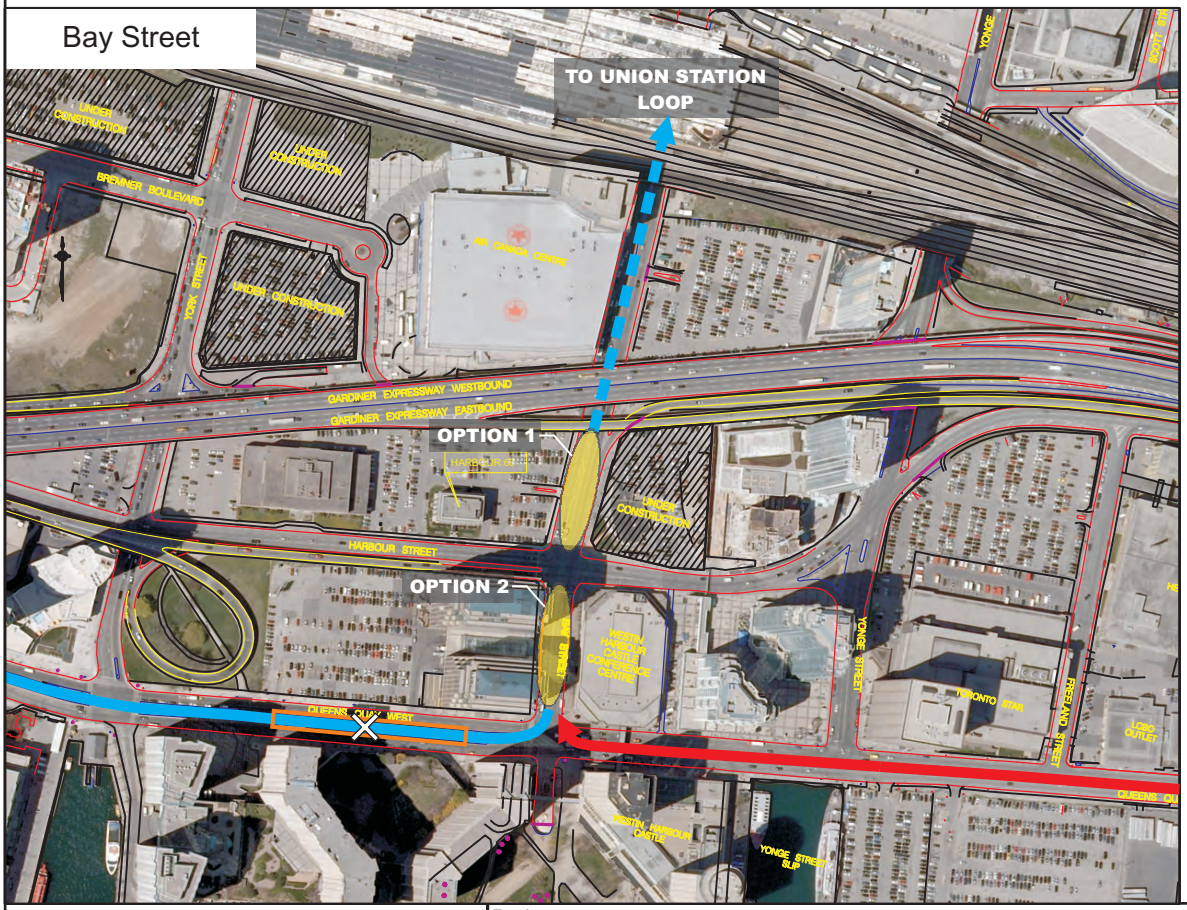
Queens Quay

As illustrated in **Figure 6-3**, the tunnel portal would be located on Queens Quay east of Bay Street, serving the proposed Queens Quay East streetcars only. The existing portal on Queens Quay west of Bay Street would be retained to serve the existing Queens Quay West streetcars. Three options were identified: (1) between Bay Street and Yonge Street, (2) between Yonge Street and Freeland Street, and (3) between Freeland Street and Cooper Street. The portal would be situated within the road right-of-way. A new tunnel would be needed to connect the portal into the existing Bay Street Tunnel. All streetcars to and from Union Station would operate through the Bay/Queens Quay intersection underground, grade-separated from surface traffic and pedestrian movements.

Yonge Street



Bay Street



Legend

- Existing Tunnel
- Existing Surface Streetcar
- New Tunnel
- New Surface Streetcar
- Existing Portal
- New Portal (N.T.S.)
- Abandoned

WATERFRONTToronto

TORONTO

Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

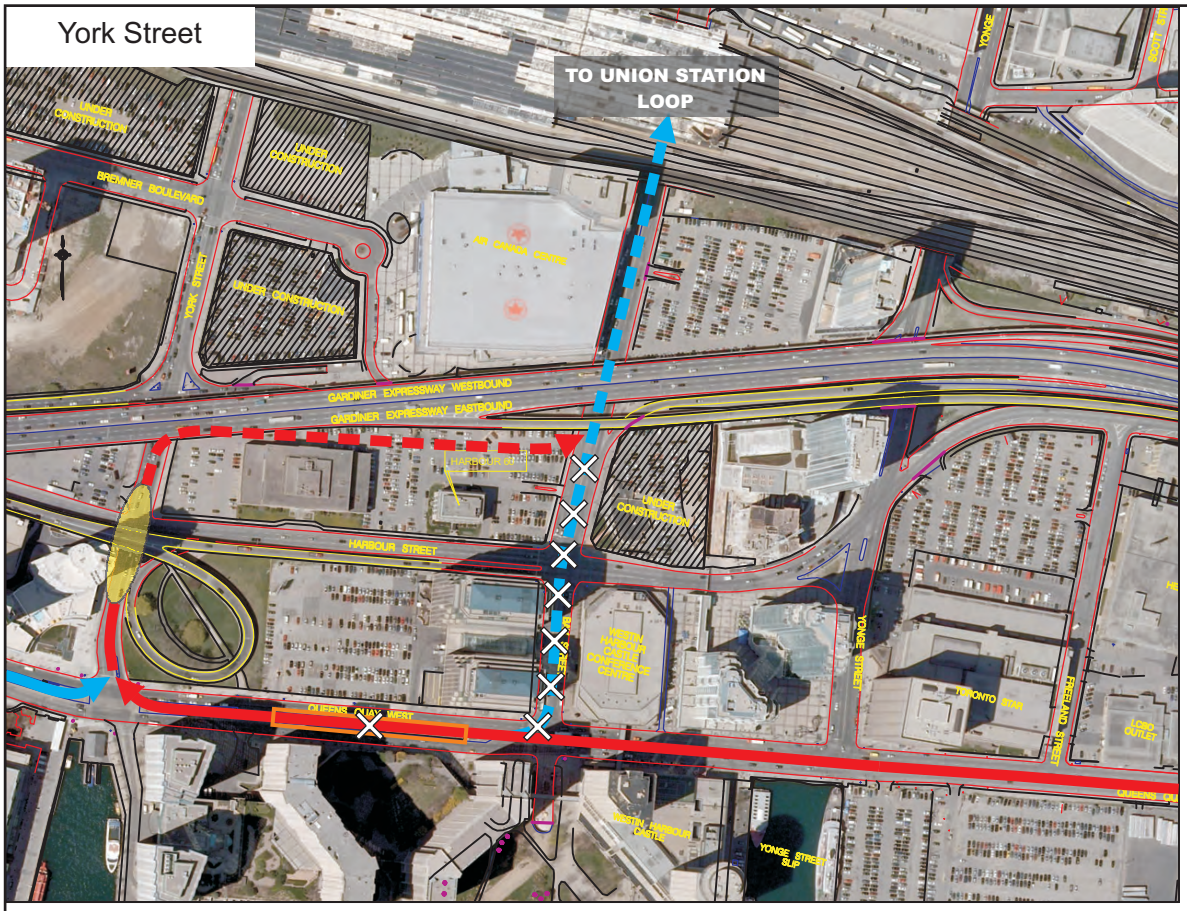
Title:

Long list of Portal Location Alternatives
(Yonge Street and Bay Street)

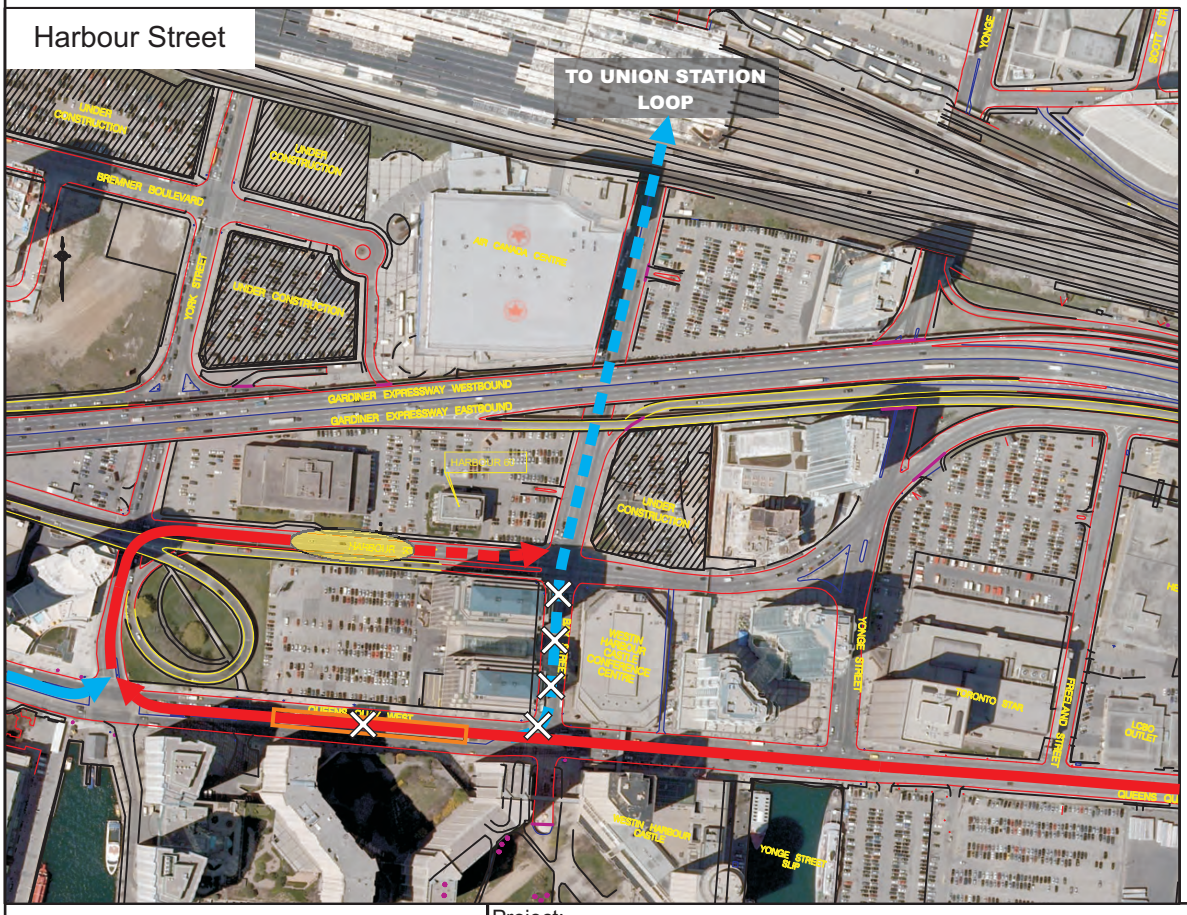
Figure No.

6-1

York Street



Harbour Street



Legend

- Existing Tunnel
- Existing Surface Streetcar
- New Tunnel
- New Surface Streetcar
- Existing Portal
- New Portal (N.T.S.)
- Abandoned

WATERFRONTToronto

TORONTO

Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

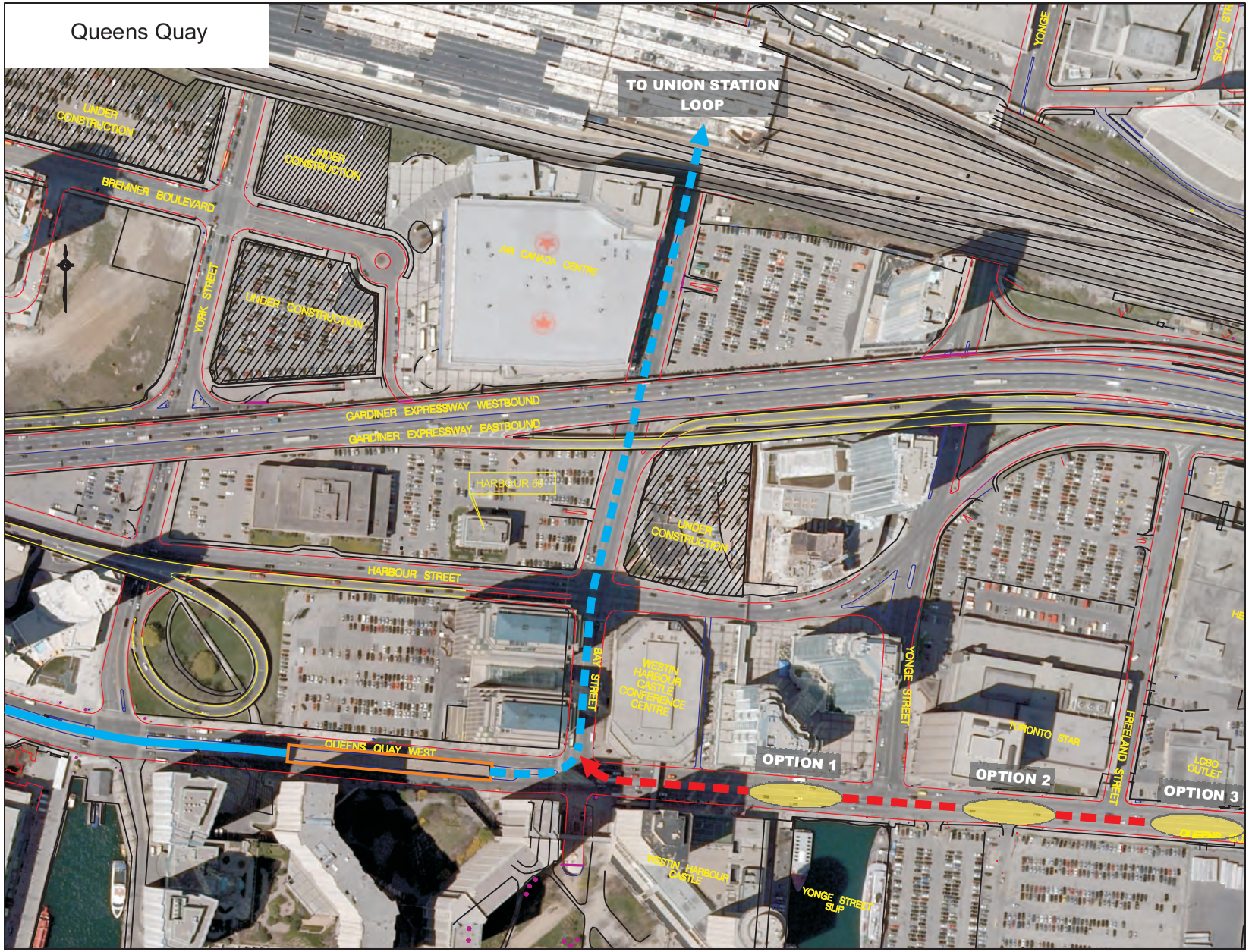
Title:

Long list of Portal Location Alternatives
(York Street and Harbour Street)

Figure No.

6-2

Queens Quay



Legend

- Existing Tunnel
- Existing Surface Streetcar
- New Tunnel
- New Surface Streetcar
- Existing Portal
- New Portal (N.T.S.)

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Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Figure No.

6-3

Title:

Long List of Portal Location Alternatives
(Queens Quay)

6.2.1 Screening of Potential Tunnel Portal Locations

A high-level assessment was carried out to screen out options based on functional feasibility. Yonge Street, York Street and Harbour Street were screened out from further considerations as all of these options would create an undesirable impact on transit and traffic operations, impose a circuitous and indirect transit access to Union Station from Queens Quay, and result in higher impacts on existing commercial and residential features in the area. Bay Street and Queens Quay were carried forward for further analysis as described in the following sections.

6.2.2 Short List of Portal Locations

Five short-list alternatives were considered:

1. Option B1 – Bay Street between Lake Shore Boulevard and Harbour Street
2. Option B2 – Bay Street between Harbour Street and Queens Quay
3. Option Q1 – Queens Quay between Bay Street and Yonge Street
4. Option Q2 – Queens Quay between Yonge Street and Freeland Street
5. Option Q3 – Queens Quay between Freeland Street and Cooper Street

Bay Street Option B1

As shown in **Figure 6-4**, the portal would be located in the middle of Bay Street between Lake Shore Boulevard and Harbour Street. The proposed streetcar line would transition from a surface route at Harbour Street to a fully underground route by Lake Shore Boulevard. A dedicated transit right-of-way would be constructed on Bay Street between Harbour Street and Queens Quay. To minimize conflict with Harbour Street, the portal would be connected to the surface by a ramp at a gradient of 7.5% which is close to the maximum allowable gradient for TTC streetcars. The first streetcar stop south of the portal would be located on Bay Street south of Harbour Street as the replacement of the would-be-demolished Queens Quay/Ferry Docks Station.

Because of conflicts with vehicular and pedestrian traffics at the Queens Quay / Bay Street intersection, streetcars turning through the intersection would be protected by a dedicated signal phase – similar to a protected left-turn phase – to prevent conflict with other road users.

Bay Street Option B2 (Screened Out)

The portal would be located in the middle of Bay Street between Harbour Street and Queens Quay. The proposed streetcar line would transition from a surface route at Queens Quay to a fully underground route by Harbour Street. To avoid the Bay Street/Queens Quay intersection, the ramp to the portal would descend at a gradient of 7.5%.

Option B2 was screened out subsequently as it was found that there is inadequate space on Bay Street south of Harbour Street to accommodate the required track geometry at the Bay Street/Queens Quay intersection.

Queens Quay Option Q1

As shown in **Figure 6-5**, the portal would be located between Bay Street and Yonge Street, and it would provide the transition for the proposed streetcar line from a surface route at Yonge Street to a fully underground route by Bay Street. Westin Harbour Castle Hotel, located on the south side of Queens Quay between Bay Street and Yonge Street, operates two private driveways off the south side of Queens Quay. To maintain access to the hotel, the portal would have to be located in the middle of the road as a south-side placement would completely cut off

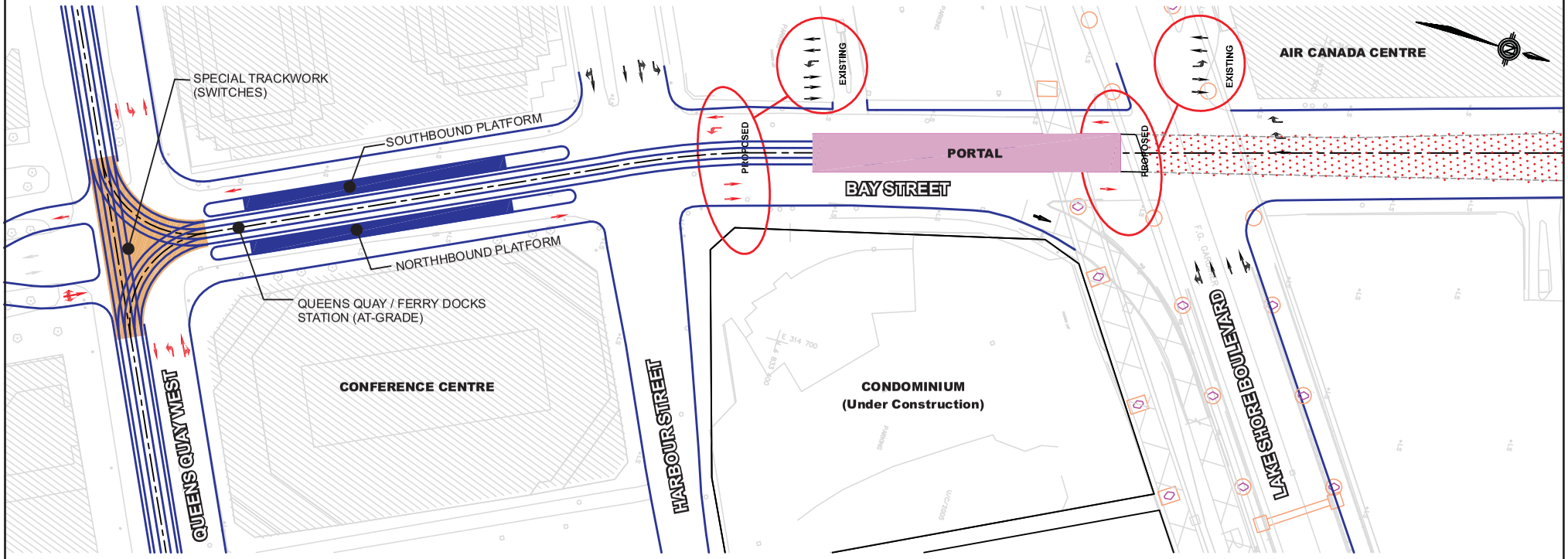
the driveways. Because of sufficient distance between Bay Street and Yonge Street, the ramp to the portal would descend at a gradient of 6%. The ramp would begin just west of Yonge Street and would be approximately 85 metres in length to reach the portal. From the portal, the fully developed tunnel would continue approximately 60 to 70 metres to the west under Queens Quay and connect into the existing Bay Street Tunnel. The new streetcar line would serve the existing Queens Quay/Ferry Docks underground streetcar stop, and the first streetcar stop on the surface east of the portal would be located at Yonge Street.

Queens Quay Option Q2

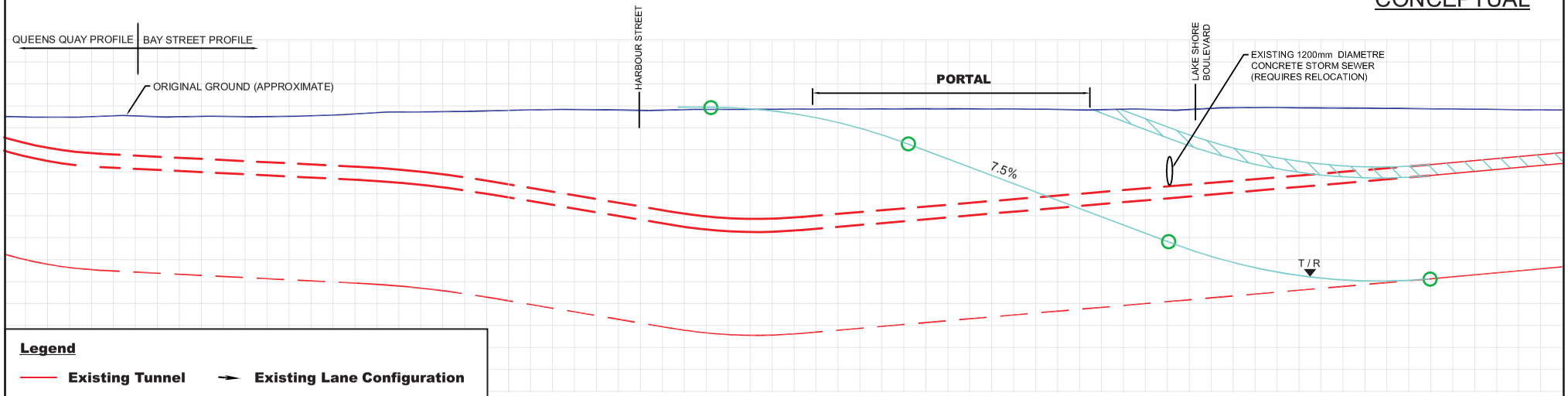
As shown in **Figure 6-6**, the portal would be located between Yonge Street and Freeland Street, either in the middle of the road or on the south side of the road depending on the preferred streetcar alignment on Queens Quay. The proposed streetcar line would transition from a surface route at Freeland Street to a fully underground route by Yonge Street. To minimize conflict with Freeland Street, the ramp to the portal would descend at a gradient of 7.5%. The ramp would begin at Freeland Street and would be approximately 70 metres in length to reach the portal. From the portal, the fully-developed tunnel would continue approximately 250 metres to the west under Queens Quay and connect into the existing Bay Street Tunnel. A 2.5 metre-wide storm sewer culvert, a major north-south Combined Sewer Overflow buried under Yonge Street, would have to be relocated due to conflict with the tunnel. The new streetcar line would serve the existing Queens Quay/Ferry Docks underground streetcar stop, and the first streetcar stop on the surface east of the portal would be located at Freeland Street.

Queens Quay Option Q3

As shown in **Figure 6-7**, the portal would be located between Freeland Street and Cooper Street to the west of the Redpath Sugar main driveway, either in the middle of the road or on the south side of the road depending on the preferred streetcar alignment on Queens Quay. The proposed streetcar line would transition from a surface route at Cooper Street to a fully underground route by Freeland Street. To avoid a 2.5 metre-wide storm sewer culvert under Yonge Street and to minimize conflict with the Redpath Sugar main driveway, the ramp to the portal would descend at a gradient of 7.5%. The ramp would begin at the Redpath Sugar main driveway and would be approximately 70 metres in length to reach the portal. From the portal, the fully developed tunnel would continue approximately 350 metres to the west under Queens Quay and connect into the existing Bay Street Tunnel. The new streetcar line will have two underground streetcar stops – the existing Queens Quay/Ferry Docks Station at Bay Street and a new underground stop at Yonge Street. The first streetcar stop on the surface east of the portal would be located at Lower Jarvis Street.



CONCEPTUAL



Legend

- Existing Tunnel
- New Tunnel
- Existing Lane Configuration
- New Lane Configuration

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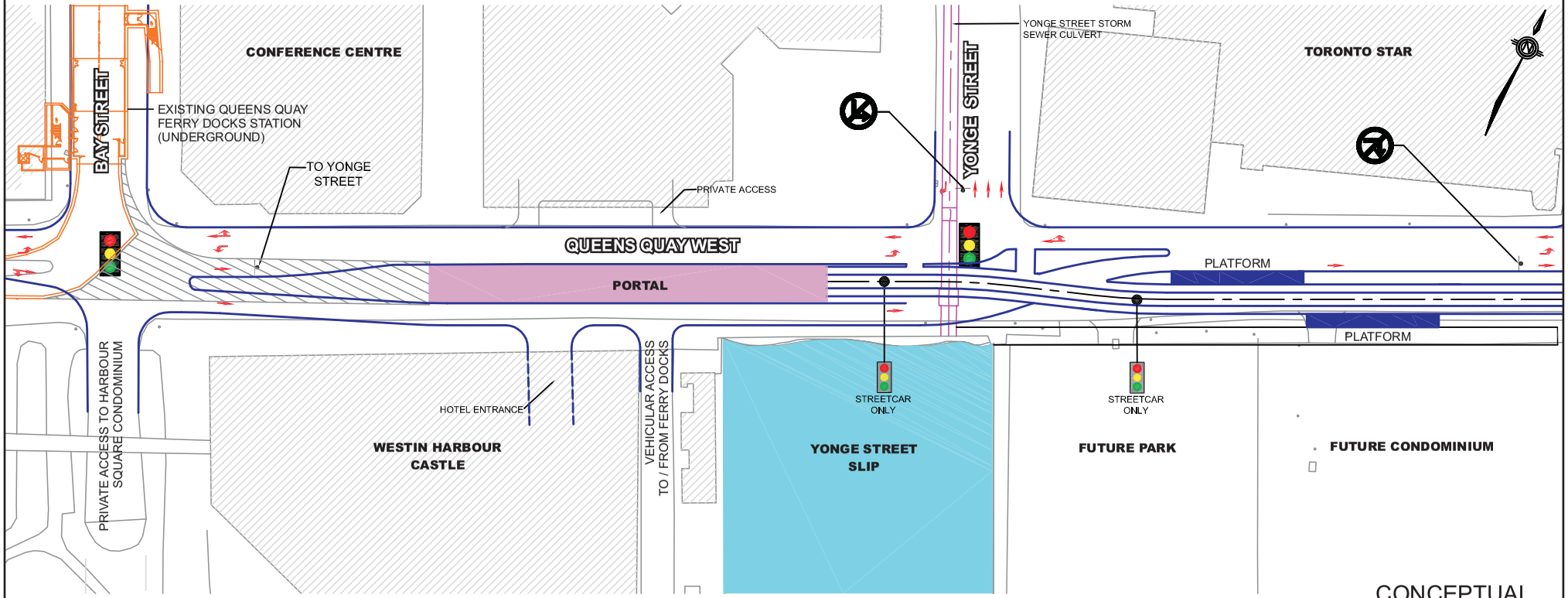
Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title: Portal Alternatives - Bay Street between Lake Shore Boulevard and Harbour Street (Option B1)

Figure No.

6-4



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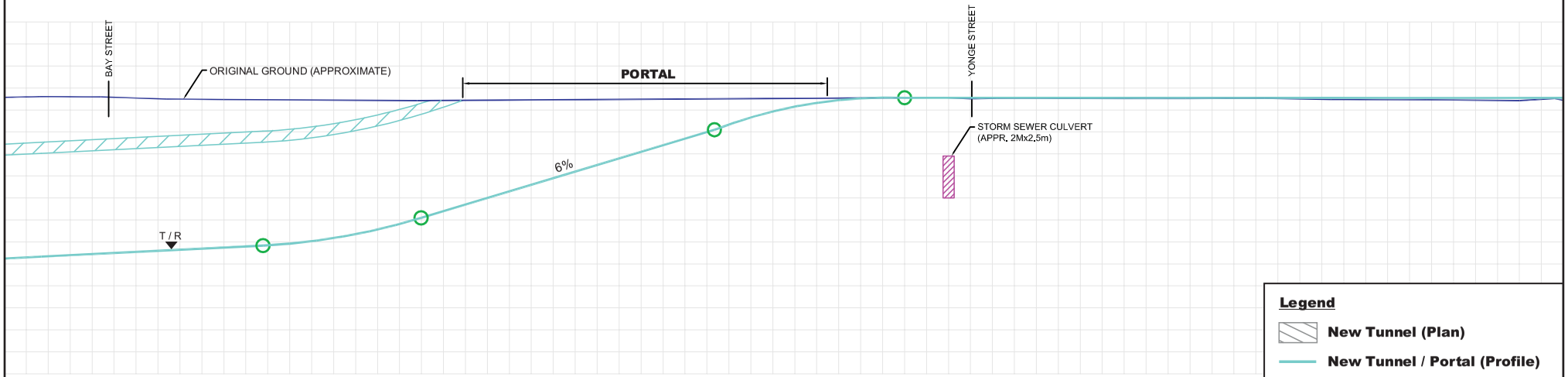


Legend

- New Tunnel (Plan)
- New Tunnel / Portal (Profile)
- Existing Underground Tunnel

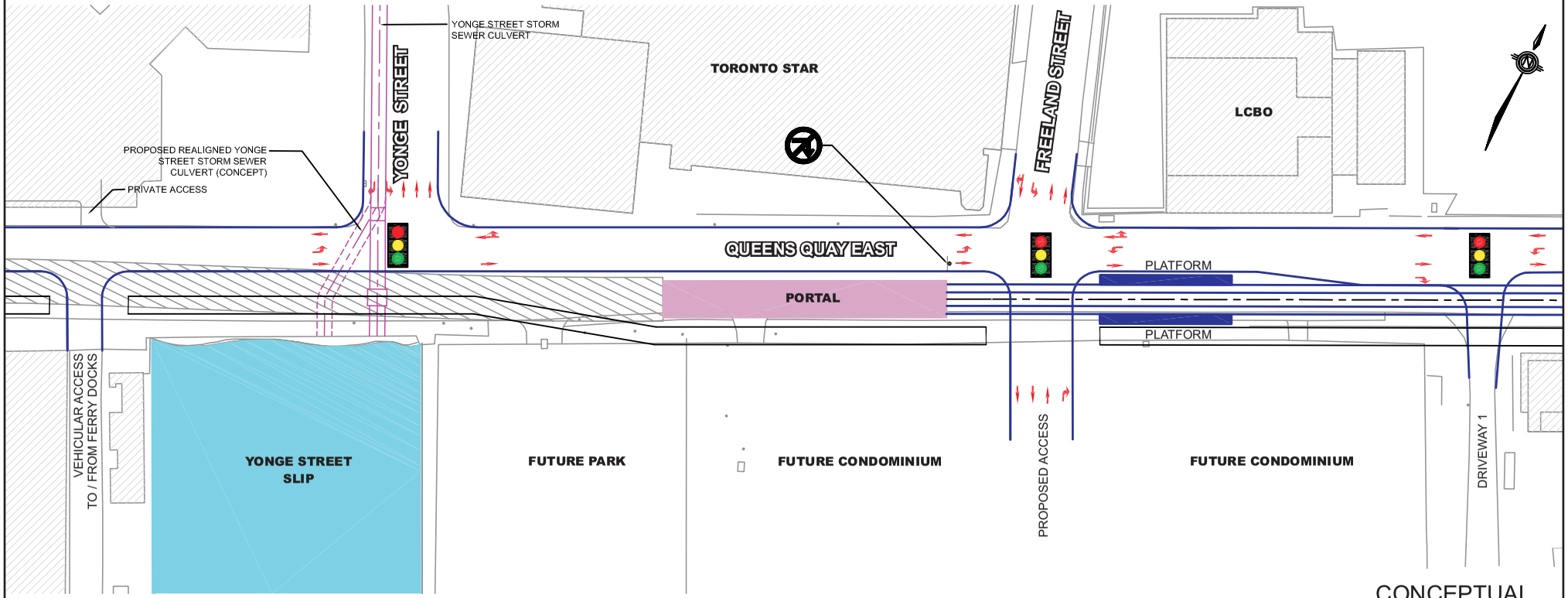
Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

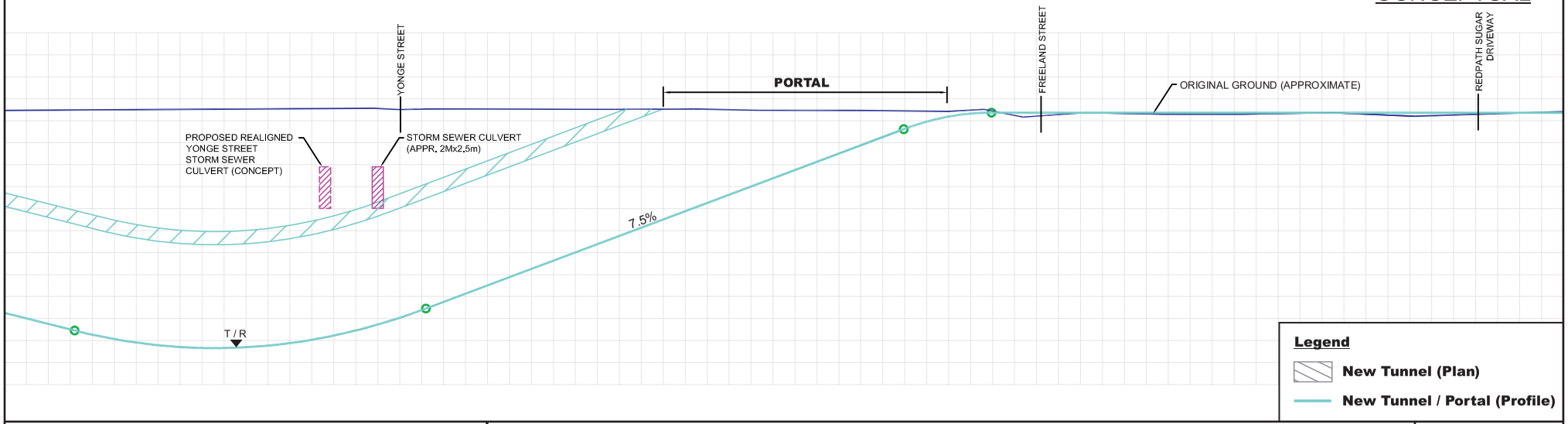
Title: Portal Alternatives - Queens Quay between Bay Street and Yonge Street (Option Q1)

Figure No.

6-5



CONCEPTUAL



Legend

- New Tunnel (Plan)
- New Tunnel / Portal (Profile)

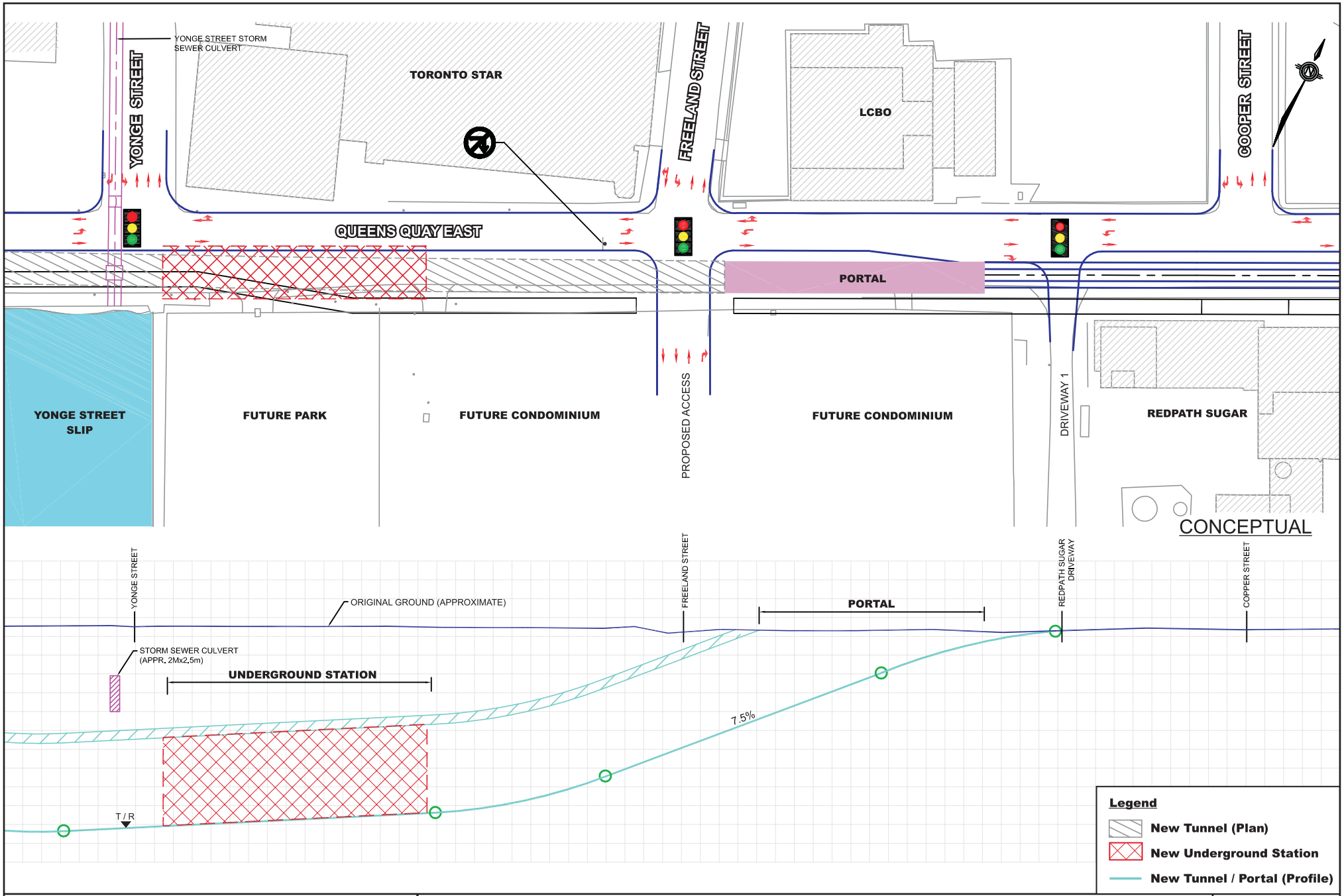
Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title: Portal Alternatives - Queens Quay between Yonge Street and Freeland Street (Option Q2)

Figure No.

6-6



Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title: Portal Alternatives - Queens Quay between Freeland Street and Cooper Street (Option Q3)

Figure No.

6-7

6.2.3 Assessment of Short-Listed Portal Locations

The short-listed portal locations were assessed with respect to a wide range of objectives. Impacts on transit service, traffic operations, public realm, existing commercial and residential features, and costs were considered major factors in the assessment process. An overview of the analysis is provided in the following sections while the complete assessment matrix can be found in **Appendix H** of this report.

Planning Policies

All of the short-listed options are generally compatible with the City of Toronto's policies and goals related to the Waterfront. Queens Quay **Option Q2** specifically, is consistent with the portal location set out in the Central Waterfront Secondary Plan.

Three of the four options also support Waterfront Toronto's goals for the revitalization of the waterfront, however, Queens Quay **Option Q1** does not support the results from Waterfront Toronto's Central Waterfront Design Competition because of the inability to integrate with a south-side streetcar alignment.

Urban Design

Streetscape and Public Realm

Bay Street **Option B1** would result in only one portal serving the existing streetcar lines and the new streetcar service. Demolition of the existing portal on Queens Quay west of Bay Street would provide a positive impact on the design and character of Queens Quay for adjacent residents and ground floor retail uses. The street cross section and extension of the Martin Goodman Trail could continue uninterrupted as proposed for both the east and west portions of Queens Quay. With the portal on Bay Street, modifications would likely be required between Lake Shore Boulevard and Queens Quay, including an at-grade transit stop and other streetscape improvements.

Queens Quay **Option Q1** would result in a second portal on Queens Quay serving streetcars operating to and from the Eastern Waterfront. The existing portal on Queens Quay would be retained. This option would also result in a negative impact on the ability to expand public realm improvements on Queens Quay as the portal would be located in one of the most constrained section of the right-of-way.

Queens Quay **Options Q2 and Q3** would result in a second portal on Queens Quay serving streetcars operating to and from the Eastern Waterfront. The existing portal on Queens Quay would be retained. However, because both portals would be located outside of the most constrained section of the Queens Quay right-of-way, both options would create extra space between Bay Street and Yonge Street above the streetcar tunnel for public realm improvement – a positive impact on public realm quality and character.

Alignment Flexibility

Bay Street **Option B1** works with both centre-of-road and south-side-of-road alignment options on Queens Quay. Because the portal would be located on Bay Street, there would be no impact on streetcar alignment.

Queens Quay **Option Q1** does not work with south-side alignment on Queens Quay. As described earlier, there are two driveways on the south side of Queens Quay between Bay Street and Yonge Street that provide access to Westin Harbour Castle Hotel. Various options were investigated to determine the ability to integrate the portal into a south-side alignment without impacting access to the hotel. The options examined included creation of a new

vehicular entrance/roundabout on the east side of the hotel which would require filling the head of the Yonge Street Slip to support the entrance. In the end, it was determined that the options would only generate a marginal benefit while the technical feasibility and the potential cost associated with them would be high.

Queens Quay **Option Q2** works with both centre-of-road and south-side-of-road alignment options. Because there will be no mid-block vehicular accesses off Queens Quay between Yonge Street and Freeland Street in the future, this option works for both alignment options on Queens Quay.

Queens Quay **Option Q3** works with centre-of-road alignment option but not as well with the south-side alignment. Because the ramp to the portal would begin at Redpath Sugar's main driveway, the driveway would likely require realignment to mitigate conflicts between streetcars entering/exiting the tunnel and vehicles entering/exiting the Redpath facility.

Transportation

Transit Operation

Bay Street **Option B1** would require all streetcars operating to and from Union Station to turn through the Queens Quay / Bay Street intersection at-grade in mixed traffic. Due to conflicts with vehicular traffic at the intersection, streetcars could only make the turns on a dedicated signal phase similar to a protected left-turn phase. Streetcars would have to wait for a very limited time frame in every signal cycle to make the turns. Given the frequent service planned for the East Bayfront and the projected ridership growth at Union Station Loop, the lack of intersection capacity for streetcars could cause significant bunch up in the service that would impact service reliability and attractiveness. Service reliability would be further impacted by pedestrian movements through the intersection, primarily in the north-south direction, interfering with transit vehicles attempting to turn through the intersection. The effects would be most pronounced at Bay Street during special events along the waterfront when high pedestrian volumes cross Queens Quay.

Queens Quay **Options Q1, Q2, and Q3** would grade-separate all streetcar movements from the surface and allow transit to operate without interference from vehicular and pedestrian traffic on the surface at Harbour Street or Bay Street. This arrangement is ideal given the frequent services planned in the Eastern Waterfront as well as future growth in the Central Waterfront.

Traffic Operation

Bay Street **Option 1** would create the most negative impact on roadway capacity and traffic operations. A reduction of two traffic lanes (1 northbound, 1 southbound) between Lake Shore Boulevard and Harbour Street would be required to accommodate the portal. A further reduction of three traffic lanes (2 northbound, 1 southbound) would be required to provide a surface streetcar stop to replace the underground streetcar station which would be demolished as a result of the portal. With Bay Street being one of the few major north-south connections into the downtown core, and already operating at capacity during peak periods, a reduction in road capacity would negatively impact the ability of motorists to travel in and around the study area.

Queens Quay **Options Q1, Q2, and Q3** would have no major impact on roadway capacity and traffic operations as each option could fit within the planned transit right-of-way on Queens Quay. However, **Option Q1** could create a complex intersection configuration on Queens Quay at Bay Street and Yonge Street in conjunction with a south-side alignment option. With a south-side alignment, eastbound traffic would need to shift from the north side of the transit right-of-

way to the south side of the right-of-way at Bay Street as a result of the portal in the middle of Queens Quay. At Yonge Street, eastbound traffic would weave across streetcar tracks to shift back to the north side of the transit right-of-way.

Socio-Economic Impact

Impact on Commercial Properties

Bay Street **Option B1** would have a direct impact on access to two commercial properties in the area. There is currently a surface parking lot on the west side of Bay Street south of Lake Shore Boulevard with the entrance located off Bay Street. Access to the site appears to be primarily from the north though there are no physical means that prevent access to the parking lot from the south. With the portal located in the middle of Bay Street in front of the entrance, however, the portal structure would form a physical barrier limiting access to the site from the north only. In addition, with streetcars entering and exiting the underground tunnel on Bay Street, there would be an at-grade dedicated streetcar right-of-way on Queens Quay between Bay Street and Yonge Street, resulting in some impact on access to the Westin Harbour Castle Hotel. The impact would vary depending on the streetcar alignment. A middle-of-road alignment would limit vehicular access to the hotel to right-in and right-out in the eastbound direction only. A south-side alignment would create a direct conflict with the hotel's driveways.

Queens Quay **Option Q1** would have a direct impact on access to Westin Harbour Castle Hotel. With the portal located in the middle of Queens Quay between Bay Street and Yonge Street, access to the hotel would be limited to right-in and right-out in the eastbound direction only.

Queens Quay **Option Q2** would have no direct impact on access to commercial properties in the area as there are no mid-block driveways on Queens Quay between Yonge Street and Freeland Street.

Queens Quay **Option Q3** would have a direct impact on access to Redpath Sugar. The main driveway of the facility is located on the south side of Queens Quay between Freeland Street and Cooper Street. The driveway provides access to the site for Redpath employees as well as the majority of tractor-trailers and container trucks that deliver shipments from the facility. Although the physical structure of the portal would not impact the driveway, the ramp to the portal would begin at the driveway. The driveway would likely require realignment to mitigate conflicts between streetcars entering/exiting the tunnel and vehicles entering/exiting the Redpath facility.

Impact on Residential Properties

Bay Street **Option B1** would create some impact on access to one residential property. The new surface streetcar stop would be located directly opposite from a private driveway of a residential development located at the foot of Bay Street. The driveway would likely require realignment so that vehicles exiting the property would not inadvertently drive into the transit right-of-way. Also, with all streetcars turning through the Bay Street / Queens Quay intersection at-grade, Option B1 could create the most perceived noise and vibration impacts resulting from wheel squeals and vibrations generated by streetcars operating through track switches at the intersection.

Queens Quay **Option Q1** would create a direct impact on access to one residential property. The residential development at 10 Queens Quay West operates a vehicular access off the north side of Queens Quay between Bay Street and Yonge Street. Although access to the site is primarily from the east there are no physical means that prevent vehicles from accessing the

site from the west. With the portal located in front of the vehicle entrance, however, the portal structure would form a permanent barrier across the driveway.

Queens Quay **Option Q2** would create minimal impact on access to residential properties in the area. There is currently a surface parking facility on the south side of Queens Quay east of Yonge Street with one vehicular access. However, plans are underway to turn the site into a mid-density residential development, with Freeland Street extended southerly to provide vehicular access to the site. Although there is space to fit the portal between Yonge Street and Freeland, the ramp to the portal would begin at Freeland Street.

Queens Quay **Option Q3** would create no direct impact on residential properties as there are no residential uses adjacent to the portal.

Costs

Bay Street **Option B1** would require extensive reconstruction of the existing Bay Street Tunnel to accommodate the portal. The section of the existing tunnel south of Lake Shore Boulevard, as well as the existing portal on Queens Quay and the Queens Quay/Ferry Docks underground station, would be demolished and filled. A new dedicated transit right-of-way and a new streetcar stop would be required on Bay Street south of Harbour Street to serve the existing and the proposed streetcar lines. For comparison purposes, the order-of-magnitude construction cost associated with the portal is estimated to be in the range of $30 million to $40 million dollars.

Because Option B1 would result in the shortest underground section for the proposed streetcar line, longer travel time and poorer service reliability are anticipated which could impact roundtrip time in the service which could increase the number of vehicles required to operate the line, resulting in higher vehicle acquisition cost and operating cost.

Queens Quay **Option Q1** would require some reconstruction of the Bay Street Tunnel (at the Queens Quay/Bay Street intersection) to connect the new tunnel and portal into the existing tunnel, and approximately 150 metres of new tunnel and portal would be constructed on Queens Quay. For comparison purposes, the order-of-magnitude construction cost of the portal and the tunnel is estimated to be in the range of $10 million to $20 million dollars. However, impact on vehicular access to the Westin Harbour Castle Hotel could require costly mitigation measures (e.g. new vehicular entrance on the east side of the hotel) which would increase the overall cost significantly.

Queens Quay **Option Q2** would require some reconstruction of the Bay Street Tunnel (at the Queens Quay/Bay Street intersection) to connect the new tunnel and portal into the existing tunnel, and approximately 320 metres of tunnel and portal would be constructed on Queens Quay. For comparison purposes, the order-of-magnitude construction cost of the portal and the tunnel, including relocation of the storm sewer culvert at Queens Quay/Yonge Street, is estimated to be in the range of $40 million to $50 million dollars.

Queens Quay **Option Q3** would require some reconstruction of the Bay Street Tunnel (at the Queens Quay/Bay Street intersection) to connect the new tunnel and portal into the existing tunnel, and approximately 420 metres of tunnel and portal would be constructed on Queens Quay. Although Option Q3 avoids the need to relocate the storm sewer culvert at Yonge Street, an underground streetcar station would be required just east of Yonge Street. For comparison purposes, the order-of-magnitude construction cost of the portal and the tunnel, including an underground station east of Yonge Street, is estimated to be in the range of $50 million to $60 million dollars.

6.2.4 Evaluation of Short-Listed Portal Locations

The portal alternatives were evaluated against the project objectives and the key net environmental impacts and benefits were identified. The detailed evaluation matrices are contained in **Appendix H**. A summary of the relative performance of each short-listed portal location is presented in **Table 6-1**.

As a result of minimal cultural and natural environment features within the study area, both categories of factors were considered not to be a major issue in deciding on the preferred transit technology option. The key differences between the five portal locations are outlined in the following sections.

Planning Policies

Bay Street **Option B1** and Queens Quay **Options Q2 and Q3** are **preferred** over Queens Quay Option Q1 with respect to planning policies considerations. All three options are compatible with City of Toronto policies and Waterfront Toronto's goals for revitalization of the Queens Quay Corridor, whereas Option Q1 is somewhat compatible as it does not support results from Waterfront Toronto's Central Waterfront Design Competition.

Urban Design

Bay Street **Option B1** and Queens Quay **Options Q2 and Q3** are **preferred** over Queens Quay Option Q1 from an urban design perspective. All three options have the potential to improve the quality of the streetscape and public realm and accommodate a continuous tree-lined Martin Goodman Trail on Queens Quay. All three options also work well with centre-of-road and south-side-of-road alignment alternatives.

Of the Queens Quay options, Option Q1 has the least potential to accommodate all of the design elements desired for the rest of the corridor. Further, Option Q1 does not accommodate the south-side alignment alternative without considerable modification to existing buildings and the relocation of property accesses.

Transportation

Queens Quay **Options Q2 and Q3** are **preferred** over Bay Street Option B1 and Queens Quay Option Q1 with respect to transportation considerations. Both options provide a grade-separated transit facility under the Queens Quay/Yonge Street, Queens Quay/Bay Street, and Bay Street/Harbour Street intersections, allowing the proposed high-frequency streetcar line to operate through all three intersections without interference from the high volume of auto and pedestrian traffics in the area, and resulting in shorter delays and better reliability in the service.

Bay Street Option B1, on the other hand, requires all streetcars to operate through the Queens Quay/Yonge Street, Queens Quay/Bay Street, and Bay Street/Harbour Street intersections at-grade, incurring delays at all intersections as a result of interference from the high volume of auto and pedestrian traffics, and resulting in poorer reliability in the service. Also, Option B1 reduces roadway capacity on Bay Street as a result of the portal north of Harbour Street and the surface streetcar stop south of Harbour Street. With Bay Street being one of the few north-south arterials connecting the waterfront with the downtown core and already operating at capacity during peak periods, a reduction in road capacity would negatively impact the ability for motorists to travel in and around the study area.

Although Queens Quay Option Q1 can provide a grade-separated transit facility under the Queens Quay/Bay and Bay/Harbour intersections, the need for the proposed high-frequency streetcar line to operate through the Queens Quay/Yonge Street intersection is less preferable

than Options Q2 and Q3. Also, Option Q1 creates a complex intersection at Queens Quay and Yonge Street as a result of the need for eastbound traffic to weave across the transit right-of-way from the south side of the streetcar tracks to the north side. This intersection configuration is not preferred as it is an unconventional arrangement for motorists in Toronto.

Socio-Economic

Queens Quay **Option Q2** is **preferred** over Bay Street Option B1 and Queens Quay Options Q1 and Q3 with respect to socio-economic considerations. Option Q2 has the least impact on access to existing commercial and residential properties on Queens Quay as the portal avoids the constrained section of Queens Quay which is between Bay Street and Yonge Street. Although the portal would be located in front of the proposed MT 27 residential development on the south side of Queens Quay east of Yonge Street, the provision of a streetcar stop at the Queens Quay/Freeland Street intersection – the main entrance to the site – is expected to be a positive impact on the future residential development. Option Q2 also has a higher potential to minimize perceived noise and vibration effects, related to streetcar operation, than Options B1 and Q1 as the portal would be located east of existing residential developments between Bay Street and Yonge Street.

On the other hand, Options B1 and Q1 are the least preferred options. Both options produce the most impact on access to existing properties. They also have the lowest potential to minimize perceived noise and vibration effects related to streetcar operation, with Option B1 generating the most impact from requiring all streetcars heading to and from Union Station to turn east and west from Bay Street at-grade.

Although Option Q3 has the highest potential to minimize perceived noise and vibration impacts – as it results in the longest grade-separated transit facility under Queens Quay – the impact on Redpath Sugar's main driveway is less preferable than Option Q2.

Cost

Queens Quay **Option Q2** is **preferred** over Bay Street Option B1 and Queens Quay Options Q1 and Q3 with respect to cost considerations. In comparison with the other short-listed portal options, Option Q2 has the potential to incur the least overall cost.

Bay Street Option B1 was initially proposed as a low cost option as a result of having the shortest underground section. However, the need for extensive modification of the existing Bay Street Tunnel to accommodate a new portal on Bay Street, as well as the need to decommission half of the existing Bay Street Tunnel and related facilities (existing portal on Queens Quay, existing Queens Quay/Ferry Docks underground streetcar station), placed Option B1 in the same order of magnitude as Option Q2 in terms of construction cost. Also, in comparison with all three Queens Quay options, Option B1 has the lowest potential to minimize streetcar acquisition cost and transit operating cost than Option Q2 because of the longer transit travel time and poorer service reliability expected for Option B1.

Although Queens Quay Option Q1 has the highest potential to minimize construction cost, compared to Options Q2 and Q3, and the least impact on Bay Street Tunnel compared to Option B1, Option Q1 may require costly measures to mitigate access issues at Westin Harbour Castle Hotel which would increase the overall cost. Therefore, Option Q1 is less preferred compared to Option Q2.

Option Q3, by having the longest tunnel section, is considered to be more expensive to construct than Option Q2. Although Option Q3 avoids the need to relocate the stormsewer culvert under Yonge Street, the need for an underground streetcar station at Yonge Street, in

combination with a longer tunnel section, increases the overall cost. Therefore, Option Q3 is less preferred compared to Option Q2.

Table 6-1: Evaluation of Short-Listed Portal Options – Key Considerations

Key Considerations	Option B1 Lake Shore-Harbour	Option Q1 Bay-Yonge	Option Q2 Yonge-Freeland	Option Q3 Freeland-Cooper
Planning Policies				
Compatibility with City of Toronto policies and Waterfront Toronto goals	Compatible	Somewhat compatible Does not support results from Waterfront Toronto's Central Waterfront Design Competition	Compatible Portal location consistent with Central Waterfront Secondary Plan	Compatible
Evaluation:	●	◑	●	●
Urban Design				
Effect on Queens Quay streetscape between Bay and Yonge	Improvement	Reduction	Improvement	Improvement
Number of streetcar tunnel portals	One (Bay Street)	Two (Queens Quay)	Two (Queens Quay)	Two (Queens Quay)
Potential for achieving public space enhancement and public realm improvement	Some	Minimal	High Portal fits within ROW	High Portal fits within ROW
Ability to accommodate a continuous tree-lined Martin Goodman Trail	Some	Minimal	High Fits full width of Martin Goodman Trail	High Fits full width of Martin Goodman Trail
Evaluation:	◕	◔	●	●
Transportation				
Quality of transit service and operation	Poor Delays at Harbour, Bay, and Yonge intersections result in longer travel time and lower service reliability	Adequate	Better Grade-separated operation through Harbour, Bay, and Yonge intersections results in shorter delay, shorter travel time, and better service reliability	Better Grade-separated operation through Harbour, Bay, and Yonge intersections results in shorter delay, shorter travel time, and better service reliability
Impact on roadway capacity and traffic operation	Reduces north-south roadway capacity and ability for motorists to travel in and around the study area	Complex intersection operation at QQ/Yonge as a result of need for eastbound traffic to weave across streetcar ROW	No major impact	No major impact
Evaluation:	○	○	◕	●

Key Considerations	Option B1 Lake Shore-Harbour	Option Q1 Bay-Yonge	Option Q2 Yonge-Freeland	Option Q3 Freeland-Cooper
Socio-Economic				
Existing/future commercial properties with driveway affected by undertaking	(1) West side of Bay Street between Lake Shore and Harbour (Entrance limited to SB right-in / right-out only) (2) Westin Harbour Castle Hotel / Toronto Island Ferry Docks Access reduced to eastbound right-in/ right-out only	Westin Harbour Castle Hotel / Toronto Island Ferry Docks Access reduced to eastbound right-in/ right-out only	None	Redpath Sugar End of streetcar ramp in conflict with main driveway - likely requires driveway modification
Existing and future residential properties with driveway affected by undertaking	Harbour Square Condominium Bay Street entrance requires modification	World Trade Centre Condominium Access on Queens Quay reduced to westbound right-in/right-out only	MT 27 residential development Portal will be located just west of Freeland Street (main entrance); however, it is anticipated that full access can be maintained	None
Potential for minimizing perceived noise and vibration effects on existing residents	Lowest Streetcars will operate at-grade between Harbour Street and Yonge Street and through the QQ/Bay Intersection	Lower Streetcars will reach surface between Bay Street and Yonge Street	Higher Streetcars will be underground between Harbour Street and Yonge Street	Higher Streetcars will be underground between Harbour Street and Yonge Street
Evaluation:	○	○	●	◕
Cost				
Potential to minimize construction cost	Medium	Highest	Medium	Lowest
Potential to minimize vehicle acquisition cost	Lower	Higher	Higher	Higher
Potential to minimize property acquisition cost	Potentially costly measure for mitigating access issues at Westin Harbour Castle Hotel	Potentially costly measure for mitigating access issues at Westin Harbour Castle Hotel	No major property acquisition anticipated	No major property acquisition anticipated
Potential to minimize transit operating cost during and after construction	Lower	Higher	Higher	Higher
Evaluation:	◔	◕	◑	◔

6.2.5 Recommendation on the Preferred Portal Location

Through the detailed evaluation process described in Section 6.2.4 and summarized in **Table 6-2,** Queens Quay **Option Q2** was recommended as the preferred portal location. The preferred alternative was selected for the following reasons:

- Option Q2 would result in better quality of transit service and minimal impact on pedestrian and traffic operations.
- The portal would fit within available right-of-way and allow for public realm improvements on Queens Quay
- The portal would create the least impact on commercial and residential features.
- Option Q2 is one of the lowest cost options

Table 6-2: Portal Alternatives Evaluation Summary

OBJECTIVES	Option B1 Lake Shore-Harbour	Option Q1 Bay-Yonge	Option Q2 Yonge-Freeland	Option Q3 Freeland-Cooper
Planning Policies	●	◑	●	●
Urban Design	◕	◔	●	●
Transportation	○	○	◕	●
Socio-Economic	○	○	●	◕
Natural	Not a Decision-Relevant Factor			
Cultural	Not a Decision-Relevant Factor			
Cost	◔	◑	◑	◔
OVERALL	◔	◑	●	◕

6.3 Design Alternatives: Streetcar Alignment

The alternative streetcar alignments and street cross-sections were developed in coordination with the parallel *Queens Quay Revitalization EA*. The intent was to provide a consistent arrangement of roadway design, transit facilities, and urban design character for the entirety of the Queens Quay reconstruction efforts from Spadina Avenue to Parliament Street. The following sections provide a description of the alignment alternatives and the evaluation process through which the preferred alternative was selected.

6.3.1 Development of Alignment Alternatives

The first step in the development of alignment alternatives was the decision on the number of through auto traffic lanes that should be provided on Queens Quay East: two through lanes or four through lanes. It should be noted that, from the outset of this study, there has been a preference to adopt as narrow a right-of-way as possible to minimize overall scale of the street while providing the necessary cross-sectional elements.

The traffic operational analyses undertaken as part of the *East Bayfront Class EA Master Plan* demonstrated that, with only one through lane in each direction on Queens Quay East (two through lanes in total), the roadway could adequately support future development along the corridor, provided that dedicated turn lanes are available at key intersections. On that basis, the Class EA Master Plan recommended two through lanes with on-street bike lanes and on-street parking as the preferred cross-section design for Queens Quay East. There would be limited roadway capacity for through traffic, as acknowledged in the Class EA Master Plan, but this condition was deemed an acceptable trade-off given the benefits to the local community itself. The lack of discretionary auto capacity has the potential to discourage transient auto traffic and maintain Queens Quay East as a local roadway for local developments. The traffic operational analysis carried out as part of this EA – described in Sections 6.3.2 and 6.3.3 of this report – also demonstrated that future traffic volumes could be acceptably accommodated with two through lanes and dedicated turn lanes.

In addition, the *Queens Quay Revitalization EA* – which addresses transportation and public realm improvements on Queens Quay through the Central Waterfront area – recommends a reduction of traffic lanes from the current four lanes to two lanes to rebalance all transportation modes (auto, transit, walking, cycling) within the road right-of-way. This recommendation would, amongst other things, improve operations of all modes of travel, improve the pedestrian realm, and support better street and commercial activities on Queens Quay while meeting the adopted City policies and guidelines.

Recommendations from the *East Bayfront Class EA Master Plan* and the *Queens Quay Revitalization EA* were key factors in the adoption of two lanes over four lanes through the Transit EA study area, as the result would also benefit the East Bayfront from a community and urban design perspective, and would provide an opportunity to narrow the traveled portion of Queens Quay East. This conclusion was an important input into the assessment process related to the preferred design for Queens Quay East.

6.3.2 Description of Alignment Alternatives

Two alignment options were evaluated for the proposed streetcar service on Queens Quay East which were

- Option 1: Dedicated Transit in Centre Median with One-Street Bike Lanes (“Centre Transit”)

- Option 2: Dedicated Transit South Side with Expanded Public Realm ("South Side Transit")

Typical cross-sections illustrating the two options are shown in **Figure 6-8** and discussed below.

Option 1: Centre Transit

The Centre Transit option locates a basic 7-metre wide dedicated transit facility in the middle of the Queens Quay roadway as is typical of similar facilities across Toronto. A 3-metre wide median is located on each side of the transit right-of-way, wherever feasible, to provide space for landscaping and transit stop platforms/shelter facilities. Sidewalks would be widened on both sides of the street.

One traffic lane is provided in the westbound and eastbound direction on either side of the transit right-of-way. Each traffic lane comprises of a 3.5-metre auto lane and a 1.5-metre wide on-street bicycle lane adjacent to the curb. Separate 3-metre wide turn lanes are provided at intersections utilizing the space available within the adjacent median. The left turn lanes also provide for 'U'-turns at these intersections given that the raised transit right-of-way will restrict access at a number of public streets and driveways to right turn movements only.

To be consistent with the same concept examined by the *Queens Quay Revitalization Environmental Assessment*, the centre transit option includes on-street bike lanes. Although adequate space exists within the widest parts of Queens Quay east of Jarvis Street to accommodate the Martin Goodman Trail, this cross section cannot be carried throughout the entire *East Bayfront Transit EA* study area due to the narrower right-of-way west of Jarvis Street.

Since no dedicated transit facility exists east of Bay Street, some properties on both sides of the street would have modified vehicular access, with right-in, right-out operations between signalized intersections. Left hand turning movements would be restricted to intersections and not permitted to cross the transit right-of-way mid-block. This option would also provide flexibility for the TTC and the City to implement the TTC's transit signal priority measure at intersections.

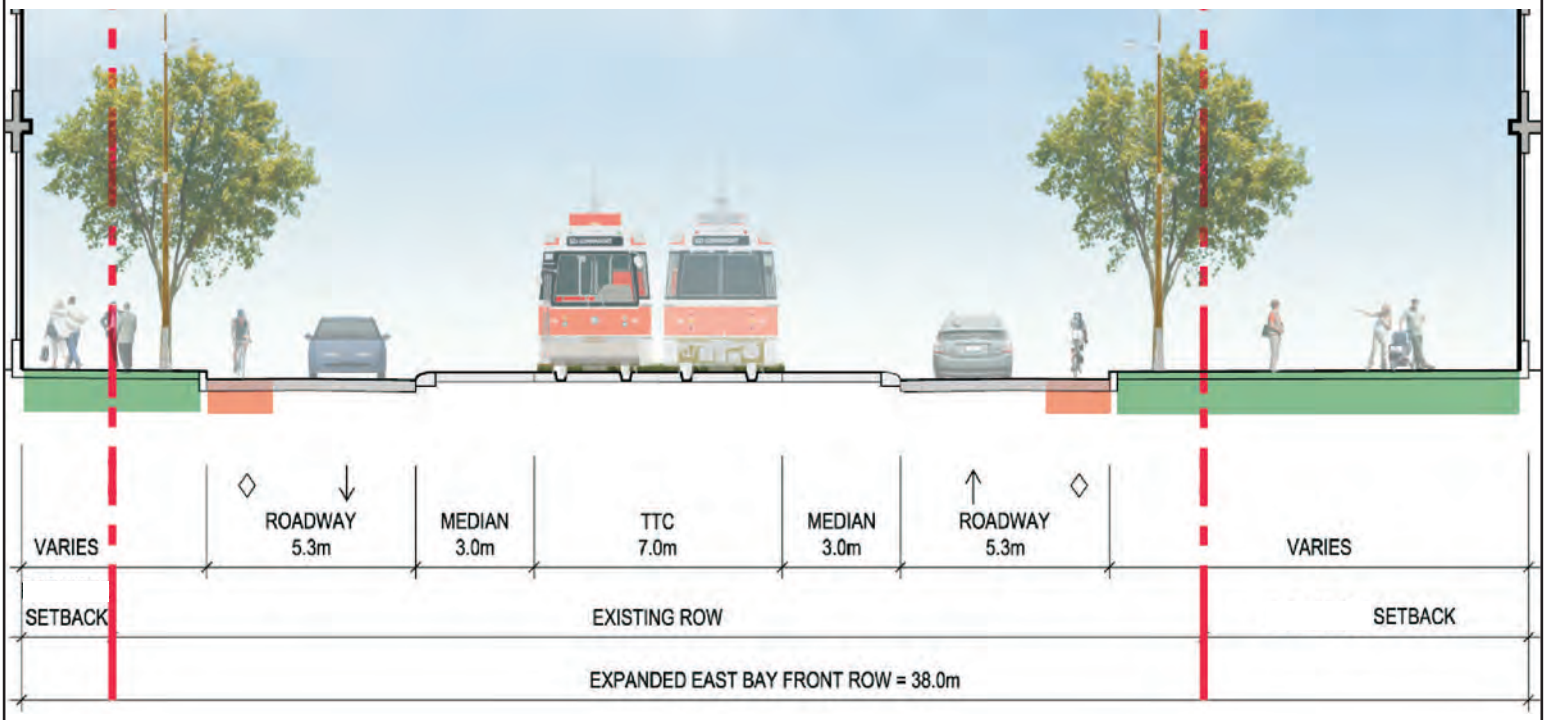
Option 2: South Side Transit

The South Side Transit option locates the dedicated transit facility on the south side of the Queens Quay roadway separated, generally, by a 3-metre wide median. Widened pedestrian sidewalks and boulevards are provided on both sides of the road.

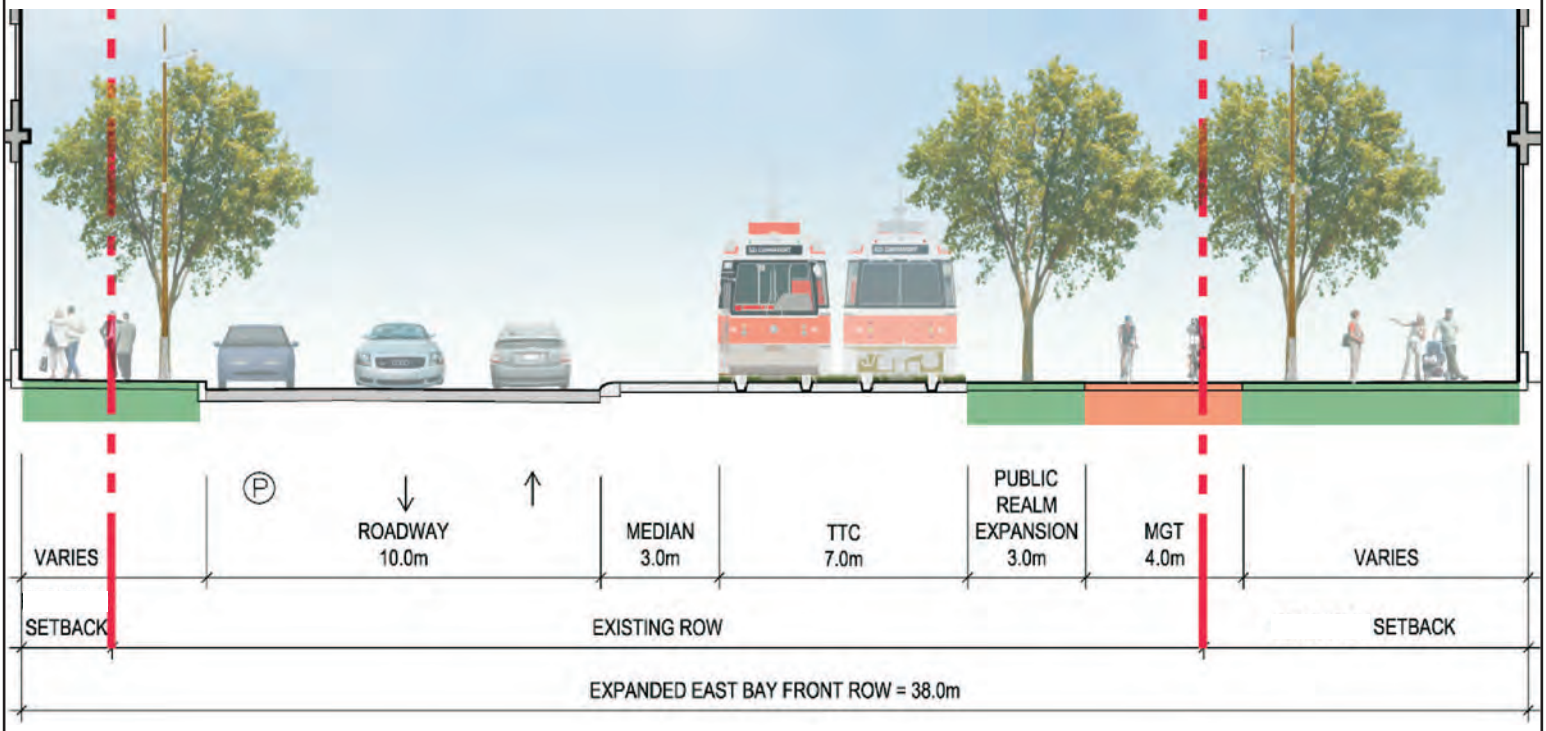
One traffic lane is provided in the westbound and eastbound direction on the north side of the transit right-of-way. Auxiliary turn lanes are provided at select signalized intersections and other key locations along the corridor. On-street parking is provided at mid-block locations, wherever possible, along the north side of the street.

The Martin Goodman Trail runs off-street along the south side of the transit facility adjacent to pedestrian sidewalks within an expanded and landscaped boulevard.

For safety reasons and to avoid potential conflicts between turning vehicles and streetcars on the transit right-of-way, it is necessary to install traffic signal control at all road crossings of the streetcar tracks.



Option 1 - Dedicated Transit in Centre Median with On-Street Bike Lanes



Option 2 - Dedicated Transit on South Side with Expended Public Realm

	Project: **EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT**	Figure No. **6-8**
	Title: Queens Quay East Streetcar Alignment Alternatives	

6.3.3 Assessment of Alignment Alternatives

The alignment alternatives were assessed with respect to a wide range of objectives. Impacts on transit service, traffic operations, public realm, and existing commercial and residential features were considered major factors in the assessment process. An overview of the analysis is provided in the following sections while the complete assessment matrix can be found in **Appendix H** of this report.

Planning Policies

City of Toronto Official Plan

The Toronto Official Plan contains policies with the aim of increasing the proportion of trips made by transit. Both the Centre Transit option and the South Side Transit option support these policies by providing improved access to transit and high quality transit service to Queens Quay that is capable of serving the future demands of the East Bayfront.

The Official Plan also contains policies that call for a more balanced approach in apportioning the public right-of-way – Streets will be designated to perform their diverse roles, balancing the spatial needs of existing and future users within the right-of-way. This includes pedestrians, people with mobility aids, transit, bicycles, automobiles, utilities and landscaping. City streets are regarded as public spaces that should not only function as efficient transportation corridors for all modes, but should be interesting and attractive spaces providing for tree landscaping, quality street furnishings and decorative paving. Streets should be scaled to the common denominator for all modes, that being pedestrians.

Although the **Centre Transit** option improves the needs of pedestrians, transit users, cyclists, and auto users over the existing condition, there are a number of constraints placed on the non-auto users. Longer north-south crossing distances and less non-auto space in the public realm are weaknesses of the Centre Transit option from the perspective of pedestrians. The provision of on-street bike lanes is more suited to commuter cyclists than recreational users such as families with children, inline skaters, and joggers.

The **South Side Transit** option provides a better balance for all modes of transport. Pedestrians would be provided with shorter north-south crossing distances than the Centre Transit option. More generous non-auto areas in the public realm would promote more efficient east-west movement and provide space for pedestrian scale amenities including street trees, landscaping and street furniture and decorative finishes. The transit right-of-way will be integrated within the expanded non-auto area of the public realm, creating a visual buffer from auto traffic. The mix of cyclists on the waterfront – ranging from commuters to families – is better served in the dedicated off-street Martin Goodman Trail than by on-street bike lanes.

Central Waterfront Secondary Plan (CWSP)

A primary objective of the CWSP is to improve connections within the Central Waterfront. While improvements to east-west connections and mobility can be achieved by both Centre Transit and South Side Transit options, there is limited improvement to north-south connections in the Centre Transit option due to the longer crossing distances and fewer crossing locations.

One of the defining features of the **South Side Transit** option is the linear park consisting of the Martin Goodman Trail framed by the double of row of trees. This feature achieves a scenic waterfront street envisioned in the CWSP. With the expanded non-auto area of the public realm, the South Side Transit option will greatly enhance the planned parks and open spaces along Queens Quay East, in particular the Sugar Beach at the foot of Lower Jarvis Street and Sherbourne Park at the foot of Lower Sherbourne Street. In comparison, the **Centre Transit**

option – with less space dedicated to street trees and public realm integration – does not achieve the vision of a scenic waterfront street to the same extent as the South Side Transit option.

The City of Toronto is developing and implementing a network of cycling facilities throughout the city that are specifically designed to encourage cycling and enhance the safety of cyclists. Both the CWSP and the Toronto Bike Plan call for the extension of the Martin Goodman Trail along Queens Quay Boulevard. While on-street bike lanes are provided in the Centre Transit option, they are not as well suited for recreational cyclists which form a large percentage of the riders expected on the waterfront. On the other hand, the provision of an off-street Martin Goodman Trail in the South Side Transit option reinforces the commitment to improving the quality of cycling on the waterfront. Recreational users such as families with children, inline skaters, joggers, and visitors to the waterfront would be better served by the off-street Martin Goodman Trail.

Waterfront Toronto Sustainability Framework

The Waterfront Toronto Sustainability Framework outlines a series of objectives to achieve sustainable and economically viable neighbourhoods within the Eastern Waterfront. The key objectives include the following:

- provision of a vibrant street life
- making alternative transportation modes a natural choice for local residents and visitors
- achieve improved air quality through the use of non-auto modes of transportation and enhancing natural vegetation
- improve access to the waterfront and create cultural destinations and green spaces

Both the Centre Transit option and the South Side Transit option would significantly improve the quality of the transportation facility, increase street activity, increase the availability and desirability of non-auto modes of transportation, improve access to the waterfront, and help create cultural destinations and enhance green spaces. The **Centre Transit** option supports the goals and objectives of the Framework by providing improved transit services, adding cycling lanes, and increasing street tree canopy coverage. However, the extent of the improvements is limited compared to the **South Side Transit** option. The expanded public realm in the **South Side Transit** option provides greater opportunity to incorporate urban design, landscape and streetscape elements to attract visitors and activity. The South Side Transit option also features a more comfortable environment for passengers at transit stops, and greater improvement in pedestrian and cycling facilities. The expanded public realm in the South Side Transit option will be essential for creating more green spaces and attracting cultural programming and activities.

Urban Design

Good urban design is the successful arrangement and planning of the built form to provide utility and enjoyment to its users. City Planning considers good urban design as an essential ingredient of city building. Toronto should strive to be beautiful, vibrant, safe, and inclusive. The City's streets, parks and public spaces are key shared assets that require special design attention.

The existing street configuration is deficient in terms of urban design: the street arrangement favours autos, there are limited and discontinuous facilities for cyclists; there are virtually no streetscape amenities or landscaping to provide convenience and enjoyment for tourists, visitors, workers and residents. The **Centre Transit** is not preferred in this regard, as it maintains

the existing arrangement found to the west. Compared to the South Side Transit option, it is limited how much of the street can be rebalanced to accommodate all its users and the degree of land and streetscaping that can be implemented to provide a comfortable environment.

With traffic on both sides of the TTC right-of-way in the **Centre Transit** alternative, there is limited expansion of the non-auto area of the public realm. This places spatial constraints on apportioning the street space to all users in a more balanced way, creating an accessible street side experience, and creating a public realm on Queens Quay that unifies the Central Waterfront and the Eastern Waterfront and accommodating special events. In the **South Side Transit** alternative, the traffic lanes are consolidated to the north side of the transit right-of-way, which requires less area than a centre transit arrangement. A more balanced cross section can be achieved for all users over the **Centre Transit** alternative, with satisfactory overall traffic and transit operations.

One of the defining features of the **South Side Transit** arrangements is the continuation of the Martin Goodman Trail—a multi-use off-road facility that runs for 22 kilometres along Lake Ontario and is part of the 900-kilometre Waterfront Trail—to the south of the TTC right-of-way. Framing the Martin Goodman Trail will be a row of trees on both sides. One row will separate the TTC right-of-way from the Trail; the other will define the edge between the Trail and the pedestrian boulevard. Each tree will be provided a minimum of 30 cubic metres of growing volume, meeting the City Department of Forestry target. The Centre Transit option, on the other hand, will accommodate less soil volume and less favourable growing conditions than that of the South Side Transit option.

The **Centre Transit** alternative can provide for a 100 percent improvement in the number street trees on Queens Quay, but this falls well short of the **South Side Transit** alternative, which provides for a 200 percent improvement. The single row of trees on each side of Queens Quay afforded by the Centre Transit option will limit the street tree canopy to approximately 25 percent. The row of trees on the north side of Queens Quay with the double row of trees south of the transit right-of-way in the South Side Transit option provides a street canopy of around 35 percent, which meets the City of Toronto Department of Forestry's guideline of 30 to 40 percent. The additional canopy in the South Side Transit option also provides the highest degree of wind amelioration and summer shade.

The **South Side Transit** alternative allows for the conversion of the lanes on the south side of the street to a public realm, which would include a double row of trees, off-street bike trail, expanded sidewalks, integrated with the streetcar stops and right-of-way. This creates a more substantial and comfortable public realm than the **Centre Transit** alternative and promotes an accessible, unique street side experience. Off-street improvements in the Centre Transit alternative are limited to larger sidewalks and improvements on the existing landscaping.

The arrangement with the TTC right-of-way to the north of the non-auto area of the public realm is the design feature that sets apart the **South Side Transit** alternative from the Centre Transit alternative. Transit will operate in a visually expanded non-auto area. Passengers will ride along the edge of a waterfront linear park. The transit platforms are less isolated than with the centre transit. Riders would wait for streetcars to the south of the roadway and the eastbound platforms would be removed entirely from auto traffic.

Transportation

The **Centre Transit** option performs well from a transit and traffic operations perspective. It is a typical arrangement in Toronto and autos, pedestrians and transit operators are familiar with the arrangement. With transit in the centre of the road, there are opportunities to reduce the number of intersections crossing the transit right-of-way and maintain the desirable distance between traffic signals for an effective operation of transit signal priority. However, from a passenger perspective the provision of waiting areas in the middle of the roadway is less desirable than integrating the transit stops into the sidewalk area, as is possible with the **South Side Transit** option.

The **South Side Transit** option provides for a similar level of service for traffic operations as the **Centre Transit** option but is more challenging from a transit operations perspective. The option is, however, capable of supporting future forecast transit and traffic volumes.

The **Centre Transit** option reinforces the actual and perceived width of the street, creating a sense of isolation for passengers due to the separation from sidewalks by through traffic, bike lanes, and parking. Under the **South Side Transit** option, streetcars would operate in a dedicated right-of-way to the south of the roadway. This configuration will reduce the sense of isolation for passengers as the streetcar platforms will be located to the south of general traffic.

With transit on the south side of the road, there are fewer opportunities to reduce the number of intersections or driveways crossing the transit right-of-way. However, there are strategies that can help reduce the number of signals that streetcars would need to cross, maintain an acceptable distance between transit signals, and allow for effective implementation of transit signal priority. The **South Side Transit** option would require a unique signal priority system in order to operate effectively through closely-spaced signals.

From a traffic operation perspective, results from micro-simulation traffic analysis show that, under both **Centre Transit and South Side Transit** options, all signalized intersections along the corridor will operate acceptably for future total traffic conditions for morning and afternoon peak hours. Forecast future traffic volumes can be acceptably accommodated from a capacity perspective. Details of the traffic analysis can be found in **Appendix I** of this report. The **South Side Transit** option provides some benefit to traffic over the **Centre Transit** option as the majority of traffic is destined to the downtown area and beyond. With transit on the south side of Queens Quay East, there will be fewer turning conflicts between transit and traffic as the eastbound left-turn movements – the higher volume turning movement on Queens Quay —will be separated from through transit movements.

In terms of vehicle access to properties in the East Bayfront development area, the **Centre Transit** option would result in a situation on Queens Quay East similar to the existing conditions on Queens Quay West – all left turn movements in and out of properties are made at signalized intersections, or with a u-turn movement at the nearest signalized intersection if the access point is not signal controlled. The **South Side Transit** option, in comparison with the **Centre Transit** Option, will provide a greater level of access and egress to existing properties and future developments on the north side of Queens Quay East, with modified access to the existing south side properties and full access to newly redeveloped sites in the East Bayfront Precinct. Access to properties on the north side of Queens Quay would either be provided by signalized turn movements or – for those properties located away from signalized intersections – permissive turn movements. Access to properties on the south side of Queens Quay would require a signal controlled intersection to safely cross the streetcar tracks. Some traffic would need to reroute to Lake Shore Boulevard as not all turning movements to properties on the south side will be available from Queens Quay due to right-of-way constraints.

From a pedestrian perspective, the **Centre Transit** option would provide an improvement over existing condition on Queens Quay East. However, under the **South Side Transit** option, the integration of the transit right-of-way into the public realm on the south side of Queens Quay East would significantly reduce the curb-to-curb crossing distance – an improvement over the **Centre Transit** option.

From a cyclist perspective, provision for on-street bike lanes in the **Centre Transit** option could accommodate commuter cyclists who are accustomed to travelling at higher speeds with vehicular traffic. However, recreational users such as families with children, in-line skaters, and casual cyclists would find on-street bike lanes intimidating as they are not as familiar with travelling with vehicular traffic as experienced cyclists are. Under the **South Side Transit** option, the provision of an off-street, multi-purpose Martin Goodman Trail would better serve experienced cyclists as well as recreational users.

From an emergency response perspective, both the **Centre Transit and the South Side Transit** options would meet the requirements of Fire, Police, and Emergency Medical Services, with the Queens Quay roadway serving as the primary access route and the transit right-of-way potentially as a secondary route.

Socio-Economic

The inconvenience of modified auto access and out-of-way travel associated with the South Side Transit alternative is outweighed by the benefits of enhanced access afforded to tourists, visitors, workers and residents arriving by walking, transit and bike. A satisfactory traffic operation is provided by the **South Side Transit** alternative and will continue to serve the existing sites along Queens Quay. The benefits that the **South Side Transit** alternative have over the **Centre Transit** alternative, in terms of existing and future retail, tourism, employment and residential, make the **South Side Transit** alternative preferred under socio-economic considerations.

Site Access

The **Centre Transit and the South Side Transit** alternatives do not displace any of the existing land uses and provide access to all existing properties along Queens Quay. Maintaining access to and from individual sites on Queens Quay was identified as a critical issue for both landowners and the study team. In consultation with landowners, the study team analyzed site access operations for several individual sites, which included the use of modeling software, undertaking additional traffic counting, and analyzing delivery and service logs. This allowed the team to make modifications to the layout and operational aspects of each alternative to ensure that each individual site is provided with good site circulation and traffic operations under each alternative.

Both alternatives provide access to all properties. The **Centre Transit** alternative has a slight advantage in this regard in that it maintains all of the existing access points. However, it limits many entrances to right in/right-out movements only with possible u-turns at signalized intersections. The **South Side Transit** alternative consolidates entrances and requires re-routing to Lake Shore Boulevard, as turning movements into the south side properties will be either eastbound rights or westbound lefts, but not both. This is necessary to optimize transit service. Only those properties with multiple entrances will relinquish an access point.

Main Street Environment

Improved access for all modes and combined with the expanded non-auto area of the public realm of the **South Side Transit** alternative could support a main street environment needed to better serve the existing and future retail, tourism, employment and residential community along Queens Quay. The **Centre Transit** alternative does not achieve the same level access with less space for pedestrians and cycling lanes that are less amenable to the mix of users that visit the waterfront now and in the future redeveloped areas. The Centre Transit alternative does not compare as well with the South Side Transit alternative in terms of improvements public realm space, urban design, street and landscaping, which all serve to attract tourism, cultural events and programs to the area.

Retail Activity

The **South Side Transit** alternative provides greater access to retail areas than the Centre Transit alternative for pedestrians, transit riders and cyclists, while maintaining auto access to all properties. All properties will be located within 380 metres of a major north-south connection to downtown.

Tourism

The public realm provided in the South Side Transit alternative includes more and higher quality amenities than the Centre Transit alternative to attract visitors to the waterfront. Visitors would enjoy a pedestrian-scaled public realm featuring a linear park with healthy street trees to provide shading and screening of the elements. The larger non-auto area of the public realm provides additional space for well-defined access points to the waterfront. The reduced non-auto area in the public realm of the Centre Transit alternative limits the space that can used to provide this kind of comfort to visitors and tourists.

The South Side Transit alternative also provides better overall access to the tourist areas along Queens Quay for pedestrians, transit and cyclists, while providing a high degree of auto access.

Employment

A waterfront address is considered a desirable location for employment regardless of the configuration on Queens Quay. The South Side Transit alternative has advantage in that it provides greater variety in terms of commuting options.

Residential

Nuisance effects (e.g., noise and vibration) are similar to the future Do Nothing scenario. Under Centre Transit and South Side Transit alternatives, noise and vibration mitigation would be improved with the installation of the latest track technologies that include noise insulating features. The potential for a turf tramway in both alternatives will further mitigate noise and vibration. And the reduction of traffic lanes in the South Side and Centre Transit alternatives will have a traffic calming effect.

Where the South Side Transit alternative provides a greater benefit is in the quality of place. The linear park and additional amenities within the public realm of the South Side Transit alternative would provide residents with greater use and enjoyment in the area than the Centre Transit alternative.

Natural Environment

The South Side Transit alternative provides the best opportunity to improve the urban forest, meeting the City's target for street tree cover. Three rows of street trees are possible, compared to only two in the Centre Transit alternative. This translates to 100 additional trees over the Centre Transit alternative and existing condition.

The South Side Transit alternative also includes provisions for increased soil volumes to facilitate more favourable growing conditions for the trees. Not only will the vegetation be more plentiful in the South Side alternatives, they will be of higher quality and better health.

The additional vegetation will improve local microclimate, regulate mid-summer temperature and buffer winter winds. Further the higher number of trees, together with a greater focus on non-auto modes of transport in the South Side Transit alternative, promotes improved air quality.

Cultural Environment

There are no expected impacts to the cultural and archaeological features in the area by any of the alternatives. Redpath Sugar refinery, a listed feature in the City of Toronto heritage inventory, is the only built heritage feature located adjacent to the Queens Quay Boulevard right-of-way. The expanded non-auto area of the public realm in the South Side Transit option provides the greatest opportunity to enhance the Redpath Sugar site in the area.

Cost

The capital costs to implement both options are similar. Each of the options would require the inclusion of similar elements (transit facility, roadway improvements, sidewalks, trees, furnishings). Any additional cost for the South Side Transit option would be due to additional trees and higher-quality finishes within the expanded public realm.

6.3.4 Evaluation of Alignment Alternatives

The alignment alternatives were evaluated against the project objectives and the key net environmental impacts and benefits were identified. The detailed evaluation matrices are contained in **Appendix H** of this report. The key differences between the two alignment alternatives are outlined in the following sections.

Urban Design

The **South Side Transit** option is **preferred** over the Centre Transit option with respect to urban design consideration. The South Side Transit option offers opportunities for a character that can reduce the scale of the roadway to greatly improve the public realm.

Transportation

There is no strong preference between the options from a transportation perspective. The Centre Transit option is preferred over the South Side Transit option with respect to transit operations however the options are similar from a traffic operations perspective. The South Side Transit option rebalances the street, promoting a wider range of uses while accommodating all modes of travel. Either option provides good transit and traffic operations allowing Queens Quay to fulfill a significant role within the larger street network.

Socio-Economic

The **South Side Transit** option is **preferred** over the Centre Transit option with respect to socio-economic considerations. The South Side Transit option maintains access to adjacent properties at a level similar to existing condition. The expanded public realm, making Queens Quay a major destination street, has more potential to improve tourism attractiveness along the waterfront. On the other hand, the Centre Transit option limits access to several adjacent properties and has less potential to improve tourism attractiveness along the waterfront.

Natural Environment

As noted above, the **South Side Transit** alternative is **preferred** simply due to the far greater number of street trees and their potential to reach a mature canopy state. Other benefits include fewer overall hard surfaces to reduce over land storm water flow, and improvements to air quality, human thermal comfort and wind amelioration.

6.3.5 Recommendation of the Preferred Alignment Alternative

Based on the application of the evaluation criteria the recommended alignment alternative was determined to be **South Side Transit** option. A summary of the evaluation is provided in **Table 6-3**. The preferred alternative was selected for the following reasons:

- Balanced space for all modes of travel;
- Generous and suitably scaled pedestrian boulevards;
- Reduced north-south crossing distance for pedestrians allows more time in the cycle to be dedicated to east-west transit to support the transit oriented development and non-auto goals of the waterfront and city more broadly;
- A continuous Martin Goodman Trail provides a safe and efficient facility for the mix of cyclists who travel along and visit the waterfront – an improvement over today and better overall than on-street bike lanes;
- Traffic can be accommodated on Queens Quay at an acceptable level of service with minor re-routings to Lake Shore Boulevard;
- Adequate access can be provided to all properties south of Queens Quay for all modes of travel;
- A multi-modal street that promotes improved air quality;
- Vastly improved urban tree canopy/a linear park;
- A main street environment that promotes Queens Quay as a place for tourism, employment, cultural activity and residential uses;
- A main street environment that will support and encourage private investment in Toronto's waterfront precincts.

Table 6-3: Alignment Alternatives Evaluation Summary

OBJECTIVES	Option 1 Centre Transit with On-Street Bike Lanes	Option 2 South Side Transit with Off-Street Martin Goodman Trail
Planning Policies	◑	●
Urban Design	◑	●
Transportation	◑	◑
Socio-Economic	◔	●
Natural	◕	●
Cultural	Not a Decision-Relevant Factor	Not a Decision-Relevant Factor
Cost	Not a Decision-Relevant Factor	Not a Decision-Relevant Factor
OVERALL	◑	●

6.4 Public Consultation: Design Alternatives

Consultation activities in support of selecting the Preferred Design involved numerous meetings with key stakeholders and two rounds of public consultation:

- Public Information Centre (PIC) #2 on June 21, 2007 at Novotel Hotel (6:00pm to 9:30pm) – while the first half of PIC 2 focused on selection of the preferred transit technology, the second half of the PIC was dedicated to discussion on the long list of portal location options and recommendation on the short-listed alternatives.
- Public Information Centre (PIC) #3 on March 25, 2009 at Westin Harbour Castle Hotel (6:30pm to 9:00 pm) and on March 28, 2009 at Harbourfront Centre (10:00am to 1:00pm) – this PIC was held in conjunction with the Queens Quay Revitalization EA to discuss selection of the preferred design alternative including the preferred location of the tunnel portal and the preferred streetcar alignment on Queens Quay.

6.4.1 Summary of Second Round of Public Consultation (PIC #2)

As described in Section 5.4.2 of this report, the purpose of PIC 2 was to discuss selection of the preferred transit technology and to present a long list of options for locating the entrance to the existing Bay Street Tunnel for the proposed streetcar line on Queens Quay East.

Summary of Key Issues

Key issues related to the selection of the short-listed tunnel portal alternatives are summarized in **Table 6-4**. Details from the workshop can be found in **Appendix A**.

Table 6-4: Summary of Key Responses to PIC #2 Workshop Questions Related to Tunnel Portal

Question	Summary of Response
What are your views on each of the following alternatives as a potential location for streetcar/LRV traveling to/from Queens Quay East to enter the existing Bay Street tunnel and connect to the Union Station Loop? (Please identify perceived strengths, weaknesses, and questions) a. Bay Street between Lake Shore Boulevard and Harbour Street b. Bay Street between Harbour Street and Queens Quay c. Queens Quay between Bay Street and Yonge Street d. Queens Quay between Yonge Street and Freeland Street e. Queens Quay between Freeland Street and Cooper Street	**Key Strengths** Based on the comments received, there was considerable support for Bay Street and Queens Quay as possible options for locating a new tunnel portal: *Portal on Bay Street* • No portal(s) on Queens Quay • Visually more attractive • More appreciation of the waterfront • Better for passenger pickup/drop-off on street *Portals on Queens Quay* • Best for transfer when travelling east-west or west-east and not wanting to go to Union (tourists) • Fewer underground stations [Alternative 'C' in particular] • Might be cost effective as a station is below **Key Weaknesses** *Portal on Bay Street* • Costly • Disruptive • Not wide enough for two lanes of traffic • Will cause traffic problems during construction *Portals on Queens Quay* There were some concerns over the perceived impact of Options Q2 and O3 on the existing LCBO facilities on Queens Quay East: • May disrupt the LCBO at Queens Quay and Cooper Street (Canada's largest liquor store, $40 M in sales, 1 million plus visits per year). • Careful consideration needed to ensure that licensees and customers can enter and exit

6.4.2 Summary of Third Round of Public Consultation (PIC #3)

The third round of public consultation (PIC #3) was held in conjunction with the Queens Quay Revitalization EA on March 25, 2009 at Westin Harbour Castle Hotel between 6:30pm to 9:00 pm and on March 28, 2009 at Harbourfront Centre between 10:00am and 1:00pm.

The purpose of this workshop was to discuss the following:

- The assessment of short-listed portal alternatives and selection of the preferred portal location

- The assessment of streetcar alignment alternatives on Queens Quay and selection of the Preferred Design

Attendees were invited to provide their input on these topics and the Project Team's recommendations.

Notification

A meeting notice for the Joint Public Information Centre was published in the local media (*Toronto Star*) and distributed via email to the project mailing list for each respective EA process.

Summary of Key Issues

The meeting on March 25, 2009 began as an open house during which those who arrived could review the available display panels and discuss the study with Project Team staff. Following the open house session, staff from Waterfront Toronto, the TTC, and the Consultant Team made a formal presentation.

The presentation was followed with a workshop discussion session. The discussion session provided an opportunity for the public to provide their views on the Project Team's recommendations on the alternatives proposed to be carried forward.

Key issues related to the selection of the preferred alignment are summarized in **Table 6-5.** Details from this workshop can be found in **Appendix A**.

Table 6-5: Summary of Key Responses to PIC #3 Workshop Questions

Question	Summary of Response
1. What feedback do you have on the results of the evaluation to date – What do you like? What concerns do you have?	Participants were generally pleased with the proposed plan for Queens Quay, the landscaping designs, the pedestrian and cycling realms, and public transit. There was overall support for the South Side Transit alternative. Participants felt that the proposed plan should further consider seasonal changes; that it may negatively impact access to south side residences; that it does not address the western continuity of the Martin Goodman Trail; that it does not address the lack of public washroom facilities along the waterfront; and it may cause traffic delays and congestion. It was noted by a number of participants that decreasing Queens Quay from 4 lanes to 2 lanes of traffic may cause congestion and traffic delays.
2. What would you like the Project Team to consider further as the project moves into the detailed design stage?	Participants requested that the project team consider expanding the PATH system from Union Station to the waterfront, design more for the winter season, increase public washroom facilities and public benches, provide a public swimming pool, consider the impact of the island ferry docks, and strive to make Queens Quay a destination itself.

The meeting on March 28 was held as a drop-in style public open house with no formal presentation or workshop discussion. Members of the Project Team were available at the open house to discuss issues related to assessment of the design alternatives, selection of the preferred design alternative, and elements of the recommended design.

7. DESCRIPTION OF THE PREFERRED DESIGN

The typical environmental assessment process first seeks to solve the engineering and technical problem related to transportation and infrastructure, and then considers aesthetic and urban design improvements within the boundaries defined by the preferred alternative design concept. In some cases, this approach has lead to a less than ideal design solution.

As part of this Class EA, the urban design quality of the corridor was considered from the beginning of the process, alongside traffic and transit infrastructure needs. The study approach considers the street as an urban place, not simply a corridor for movement.

The evaluation of Planning Alternatives (Alternative Solutions) and Design Alternatives (Alternative Designs) concluded with the selection of South Side Transit on Queens Quay East with Expanded Public Realm and Two-way Operations as the Preferred Design. The result was arrived at through rigorous analysis and a robust consultation program, with open and continuous engagement with stakeholders, agencies and the public.

The design supports the principles and policies for the Central Waterfront described in the Toronto *Official Plan* and *Central Waterfront Secondary Plan*. Most importantly, its users will be better served – the plan accommodates recreational, transit, bicycle, pedestrian and auto traffic, both locally on Queens Quay and system wide, while enhancing landscape features and the public realm within the Queens Quay corridor between Bathurst Street and Parliament Street.

7.1 The Preferred Design

One of the core principles in the City's transportation policies is simply, *Transit First* – to move more people more efficiently, while minimizing environmental impacts. High quality transit service is a fundamental element in the Preferred Design. The system features of the Preferred Design bring high quality transit service to the East Bayfront, capable of supporting the future demands of the area as planned development takes place.

The new streetcar line will complement the two existing lines on Queens Quay west of Bay Street. The new line will provide service between Union Station, the East Bayfront, and the future West Don Lands, Lower Don Lands, and Port Lands communities via Cherry Street. It will be below grade within the existing Bay Street Tunnel and surface on Queens Quay East through a portal located just east of Yonge Street.

The Preferred Design represents a "shift in the balance" or a re-ordering of the street right-of-way to accommodate pedestrians and cyclists while still meeting the needs of transit and other vehicles. The existing Queens Quay right-of-way is 27.4 metres, with a typical pavement width of 19 metres east of Lower Jarvis Street. Although the Preferred Design reduces the pavement width to 10 metres, the total right-of-way increases to accommodate dedicated transit on the south side, an off-road multi-use trail, and provide generous pedestrian boulevards. More than simply a sum of parts, the overall impact of this arrangement will be that of a linear park that transforms Queens Quay. At 38 metres, the recommended right-of-way is less than the 40 metres prescribed in the *Central Waterfront Secondary Plan*.

The *East Bayfront Class Environmental Assessment Master Plan* recommended a staged widening of the right-of-way that maintains the existing curb line on the north side as an interim condition until lands on the north side redevelops. Upon redevelopment, and as the fronting ground floor uses emerge, the street would be widened to its full extent through the

appropriate City of Toronto approvals processes. The recommended design is generally consistent with this approach, as illustrated in the plates following this Chapter.

The proposal will generally match the existing road profile. Minor changes in grade may occur during the detailed design stage to facilitate surface drainage or minimize grading impacts to adjacent properties.

The Preferred Design for transit in the East Bayfront is illustrated in Plates 1 to 7, at a scale of 1:1000 horizontally and 1:200 vertically. The remainder of this chapter describes the primary characteristics of the recommended design. Although changes may occur during the detailed design and construction phases, they should not alter the intent of the recommended design or its components.

One of the key considerations in selecting transit on the south side was the potential to visually associate the transit right-of-way with the adjacent south side boulevard and Martin Goodman Trail. A fundamental element of the urban design approach in the study has been to consider the street as an urban place, not simply a corridor for movement. This embodies the principles of:

- designing for spatial comfort and human scale;
- making a place not a thoroughfare; and
- orienting to the pedestrian

The Preferred Design provides an opportunity to visually expand the non-auto portion of the street. Generally, the Queens Quay East right-of-way between Yonge Street and Parliament Street will be composed of:

- north sidewalk of variable width;
- a roadway generally 10 metres;
- a raised centre median between the roadway and transit right-of-way 3 metres;
- a dedicated transit right-of-way 7 metres;
- a tree-lined buffer 3 metres;
- Martin Goodman Trail 4 metres; and
- south sidewalk of variable width.
- **TOTAL RIGHT OF WAY 38 metres**

In general terms, the proposed curb line on the north side of the road will remain similar to where it is today, except at Lower Jarvis Street and Lower Sherbourne Street where provision of a westbound right-turn lane would require the current curb line to be shifted north approximately 3 metres. Roadway modifications are expected to take place along the south side of the road.

The standard 38 metres right-of-way cannot be maintained, initially, west of Lower Jarvis Street in front of the Redpath Sugar property, where the existing building face on the south side of Queens Quay requires that the right-of-way be narrower. Design elements will be adjusted where necessary to account for these types of right-of-way constraints. The Preferred Design and standard right-of-way will be achieved between Lower Jarvis Street and Yonge Street, over time, as the properties adjacent to the right-of-way are redeveloped.

Functional Plan of the Preferred Design can be found in **Appendix E** of this report. The recommended design concept is illustrated in **Figure 7-1** and typical cross-sections are illustrated in **Figure 7-2**.

Project:

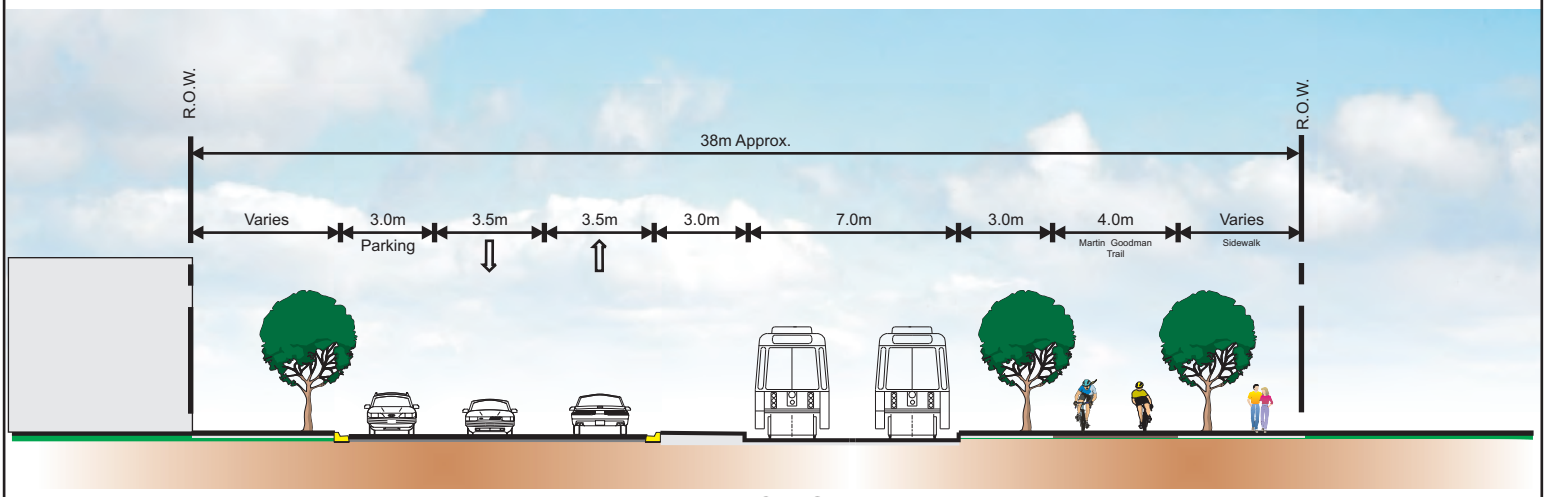
EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

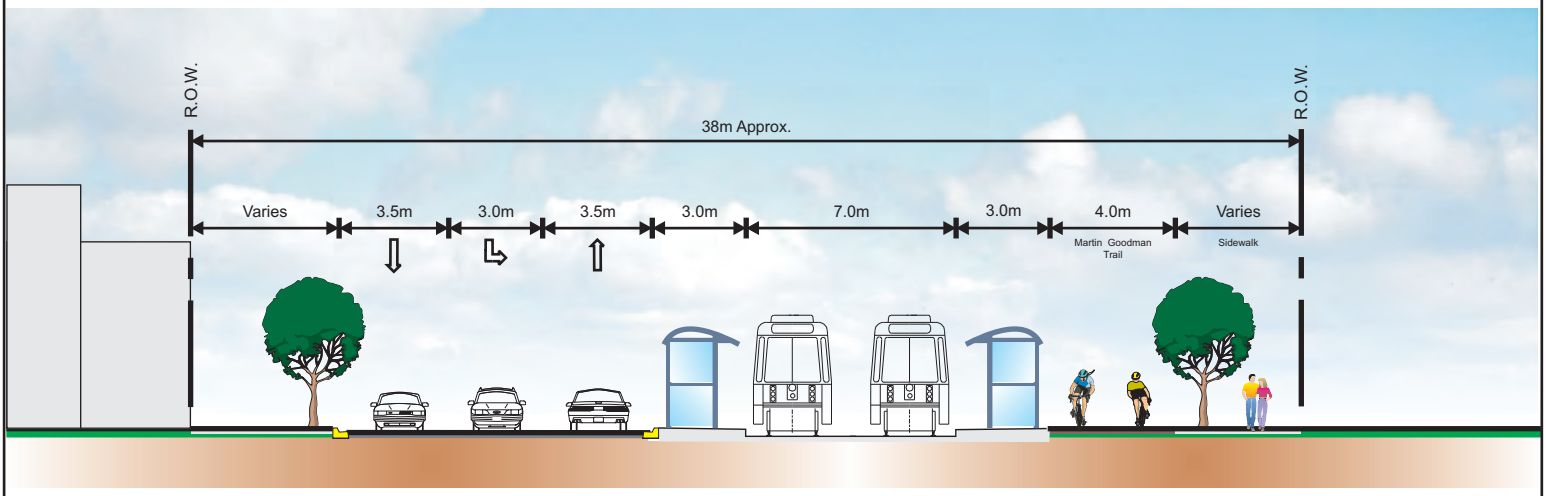
Artist's Rendering of the Preferred Design Alternative

Figure No.

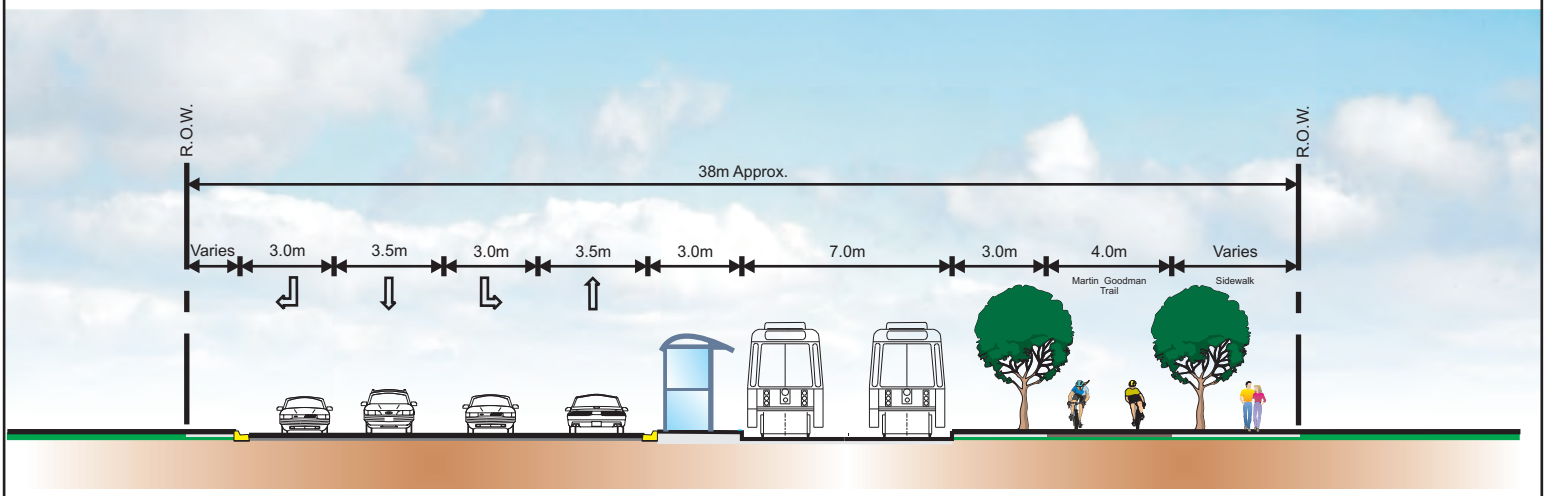
7-1



Mid-Block with On-Street Parking



Intersection with Facing Platforms and One Turn Lane



Intersection with Two Turn Lanes

Project: **EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT**		Figure No. **7-2**
Title: Typical Cross-Sections of the Preferred Design		

7.2 Roadway

The Preferred Design provides for one traffic lane per direction. At some intersections one auxiliary turn lane is provided. Both left-turn and right-turn lanes are provided at Redpath Sugar's main driveway, Lower Jarvis Street, Lower Sherbourne Street and Street 'D'. The right turn lane at Freeland Street and Street 'D' requires the lane to cut into the centre median by 3 metres, while the right turn lane at Lower Jarvis Street and Lower Sherbourne Street requires the north curb line to be shifted north by 3 metres.

The right turn lane at Redpath's main driveway is an interim condition until the TTC platform requires extension to accommodate longer transit vehicles. This would take place sometime in the future, coinciding with greater passenger demand associated with the build-out of the Lower Don Lands and Port Lands redevelopment areas.

On street parking is provided at mid-block locations, wherever possible, along the north side of the street. The pavement width is generally 10 metres from the north curb line to the centre median. At intersections where both a left turn and a right turn lane are provided, the width is increased to 13 metres. The final roadway width will be confirmed during the Detail Design Phase.

It should be noted that detailed design of the intersection at Freeland Street, Lower Jarvis Street, and Lower Sherbourne Street will need to accommodate turning movements of TTC buses that currently operate through these intersections.

7.3 Intersections

With the preferred south side transit alignment, it is necessary to introduce traffic signal control at all road crossings of the streetcar tracks to avoid conflicts between turning vehicles and streetcars. The Queens Quay East intersections with Freeland Street, Redpath West Driveway, Redpath Centre Driveway, Lower Jarvis Street (a T-intersection), Richardson Street, Lower Sherbourne Street, and Street 'D' will all operate under traffic signal control.

These closely-spaced signals, in particular between Freeland Street and Richardson Street – where there are five signals in a 460m section of roadway reflecting an average signal spacing of 115m – are more closely spaced than would normally be recommended. These signals will result in delays to transit vehicles, but the delays can be minimised through careful design and the implementation of aggressive transit priority signal strategies which include:

- enabling east-west transit movements to occur at the same time as the east-west through traffic phases;
- the two-stage pedestrian crossing design at Lower Jarvis Street which removes streetcars/LRVs from traffic signal control;
- the signal at the Redpath Centre Driveway will operate under complete transit pre-emptive control and not allow for north-south pedestrian crossings of Queens Quay; and
- reduction of posted speed limit to 40 km/h on Queens Quay to allow for the safe operation of the signals without coordination with adjacent or nearby signals.

For safety and operational reasons, when signals are very closely spaced, they are often interconnected so that the amber and all-red signal displays start at the same time. If they are not interconnected, and signals are very close together, motorists have two sets of signals clearly within their field of vision and could have difficulty in discerning which signal applies to

them. The second benefit of interconnecting traffic signals is that, depending upon the speed of traffic, a motorist may have to begin responding to a changing signal display at the downstream intersection before they cross the upstream signalised intersection. In both these situations, having the amber display come on simultaneously at both intersections mitigates the safety concern.

However, there are two problems with interconnecting these traffic signals. Firstly, five signals interconnected will not work efficiently as a system. Secondly, the interconnection of all five signals would result in a less efficient operation for transit operations. Transit vehicles must stop to serve customers and would get 'out of sync' with the traffic flow. Also, the signals are spaced too closely to allow the implementation of effective transit signal priority – this is because the streetcars cannot be detected early enough to allow the traffic signal controller to bring on a favourable signal display. To reduce delays to transit vehicles, it was decided that two pairs of signals would be interconnected and the middle traffic control signal, at the Redpath Centre Driveway, would operate independently. In order to alleviate safety concerns with close, non-interconnected signals, City of Toronto Transportation Services will be reducing the posted speed limit on this section of Queens Quay from 50 to 40 kilometres per hour.

These strategies will result in slower traffic operations, but are required to achieve the transit quality of service objectives of the project. For safety reasons, and to avoid conflicts between turning vehicles and streetcars on the TTC transit right-of-way, the phasing strategy requires that turning movements across the streetcar tracks at the various intersections (i.e. eastbound right turn and westbound left turn movements) operate only during protected turn phases and from an exclusive turn lane (left or right). No permissive movements or right turns on red will be permitted on turning movements across the streetcar tracks (i.e. westbound and northbound right turn movements) due to safety and operational considerations. The proposed signalization plan and turn prohibitions are illustrated in **Figure 7-3**.

For the planned transit services to operate effectively, it is essential that any future proposals for the installation of additional signals on Queens Quay East – above and beyond those illustrated in Figure 7-3 – will need to be supported by an independent technical audit to ensure that such signals can be installed in a way that allows safe traffic operations and does not adversely affect streetcar operations.

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Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

Recommended Intersection Controls on Queens Quay East

Figure No.

7-3

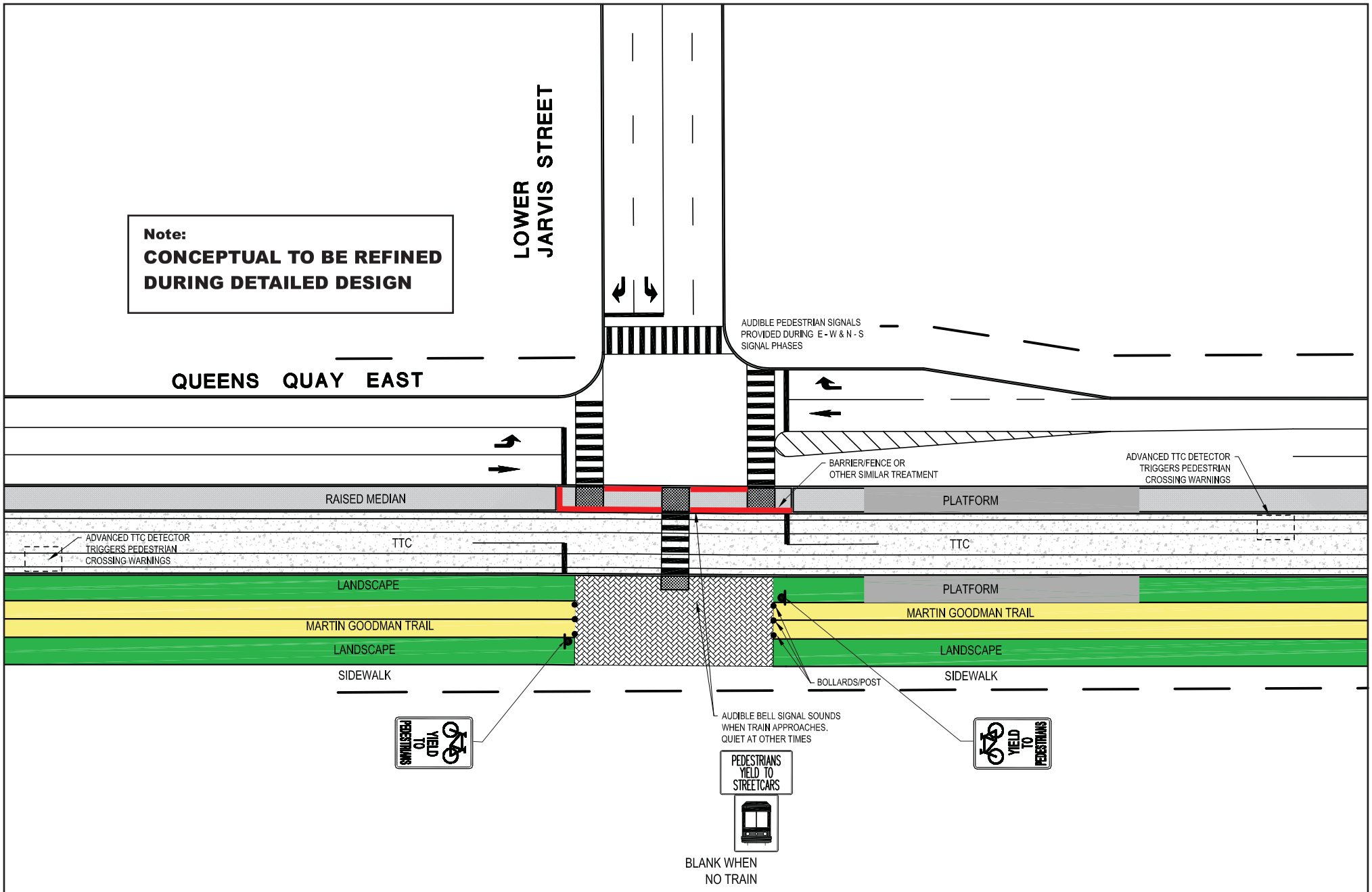
7.3.1 Two-Stage Pedestrian Crossing at T-Intersections

The Preferred Design features a T-intersection at Lower Jarvis Street, where no roadway extends south of Queens Quay East. Recognizing that there will be no vehicular movements crossing the streetcar tracks at this T-intersection, a two-stage pedestrian crossing arrangement has been adopted to reduce delays to transit operations by minimizing the need for transit vehicles to stop at this intersection. The arrangement separates the activation of the pedestrian crossings over the roadway from the streetcar portions of Queens Quay East. The arrangement also serves to reduce the roadway width that pedestrians are required to cross as part of a single crossing.

The two-stage arrangement, illustrated in **Figure 7-4**, includes a full traffic signal control of the roadway portion of Queens Quay East, with pedestrian crossings of the roadway on the east and west sides of the intersection, and a separate single pedestrian crossing of the streetcar tracks. The pedestrian crossing of the streetcar tracks operates independently from the main road traffic signal but provides a protected crossing facility for pedestrians. Physical measures, standard curbing, and related features will be located on the median, situated between the roadway and the transit right-of-way, to guide pedestrians – including the visually impaired – between the two sets of crossing facilities.

The pedestrian crossing of the transit right-of-way will, given the relative frequency of streetcars during peak hours, operate with standard visual 'walk' and 'don't walk' signals but will, similar to a railroad pedestrian crossing arrangement, adopt a suitable audible 'don't walk' (rather than 'walk') warning, such as a ringing bell sound, advising pedestrians of the presence of an approaching streetcar and that they should wait until the tracks are cleared. The use of a railroad style warning system provides an audible signal for the pedestrian crossing that is distinct from the typical road crossing audible indicators that will be in use over the roadway portion of Queens Quay East and also avoids the continuous sounding of a 'walk' signal for extended periods between streetcar movements.

It may be possible to apply this concept to other locations on Queens Quay East, notably at Street 'A', Bonnycastle Street, and Small Street. However, the resulting multiple closely-spaced traffic signals may require that they be coordinated, for safe auto movement, in a way that is very detrimental to streetcar operations. For this reason, any future proposals for the installation of additional signals on Queens Quay East – including the signals suggested for Small Street, Bonnycastle Street, and Street 'A' – will need to be supported by an independent technical audit to ensure that such signals can be installed in a way that allows safe traffic operations and does not adversely affect streetcar operations.



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Title:

2 - Stage Pedestrian Crossing at T - Intersections

Figure No.

7-4

7.4 Pedestrian Zone

The pedestrian improvements and features detailed in this section align with established policies and guidelines that support a shift to improving pedestrian mobility in the city. Several documents, including the Toronto *Official Plan*, *Central Waterfront Secondary Plan*, *Toronto Green Development Standard and Pedestrian Charter*, specifically encourage walking as a mode of choice. Improving air quality and minimizing impacts to the natural environment is embedded in this direction and is reflected in the study's Problem Statement and in the evaluation of alternatives. Moreover, the directions are echoed in the Preferred Design, which provides a plan for improving pedestrian movement.

One feature of the Preferred Design – reducing the number of auto through lanes to two and locating them to the north side of the TTC right-of-way – has a positive impact for north-south pedestrian crossings and the overall walkability of the area. The average pedestrian crossing of Queens Quay is shorter than with a more conventional arrangement with two travel lanes on either side of transit. The shorter north-south crossing distance provides additional east-west green time for movements (including pedestrian) along Queens Quay.

East-west movement is also improved with a wide and generously landscaped pedestrian boulevard on the south side of the TTC right-of-way. The Preferred Design considers pedestrian-accessible spaces within the street level of buildings that front Queens Quay in weather-protected colonnades and arcades as part of the boulevard. This is a similar strategy used in Toronto and many European cities to expand the walkable portions of the street.

For the section of roadway from Freeland Street easterly, the Preferred Design includes a 3-metre median that separates the transit right-of-way from the roadway. The median serves several functions: to reduce the scale of the street; to provide a mid-street location for transit poles and street lighting, to provide a pedestrian refuge, help to locate transit platforms and allow for fully protected eastbound right hand turning lanes at designated intersections.

The pedestrian realm is expansive with a landscape zone separating the Martin Goodman Trail and the sidewalk. The zone is intended for trees and other plantings, but it will integrate with the sidewalk providing additional space to pedestrians. The south pedestrian boulevard will provide access to both existing and proposed adjacent land uses, including storefronts, residential entrances, and connections to the waterfront.

7.5 Martin Goodman Trail

Both the *Central Waterfront Secondary Plan* and the *Toronto Bike Plan* identify an extension of Toronto's bike network into the Central Waterfront on Queens Quay. The Secondary Plan specifies:

> *The Martin Goodman/Waterfront Trail will be completed through the Central Waterfront and connected to the city-wide trial or pathway system, including the garrison Creek, Humber Valley and Don Valley trails.*

The benefits of a completed waterfront trail extend beyond a physically more connected bicycle network, as it helps achieve a more balanced and transportation system while minimizing environmental impacts. The Preferred Design achieves these objectives by providing a dedicated off-street extension of the Martin Goodman Trail.

The Preferred Design will provide for continuation of the Martin Goodman Trail from the Central Waterfront area west of Bay Street and connect to the trail as it continues east from the intersection of Parliament Street and Lake Shore Boulevard. This multi-use off-road facility runs

for 22 kilometres along Lake Ontario and is part of the 900-kilometre Waterfront Trail. The Martin Goodman Trail will provide connections to proposed or established bicycle facilities at Yonge, Lower Jarvis, Lower Sherbourne and Parliament Streets. The trail will be generally 4 metres wide – the approximate width of two standard bike lanes.

Framing the Martin Goodman Trail will be a row of trees on both sides, wherever possible. One row will separate the TTC right-of-way from the trail; the other will define the edge between the trail and the pedestrian boulevard. Each tree will be provided sufficient soil to meet the City's desired garget. Although pedestrians are permitted to use the Martin Goodman Trail, it will be primarily for non-pedestrian movement and activities.

Consistent with other multiuse trails in the City, cyclists would be required to yield to pedestrians and slower moving users (e.g., children on bikes, inline skaters) on the Martin Goodman Trail. The movements on the trail will also need to be coordinated with the traffic signals along Queens Quay to allow trail users to safely cross intersections and entrances. Features such as separate cycling controls at intersections will be considerations during the design and implementation stage of the project, as will a comprehensive way-finding and signage program. Bollards and "cattle gates" to calm traffic on the trail are other features that will be considered as a part of the traffic control strategy to be undertaken during detailed design.

7.6 Transit Right-of-Way

The transit right-of-way on the surface will generally be 7 metres wide. The right-of-way proposed in the Preferred Design is directly adjacent to a 3-metre landscape zone to the south, with a 3-metre median between transit and the roadway to the north. Both will serve as buffers between streetcars and adjacent modes of traffic and provide space for transit platforms. Bollards, curbs, and trees will be used to delineate the transit right-of-way from the sidewalk. Overhead traction power will be suspended from guy wires attached to poles on either side of the right-of-way (i.e. one pole in the median and one pole in the boulevard). Toronto Fire Services prefer this configuration to an arrangement with a single pole between the tracks as it provides an additional drivable surface. Fire and EMS vehicles can use either the roadway or the transit right-of-way in the event of an emergency. The poles can be stand-alone or used in combination with streetlights.

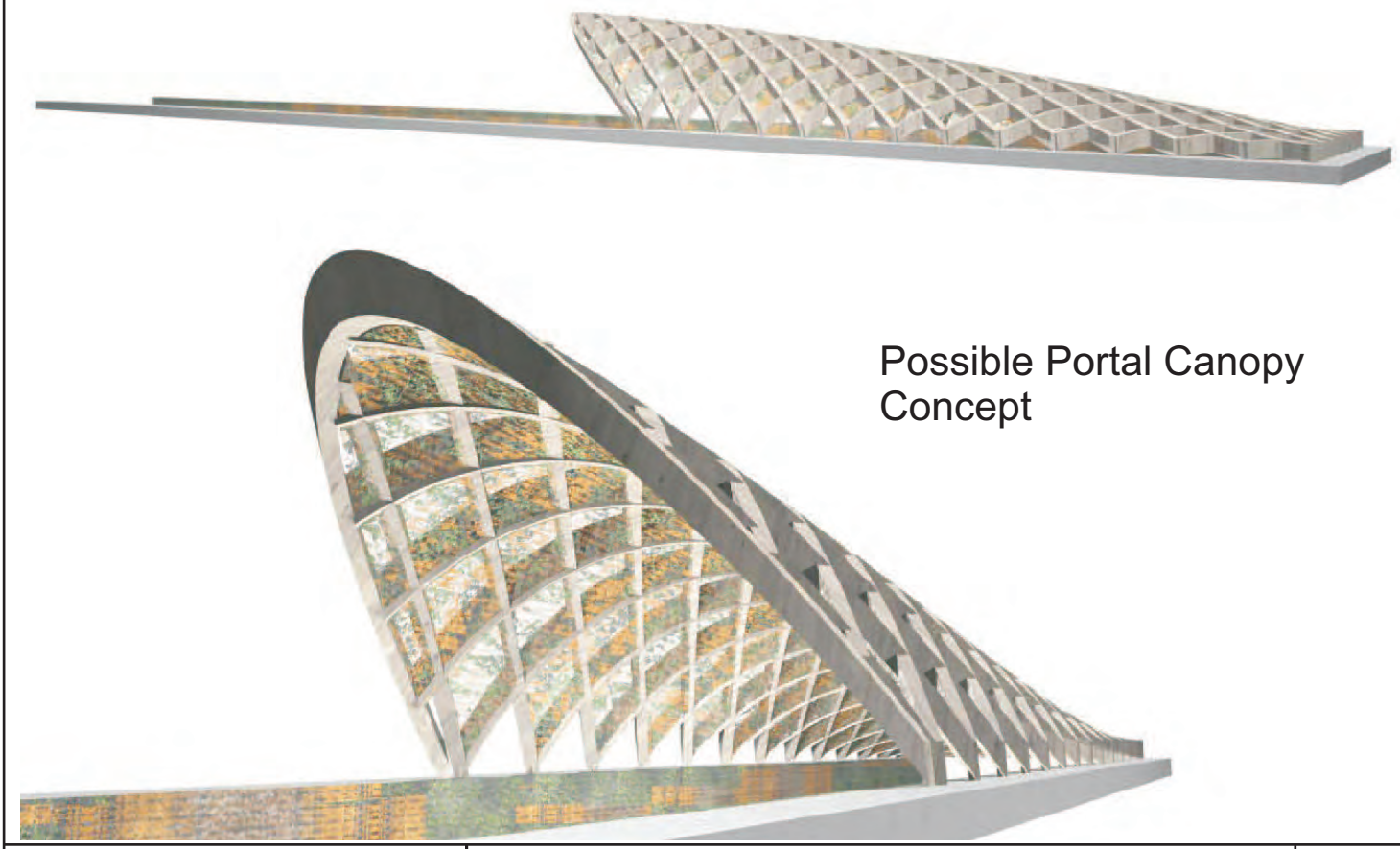
The TTC platforms will accommodate the modern low-floor light rail vehicles that will be replacing the TTC's existing streetcar fleet in the future, providing improved accessibility for all users and more efficient operations. The platforms will be 3 metres wide. This will promote accessibility, while providing the necessary space for street furniture such as shelter and railing to improve passenger loading.

The key benefit of the south side arrangement is the potential to visually expand the public realm through the use of consistent colour/texture treatments for both the pedestrian area and the transit right-of-way. The streetcar platforms will feature a surface treatment in keeping with the unique design for the street to be developed in the detailed design phase.

7.7 Underground Structure

The proposed streetcar route will begin underground at Union Station Loop and travel south through the existing streetcar tunnel under Bay Street. At the intersection of Bay Street and Queens Quay, the route will turn east through a reconfigured wye (a triangular streetcar junction) and enter a new tunnel under Queens Quay. The new tunnel will continue approximately 250 metres easterly within the Queens Quay right-of-way until it reaches a new portal located east of Yonge Street. East of Yonge Street, the route will transition from a fully-underground route to a surface route at Freeland Street. The tunnel portal for the route would be located between Yonge Street and Freeland Street. Past the portal, the route will ascend to surface along a ramp extending approximately 70 metres in length and ascending at a gradient of 7.5%, which is similar to the ramp connecting to the existing portal west of Bay Street. This is steeper than desirable but the presence of a major storm sewer culvert running north-south under Yonge Street forces this steep grade. Even so, the sewer culvert will need to be realigned at Queens Quay in order for the streetcar route to reach surface prior to Freeland Street.

For planning purposes, the dimensions of the new tunnel under Queens Quay will be approximately 10 metres in width and 6 metres in height, while the tunnel portal and ramp will be approximately 9 metres in width. Possible methods for constructing the tunnel and portal are discussed in details in **Appendix M** of this report. **Figure 7-5** illustrates a conceptual view of the tunnel portal**.** Details related to the design of the tunnel and portal will be determined during detailed design.



Possible Portal Canopy Concept

	Project: **EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT**	Figure No. **7-5**
	Title: Tunnel Portal on Queens Quay between Yonge Street and Freeland Street	

7.8 Special Track Work

Special track work will be required at the underground transit intersection of Queens Quay and Bay Street to allow streetcars operating on the new streetcar line on Queens Quay East to turn north to enter the Bay Street Tunnel and continue north to Union Station. The current underground junction at the Queens Quay / Bay Street intersection features a set of two curved tracks connecting the Queens Quay/Ferry Docks Station with the ramp to the existing portal west of Bay Street. With the new streetcar line on Queens Quay East, a second set of curved tracks will be provided connecting the Queens Quay/Ferry Docks Station with the new tunnel east of Bay Street.

In the long term, transit service on Queens Quay East will be integrated into a larger network serving the Central Waterfront, the Eastern Waterfront, and other areas of Toronto. For this reason the underground junction at Queens Quay and Bay Street will be constructed to protect for east-west streetcar movements across Bay Street. The Preferred Design includes a preliminary vertical alignment of an east-west track connection allowing streetcars to operate from the east side of the Queens Quay / Bay Street junction to the west side and vice versa.

The special track work will consist of switches – mechanisms that divert streetcars from one track onto another – and frogs – track structures that provide support for streetcars where one track crosses another. Due to limited space available at the Queens Quay / Bay Street junction, as well as the need to maintain existing track geometry at the junction, the following design parameters were used to develop the preliminary concept for the special track work at the Queens Quay / Bay Street junction:

- Number 8 turnout
- Equilateral turnout for the east-to-north track in the northeast quadrant of the intersection
- Switches and frogs connected by compound vertical curves

The preliminary concept will be refined and confirmed during detailed design.

7.9 Union Station Loop Expansion

The existing underground streetcar loop at Union Station is the eastern terminus for the 509 HARBOURFRONT and 510 SPADINA streetcar routes. The loop is located directly south of Union Subway Station on the same level as the subway platforms. The loop provides a direct connection via a tunnel walkway to the fare-paid area of the subway station's east mezzanine. The streetcar loop features one platform for unloading and another for loading passengers.

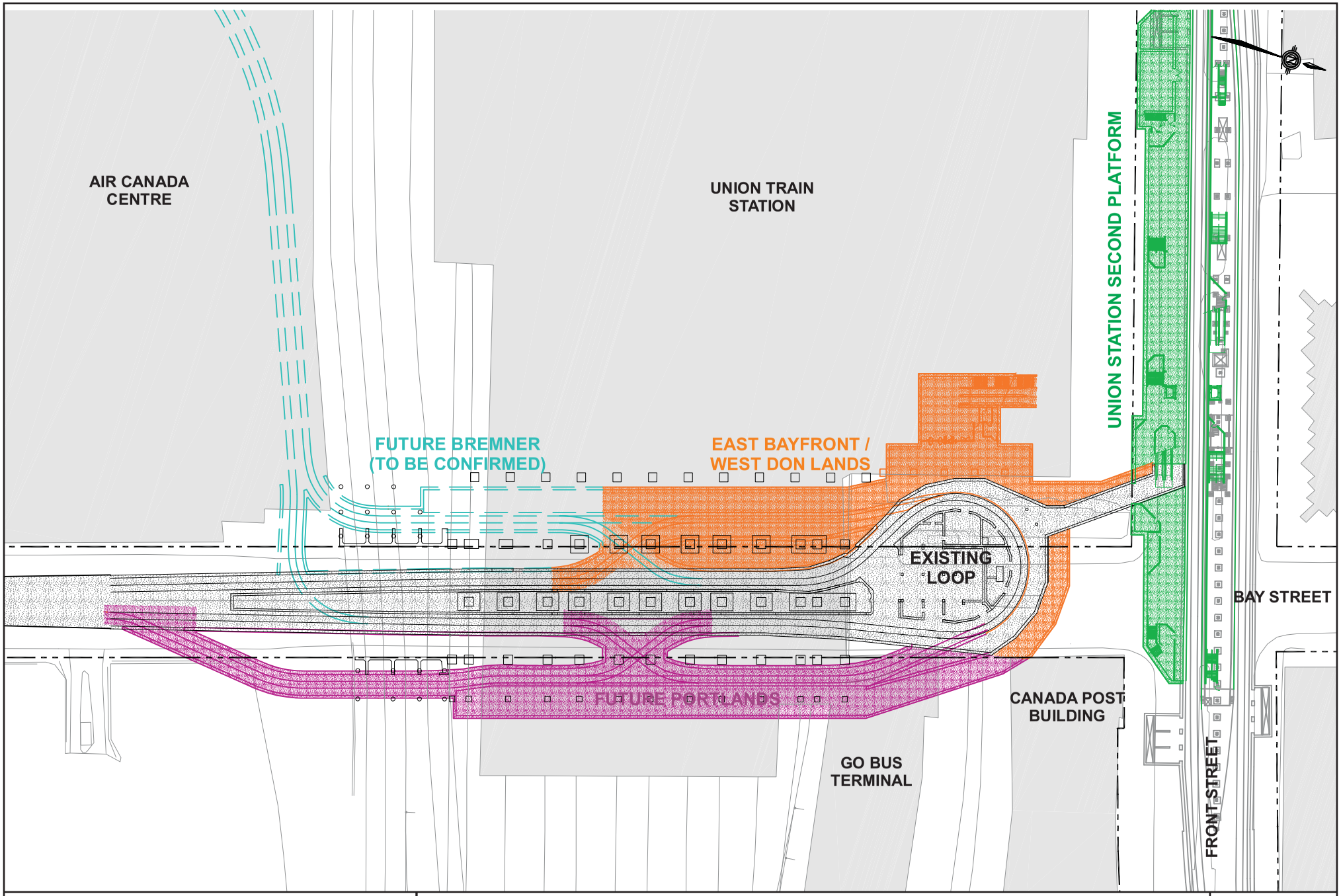
Since opening in 1992, the streetcar loop has been experiencing a steady increase in passenger volumes as a result of residential, commercial, and entertainment developments along the waterfront. As development and revitalization take place in the East Bayfront, West Don Lands, Lower Don Lands, and the Port Lands areas, passenger demand at the streetcar loop will continue to rise. Additional growth is also anticipated in areas west of Union Station and south of the rail corridor where developments continue to occur on the remaining former railway lands. Future Waterfront West Light Rail Line, part of the *Toronto Transit City Plan*, is also expected to carry additional passengers into the streetcar loop, possibly via a connection from Bremner Boulevard. The future ridership growth, in conjunction with peak demands required by special events at the entertainment venues along the waterfront, contributes to the large anticipated increase in passenger activities at the streetcar loop.

The existing platform and track at Union Station have very limited capacity to accommodate future passenger volumes and cannot accommodate the multiple streetcar lines planned to serve the loop. As a result, the streetcar loop needs to be expanded to accommodate the proposed streetcar service on Queens Quay East, the existing streetcar routes serving the Central Waterfront, as well as future services on Cherry Street in the West Don Lands and the Port Lands areas.

The expansion of the streetcar loop is one of a number of projects currently underway or planned for the Union Station area including the construction of a second subway platform under Front Street, expansion of GO Rail track and passenger facilities and a comprehensive revitalization of the Union Railway Station being undertaken by the City of Toronto. These projects are being closely coordinated by the City of Toronto, GO Transit and The TTC.

In general, the scope of the streetcar loop expansion is to widen the existing station, construct new platforms on the east and west sides of the existing streetcar tracks under the east and west Teamways, and provide access between the new widened tunnel and existing tunnel to accommodate crossover tracks in order to bypass streetcars stopped to load/off-load passengers with a direct connection to Union Railway Station.

The feasibility of routing the future Waterfront West LRT to Union Station via Bremner Boulevard is currently under investigation by the *Waterfront West LRT Union Station to Exhibition Place Class EA*. Although the need to provide a connection to Bremner Boulevard is still to be confirmed, the proposed loop expansion concept does not preclude future connection and loading area for Waterfront West LRT via Bremner Boulevard. The proposed loop expansion concept is illustrated in **Figure 7-6**.



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Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

Union Station Streetcar Loop Expansion

Figure No.

7-6

7.10 Interim Loop at Parliament Street

As the Queens Quay East roadway is expected to terminate at Parliament Street in the short term, an interim loop will be required to turn streetcars around. This interim loop will be removed when the line is extended further east. The preferred location for the interim loop is the east side of Parliament Street immediately north of the approved planned storm water management facility and wave deck in the Parliament Street Slip, as shown in **Figure 7-7**.

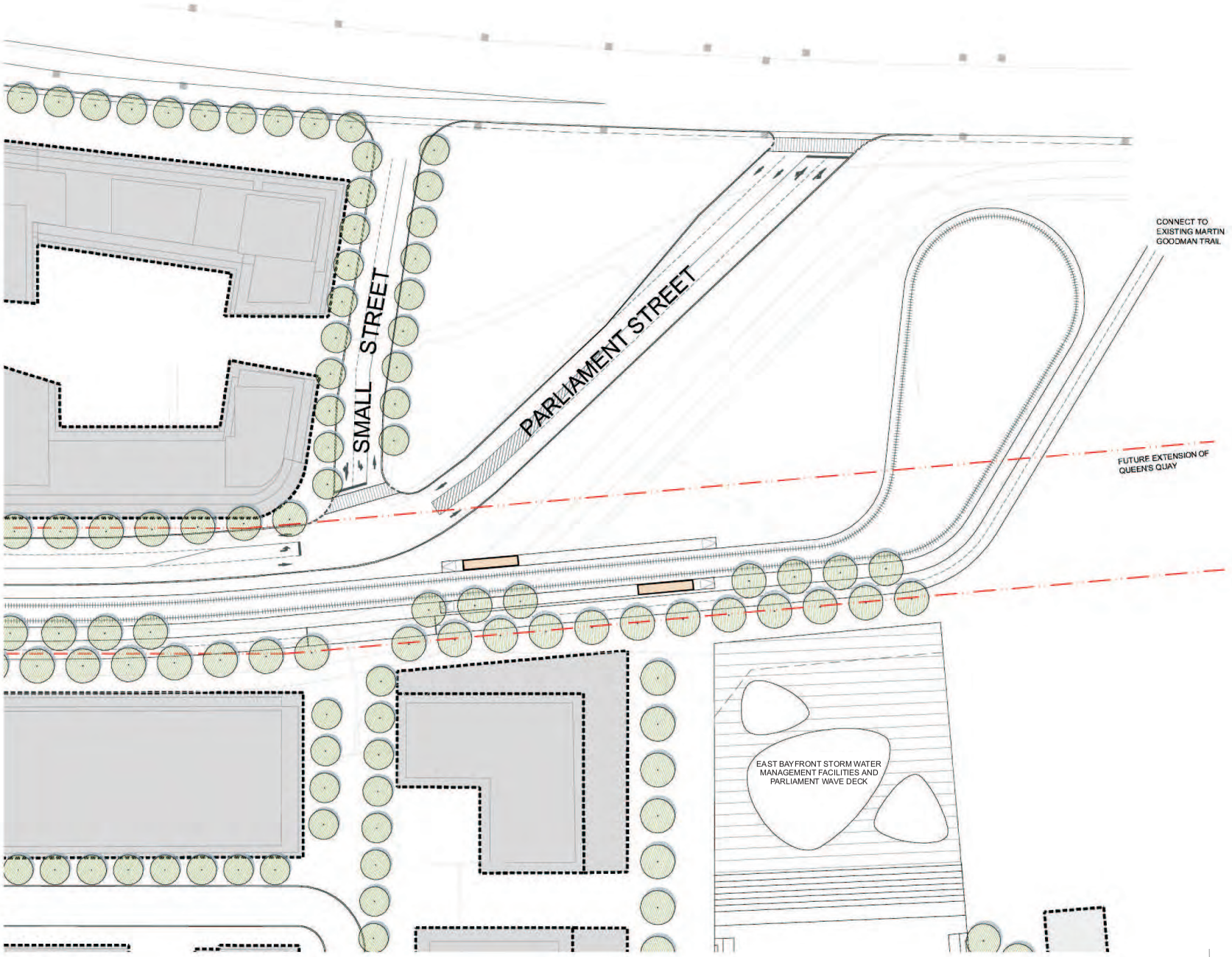
The head of Parliament Slip will be backfilled to construct a stormwater retention tank as part of the proposed stormwater management strategy for the East Bayfront development area. The land created by the backfill will provide an opportunity to locate the interim streetcar loop on the east side of Parliament Street. Details of the approved planned storm water management facility in the Parliament Street Slip can be found in the *2009 East Bayfront Class EA Master Plan Addendum – Stormwater Collection and Management System*, prepared and approved in January 2010 per the requirements of the Ontario Environmental Assessment Act.

In the longer term, the extension of Queens Quay East to Cherry Street and Commissioners Street would eliminate the need for the loop.

7.11 Extension to Cherry Street

Although the Queens Quay East streetcar service is proposed to terminate, initially, at an interim loop at Parliament Street, it is expected that the streetcar service will be extended easterly to Cherry Street in conjunction with the future roadway extension of Queens Quay East and the re-development of the Lower Don Lands area. Streetcar service on Queens Quay East will connect with future streetcar service on Cherry Street through the West Don Lands area and into the Port Lands, as called for in the *Central Waterfront Secondary Plan*. The conceptual connection to Cherry Street is illustrated in **Figure 7-8**.

Waterfront Toronto is undertaking a *Municipal Class EA Master Plan* for the Lower Don Lands area and EA approval for the extension to Cherry Street will be part of that study.



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Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

Interim Streetcar Loop at Parliament Street

Figure No.

7-7

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Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title:

Future Connection to Cherry Street

Figure No.

7-8

7.12 Electrical Substation

Electrical power is required to provide traction power for the streetcars and to operate lights and amenities associated with the streetcar platforms. Toronto Hydro will distribute power to the TTC through the use of electrical substations. Substations reduce the voltage from the Toronto Hydro power supply to the 750 volts required to run the streetcars and help maintain consistent power levels along the line. A substation for streetcars is typically an at-grade structure that is approximately 4 metres high and 4 metres by 12 metres in plan plus additional width and length that may be required for architectural features and access to the substation.

One electrical substation will be required in the vicinity of Queens Quay East and Lower Sherbourne Street. The exact location and positioning of the substation will be confirmed during detailed design.

7.13 Street Tree Planting

The City of Toronto has experimented with several tree-planting details over the years with varied levels of success. Street trees face several challenges to growing in a healthy and stress-free manner. With a dwindling urban forest, the City recognizes that to protect its further investment in "green infrastructure" will require a new approach. One of the primary obstacles identified has been low soil volume. Traditional street tree planters provided less than 1 cubic metre of soil for each tree. Those trees that managed to grow did so by finding soil outside of the planter in which to grow.

The current City of Toronto Urban Forestry standard is to try to achieve 30 cubic metres for each street tree. To provide this volume of soil within a pedestrian boulevard condition will require several techniques to protect the root zone from the adjacent track bed. The Preferred Design recommends a continuous trench for root zone protection. The trench shall extend the entire length of the tree-planting zone and beneath the Martin Goodman Trail on the south side. The root zone may extend beneath the pedestrian boulevard either through the use of structural soil or soil cells. An irrigation system shall be provided to ensure proper water levels are maintained. The planting area should be open air to allow for passive water infiltration and additional understory or groundcover plantings. If tree grates are required, they should be removable and permit adequate water and gas exchange. Furthermore, in order to achieve the soil volumes required by the City, Waterfront Toronto are pursuing alternative technologies like structural sand and Silva cells proposed elsewhere within the East Bayfront, the West Don Lands, and currently under construction on Bloor Street

7.14 Pavement Treatments

One of the main advantages of the Preferred Design is the visually expanded segment without automobiles. Critical to delivering the intended result is the use of high quality paving materials within the transit right-of-way as well as the pedestrian boulevards. Suitable pavements include authentic stone like granite sets and pavers, or precast concrete unit pavers. To accurately convey the design intent, consistent and/or complimentary color and texture between the pedestrian boulevard and the transit right-of-way is required. Examples of the types of treatments and arrangements are illustrated in **Figure 7-9**.

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Project:

EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT

Title: Examples of Appropriate Streetscape Character and Materials

Figure No.

7-9

8. IMPACT ASSESSMENT AND MITIGATION MEASURES

During the environmental assessment process undertaken for this project, potential environmental concerns related to the project have been investigated. Potential long term and short-term construction related environmental impacts are addressed in this section.

The TTC and Waterfront Toronto will ensure that environmental protection commitments identified in this section, as well as subsequent agency approval conditions, are complied with during detail design and construction.

8.1 Natural Environment

8.1.1 Terrestrial Features

The road, transit and public realm improvements to Queens Quay will likely require the removal of all existing street trees within the right-of-way and several trees on City of Toronto lands fronting the right-of-way from Yonge Street to Parliament Street. Those trees that currently exist currently grow within sub-standard growing conditions and with varied levels of health; some are stunted while many have little hope to achieve maturity. The widening of the pedestrian boulevards, relocation of curbs and improvements to roadway structural elements will compromise the root zone of existing trees. These factors will further minimize their chances of reaching a suitable size to positively contribute to the urban forest.

The double row of trees that will line the expanded public realm on the south side will each row will be planted within a far improved growing condition than a typical street tree, a minimum of 30 cubic metres of soil volume to meet the City Department of Forestry's aggressive new target. For the north side the Preferred Design recommends the planting of trees within a continuous root zone trench, ideally with structural soil and irrigation. The intent is to provide the best opportunity possible for all street trees to live a long life, reach a mature height and develop a broad canopy.

The Preferred Design will replace displaced trees at a ratio of 3:1 (i.e., approximately three trees will be planted for every tree removed). This exceeds the standards promoted by the City's Urban Forestry and will provide a better opportunity for vigorous and successful growth. The number of trees proposed as a part of the Preferred Design will also meet the City's target for 35 percent tree canopy coverage.

A detailed replacement or relocation plan will be developed as part of the public realm design. The final mitigation plan will be developed during detail design in accordance with the City's tree protection by-laws.

8.1.2 Aquatic Features

The Preferred Design is not expected to create permanent impacts on aquatic features in the study area. However, construction-related activities, such as sedimentation and accidental spills, can affect aquatic habitat. Appropriate sediment control measures and spill response plans should mitigate these effects.

8.1.3 Wetlands

There are no provincially significant or non-provincially significant wetlands located within the study area. Therefore, there are no impacts.

8.1.4 Species at Risk

There are no permanent displacements or impacts to aquatic, vegetation, or wildlife species at risk associated with the Preferred Design.

8.1.5 Soil and Groundwater

Construction activities may impact groundwater flows if large quantities of groundwater are removed during dewatering or if recharge areas or flow patterns are disrupted. As a significant length of the Preferred Design will be underground, it is expected that excavations for the tunnel construction will penetrate below the shallow groundwater table and dewatering will be required. Surplus soils excavated must be managed and disposed of according to appropriate regulatory guidelines with respect to environmental quality. Groundwater would have to be treated prior to discharge to the City of Toronto sanitary sewer system. Because groundwater would not be discharged into the storm sewer system, no impacts on Lake Ontario are anticipated.

An analysis of the environmental quality and chemistry of soil and groundwater will be undertaken during the Detailed Design phase of the project. A detailed soil and groundwater management and disposal plan will be developed to include the following:

- Land use history along and immediately adjacent to the alignment with respect to the potential existence for environmental contaminants present within the soils or groundwater and the potential presence of buried structures;
- Reuse of excavated soils for construction and landscaping purposes;
- Hauling and disposal of volumes of the excavated earth materials that may not be suitable for reuse on the project as a result of the physical consistencies or environmental contamination, either due to the in-situ condition or the construction process (e.g. during slurry trench excavation); and
- Management and disposal of water collected during construction that could include potential contaminants from existing fill materials and construction processes

Based on the available information, it is anticipated that a Permit to Take Water (PTTW) would be required for construction.

Subsurface exploration and testing programs will be undertaken prior to completion of Detailed Design. These programs will be developed in a manner consistent with recent practices undertaken for the Sheppard Subway and for the current Toronto-York Spadina Subway Extension as identified in the current TTC's *Direction for Conducting Subsurface Investigation*. These programs should include the following:

- Determine the overall nature and character of the fill materials
- Define the quality and structure of the bedrock beneath the construction site
- Clarify the need for and type of groundwater control systems that may be required during construction
- Determine the methods and effort that may be required for rock removal to achieve desired rail grades beneath the Yonge Street storm sewer
- Define the hydraulic conductivity of the overburden (materials above the bedrock) and the local bedrock should be given particular attention during future exploration and testing programs

As part of preliminary design, at least three detailed geotechnical boreholes should be completed. Each of these boreholes should include a minimum of 8-metres of coring into bedrock. Pressure packer testing should be carried in each of the boreholes to help quantify the potential hydraulic conductivity of the bedrock. In addition, two groundwater pumping tests should be carried out including one within the overburden (fill and native soils) and the second within the bedrock. A series of observation wells would have to be installed in close proximity to the pumping wells to observe drawdown of the groundwater. Soil and groundwater samples should be subjected to chemical analyses to determine the environmental quality of the subsurface materials for excavation, dewatering, and subsequent disposal or treatment. Depending on the results, additional geotechnical explorations should be completed with the final borehole spacing ranging between about 30 to 50 metres.

Following the completion of the preliminary geotechnical investigations, detailed analyses should be undertaken to estimate the potential groundwater control requirements and to develop appropriate excavation support design and construction system criteria. As part of these analyses, an outline dewatering assessment should be undertaken to estimate the steady-state groundwater volumes that may be extracted during construction so as to develop documents in support of obtaining a PTTW from the MOE.

In addition, it will be necessary to review records that may be available regarding the foundation types of the nearby buildings and the nearby major utilities. It is understood that some of the nearby major utilities may be supported on piles, similar to the Yonge Street Culvert. It will also be beneficial to review any historical or archaeological records of the area to determine what materials or former structure might be within the planned zone of construction so as to develop designs that are more likely to be successfully constructed while minimizing subsurface difficulties. Data arising from such reviews will also assist in development of designs that limit the effects of constructing the tunnel and portal on the existing structure and facilities in the area.

8.1.6 Stormwater

The *2006 East Bayfront Class EA Master Plan* and the *2009 East Bayfront Class EA Master Plan Addendum – Stormwater Collection and Management System* have determined the overall approach to stormwater drainage for Queens Quay East and the Preferred Design. This addresses conveyance (overland and storm sewer system) as well as the overall approach to stormwater quantity and quality.

8.1.7 Contamination

Much of the land in the study area was formed through the infilling of Lake Ontario using soil and other fill materials from a variety of sources, some of which may have included contaminated materials. Industrial uses in the area may have also introduced contaminants.

During the Detailed Design phase, a comprehensive geotechnical and geo-environmental investigation program will be undertaken, with a significant number of boreholes excavated very close to the proposed streetcar alignment. This investigation will require the disposal of significant volumes of excavated material and will determine the extent of and whether the excavated soil is contaminated.

When soil is removed from the construction site, it is to be managed according to *Ontario Regulation 347; General – Waste Management* under the *Ontario Environmental Protection Act (EPA)*. This requires that contaminated materials be hauled by licensed contractors and that receiving sites are approved for the types of materials that are being disposed. Any treatment

of contaminated soils is governed by a Certificate of Approval process set out in section 27 of the EPA.

A Soil Management Plan will be prepared, at the Detailed Design stage, before the implementation of any site activities and will provide details concerning the characterization of soil quality and the management and treatment of contaminated soils. The plan will ensure effective management of contamination as well as minimization of risk to human and safety through exposure to contaminants.

Site supervision, as set out in section 7.3.6 of the *Waterfront Toronto Environmental Management Plan for Project-Related Activities*, will be carried out by the Proponent when excavations into or around suspected contaminated soils take place. Where soil excavation is required, advance soil sampling is to be conducted to determine the presence and concentrations of potential contaminants. Records on the identification and management of contaminated soils will be maintained. Site protocols are to be established to ensure contaminated soils are not transported to uncontaminated areas of the construction site.

8.1.8 Air Quality

Effects on air quality associated with airborne particulates are typically correlated with periods of dry weather and windy atmospheric conditions, while dust emissions are typically associated with construction activities such as handling of soils or aggregates, traffic through construction zone, and other related activities. Construction-related dust – contaminants such as metals and organic contaminants that bind to the soil particles – can be irritants to persons while airborne emissions may contribute to adverse health effects.

As per the requirements of *Ontario Regulation 419/05 Air Pollution – Local Air Quality*, emissions to the atmosphere are to be controlled to prevent discomfort to persons, loss of enjoyment of normal use of property, interference with normal business operations, or damage to property. Dust and other airborne contaminants can be mitigated through good management practices and standard dust control measures such as misting, sweeping and tarping of materials, and control of traffic routes and speeds. Adequate dust control measures are to be in place prior to the initiation of work in order to prevent the uncontrolled generation of dust as well as to minimize creation of smog.

Dust controls address the potential for release of other air pollutants as well. Toronto Public Health may be consulted during the preparation of dust control plans to ensure methods adequately mitigate the potential for health effects from the generation of dust during construction activities.

Applicable environmental control measures, as outlined in Section 7.1.5 of the *Waterfront Toronto Environmental Management Plan for Project-Related Activities*, are to be applied to prevent the emission of dust and other pollutants into the atmosphere.

Dust control is to be monitored regularly by the construction contractor who is responsible for compliance with project specifications. At minimum, observations of compliance with air quality and dust control objectives are to be recorded daily.

8.2 Cultural Environment

8.2.1 Built and Cultural Heritage

The recommended alignment including the underground section has been developed within the existing roadway allowance. Therefore, the proposed transit improvements are expected to have minimal direct and indirect impacts on identified built heritage and cultural heritage resources. The preferred streetcar route follows the alignment of the current road way, and therefore none of the heritage resources is expected to be displaced by the Preferred Design. Furthermore, there are no identified heritage resources in the vicinity of the proposed tunnelling activity within the Queens Quay road alignment between Bay Street and Freeland Street and therefore vibration and construction related impacts are not expected.

8.2.2 Archaeological Features

Stage 1 Archaeological Resource Assessment of the East Bayfront Transit Precinct between Bay Street, Lakeshore Boulevard, Parliament Street and Lake Ontario in the City of Toronto has determined that no registered archaeological sites are located within the study area limits and that the entire area consists of lands created through lakefilling operations in the late nineteenth through mid-twentieth-centuries.

None of these features fall within the Queens Quay right-of-way in which construction of the streetcar line is expected to occur though remains of the Don Breakwater, a Grade 2 resource, may be impacted if any future extension of the streetcar line follows Lakeshore Boulevard and involves construction at depths 2 metres below grade. It is noted that the proposed interim streetcar loop at Parliament Street would be situated just south of the Don Breakwater remains; however, the depth of construction for the loop is not expected to reach 2 metres below grade. Therefore, no impacts attributed to the Preferred Design are anticipated.

The remaining features are considered to be of Grade 3 significance. These include the Don River mouth fill zone; the City Wharf (no longer extant); the Toronto Ferry Terminal Wharf (no longer extant); the Bulkhead/Pierhead Line; the Air Harbour; and the RCAF Equipment Depot. No further archaeological action is required with respect to these features.

The balance of the East Bayfront Transit Precinct study area, including the identified Grade 3 features, may be considered clear of further archaeological concern.

8.3 Socio-Economic Environment

8.3.1 Noise and Vibration

The TTC's streetcar operation has the potential to increase local noise and generate ground borne vibration. To mitigate this impact, the TTC has adopted a track construction methodology comprising:

- Continuously welded rail eliminates the use of rail joints, providing a smooth operation
- Rubber sleeve isolates rail from concrete and helps reduce noise and vibration (see **Figure 8-1**)

This track construction methodology can increase life of rails to more than 25 years and reduces the need for regular track maintenance.

In addition, a noise and vibration analysis was completed as part of this Class EA and results of the analysis can be found in **Appendix K** of this report.

The predicted noise levels were assessed against the MOE / TTC Transit Expansion Protocols. These guidelines state that the sound level during daytime (16-hour equivalent) must not exceed the higher of 55 dBA or the existing background ambient sound level, while the sound level during night time (8-hour equivalent) must not exceed the higher of 50 dBA or the existing background ambient sound level. Using the Ontario Road Noise Method for Environment and Transportation (ORNAMENT) algorithm, existing background sound levels at the noise receptors were found to be in the range of 64 to 67 dBA during day time and 57 to 61 dBA during night time. As the existing background sound levels are higher than the MOE/TTC default guidelines, the background sound levels were used as the guideline sound level limits.

Results of the noise analysis indicated that the predicted sound level during daytime is 56 to 58 dBA which is below the guideline limit of 64 to 67 dBA, while the predicted sound level during night time is 50 to 51 dBA which is below the guideline limit of 57 to 61 dBA. Based on the MOE / TTC criteria, consideration of noise mitigation is not required.

The predicted vibration levels were assessed against the CN Rail vibration level guidelines. These guidelines state that the vibration levels from a single pass-by of a train should not exceed 0.144 mm/s RMS.

Results of the vibration analysis indicated that the predicted vibration levels are below the CN guideline limits at a distance 15 metres and greater from the centreline of the streetcar tracks. Since none of the current developments on the south side of Queens Quay East are planned within 15 metres of the tracks, consideration of vibration mitigation is not required. However, all future developments within the study area of this project should require a noise and vibration study to ensure they comply with the applicable noise and vibration criteria.

Project: **EAST BAYFRONT TRANSIT ENVIRONMENTAL ASSESSMENT**		Figure No. **8-1**
Title: Rubber Isolating Sleeve for Streetcar Track		

8.3.2 Property Impact

The Preferred Design would result in a widening of Queens Quay East from the current 27- to 30-metre right-of-way to approximately 38 metres. While this is less than the width originally prescribed in the *Central Waterfront Secondary Plan*, property will be required on Queens Quay East to accommodate widened sidewalks and the Martin Goodman Trail.

The project team has employed a number of techniques during the EA to engage the property owners directly affected. **Tables 8-1 and 8-2** list all properties that are directly affected by the Preferred Design and summarises the status of discussions with the property owners. Affected property owners were contacted during the course of this study, and will be consulted during the design phase.

Most of the land required for the proposed road and transit facilities are within the existing road right-of-way, are under public ownership, or in the process of being transferred to public ownership. As listed in **Table 8-1**, one property will need to be acquired to proceed with construction of the major elements of the plan:

- There is an agreement between the City of Toronto and property owners for 25 Queens Quay East (MT 27 Development) to p*rotect for a 9m building setback along the north*ern edge of the development site to achieve the 38-metre public right-of-way, while accommodating the Martin Goodman Trail and southern pedestrian promenade.

To conform to the *East Bayfront Class EA Master Plan* recommendation for an ultimate 38m right-of-way on Queens Quay, and to provide for the functional elements in the preferred plan, a number of privately-owned properties will be subject to property taking at the time of site re-development as listed in **Table 8-2** and this will be negotiated on a site-by-site basis.

At the Redpath Sugar property, 95 Queens Quay East, which is on the south side of Queens Quay west of Jarvis Street, the existing road right-of-way is narrow; however, the current buildings on the Redpath property are set back between 3.6m and 9m from the edge of the right-of-way. The Preferred Design provides for the use of these lands to accommodate a separate Martin Goodman Trail and wider sidewalks along the Redpath frontage. Discussions are on-going with Redpath regarding the accommodation of improved sidewalk and the Martin Goodman Trail on their property. If agreement cannot be reached, however, a combined arrangement of the sidewalk and Martin Goodman Trail will be constructed initially within the existing road right-of-way.

Table 8-1: Property Needs on Initial Construction

Property	Description	Comments	Agreements to Date with Owner
25 Queens Quay East (MT 27)	Future residential development	**Partial Taking –** 9m setback for width of property (reduced from 11.0m identified in the *Central Waterfront Secondary Plan*)	Setback agreement between the Owner and the City confirmed.

Table 8-2: Property Needs on Site Redevelopment

Property	Description	Comments	Agreements to Date with Owner
1 Yonge Street (Osmington – Toronto Star)	High-rise office/commercial complex	**Partial taking** - 1.6m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.
LCBO	One-storey retail with surface parking	**Partial taking** – 1.6m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.
95 Queens Quay East (Redpath Sugar)	Industrial complex	**Partial taking** – 9m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.
102 Queens Quay East (Loblaws)	Two-storey commercial/retail with multi-level parking structure	**Partial taking** – 1.6m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.
N/A – Lower Jarvis Street (Nuko Investments Ltd.)	One-storey entertainment	**Partial taking** – 2.0m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.
162 Queens Quay East (Gemess Investments Ltd.)	One-storey office/commercial	**Partial taking** – 2.0m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.
178 Queens Quay East (Imperial Parking Canada Corporation)	One-storey office/commercial	**Partial taking** – 2.0m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.
180 Queens Quay East (1147390 Ontario Ltd.)	Surface parking lot in the NW quadrant of Queens Quay East and Lower Sherbourne Street	**Partial taking** – 2.0m setback for width of property	Right of Way Widening on redevelopment as defined in the *Central Waterfront Secondary Plan*.

Access to Redpath Sugar

Redpath Sugar (95 Queens Quay East) currently maintains a main driveway off Queens Quay East at the west side of their property (West Driveway), and a secondary truck driveway (Centre Driveway) and a minor access point to the east. The proposed design will improve Redpath's driveways by providing traffic signal control across the transit right-of-way, while the minor access point at the eastern edge of Redpath's property will become a flagged entrance. Truck activity at the Centre Driveway is typically five or six trucks per hour in the morning peak period, and the minor access point is used infrequently to bring special equipment on to the west side of the Jarvis Street Slip.

The Preferred Design requires the installation of two closely-spaced signals at the Redpath site; however, this will significantly affect the speed and reliability of streetcar service through the area. These concerns will be mitigated by ensuring that the operation of the signal at the Centre Driveway is under complete transit pre-emption, and that it is controlled independently from the adjacent traffic signals, i.e. Redpath West Driveway and Lower Jarvis Street. Based on operations simulations and traffic assessments it has been concluded that this arrangement can be operated safely, and with minor delays to transit and truck movements, as long as the auto traffic speeds on Queens Quay are limited to 40 km/h and an acceleration lane is provide for right turning trucks out of the site traveling to the east. This acceleration lane has been incorporated into the Preferred Design. Detailed operations analysis can be found in **Appendix J** of this report.

As this arrangement is undesirable from a longer-term transit and traffic operations perspective, the signal at the Redpath Centre Driveway will be removed if the sugar processing and storage plant at 95 Queens Quay East is redeveloped for other uses.

Access to Loblaws

Loblaws (102 Queens Quay East) currently maintains a one-lane ramp off Queens Quay East that provides access for delivery trucks servicing the loading dock on the second level of the food store. The truck ramp is currently oriented in a manner that facilitates inbound trucks making a right-in from westbound Queens Quay and outbound trucks making a left-out to eastbound Queens Quay. To a lesser extent, the current ramp can also accommodate some inbound trucks making a left-in from eastbound Queens Quay and a right-out to westbound Queens Quay within the existing roadway.

The Preferred Design of Queens Quay East, as a result of a reduction of the current road width, would limit the maneuverability of inbound heavy trucks making a left-in from eastbound Queens Quay East. To mitigate this impact, it is recommended that the current truck ramp be widened and straightened to accommodate inbound trucks making a left-in movement from eastbound Queens Quay. The recommended concept is illustrated in **Plate 5 of Appendix E**. The proponents will continue to consult with Loblaws during detailed design to ensure that existing truck vehicle operations at the Queens Quay access can be accommodated in the final design.

8.4 Utilities

A preliminary investigation of existing utilities within the Queens Quay East corridor was undertaken based on the City's utility dataset. **Appendix O** of this report contains a listing of utilities that are potentially affected by the proposed changes to the road right-of-way. Conflicts are categorized into three distinct types:

- **Crossing** – utilities along crossing streets are likely unaffected provided that they are sufficiently deep so as to not conflict with the road or transit roadbed.
- **Longitudinal** – utilities that run for extended lengths under the proposed TTC tracks. Recognizing the potential challenges of utility maintenance without significant, long-term disruption to the tracks, these utilities should be relocated as part of the overall works. In many instances, these utilities are proposed to be replaced in support of the East Bayfront redevelopment.
- **Maintenance Chambers** – notwithstanding that some utilities that fall into the crossing category, existing maintenance/access chambers might fall within the proposed track area. If possible, these should be relocated.

Utility companies will be contacted during detailed design to define the impact to the individual utility plants and to develop a relocation strategy, if required.

8.4.1 Yonge Street Culvert

The new tunnel structure of the Preferred Design will interfere with an existing 2.3-metre by 2.6-metre storm sewer culvert that runs north to south along the west side of Yonge Street and ends at the Yonge Street Slip on Lake Ontario. The culvert will require relocation at the Queens Quay/Yonge Street intersection.

It is understood that the existing culvert is supported on timber piles that may be driven to foundation on the bedrock. The culvert invert near the outlet is at about Elevation 72.0 metres, or about 4.2 metres below ground surface. In addition, the proposed streetcar tunnel will interfere with a 7-metre wide timber crib structure located at the sewer outlet at the foot of the Yonge Street Slip. The crib and existing concrete harbour headwall located on top of the crib protect the roadway from Lake Ontario. It is anticipated that the timber crib was rock filled and that wave action over the years has probably deposited silt and sediment within the voids in the crib.

Possible methods for constructing the tunnel walls and supporting the culvert are discussed in **Appendix M** of this report. Alternatives for realigning the sewer culvert, such as network/local re-routing of the sewer or vertical reconfiguration of the culvert outlet, will be examined during detailed design. Partial excavation of the crib wall will be necessary as part of the tunnel construction. Solutions for maintaining the crib structure during construction and the appropriate mitigation measures will be developed during detailed design. The mitigation measures should allow the construction of the streetcar tunnel under Queens Quay, provide adequate protection against waves and withstand the applied water force, and produce no adverse environmental effects that would affect the water quality of Lake Ontario.

8.4.2 Toronto Hydro Redpath Ductbank

The streetcar right-of-way in the Preferred Design will create a longitudinal conflict with an existing underground ductbank running east-west along the current south curb line of Queens Quay East. The ductbank, approximately 215 in length between Cooper Street and Lower Jarvis Street, is owned by Toronto Hydro servicing Redpath Sugar on the south side of Queens Quay East. At the intersection of Queens Quay East and Lower Jarvis Street, the ductbank turns north and runs north-south along the east side of Lower Jarvis Street. Three maintenance chambers located at Cooper Street, Loblaws Driveway, and Lower Jarvis Street provide access to the ductbank.

As a result of the conflict, the ductbank will require relocation outside of the streetcar right-of-way in order to maintain Toronto Hydro's access to its facility without incurring significant, long-term disruption to the streetcar tracks and streetcar operations. The proponents will continue to consult with Toronto Hydro during detailed design to confirm the extent of conflicts and develop a strategy to mitigate these impacts and/or to relocate the utilities.

8.5 Construction Related Impacts and Mitigating Measures

The proponent will undertake the following mitigating measures contained in **Table 8-3** below in order to ensure that the construction of the project has a minimum effect on the environment.

Table 8-3 - Potential Construction Related Impacts and Proposed Mitigation Measures

Factor Affected	Impact	Mitigation
Natural Environment		
Erosion and Sedimentation	Slope erosion and stability Sediment transport in stormwater runoff.	Erosion control fencing to be placed around the base of all stockpiles. Vegetation should be planted on all exposed slopes immediately after construction. Minimize extent and period of surface exposure, particularly for ditches and slopes.
Air Quality	Reduced air quality due to dust.	Apply water and calcium during construction as required.
Vegetation	Damage to vegetation in close proximity to work area.	Protective fencing should be placed around trees to reduce the potential for damage (see Terrestrial Environment for details). Should any trees indicated to remain is damaged or removed as a result of construction, replacement with a tree of similar species and suitable caliper should be provided.
Migratory Birds Convention Act (MBCA)	No vegetation removals should occur during the nesting season.	No vegetation removals should occur during the nesting season. With several exceptions, this includes the period from April 1 to July 31.
Socio-Economic Environment		
Maintenance of Traffic and transit	Delays to local traffic due to construction.	Maintain general traffic movements to commercial / residential areas. Stage construction to minimize traffic delays. Detours or replacement of streetcars with buses may be required during the construction of the Queens Quay / Bay Street special track work.
Assurance of Traffic Safety	Roadway safety affected by construction activities.	Standard construction safety practices to be undertaken on site. Require contractor to prepare traffic management plan.
Noise	Increased noise levels.	Adhere to municipal by-law hours of construction operation. Ensure proper maintenance and type of construction equipment.

8.6 Monitoring

The proponents to ensure that the Contractor is implementing standard construction practices will monitor the construction of the proposed improvements on site. This will include erosion and sedimentation control, dust and noise control, protection of existing vegetation, assurance of traffic safety and maintenance of traffic flow without causing unnecessary delays, etc. The overall performance and effectiveness of the environmental mitigating measures specified will be monitored and assessed during and subsequent to the construction of the project.

As the environmental impacts outlined in this section are the normal impacts associated with the construction of roads and services in an urban environment, and are based on the established standard construction practices, the mitigating measures will be incorporated in the contract documents. The Contract Administrator will ensure that these mitigating measures are undertaken during construction. Should unforeseen environmental concerns and/or issues arise during the construction period, the appropriate Ministry and Agencies will be contacted and appropriate measures will be taken to mitigate the environmental concerns/issues.

9. COMMITMENTS TO FUTURE WORK

During this Class EA process, the TTC, Waterfront Toronto, and the City of Toronto have worked closely with key stakeholder agencies to address and resolve any issues or concerns. Commitments to future work for implementation of the undertaking are listed below.

9.1 Permits and Approvals

The TTC, Waterfront Toronto, and the City of Toronto will secure necessary permits for the implementation of the undertaking, including, but not limited to:

1. Planning approvals (including Site Plan Approval) for above-grade structures and facilities;
2. Building permits for ancillary facilities associated with the undertaking;
3. Access and structure permit for access from road right-of-way to work site;
4. Consult with the MOE Central Region Permit to Take Water (PTTW) Coordinator prior to detailed design to confirm any approval requirements for water takings during construction or operation. This includes groundwater or surface water extraction, and the active diversion of surface water flows by pumping.
5. Permit to Take Water from the Ministry of the Environment if dewatering or diversion of flow from any of the watercourses by means of active pumping exceeds 50,000 litres per day will result from construction activities;
6. Toronto Region Conservation Authority permits and approvals for work within a regulated area;
7. Stormwater management in accordance with City of Toronto, TRCA and MOE requirements;
8. Sewer discharge approvals in accordance with City of Toronto requirements;
9. Sewage works approvals in accordance with City of Toronto requirements for sewer relocation as well as any storm sewer works or watermains affected by construction;
10. Road cut permit in accordance with City of Toronto requirements for traffic staging plans;
11. Approval for removal or relocation of any trees currently located within the Queens Quay road allowance;
12. Consult with the MOE Environmental Assessment and Approvals Branch prior to detailed design to confirm any Certificate of Approval requirements for the proposed works.
13. Certificates of Approval from the MOE for relocation of sanitary sewer as well as haulage and disposal of waste during construction;
14. Noise by-law exemption for possible work to be conducted at night and/or Sundays to minimize construction-related impacts; and
15. Any temporary or permanent utility relocation will need to be reviewed and approved by the affected utility companies.
16. Mitigation measures to reduce any potential impacts to the natural environment will be developed in consultation with the appropriate agencies (i.e. Toronto and Region Conservation Authority, Ministry of Natural Resources, and the Department of fisheries and Oceans);

17. In detailed design the project will be assessed for potential harmful alteration, disruption, or destruction (HADD) of fish habitat under Section 35 of the *Fisheries Act*. The TRCA has a Level III agreement with the DFO which allows the TRCA to review projects for potential HADDs on behalf of DFO under Section 35 of the *Fisheries Act*. Ongoing consultation will occur with the TRCA/DFO during detailed design towards obtaining a HADD determination for the proposed work.

9.2 Property Acquisition

Waterfront Toronto, the City of Toronto, and the TTC will continue to consult with property owners where property negotiations are required for the project. Waterfront Toronto and the City of Toronto will acquire all other properties required including temporary easements to facilitate construction. The exact property requirements can only be identified through completion of the detailed design process.

9.3 Construction Issues

The TTC, Waterfront Toronto, and the City of Toronto will conduct further research and analysis related to the construction of the undertaking. Specific tasks include, but are not limited to the following activities:

- Developing traffic, transit and pedestrian management strategies to be included in construction contract documents;
- Undertaking an existing building and structure condition survey and railway protection and monitoring survey prior to, during, and post construction;
- Preparing and implementing tree and streetscape protection and restoration plans;
- Undertaking Designated Substances Surveys for any buildings or structures which require demolition and to reflect the findings in construction contract documents;
- Developing procedures for disposal of excavated materials, including contaminated soils as part of a soils management strategy, in accordance with Ministry of the Environment requirements;
- Preparing the mitigation, monitoring and contingency plans for groundwater protection in consultation with and accordance with TRCA's Guidelines for Dewatering Needs Assessment and Environmental Management Plan;
- Preparing an erosion and sediment control plan, which complies with prevailing TRCA and City of Toronto water guidelines and requirements;
- Preparing an air quality monitoring and mitigation plan and protocols for inclusion in contract documents;
- Undertaking stray current protection and monitoring for utilities;

9.4 Consultation

The TTC, Waterfront Toronto, and the City of Toronto will consult with the public, property owners and stakeholder agencies (including Police, Fire and other emergency service providers) during detailed design of the Queens Quay East streetcar alignment and related ancillary facilities.

9.5 Process for Amending the Undertaking Following EA Approval

Due to unforeseen circumstances, some aspects of the project may require a change as Design Detail progresses. It may be necessary to amend the EA because of changes in conditions, development of new technologies or mitigation measures or the identification of previously unknown concerns.

Changes to the project may occur due to:

- unforeseen site-specific problems encountered only during subsequent design phases and/or construction;
- improvements in the design to provide greater environmental benefits and/or less adverse effects;
- elements of the project that were not previously envisioned;
- circumstances that develop at the time of construction;
- issues identified in other approvals processes; and
- changes to the regulatory framework (i.e. new legislation or regulations).

The following sections outline the amendment procedure to be followed which will address these changes. This is consistent with the Municipal Class Environmental Assessment (October 2000, as amended in 2007).

9.5.1 Change in Project or Environment

Any modification to the project or change in the environmental setting for the project which occurs after the filing of the ESR shall be reviewed by the proponent. If the change is considered significant the proponent's review shall be recorded in an addendum to the ESR. The addendum shall describe the reasons precipitating the change, the environmental impacts associated with the change, and the proposed measures to mitigate the impacts. If the change is not considered significant it can proceed without an addendum.

The addendum will be filed with the ESR. The Notice of Filing of Addendum will be given to all members of the public and review agencies that will be potentially affected by the change and a 30-day public review period will be provided. Only the items in the addendum – the proposed changes to the recommended undertaking – are open for review. The Notice of Filing of Addendum will specify the public's right to request a Part II Order within the 30-day review period.

If no requests for a Part II order are received by the Minister of the Environment within the review period, the proponent can proceed with implementation and construction.

9.5.2 Lapse of Time

Following the end of the ESR public review period, or the date of the MOE's denial of a Part II Order request(s), the proposed project and the associated environmental mitigation measures are valid for a 10-year period up to the proposed commencement of construction for the project. Where the 10-year period has lapsed, the proponent shall review the planning, design, and the current environmental setting to ensure that the project and the associated environmental mitigation measures are still valid. The proponent's review shall be recorded in an addendum to the ESR.

The addendum will be filed with the ESR. The Notice of Filing of Addendum will be given to all members of the public and review agencies that will be potentially affected by the change and a 30-day public review period will be provided. Only the items in the addendum are open for review. The Notice of Filing of Addendum will specify the public's right to request a Part II Order within the 30-day review period.

If no requests for a Part II order are received by the Minister of the Environment within the review period, the proponent can proceed with implementation and construction.