

**TABLE 10 EXISTING INTERSECTION OPERATIONS**

Intersection	Overall Average Delay <sup>1</sup>
Queens Quay / Bathurst / Eireann Quay	24 (28)
Lake Shore / Bathurst	43 (48)
Queens Quay / Dan Leckie Way	15 (16)
Lake Shore / Dan Leckie Way	18 (49)

Notes:

1. 00 (00) – Morning peak hour results (Afternoon Peak hour results)

Key observations on the existing traffic operations analysis are provided below.

- The road network surrounding BBTCA (Queens Quay / Lake Shore / Eireann Quay / Dan Leckie Way) can be characterised as operating under very busy conditions during both the AM and PM peak hours. Certain intersections in the network will experience high delays and operate near or at their capacity for portions of the peak period / peak hour.
- From a traffic operations perspective, the intersection of Bathurst and Lake Shore is the critical intersection. During both peak periods this intersection has the highest delays, and during periods of high demand the operation of this intersection will begin to fail resulting in downstream impacts to the operation of the adjacent intersections. In particular the intersection of Queens Quay / Bathurst experiences operational problems during the peak periods due to a lack of capacity at Bathurst / Lake Shore.
- Traffic volumes on Lake Shore Boulevard are highly variable. Traffic volumes on Lake Shore are affected by the operation of the Gardiner Expressway and by any events or special activities going on downtown. This variation contributes to the operational deficiencies that occur in the area.
- Under typical existing traffic volumes, the intersection of Lake Shore and Bathurst is operating at or near capacity with an overall average delays of 43 to 48 seconds during the morning and afternoon peak hours (respectively). This corresponds to an overall Level of Service (LOS) of D to E. Key movements that are at capacity and operating with an LOS of F during one or both of the peak hours include the westbound left turn, all southbound movements, and the northbound left turn movement. Overall operations on Lake Shore Boulevard are further impacted on days when traffic volumes on Lake Shore increase beyond the typical peak hour volumes because of Gardiner operations or nearby events.
- The other intersections in the immediate study area are operating under busy operating levels with LOS values of C to D during the peak hours under existing conditions. This is generally considered acceptable for a built-out urban context. In some instances, however, the operation of Lake Shore Boulevard and Bathurst Street causes spillover queuing and delay effects that cause the adjacent intersections in the network failing periodically through the peak periods.



## 7.3 POTENTIAL MITIGATING MEASURES FOR JETS

Given that the intersections in the immediate area of BBTCA (particularly Bathurst Street / Lake Shore Boulevard) are operating at or near capacity during the peak periods, it is likely something will need to be done in order to accommodate any additional traffic from permitting jets.

In this regard, two methods of mitigating the potential traffic impact of permitting jets were evaluated. They were:

1. increasing the number of passengers who utilize the shuttle and/or take transit; and
2. modifying the existing road network to increase capacity.

### SHIFT PASSENGERS TO NON-AUTO MODES

The preferred way of managing any increased traffic demand is to reduce the need to drive. Therefore, BBTCA should consider expanding the existing shuttle service with the intent of reducing the proportion of passengers who take taxis and get dropped off to at BBTCA. Potential ways in which the shuttle mode split could be increased include:

- providing new shuttle routes to other locations in the downtown area; and
- increasing the frequency of the shuttle service.

For the purposes of this analysis, we have tested the potential benefit of achieving a decrease in the taxi mode split from approximately 45% to 35% (a 25% reduction) in favour of an increase in the shuttle mode split.

### MODIFY THE EXISTING AREA ROAD NETWORK

There are a limited number of road network improvements that are possible and that do not have significant urban design or property drawbacks. One modification that is possible is the reconstruction of the westbound left turn lane at Dan Leckie Way and Lake Shore Boulevard. If the westbound left turn lane at this intersection was reconstructed such that westbound left turning traffic was better aligned with the opposing eastbound left turns, it would be possible to change the traffic signal operation from protected-only left turns to a protected and permissive left turn phasing which would add significant capacity to the westbound left turn movement.

Increasing the capacity of the westbound left turn at Dan Leckie Way would also provide the City with the ability to restrict the westbound left turn at Lake Shore and Bathurst intersection during peak periods, to improve operations at this intersection. With no westbound left turns during the peak hours, the signal timing at the intersection of Lake Shore and Bathurst could be adjusted to improve overall operations.

## 7.4 ANALYSIS OF IMPACT OF PERMITTING JETS

The future 'Growth Baseline' BBTCA traffic volumes and the background volumes from other approved development in the area were input into the VISSIM model to estimate traffic operations in the area under these future conditions. The purpose of this analysis was to evaluate the relative traffic implications of approving jets while still retaining the existing hourly flight slot capacity of approximately 16 flights per hour.



The traffic implications of growth in the number of hourly flights at BBTCA up to the runway's theoretical capacity are further discussed in Section 8.0.

Table 11 below summarizes the forecast intersection delays that would result from permitting jets (at 16 flights per hour) based on the VISSIM analysis undertaken.

**TABLE 11 SUMMARY OF TRAFFIC ANALYSIS FOR GROWTH BASELINE TRAFFIC FORECASTS**

	Existing Traffic Volumes <sup>2</sup>		Growth Baseline Traffic Volumes <sup>3</sup>			Growth Baseline with Future Development <sup>4</sup>
	No Jets		With Jets			
Road Network	No Change	Minor Signal Timing Adjustments	Minor Signal Timing Adjustments		Road Network Improvements <sup>5</sup>	
Mode Split	Current Mode Split		Current Mode Split	Improved Mode Split <sup>6</sup>		
Queens Quay / Bathurst Street / Eireann Quay <sup>1</sup>	24 (28)	22 (25)	26 (29)	24 (24)	32 (28)	34 (36)
Lake Shore Blvd./ Bathurst Street <sup>1</sup>	43 (48)	44 (41)	50 (49)	43 (45)	36 (25)	38 (25)
Queens Quay / Dan Leckie Way <sup>1</sup>	15 (16)	15 (14)	15 (15)	15 (15)	16 (24)	18 (31)
Lake Shore Blvd./ Dan Leckie Way <sup>1</sup>	18 (49)	17 (45)	17 (53)	17 (44)	11 (22)	13 (30)

Notes:

1. Results in table not in parenthesis represent estimated average intersection delay during the weekday morning peak hour. Results in parenthesis represent average intersection delay during the weekday afternoon peak hour.
2. Traffic operations based on estimated current peak traffic volumes from August 2012.
3. Estimated increase in airport traffic volumes while maintaining existing hourly flight levels of 16 flights / hour.
4. Includes 'Growth Baseline' BBTCA traffic growth as well as increases on the road network from anticipated future developments in the area
5. Reflects construction of permissive west bound left turn lane at Dan Leckie Way / Lake Shore Boulevard as well as the prohibition west bound lefts at Bathurst Street / Lake Shore Boulevard
6. Reflects an assumed reduction in the BBTCA trip generation due to improvements made in the airport shuttle bus.

**GROWTH BASELINE IMPACTS**

The first column in Table 11 illustrates existing operations, with current estimated peak traffic volumes from August 2012.

The second column provides an indication of the impact of the incremental growth of passenger volumes at BBTCA during the peak hours up to the Growth Baseline forecast, with the opening of the pedestrian tunnel. The analysis suggests that there will be a modest improvement in the area traffic operations, despite an increase in traffic volumes at BBTCA. The improvement is a reflection of the impact of the pedestrian tunnel on traffic flows at BBTCA. Once the tunnel is opened, traffic volumes associated with BBTCA will become more evenly distributed compared to the 4 sub-peaks that occur each hour around the arrival and departure of the ferry.



## **JET IMPACT DISCUSSION**

The third column in Table 11 illustrates what the net impact of jets would be if there were no changes made to the mode split or road network.

If jets were permitted, the additional vehicles that would be added to the road network would result in significant additional delays at the intersection of Lake Shore Boulevard and Bathurst Street. This intersection would experience significant increases in vehicle delays for movements that are already operating with an LOS of F. Key movements impacted include the westbound left turn, the southbound movements, and the northbound left turn movements.

The potential traffic impacts of permitting jets at the other area intersections can generally be managed by the other area intersections, however, the decreased operations at Bathurst Street / Lake Shore Boulevard result in increased spillover effects that periodically will cause the adjacent intersections in the area to fail.

## **IMPACT OF THE POTENTIAL IMPROVEMENTS**

The VISSIM analysis suggests that achieving a mode split change consistent with a reduction in the auto mode splits from approximately 65% to 55% would reduce delays at the area intersections back to approximately the growth baseline scenarios, thereby mitigating most, if not all, of the potential traffic impact of permitting jets.

The VISSIM analysis also suggests that modifying the westbound left turn at Dan Leckie Way / Lake Shore Boulevard, in combination with eliminating the westbound left turn traffic at Bathurst Street / Lake Shore Boulevard, would result in a significant reduction in the intersection delays compared to the growth baseline and existing traffic operations. Moreover, improvements in the traffic operations resulting from this change, in combination with a mode shift change, have the potential to provide a net benefit to area operations as a whole.

## **IMPACT OF FUTURE AREA GROWTH**

The VISSIM analysis indicates that the estimated traffic impact due to future development in the area will be relatively minor. Presuming that an improvement the shuttle mode split at BBTCA and a physical improvement to the westbound left turn at Dan Leckie Way / Lake Shore would be implemented if jets are approved, then the estimated traffic increases associated background growth can be accommodated and no additional improvements are required.

## **SUMMARY DISCUSSION**

Based on our review of the traffic operations analysis findings, we find that BBTCA should attempt to shift the mode split of the airport uses to reduce, if not eliminate, potential increases in traffic resulting from permitting jets. Our analysis suggests that this could be achieved through improving the existing shuttle by offering either more routes and/or by increasing the frequency of the shuttle. In this regard, if jets are permitted the City should set mode split targets for BBTCA that need to be achieved as part of the Tripartite Agreement, and also require an ongoing annual traffic monitoring / passenger survey program that monitors and estimates the mode split at BBTCA to review if the targets are being achieved.



The City should also require that the westbound left at Dan Leckie Way be modified as described above if jets are ultimately permitted. This will allow the City greater flexibility to manage traffic demands in the area, including the potential of restricting the westbound left turn at Lake Shore Boulevard / Bathurst Street. The potential modification to the westbound left at Lake Shore Boulevard / Dan Leckie Way intersection, in combination with restricting the westbound left turn at Bathurst Street / Lake Shore Boulevard, would result in a net improvement to the area traffic operations and will provide additional capacity to accommodate any additional traffic generated by BBTCA associated with jets and any future development traffic.

## **7.5 BROADER IMPACTS OF JETS**

A review of the traffic impacts of permitting jets on the broader study area was also undertaken. The analysis focused on reviewing the estimated change in traffic volumes caused by permitting jets within the broader area defined by Front Street to the north, York Street to the east, Jameson Avenue to the west, and Lake Ontario to the south.

Analysis of the incremental traffic added by jets at BBTCA indicates that the estimated traffic increase at any movement in the broader area is in the order of 10-15 net new vehicles during the peak hours (compared to the current volumes). The corresponding percentage impact to any individual intersection movement is generally in the order of 1% to 3%.

In a small number of cases, the percentage impact to some left turn movements is approximately 10% (i.e. the eastbound left turn from Lake Shore Boulevard to Simcoe Street and the eastbound left turn from Queens Quay to York Street). However, analysis of those movements suggests that they have sufficient capacity to accommodate the additional 10-15 additional vehicles per hour with minimal impact to the overall intersection operation.

Based on this, we estimate that the traffic impact of permitting jets on the broader area intersections would be small. Any net-new traffic volumes that would be generated by permitting jets can likely be accommodated without significant impact to the broader area intersections, and no improvements to these intersections would be required.

Figures illustrating the net-new traffic generated in the larger study area by permitting jets are provided in the Technical Appendix.

## **7.6 ORDER OF MAGNITUDE COSTS**

A preliminary cost estimate of the modification to the Dan Leckie Way / Lake Shore Boulevard intersection is in the order of \$1 million, depending on the extent of the landscaping that would be required and the extent that the existing signal poles and hardware would need to be adjusted to accommodate the change.

If the City decides to approve jets, a more detailed cost estimate for this work should be undertaken to provide a more refined estimate for this work.



## 8.0 INCREASED HOURLY FLIGHT CONSIDERATIONS

While the permission for jets could result in increased traffic volumes, the key determinant of BBTCA's traffic impact is the number of hourly flights that occur, which is what determines the number of passengers that can pass through BBTCA in an hour.

BBTCA currently operates with approximately 16 flights during the busiest hour. We understand that this is currently the operational capacity of the airport based on TPA slot scheduling guidelines, the current staffing levels at BBTCA, and the current terminal capacity<sup>3</sup>. Based on discussions with representatives from AirBiz, we understand that the capacity of the main runway at BBTCA could reach as high as 30-36 flights per hour. This implies that the overall hourly capacity of the airport could be increased over time through the modification / elimination of other operational constraints (e.g. the slot scheduling guidelines or the existing terminal building).

There is no limit on the number of flights per hour within the existing Tripartite Agreement. This is significant because it means that the number of hourly flights could be increased regardless of whether jets are permitted.

Increasing the number of hourly flights at BBTCA would have a significant traffic impact on Eireann Quay and the immediate area; and could far outweigh any traffic increases from permitting jets. Addressing these impacts will likely require a significant investment in new infrastructure. Several possible infrastructure and operational improvements have been considered and analysed to determine which, if any, are capable of addressing the potential traffic demands that could be generated at BBTCA should hourly flights increase to their maximum potential. The following section provides a review and discussion of the improvements considered, and a summary of the analyses.

### 8.1 IMPROVEMENTS CONSIDERED

A variety of infrastructure and operational improvements were considered for the 30-36 flights per hour scenarios. The list of improvements considered was developed in consultation with City staff and through a review of the alternatives generated during the public workshops hosted by the City of Toronto as part of the 2012 Eireann Quay Strategic Transportation Study.

The improvements considered in this study can be classified into three broad groups: transit improvements, road capacity improvements, and operational improvements / changes.

#### 8.1.1 Transit Improvements

The purpose of any transit investment would be to increase the proportion of trips to and from the airport taken by transit in order to reduce the amount of vehicular traffic generated. Figures conceptually illustrating the potential transit improvements that were considered in our analysis are shown in Figure 3a, Figure 3b, and Figure 3c. The transit options considered in this report were developed based on discussions with City

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<sup>3</sup> Based on discussions with Dillon Consulting and AirBiz



staff and based on a review of the various alternatives identified through the *2012 Eireann Strategic Transportation Study* undertaken by the City of Toronto. A brief description of the alternatives is provided below.

#### **EXTEND THE HARBOURFRONT TTC LINE SOUTH TO BBTCA TERMINAL**

This option envisions an extension of the existing TTC streetcar line south from the intersection at Queens Quay and Bathurst Street to a new stop located adjacent to the BBTCA terminal at the south end of Eireann Quay. The new station would include a turn-around loop for streetcars and would likely need to be located underground in order to avoid conflicts with other pick-up / drop-off activity occurring at the terminal front door. This option is illustrated in Figure 3a.

#### **EXTEND THE BBTCA PEDESTRIAN TUNNEL NORTH TO A NEW UNDERGROUND TTC STREETCAR STATION**

This option proposes to construct a new underground transit station in the vicinity of the intersection of Queens Quay / Bathurst Street that would connect to a northerly extension of the pedestrian tunnel that is currently nearing completion. The new tunnel would be similar to the portion that is currently under construction and would preferably include moving walkways to minimize the time it takes to walk to the transit stop. This option is illustrated in Figure 3b.

#### **EXTEND THE BBTCA PEDESTRIAN TUNNEL NORTH TO PROVIDE AN IMPROVED CONNECTION TO THE EXISTING STREETCAR**

Similar to the previous option, this option would extend the pedestrian tunnel (that is currently under construction) from the planned airport terminal at the foot of Eireann Quay to a new pedestrian only entrance located at (or near) the southwest corner of Queens Quay and Bathurst Street. The new entrance would provide a heated waiting area for the streetcar that would include real time transit information indicating when the next streetcar will arrive. This option is illustrated in Figure 3c.

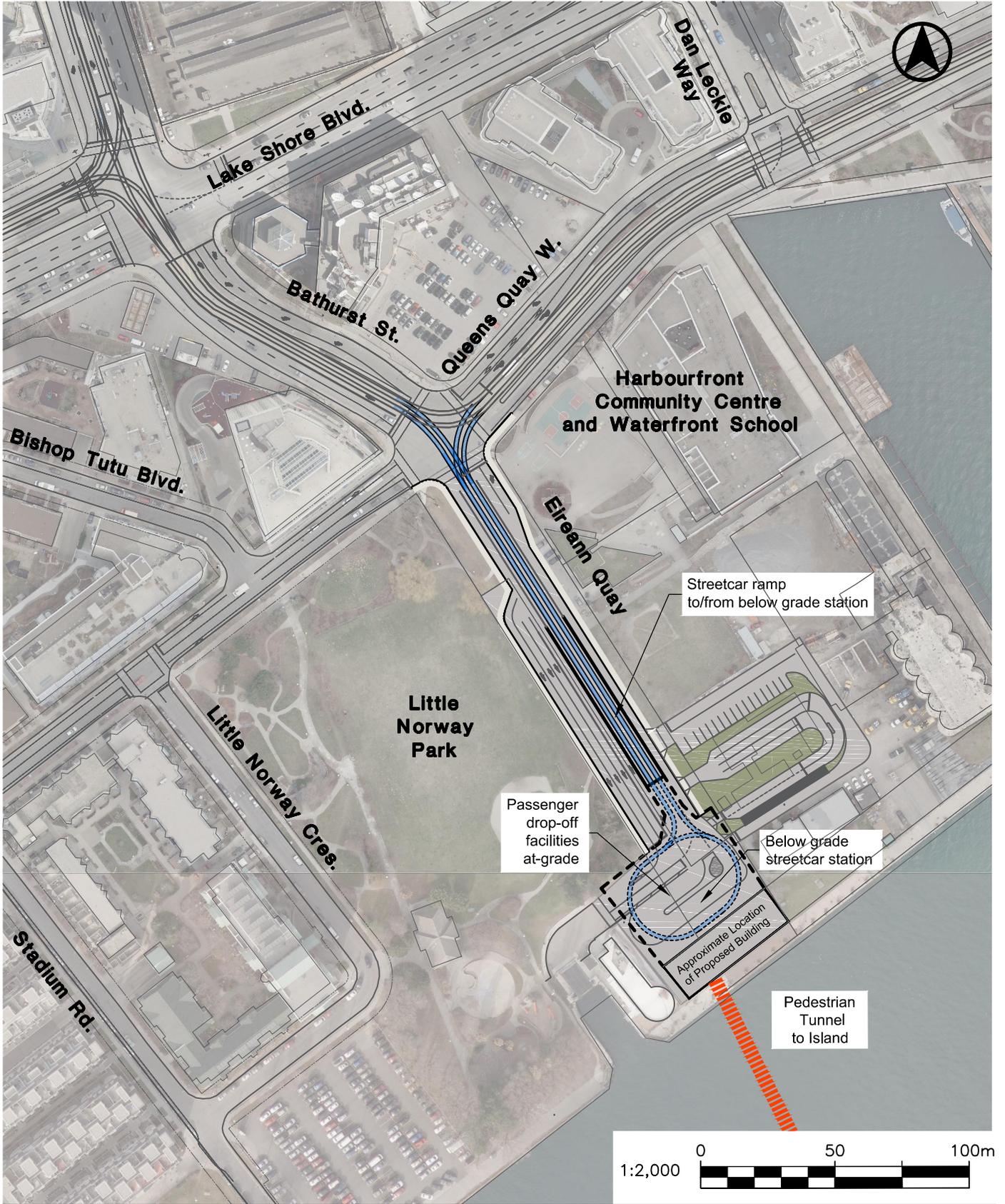
#### **PROVIDE A NEW TTC BUS ROUTE SERVING BBTCA**

This option would include the provision of a new TTC bus route that would serve the airport. The route would run between the downtown area and make stops at key subway stations, as well as serve key neighbourhoods such as Cityplace. A figure for this option is not provided as it represents an operational change.



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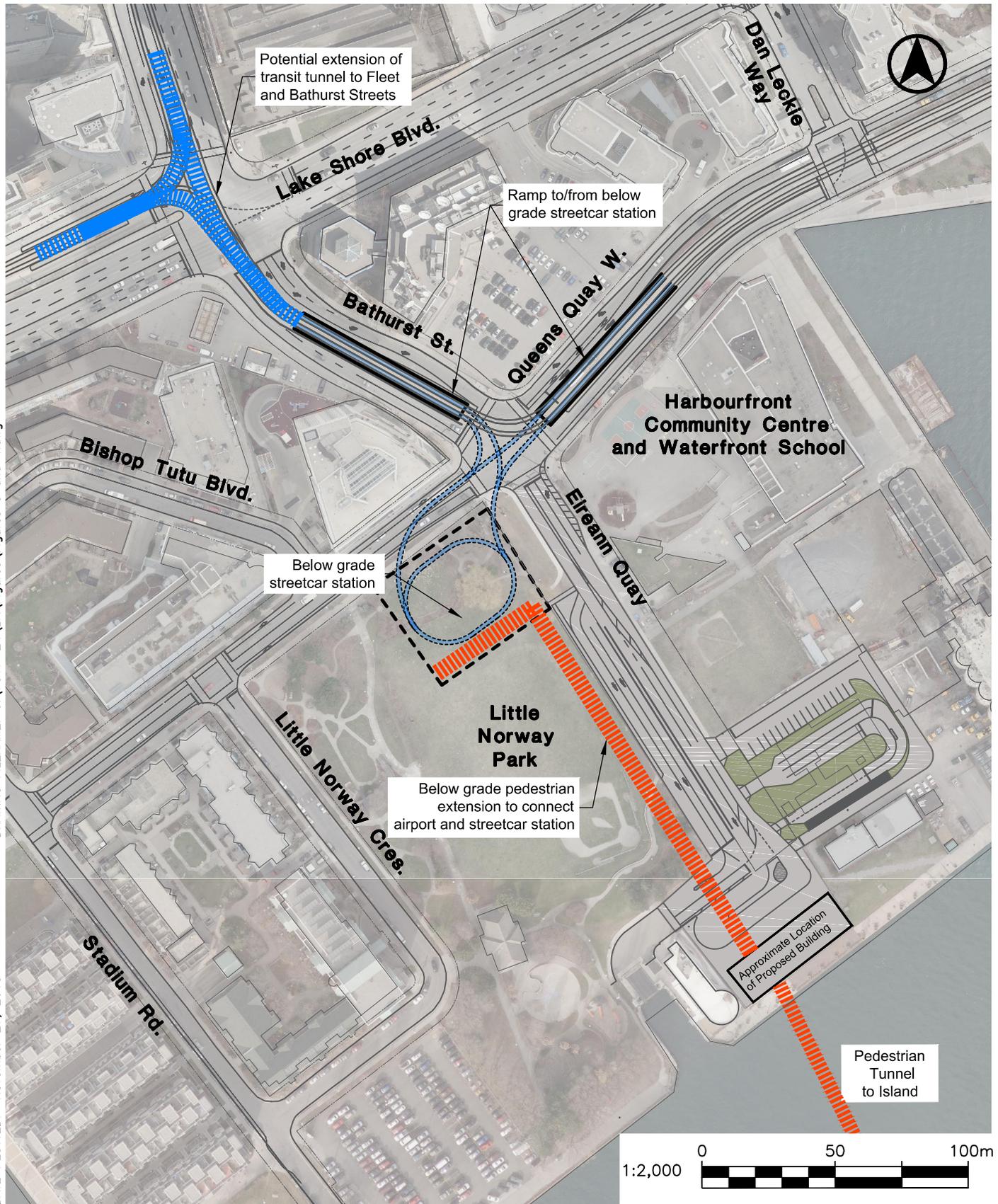
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Potential Transit Improvements:  
Extension of Harbourfront TTC Line  
South to BBTCA Terminal

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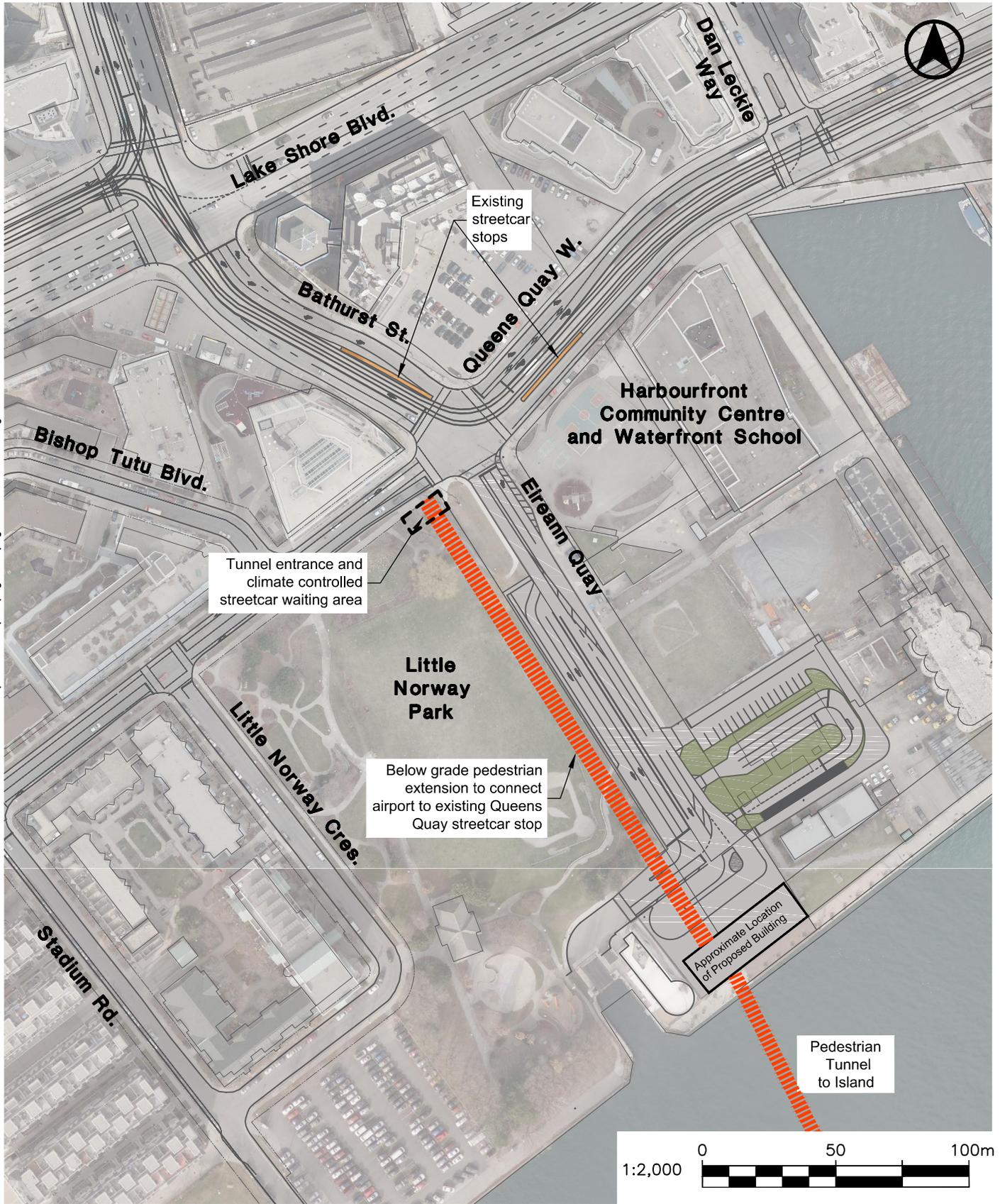
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Potential Transit Improvements:  
Extension of BBTCA Pedestrian Tunnel  
North to a New Underground Streetcar Station

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**Potential Transit Improvements:**  
Extension of BBTCA Pedestrian Tunnel North to Provide  
an Improved Connection to Existing Streetcar Stops

## 8.1.2 Road Infrastructure Improvements

The analysis considered two road options for increasing capacity in the area. They include:

1. a southerly extension of Dan Leckie Way; and
2. a direct tunnel connection to BBTCA that would start just south of Lake Shore Boulevard and pass below Queens Quay.

### DAN LECKIE WAY EXTENSION

The 2012 Eireann Quay Strategic Transportation Study identified a potential extension of Dan Leckie Way southward from its current terminus at Queens Quay to BBTCA as an option to increase road capacity. The conceptual alignment of Eireann Quay would create a new public street right of way that extends south from Queens Quay approximately 100 metres and then bends to the west to connect across a portion of Bathurst Slip to Eireann Quay south of the Harbourfront Community Centre / Waterfront School, thus forming a loop road around the Harbourfront Community Centre / Waterfront School.

Extending Dan Leckie Way south would provide an additional outlet for traffic on Eireann Quay and allow traffic volumes to be spread more evenly, thereby reducing the congestion impacts at the intersection of Eireann Quay and Queens Quay.

Any extension of Dan Leckie Way would have significant implications on the public realm, the environment, and waterfront connectivity. The proposed conceptual alignment of the Dan Leckie Way extension would require partially filling a portion of the harbour adjacent to Bathurst Slip. In addition, because it would represent a significant modification to the existing waterfront edge (and would actually create new waterfront edge areas), it is envisioned that if a Dan Leckie extension were considered, it would need to be accompanied by a significant investment in the public realm along its edges (i.e. high quality urban design, large pedestrian areas, open space areas on both sides of the street to facilitate sidewalks, trees, and cyclist pathways, etc.) in order to try and off-set the impact of the new road.

An illustration of a potential Dan Leckie extension is shown in Figure 4a.

### EIREANN QUAY / BATHURST STREET TUNNEL UNDERPASS

This option would include the construction of a north-south tunnel within and under Bathurst Street that would directly connect to BBTCA. The tunnel would conceptually start on Bathurst Street, just south of Lake Shore Boulevard, and pass under Queens Quay where it would then return back to the surface and connect to the BBTCA terminal facilities on the surface.

A direct access BBTCA tunnel was initially identified by Stolport Corporation as way of improving access to BBTCA. The Stolport tunnel concept was reviewed and some adjustments to the concept design were made based on operational considerations at the intersection of Bathurst Street / Lake Shore Boulevard. An illustration of the modified BBTCA tunnel concept evaluated in this study is shown in Figure 4b.

The construction of a tunnel on Bathurst Street would allow for the creation of a direct, uninterrupted pedestrian connection between the Waterfront School and Little Norway Park along the south edge of



Queens Quay. It would, however, also have significant property access implications for the sites located along the east and west sides of Bathurst Street between Lake Shore Boulevard and Queens Quay, and would also likely require the relocation of the TTC streetcar right-of-way to another location to make space for the creation of the tunnel itself.

### **8.1.3 Operational Improvements**

#### **ACCOMMODATE GROWTH THROUGH OPERATIONAL IMPROVEMENTS ONLY**

This option involves accommodating the growth in hourly traffic volumes through further improvements to the shuttle and transit operations serving BBTCA. These could include the addition of more routes, more frequent bus service, and so forth. It should be noted that no actual new transit infrastructure or road capacity would be added in this option.

#### **PLACE A CAP ON HOURLY PASSENGER NUMBERS**

Another way in which the City could respond to the potential for increases in hourly activity is to put a cap on the number of flights that occur in an hour, or by capping the number of hourly passengers that can be processed by BBTCA. There is currently no limit on hourly flights within the Tripartite Agreement agreement, however if jets were approved a limit on hourly activity could potentially be incorporated as part of a renegotiated agreement.



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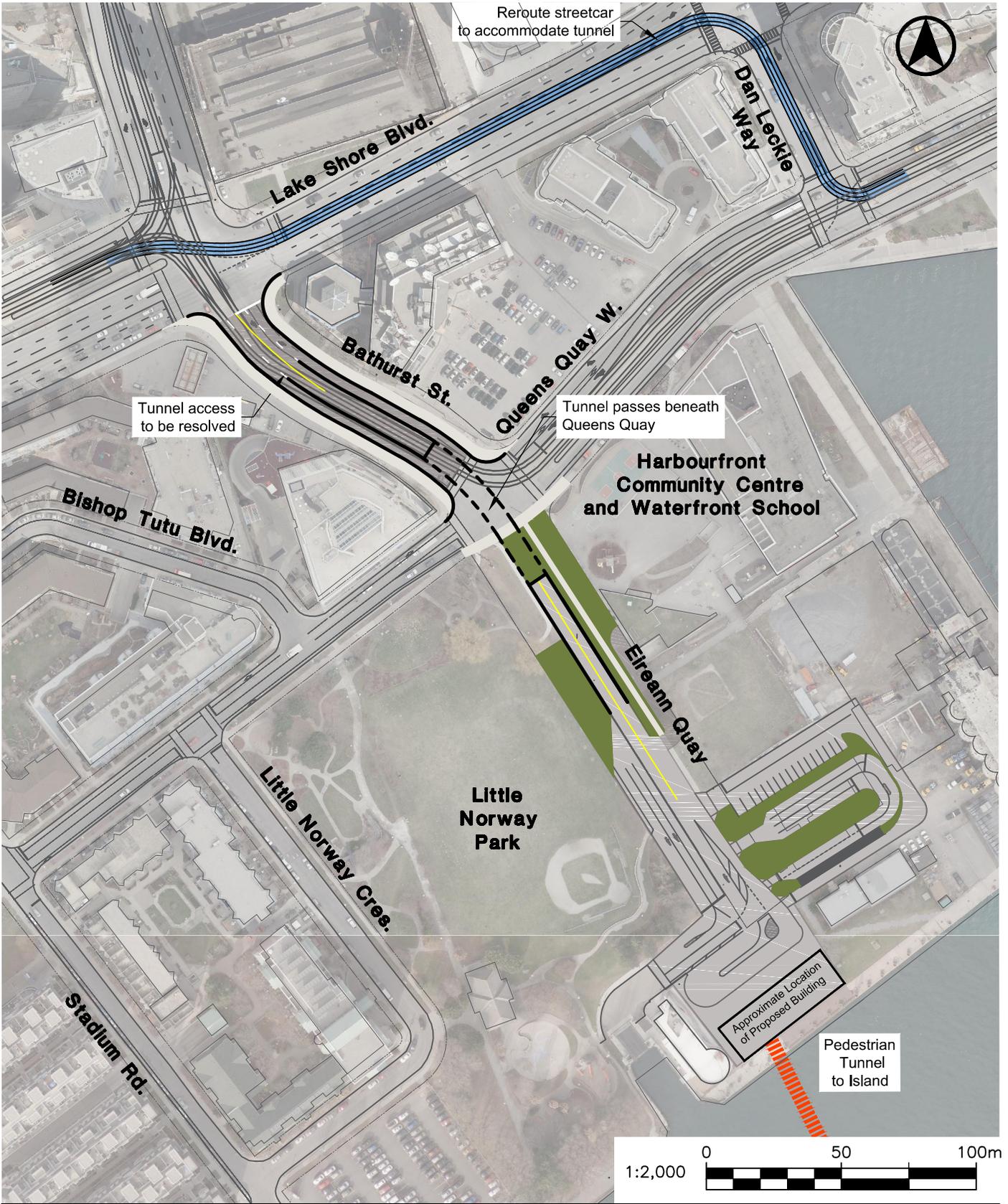
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Potential Road Infrastructure Improvements:  
Dan Leckie Way Extension

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Potential Road Infrastructure Improvements:  
Eireann Quay / Bathurst Street Tunnel Underpass

## 8.2 MAX OPERATIONS IMPACT ANALYSIS

In order to understand their benefits and drawbacks from a traffic operations perspective, the improvements discussed in Section 8.1 were modelled in VISSIM. Detailed delay estimates for intersections in the immediate area are provided in the Technical Appendix. A summary of the findings is provided in Table 12 below.

**TABLE 12 SUMMARY OF TRAFFIC ANALYSIS FOR MAX. OPERATION FORECASTS**

Intersection	Existing Traffic Volumes	Max. BBTCA Hourly Operations Traffic Volumes				Max. BBTCA Operations With Future Development Traffic Vols.
		Improved Shuttle Bus and Transit Mode Split	Improved Shuttle Bus Mode Split		Improved Shuttle Bus and Transit Mode Split	
Traffic Volume Scenario	Existing Mode Split	Improved Shuttle Bus and Transit Mode Split	Improved Shuttle Bus Mode Split		Improved Shuttle Bus and Transit Mode Split	
Road Network	No Change	Transit Improvements	Dan Leckie Extension	Tunnel Under Queens Quay <sup>2</sup>	Dan Leckie Extension + Transit Improvements	Dan Leckie Extension + Transit Improvements
	No Jets	With Jets				
Queens Quay / Bathurst Street / Eireann Quay <sup>1</sup>	24 (28)	104 (75)	36 (40)	29 (65)	34 (34)	35 (35)
Lake Shore Blvd. / Bathurst Street <sup>1</sup>	43 (48)	75 (37)	49 (36)	86 (87)	46 (34)	48 (33)
Queens Quay / Dan Leckie Way <sup>1</sup>	15 (16)	69 (53)	24 (26)	20 (79)	24 (24)	25 (29)
Lake Shore Blvd. / Dan Leckie Way <sup>1</sup>	18 (49)	52 (57)	16 (29)	85 (86)	14 (29)	18 (42)
Can Traffic Volumes be Accommodated?	N/A	<b>No</b>	<b>Yes</b>	<b>No<sup>2</sup></b>	<b>Yes</b>	<b>Yes</b>

Notes:

1. Results in table not in parenthesis represent estimated average intersection delay during the weekday morning peak hour. Results in parenthesis represent average intersection delay during the weekday afternoon peak hour.
2. Queues extend off the VISSIM network and do not dissipate. Input volume does not get processed through the network indicating that delay is significantly more than reported.

The traffic analysis results indicate that transit improvements alone cannot accommodate the forecasted traffic increases that would be generated by increasing the number of flights per hour. Thus, some expansion of the road infrastructure to increase capacity in the area will be required if the worst case hourly flight levels are to be accommodated.

The VISSIM results also indicate that the BBTCA underpass option will result in significant increases in delay at the intersection of Bathurst and Lake Shore. The increased delays are the result of the construction of the



tunnel in the middle of Bathurst Street south of Eireann Quay, which focuses all BBTCA traffic volumes to a single point of access. Moreover, the construction of the tunnel entrance will require the addition of a new signal phasing in order for BBTCA traffic to get to and from the tunnel in a safe way. This phase will add significant delay to the other existing movements at the intersection.

From a traffic operations perspective, a Dan Leckie Way extension provides the best overall operations within the immediate study area, primarily because it provides a second point of access that BBTCA traffic can be distributed to.

The analysis also indicates that a Dan Leckie Way extension, in combination with: 1) improving access to transit; 2) improving the westbound left turn at the intersection of Dan Leckie Way / Lake Shore Boulevard; and 3) restricting westbound left turns at Lake Shore / Bathurst Street intersection, could reduce the estimated delays within the immediate study area (including Lake Shore Boulevard / Bathurst Street) to the point that future delays under the worst case BBTCA hourly volumes would be less than or equal to existing conditions.

### 8.3 ORDER OF MAGNITUDE COSTS

Table 13 summarizes the order of magnitude cost estimates for the various transportation improvements considered.

**TABLE 13 ORDER OF MAGNITUDE COST ESTIMATES**

<b>Transit Access Improvements</b>	<b>Preliminary Cost Range</b>
Extend TTC Streetcar Line South to An Underground Mainland Terminal	\$135 - \$165 million
Extend TTC Streetcar Line South to An At Grade Mainland Terminal	\$65 - \$75 million
Extend BBTCA Pedestrian Tunnel North to A New Underground TTC Station Near Queens Quay / Bathurst	\$250 - \$300 million
Extend BBTCA Pedestrian Tunnel North to A New Entrance at Corner of Queens Quay / Bathurst to Provide Improved Connection to Existing TTC Streetcar Stop	\$30 - \$45 million
Provide a New TTC Bus Route Serving BBTCA	Less than \$1 million
<b>Road Network Improvements</b>	<b>Preliminary Cost Range</b>
Dan Leckie Way Extension	\$50 - \$60 million
BBTCA Underpass	\$110 - \$135 million

Notes:

1. All costs are preliminary estimates that are for order of magnitude cost comparisons only. Further detailed cost analysis is required to confirm the costs outlined above.



## 8.4 PRE-SCREENING EVALUATION OF TRANSPORTATION IMPROVEMENTS

All of the infrastructure improvements identified carry substantial costs and would have significant impacts on the waterfront and public realm.

The analysis undertaken in Section 8.2 focuses on determining which solutions are capable of accommodating the potential traffic demand that could be generated by BBTCA. This only represents a partial view of the impact of each alternative.

To provide a more balanced review of all the impacts (both positive and negative) of the transportation improvements being considered, a pre-screening evaluation was undertaken. An evaluation matrix was developed that includes a balanced set of criteria on which the impact of each option was evaluated. The evaluation criteria adopted include:

- safety / school safety;
- waterfront connectivity;
- impact on open space, park land, and public realm;
- BBTCA access; and
- overall area traffic operations.

In addition, as requested during the BBTCA sub-committee meeting on November 7, 2013, the pre-screening evaluation also includes an assessment of the solution's impact of the solution on the ability to accommodate special events in the downtown.

Table 14 summarizes the evaluation of the alternatives considered.



**Table 14: Transportation Evaluation of Improvements to Accommodate Increased Hourly Activity**

	Operational Improvements		Add Street Capacity		Add Transit Capacity			
	Transit & Shuttle Improvements Only	Cap Hourly Passenger Movements	BBTCA Tunnel	Dan Leckie Extension	Extend TTC South to BBTCA	Extend BBTCA Ped. Tunnel to TTC With a New TTC Station	Extend BBTCA Ped. Tunnel to Corner of QQ/EQ	New TTC Bus Route
Description of Option →	Focus on increasing transit & shuttle mode split only	Limit Increase in No. of hourly flights to current levels	Construct a tunnel from Bathurst to Eireann Quay connecting below Queens Quay to access airport	Extend Dan Leckie Way southward and then westward around Waterfront School to connect Eireann Quay	Extend TTC streetcar line to BBTCA mainland terminal (with either an underground LRT tunnel at BBTCA stop or located at grade)	Extend underground pedestrian tunnel to a new underground TTC streetcar station	Extend underground pedestrian tunnel to a new entrance at SW corner of Queens Quay / Eireann Quay	Provide a new TTC bus route serving BBTCA and other nearby neighbourhoods such as Cityplace
Evaluation Criteria ↓								
Safety / School Safety	May slightly improve because fewer pedestrian / vehicle conflicts.	No impact relative to current traffic levels.	Improves by providing pedestrians with uninterrupted crossing to Little Norway Park	No impact to Eireann Quay but completely encircles school with new road. Also adds new pedestrian crossing conflict at Dan Leckie way.	Streetcar turn onto Eireann Quay occur underground and not impact pedestrians.	Little or no impact.	Little or no impact.	Little or no impact.
Waterfront Connectivity	Little or no impact.	Little or no impact.	Creates a continuous pedestrian connection along south side of Queens Quay along Waterfront.	Would create another street crossing along waterfront edge for pedestrians and cyclists.	Little or no impact.	Little or no impact.	Little or no impact.	Little or no impact.
Impact on Open Space, Parkland, and Public Realm	Little or no impact.	Little or no impact.	Improves pedestrian connectivity along Queens Quay however there is potential for significant negative impacts to public realm from tunnel portals.	Would create new street and streetscape opportunity however filling of Bathurst Quay negatively affects public realm (i.e. it creates a signalized crossing of pedestrian traffic along the Waterfront).	Potential for significant negative impacts to public realm from transit tunnel portals.	Little or no impact.	Little or no impact.	Little or no impact.
Ability to accommodate special event activity / traffic downtown	Operational improvements on their own not sufficient to minimize traffic to avoid combined impact with special events.	This option would best ensure that special event activity was not impacted by BBTCA growth.	This option would result in significant increased delays at Lake Shore / Bathurst and significant impact to special events	This option would manage traffic delays in the area such that they would be roughly the same as they are today.	Transit on its own is not sufficient to minimize traffic to avoid combined impact with special events.	Transit on its own is not sufficient to minimize traffic to avoid combined impact with special events.	Transit on its own is not sufficient to minimize traffic to avoid combined impact with special events.	Transit on its own is not sufficient to minimize traffic to avoid combined impact with special events.
BBTCA Access	Would improve transit access to airport. Auto access would be negatively impacted.	Would be maintained at current levels.	Improves by providing direct tunnel to airport bypassing intersection of Eireann Quay and Queens Quay.	Improves access for airport traffic.	Improved transit access and that would facilitate a growth in transit mode split. Little or no impact.	Little or no impact.	Little or no impact.	Little or no impact.
Overall Impact to Area Traffic Operations (vehicle delay)	Some benefit to operations depending on how many people take non-auto modes. Not sufficient however to avoid significant traffic impacts from increased airport traffic.	Could be maintained at current levels or with some increased shuttle service and minor area improvements if jets permitted.	Would improve QQ/EQ, but would have significant negative impact on other intersections (namely Bathurst / Lake Shore.)	Improves traffic operations at area intersections by dispersing traffic to more than one location.	Improvement on its own not sufficient to accommodate future traffic volumes. Significant traffic operational impacts.	Improvement on its own not sufficient to accommodate future traffic volumes. Significant traffic operational impacts.	Improvement on its own not sufficient to accommodate future traffic volumes. Significant traffic operational impacts. Could be constructed in conjunction with Dan Leckie extension however.	Not sufficient to accommodate future traffic volumes. Significant traffic operational impacts.
Order of Magnitude Cost	Minor operational costs.	Uncertain. Potential economic costs to be evaluated.	\$110 to \$135 million	\$50-60 million	\$135-\$165 million for underground option \$65-\$75 million for at grade connection	\$250-\$300 million	\$30-\$45 million	Low. Likely \$1 million or less per year.
Outcome	<b>✗</b>	<b>✓</b>	<b>✗</b>	<b>✓</b>	<b>✗</b>	<b>✗</b>	<b>✓</b>	<b>✗</b>
	Transit & shuttle improvements not sufficient on their own to accommodate worst case airport volumes	This would require opening the Tripartite Agreement which presumes jets are being permitted. Impacts of limiting flights per hour would need to be confirmed with TPA.	Option dropped because of the significant traffic impacts it would create at Lake Shore and Bathurst.	Is the only infrastructure element that will address the worst case traffic demands that could be generated at BBTCA.	Not sufficient to meet worst case traffic demands at airport on its own and costs are too prohibitive relative to the benefit it delivers.	Not sufficient to meet worst case traffic demands at airport on its own and costs are too prohibitive relative to the benefit it delivers.	Would facilitate a transit mode shift by improving access to TTC streetcar for the lowest cost of the three transit options. When combined with Dan Leckie extension this provides best traffic operations in the area based on worst case volumes.	Not sufficient to meet worst case traffic demands at airport.

## EVALUATION OUTCOME

The pre-screening evaluation eliminated several of the alternatives either on the basis that their impact on the public realm is too severe, or on the premise that they do not provide a reasonable solution to the traffic demands generated by BBTCA. Based on the analysis, there are three different potential courses of action that the City could proceed with to address future growth in hourly traffic:

1. restrict the number of possible hourly flights as part of renegotiation of the Tripartite Agreement;
2. consider and plan to increase road and transit capacity through a potential southerly extension of Dan Leckie Way and a fully weather-protected transit connection to the existing TTC stops at Queens Quay / Bathurst Street; or
3. do nothing beyond the minor improvements noted in Section 7.0 and let the current road capacity act as an indirect capacity constraint on the hourly activity at BBTCA.

The three above approaches to managing traffic impacts from increased activity offer no panacea; however, they provide basis for further analysis of potential benefits and drawbacks of each alternative.

As such, these solutions have therefore been carried forward into the broader planning analysis framework being undertaken separately by the City's Land Use Consultant Urban Strategies Inc. to determine which course of action is most appropriate based on the planning, urban design, and waterfront context.



## 9.0 WATERFRONT SCHOOL CONSIDERATIONS

An important stakeholder that is affected by BBTCA-generated vehicular traffic is the Waterfront School and Harbourfront Community Centre, located on the southeast corner of Eireann Quay and Queens Quay. The Waterfront School is actually comprised of two schools; the Waterfront Elementary School (elementary students) and the City School (high school students). Many of these children reside in the neighbourhood on the west side of Eireann Quay and are therefore required to cross Eireann Quay to access the school. The traffic activity on Eireann Quay generated by BBTCA is an operational and safety concern for the school because of the conflict it creates between vehicular traffic and pedestrians crossing Eireann Quay.

### RECOMMENDED IMPROVEMENTS

We have reviewed several alternatives for improving the safety of students crossing Eireann Quay. Several recommendations have already been implemented by the City of Toronto over the past two years in response to community concerns. This study has also identified and recommended several additional potential improvements in Section 4.0 that should be implemented immediately to further improve the existing condition.

### OTHER POTENTIAL PEDESTRIAN SAFETY IMPROVEMENTS

A more substantial improvement that has been considered is construction of a pedestrian grade separation across Eireann Quay that would provide the school and the public with a direct connection to Little Norway Park. A direct connection could be provided by:

- building a pedestrian bridge over Eireann Quay;
- building a pedestrian and cycling 'land bridge' (i.e. an wide bridge with planting, trails, etc.); or
- building a pedestrian and cycling tunnel below Eireann Quay.

An tunnel is likely the least expensive option given that it would require the least amount of grading / ramping to create it. We understand however, however, that a tunnel is the least desirable from an urban design perspective so our discussion focuses on the potential options for constructing a bridge.

### DISCUSSION

The estimated traffic increases that would be generated by BBTCA were reviewed in the context of the pedestrian volumes and the number of children that attend the Waterfront School. We have also undertaken several site visits during various times of the day to review the operation at the Queens Quay / Bathurst intersection.

Based on our preliminary analysis, it is our opinion that a grade separated crossing for pedestrians across Eireann Quay is not required on the basis of pedestrian safety. There are many examples of other elementary schools with higher enrolments on busier streets which are not being considered for grade separations simply on the basis of the number of vehicles and children crossing at any given time.



However, a grade separated pedestrian and bicycle crossing could provide a broader benefit to the neighbourhood and waterfront connectivity in general. Potential exists to extend the Martin Goodman Trail around the school site, across Eireann Quay, and through Little Norway Park where it would reconnect with the Martin Goodman Trail further west. The City should undertake a process to review the future plans for the Martin Goodman Trail and pedestrian connections along the portion of the waterfront between Spadina Avenue and Stadium Road to determine whether a pedestrian and cyclist underpass / overpass would be desirable at Eireann Quay.

## ESTIMATED COSTS

The cost of constructing a pedestrian grade separation would depend significantly on the design of the structure: whether it is a bridge or tunnel, the width of the crossing, the nature of the landscaping, and the degree of sloping required, and the degree of grade separation. Preliminary order of magnitude cost estimates suggest that constructing a grade separated pedestrian crossing over, or under, Eireann Quay would cost upwards of \$30 million. The cost estimates increase to as high as \$50-\$60 million for a wide 'land bridge' over Eireann Quay.

## ALTERNATIVES TO A PEDESTRIAN GRADE SEPARATION

An alternative solution to constructing a grade separated crossing would be to relocate the school and community centre to another site in the area and redevelop the current site. Moving the school would reduce the conflict between airport vehicular traffic and school and community centre-related pedestrians crossing the intersection of Eireann Quay. At the same time, the redevelopment of the current school site would provide an opportunity for securing additional cycling / pedestrian facilities along the south side of Queens Quay.

Depending on its design, the cost of the pedestrian grade separation may begin to approach the cost of relocating the school. This gap may narrow further if the economics of redeveloping the current school site are taken into consideration.



## 10.0 RECOMMENDATIONS

### SHORT TERM REQUIREMENTS

Short term recommendations to improve the existing operational issues associated with BBTCA are provided below. An illustration of the short term recommendations is provided in Figure 5.

- 10.1.1 Given that the temporary off-street taxi and shuttle facility on the Canada Malting Lands provides a clear benefit to traffic operations on Eireann Quay, the current facility should be retained until a suitable off-street alternative can be found. Options for replacing the off-street taxi/shuttle facility include:
- an underground facility below Eireann Quay / Little Norway Park; or
  - incorporating a replacement facility into a redevelopment of the Canada Malting lands.
- 10.1.2 Modify the signal timing at Queens Quay / Eireann Quay to include a 3 second advance for pedestrians crossing the street before the corresponding vehicle green time.
- 10.1.3 Improve the crosswalk treatments (e.g. zebra striping, patterned concrete, etc.) at the intersection of Eireann Quay / Queens Quay.
- 10.1.4 Provide a raised crosswalk, or install speed humps on Eireann Quay at the intersection with Queens Quay
- 10.1.5 Provide a new weather protection canopy along the west side of Eireann Quay from the BBTCA mainland terminal to the intersection of Queens Quay / Bathurst to improve access to transit.
- 10.1.6 Reconstruct the existing TTC streetcar platforms at Bathurst / Eireann Quay to provide improved shelters, benches, transit arrival information, and lighting, to enhance transit access to BBTCA.
- 10.1.7 Reconfigure and re-stripe Eireann Quay to improve the visibility of the lane markings, and provide for some operational improvements that achieve the following objectives:
- increase the amount of curb-side space for pick-up drop-off activity, including considering making use of the improved sidewalk on the west side of Eireann Quay with the weather protection;
  - provide a northbound recirculation 'U-Turn' on Eireann Quay so that drivers can re-enter the pick-up / drop-off queue area without having to make a three point turn in the middle of Eireann Quay;
  - improve shuttle access to and from the shuttle loop; and
  - streamline the traffic volumes that are required to travel around the loop directly in front of the future BBTCA mainland terminal building.
- 10.1.8 Reconfigure the long-term parking area located on the Canada Malting lands into additional short term parking for private vehicles waiting to pick-up passengers, with a 10 minute free parking grace period to encourage people to use the parking spaces instead of waiting illegally on Eireann Quay.



- 10.1.9 Change the price structure for the current short term pick-up parking spaces located in the off-street facility to allow for a 10 minute free parking grace period, to encourage people to use the parking spaces instead of waiting illegally on Eireann Quay.
- 10.1.10 Relocate the existing dedicated TDSB parking located in the short term spaces (which are the most convenient for BBTCA passengers) to the proposed new short term area located further east (formerly the long term parking area).

## PEDESTRIAN SAFETY / WATERFRONT PATH CONNECTIVITY

A variety of improvements have been previously recommended and implemented to address safety considerations at the intersection of Queens Quay / Bathurst.

An additional pedestrian improvement across Eireann Quay by means of a pedestrian bridge or tunnel has also been considered, but in our opinion the potential vehicular traffic increases from BBTCA relative to the number of pedestrians and school children does likely not warrant the need for this connection from a safety perspective. In addition, the creation of a grade separated crossing in the vicinity of the waterfront likely does not fit within the waterfront context from an urban design and planning perspective.

A bridge/tunnel to cross Eireann Quay south of Queens Quay could provide an overall community benefit if it was tied into an overall master plan for waterfront pedestrian connectivity. In this regard, the following are our recommendations for improving pedestrian connectivity along the waterfront.

- 10.2.1 The City should develop a preferred plan for how the Martin Goodman Trail connects through the area between Stadium Road and Spadina Avenue. Whether there is need for grade separation as part of a broader objective can be confirmed at that time.

## IF JETS ARE PERMITTED

Approving jets at BBTCA will result in an increase in the number of passengers in an hour that pass through the airport from the approximately 930 that could occur today under existing constraints (referred to the growth baseline) to approximately 1120 per hour with jets. This would result in approximately more 20% vehicles on Eireann Quay if passenger travel behaviour does not change. This impact can be reduced by increasing the percentage of passengers who use the shuttle and take transit to arrive at the airport. On this basis, the following are the recommendations if the City of Toronto permits jets at BBTCA.

- 10.3.2 The City and TPA should set minimum targets for mode shift changes that BBTCA must attain in order to minimize any increase in auto traffic volumes associated with the jets.
- 10.3.2 The initial focus should be on increasing the shuttle mode split of BBTCA passengers because it has the highest convenience factor and is free to users. Improvements to the shuttle service could include providing multiple new shuttle routes / stops, increasing the shuttle frequency, and improving the access for the shuttle on Eireann Quay (see recommendation 10.1.6).



- 10.3.3 Mode splits should be monitored once jets begin operation to confirm whether the targets are being achieved. If minimum targets are not achieved, the City should set out what methods of recourse will be taken by the TPA to increase the mode split towards both transit and the shuttle through either TPA's financial support of increased transit service to BBTCA or through modification / additions to the shuttle operation.
- 10.3.4 To add vehicular capacity to get to / from BBTCA, the westbound left turn at Dan Leckie Way and Lake Shore Boulevard should be reconstructed such that it aligns better with the opposing eastbound left turn and provides an improved sightline to opposing eastbound traffic. In our opinion this should allow for changing the westbound left turn phasing to a permissive + protected left turn operation, adding additional capacity to the inbound movement.
- 10.3.5 The modification to the westbound left should be complemented by the provision of new wayfinding signage at the Dan Leckie / Lake Shore intersection that encourages motorists accessing BBTCA to use Dan Leckie and relieves pressure at the Bathurst / Lake Shore intersection.
- 10.3.6 In combination with the improvement to the westbound left at Dan Leckie Way and Lake Shore Boulevard, the City should also consider restricting the westbound left movement at Lake Shore / Bathurst during peak period. The improved westbound left at Dan Leckie will have sufficient capacity to accommodate the displaced westbound left turns and the elimination of westbound left turns at Bathurst would provide a significant reduction in delays at the Lake Shore / Bathurst intersection.

A figure illustrating the recommended transportation improvements if jets are permitted is provided as Figure 6.

## ACCOMMODATION OF EXPANDED HOURLY FLIGHT ACTIVITY

The key driver of BBTCA's traffic impact is the number of passengers per hour that can be serviced by BBTCA, which in turn is based on the number of flight movements that can be accommodated in the peak hour.

BBTCA currently has operational constraints that limit the number of flights, however we understand that if these constraints are eliminated, the amount of hourly flight movements could increase by almost double up to the approximate capacity of the runway (i.e. approximately 30-36 flight movements in the busiest hour). Moreover, there is no cap on the hourly activity in the current Tripartite Agreement, which suggests that the hourly activity could be increased whether jets are approved or not. The number of hourly flights is the key consideration.

The way in which the City will deal with the future hourly activity levels will likely depend on whether jets are approved at BBTCA.



### ***If Jets are Approved***

- 10.4.1 Impose a limit on the number of hourly passengers that can be accommodated as part of a renegotiation of the Tripartite Agreement. In that event, the City should adopt a limit in the order of 1100 to 1200 passengers per hour as the threshold; this threshold would represent the estimated peak operation of the airport, with jets, based on the current number of hourly flight movements.
- 10.4.2 Make preparations for significant infrastructure improvements to facilitate the increased traffic activity. The two improvements required to accommodate the worst case hourly activity traffic demand are:
- construct an extension of Dan Leckie Way southward from Queens Quay, around the Waterfront School, to connect to Eireann Quay; and
  - extend the pedestrian tunnel from the island from the foot of Eireann Quay to a new entrance pavilion located on the southwest corner of the intersection of Queens Quay / Eireann Quay in order to improve access to the Harbourfront streetcar line.

Figure 7 provides an illustrative preliminary concept of what the two above infrastructure improvements would look like.

- 10.4.3 Do nothing and let the existing road network act as an indirect constraint on the hourly activity.

If a cap on the hourly activity is not obtained, the City should weigh the pros and cons of doing nothing versus constructing significant infrastructure as part of a broader planning framework analysis, to determine which course of action is most appropriate for the waterfront context.

### ***If Jets are Not Approved***

- 10.4.4 If jets are not permitted, there will likely be no opportunity to secure a limit on the hourly activity at BBTCA. As a result our recommendations set out in 10.4.2 & 10.4.3 would apply.

## OVERALL SUMMARY

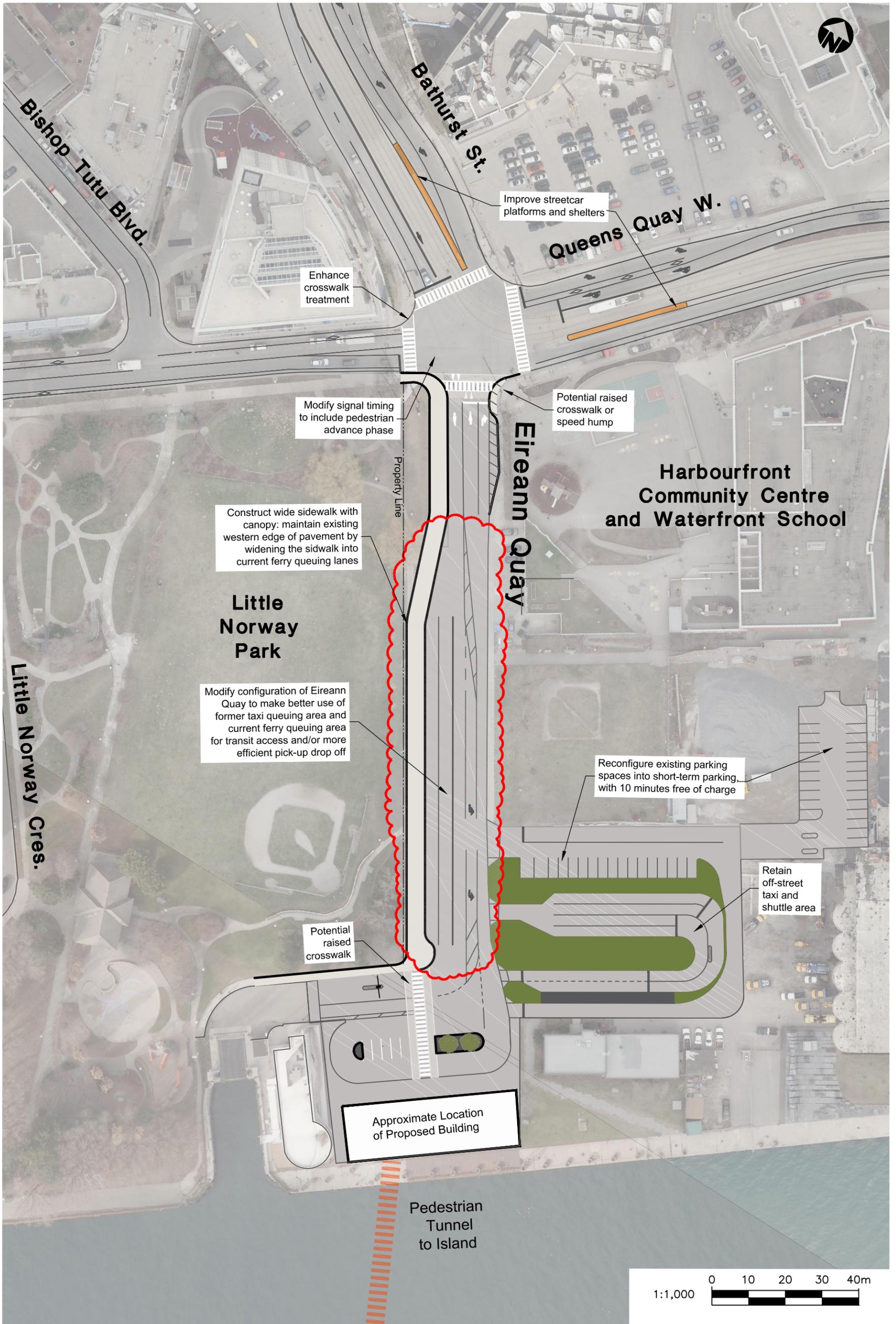
This report recommends that a variety of transportation improvements be implemented immediately to address existing operational deficiencies that are being both caused by BBTCA vehicular traffic, and experienced by BBTCA traffic. As the number of hourly passengers increases at BBTCA, either through permitting jets at the airport or by the potential increase in hourly activity that may occur, the amount of investment in infrastructure and mitigating measures required will increase substantially.

Figure 8 provides a visual summary of all recommendations identified as being required to accommodate the potential BBTCA passenger forecasts. Note that additional transportation analysis will be required in order to confirm more precisely what the 'trigger points' are for when various infrastructure may be required. In addition, all of the infrastructure improvements considered in this study have been developed to a preliminary functional design level of detail; a more detailed feasibility analysis should be undertaken on any improvement that is advanced for consideration.



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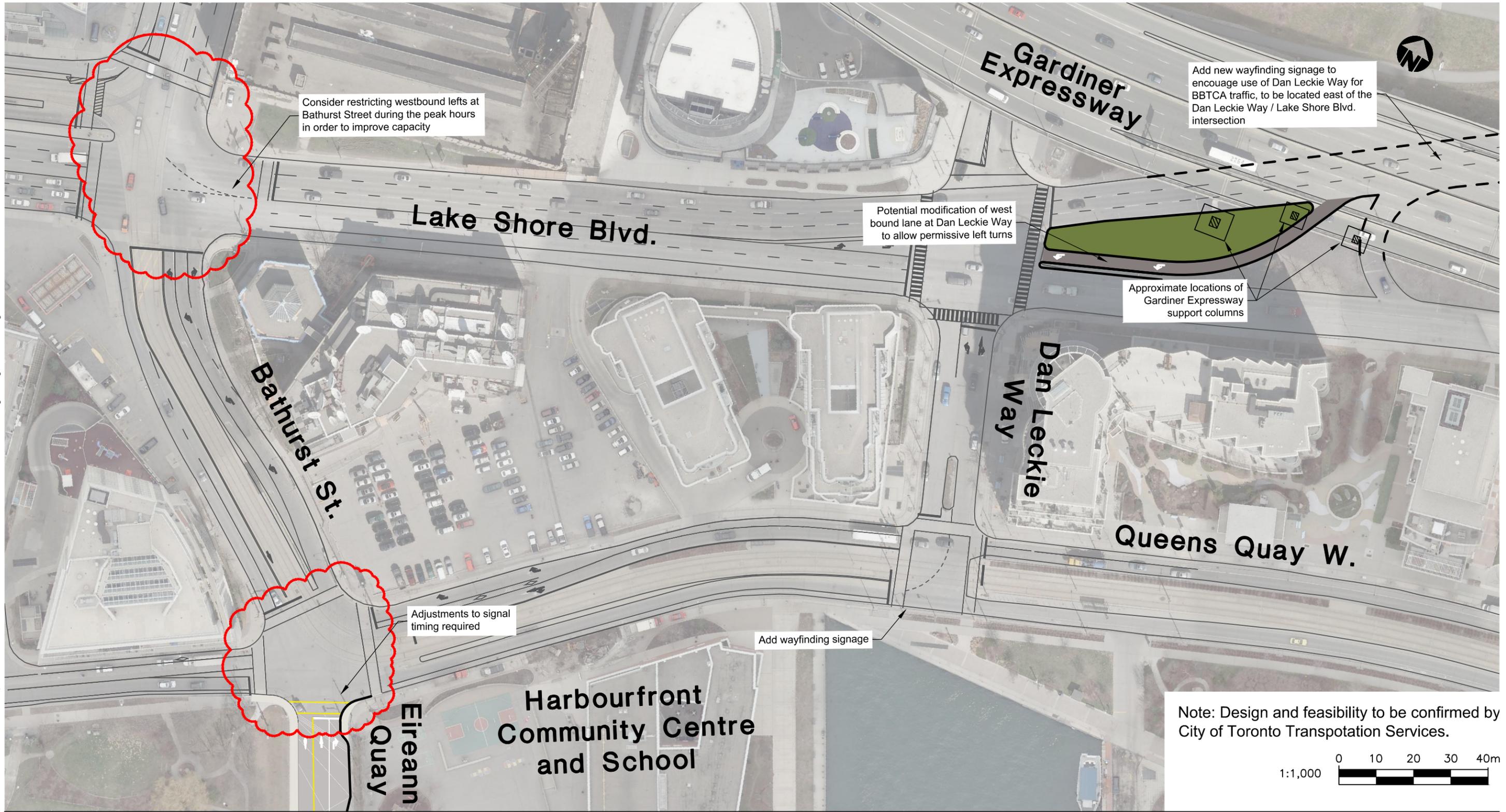
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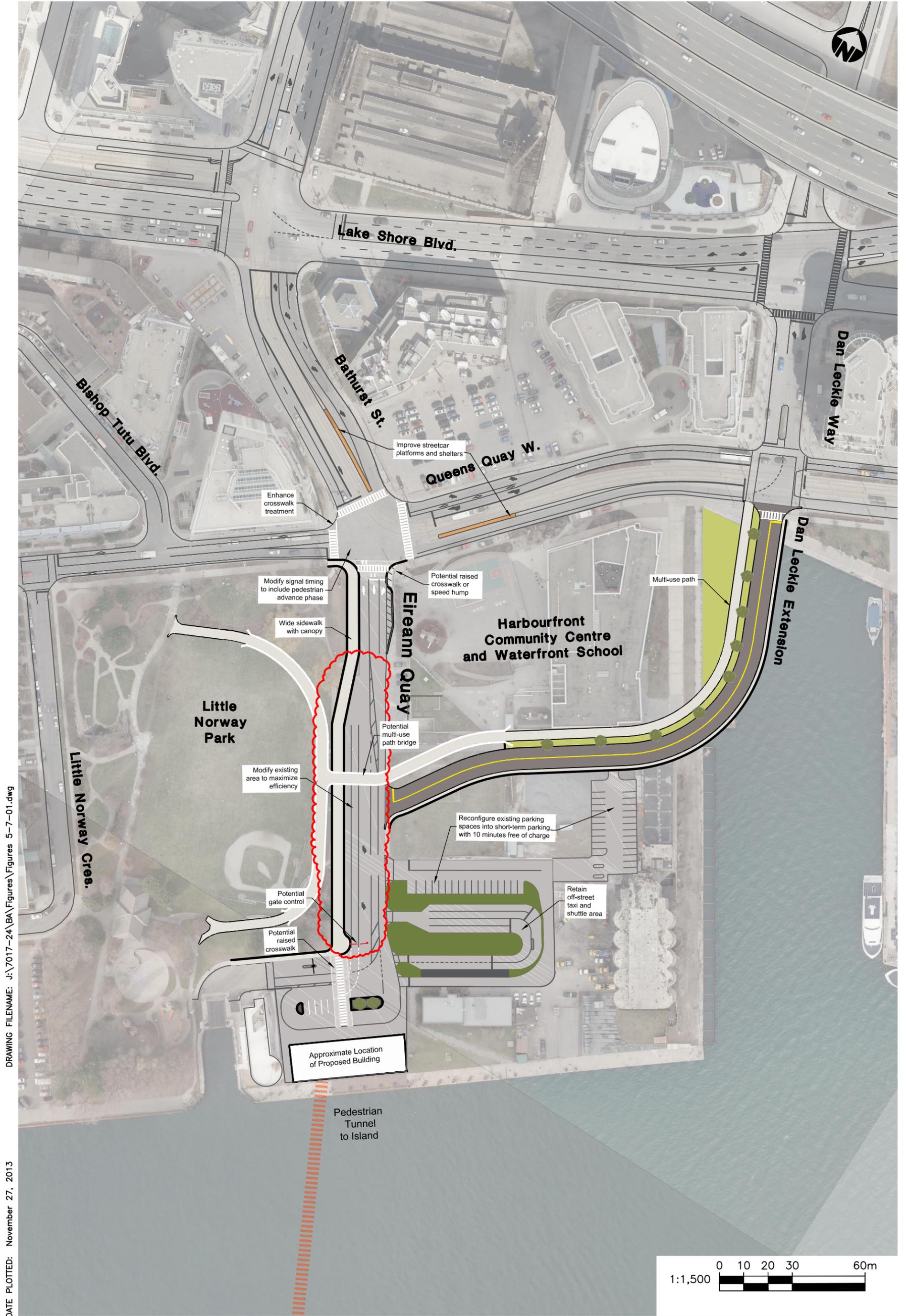
Recommended Short Term Improvements

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Recommended Road Improvements if Jets are Permitted:  
Modifications to Left Turn Lane Providing Access from  
Lake Shore Boulevard to Dan Leckie Way



**Recommended Improvements to Accommodate Increased Hourly Flights:**  
 Extension of Dan Leckie Way; Modifications to Eireann Quay to Increase Efficiency; and  
 Improved Connectivity for Bicycles and Pedestrians by way of Multi-use Path and Eireann Quay Bridge.

