

2.5.3.3 Ridership

The ridership capture area consists of minimal residential or commercial development. North and south of Eglinton Avenue are an existing golf course, park and recreational areas. Further north, beyond the recreational area, lies the only residential area within a 500 metres radius of the potential Emmett Stop. It is important to note that the path from the residential buildings to the Emmett Stop would be a total travel distance of over 700 metres. This residential area is currently served by the TTC 32D bus, which routes back to the Eglinton and Jane intersection.

2.5.4 Recommendation

Due to the area conditions and constraints described above, it was determined that a stop at Emmett Avenue was not practical. However, to serve riders in this area, an existing pedestrian route at the east end of the Humber River Bridge will be improved. As discussed later in this report, it is also expected that the 32E bus route which serves Emmett Avenue would be maintained.

2.6 Jane LRT Interface

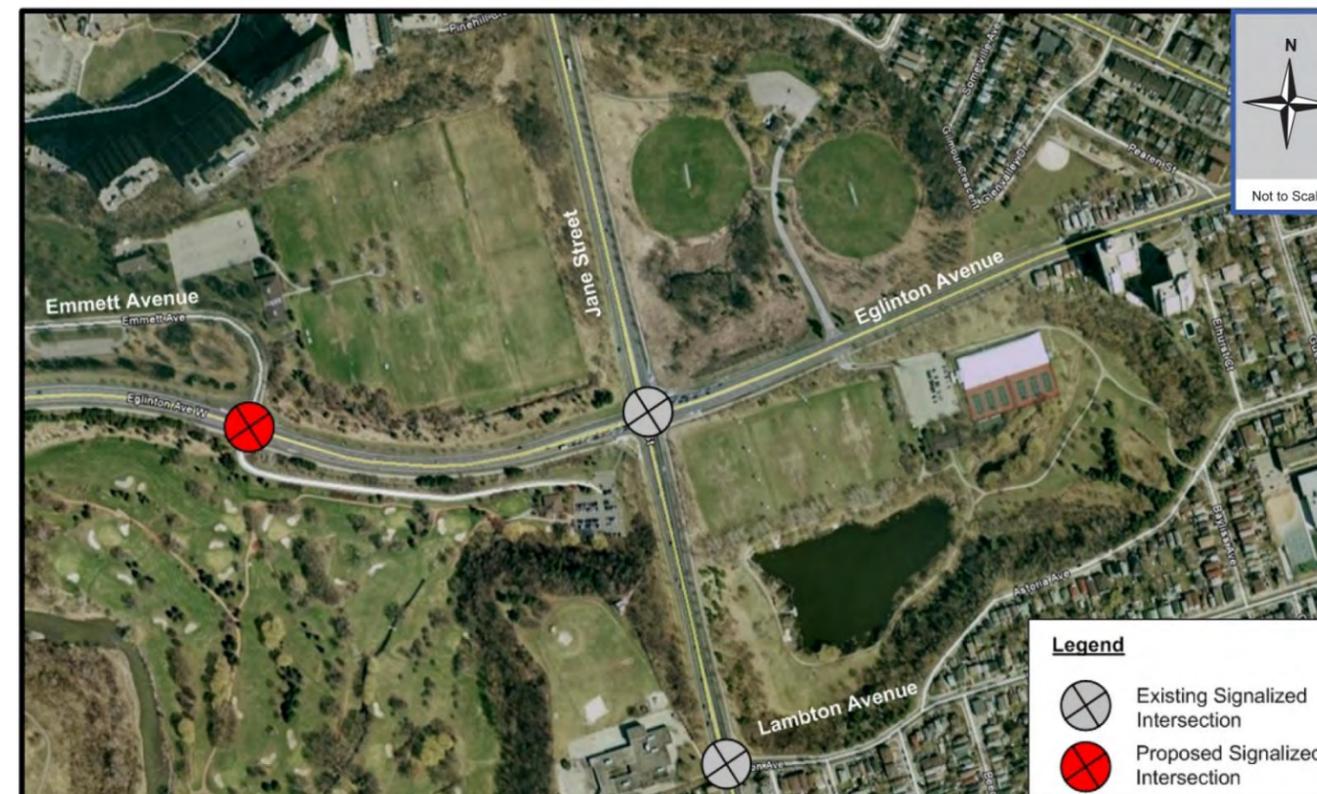
Jane Street and Eglinton Avenue will be an important transit interface with high pedestrian transfers. As such, a preliminary study was completed for the intersection of Eglinton Avenue and Jane Street. The study considered the implications of interfacing the Eglinton Crosstown LRT with the future Jane LRT at this intersection with both operating in a surface alignment, and the associated pedestrian volume increases of 750 % to as many as 1,462 pedestrians/hour as forecasted.

The preliminary study included a traffic impact analysis which was completed for the Eglinton Avenue and Jane Street signalized intersection and surrounding road network, to assess the future LRV operation and to determine the best alternative for transit operations and pedestrians while minimizing impacts to traffic operation.

Under future conditions, it is proposed that the unsignalized intersection of Eglinton Avenue and Emmett Avenue is to be signalized to facilitate left turning traffic at the intersection, and avoid migration of this traffic to the already constrained Eglinton Avenue and Jane Street intersection, which is the only alternative access route.

The study area is shown in **Exhibit 28**.

Exhibit 28 Study Area for Jane Street LRT Interface



2.6.1 Key Challenges and Constraints

The challenges at this intersection are to provide a high quality connection between the two LRT lines that allows for the safe and efficient transfer of passengers while maintaining traffic flow at the intersection.

The projected transfers between the LRT lines as well as the major bus routes at this intersection will make it one of the highest transfer locations on the Eglinton corridor.

The Eglinton Crosstown LRT and Jane LRT will replace the majority of bus services within the study area, including the four existing bus routes on Jane Street (35A, 35B, 35C, 35D) and three of the four existing bus routes on Eglinton Street (32, 32A, 32B). The existing Route 32D bus service does not travel exclusively on Eglinton Avenue and so is assumed to remain operational travelling to Keele Station under future conditions with the LRT. Route 32D was the only bus route included in the analysis.

With the implementation of the LRT network, the Eglinton Avenue and Jane Street intersection is expected to experience a pedestrian volume increase of 750%. This translates to an increase from 166 to 1250 pedestrians in the AM peak period, and an increase from 195 to 1462 pedestrians in the PM peak period. These expected pedestrian transfer figures are based on the Transit City 2031 Ridership Forecast Presentation from the Transit City Forecasting Workshop (August 2008).

2.6.2 Options

A total of five options were considered as follows:

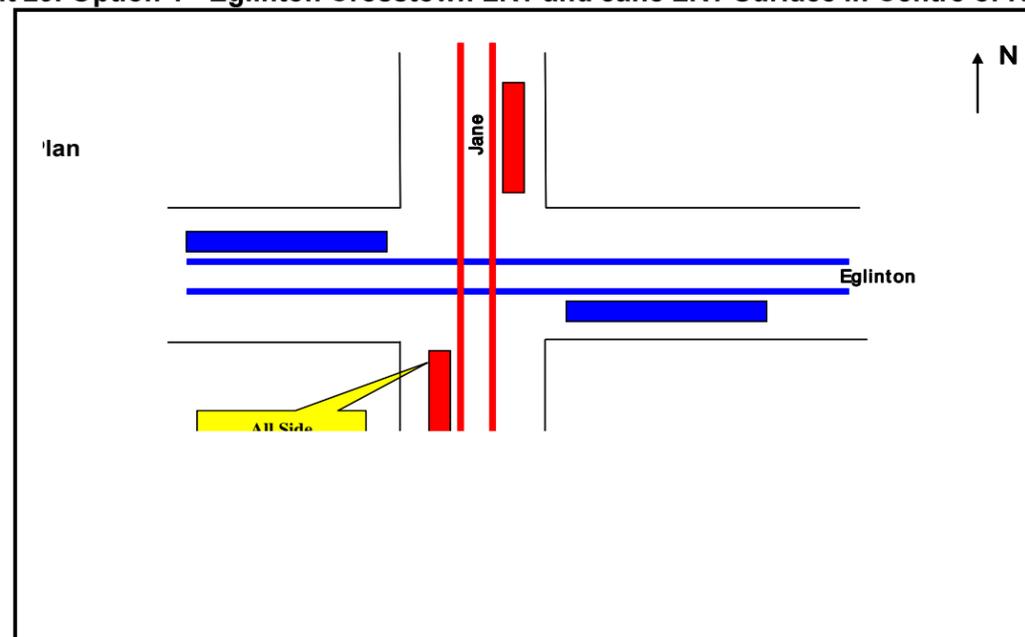
- Option 1 – Eglinton Crosstown and Jane LRT surface in centre of roadway with all left turns protected (**Exhibit 29**).
- Option 2 – Eglinton Crosstown LRT surface north of roadway and Jane LRT surface in centre of roadway with restricted left turns redistributed to u-turns on Eglinton Avenue (**Exhibit 30**).
- Option 3 – Eglinton Crosstown LRT surface north of roadway and Jane LRT surface west of roadway with restricted left turns redistributed to u-turns on Eglinton Avenue (**Exhibit 31**).
- Option 4 – Eglinton Crosstown LRT surface and Jane LRT elevated in center of roadway with north and south left turns protected and permitted; east/west left turns protected (**Exhibit 32**).
- Option 5 – Eglinton Crosstown LRT elevated in center of roadway and Jane LRT surface with north and south left turns protected; east and west left turns protected and permitted (**Exhibit 33**).

2.6.2.1 Option 1 – Eglinton Crosstown LRT and Jane LRT Surface in Centre of Roadway

Under this traditional operation, all left turns in all directions at the intersection of Eglinton Avenue and Jane Street will operate exclusively during protected left-turn only phases.

Under Option 1, all passenger transfers will occur at the Eglinton Avenue at Jane Street intersection. Transferring passengers will have to cross one leg of Eglinton Avenue and one leg of Jane Street to make their transfer.

Exhibit 29: Option 1 - Eglinton Crosstown LRT and Jane LRT Surface in Centre of Roadway



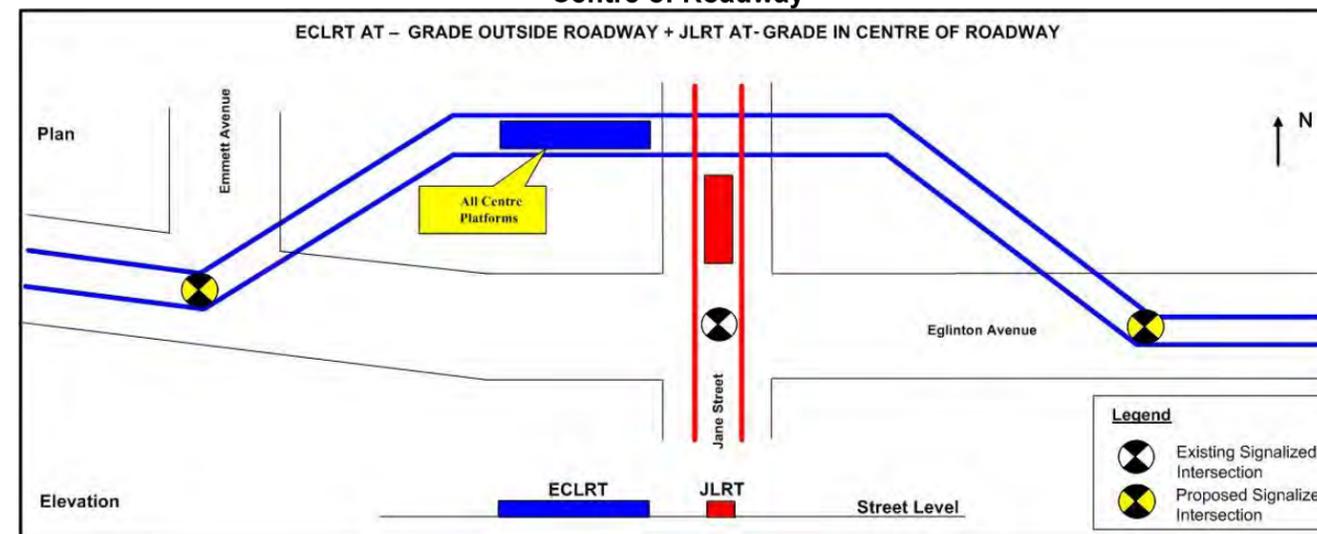
2.6.2.2 Option 2 – Eglinton Crosstown LRT Surface North of Roadway and Jane LRT Surface in Centre of Roadway

For this option, additional signalized intersections are required on Jane Street north of Eglinton Avenue and on Eglinton Avenue east of Jane Street to allow the Eglinton Crosstown LRT to enter and exit the Eglinton Avenue right-of-way. These are shown in **Exhibit 30**.

Under Option 2, left turns are prohibited at the Eglinton Avenue and Jane Street intersection, and left-turn volumes are redistributed to u-turns at downstream intersections along Eglinton Avenue.

A passenger transfer station is proposed in the northwest corner of the Eglinton Avenue and Jane Street intersection. Passengers would have to cross the northern leg of Jane Street to transfer between LRTs. With the Eglinton Crosstown LRT no longer in the centre of the roadway, the north and south pedestrian clearance time requirements will be reduced. This will allow for more green time for Eglinton Avenue. Lastly, under this option, an additional signalized intersection north of Eglinton Avenue is required for the LRT to cross Jane Street. This intersection needs to be at least 60 metres from the Eglinton Avenue and Jane Street intersection so that the Jane LRT can stop on this segment of roadway if required, without blocking Eglinton Avenue. Coordination between the two intersections is important for the progression of the Jane LRT.

Exhibit 30: Option 2 - Eglinton Crosstown LRT Surface Outside Roadway and Jane LRT Surface in Centre of Roadway



2.6.2.3 Option 3 – Eglinton Crosstown LRT Surface North of Roadway and Jane LRT Surface West of Roadway

Similar to Option 2, additional signalized intersections are required on Eglinton Avenue east of Jane Street for the Eglinton Crosstown LRT operation and on Jane Street north of Eglinton Avenue for the Jane LRT operation under Option 3. These are shown on **Exhibit 31**.

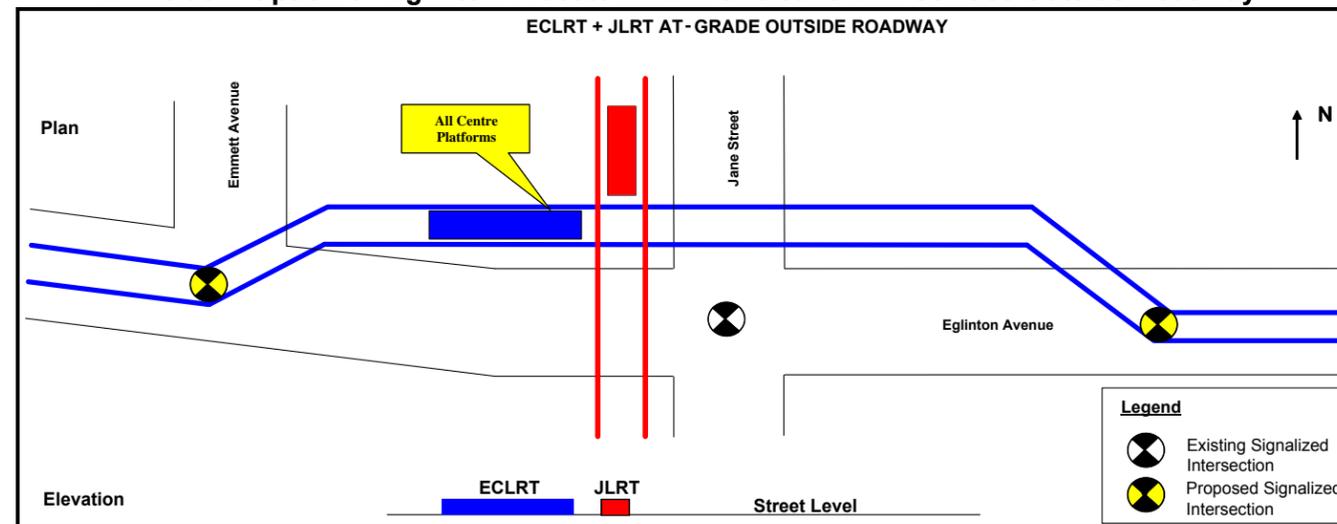
Under Option 3, similarly to Option 2, left turns would be prohibited at the Eglinton Avenue and Jane Street intersection and redistributed to u-turn movements at downstream intersections along Eglinton Avenue.

With the prohibition of left turn movements it is expected that more green time can be allocated to the through phases, thereby providing the LRTs with more green time and reducing their delay. It is assumed that proposed signalized intersection on Eglinton Avenue east of Jane Street can accommodate u-turns in addition to accommodating the LRT moving in and out of the running way.

Under Option 3, passengers will transfer at the station and will not have to cross either Eglinton Avenue or Jane Street. In addition, as both LRTs are outside of the roadway in this option, pedestrian clearance time requirements are reduced at the Eglinton Avenue and Jane Street intersection.

In addition, a modified traffic signal is required at Eglinton Avenue and Jane Street to allow the Eglinton Crosstown LRT to cross Jane Street north of the intersection, and the Jane LRT to cross Eglinton Avenue west of the intersection. It is assumed that traffic signal will be able operate such that pedestrians can wait between the LRT right of way and the roadway. The southbound right and westbound right turn movements will be controlled by a protected phase to avoid conflicting with the LRT and pedestrian movements. During the north-south green phase, the southbound right turn will be restricted when an LRT or pedestrians are crossing, and during the east-west green phase the eastbound right turn will be restricted when an LRT or pedestrians are crossing.

Exhibit 31: Option 3 - Eglinton Crosstown LRT and Jane LRT Surface Outside Roadway

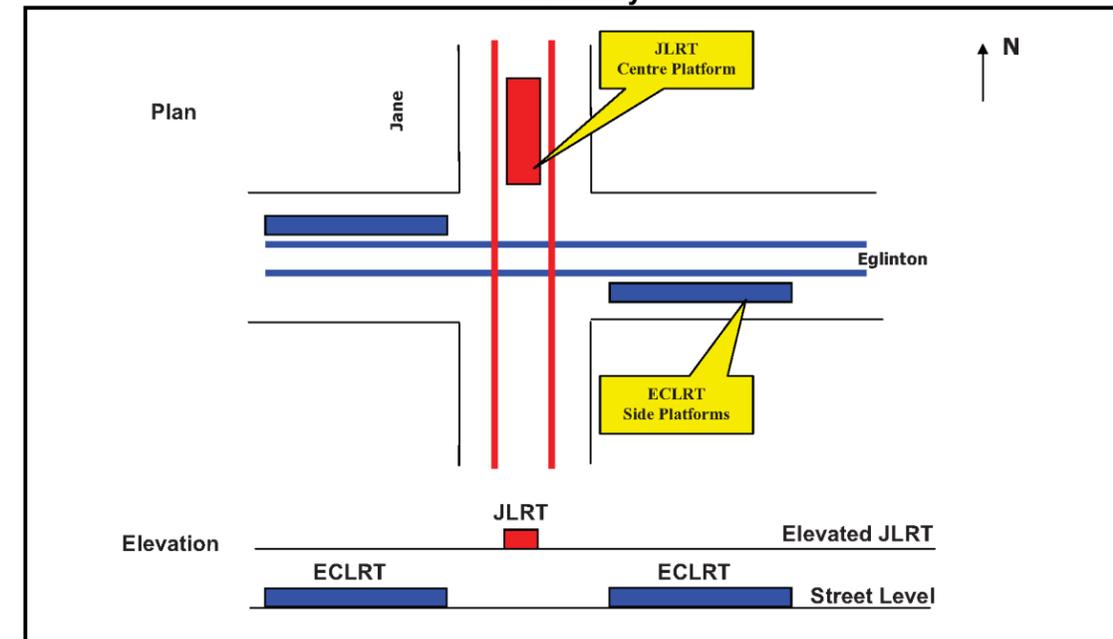


2.6.2.4 Option 4 – Eglinton Crosstown LRT Surface and Jane LRT Elevated in Center of Roadway

Under Option 4, since the Jane LRT is elevated, the northbound and southbound left turns at the Eglinton Avenue and Jane Street intersection can operate as protected and permitted. Eastbound and westbound left turns remain protected only.

Similar to Option 1, all passenger transfers would occur at the Eglinton Avenue at Jane Street intersection. Transferring passengers will have to vertically transfer and cross one leg of Eglinton Avenue and one leg of Jane Street to make their transfer.

Exhibit 32: Option 4 - Eglinton Crosstown LRT Surface and Jane LRT Elevated in Centre of Roadway

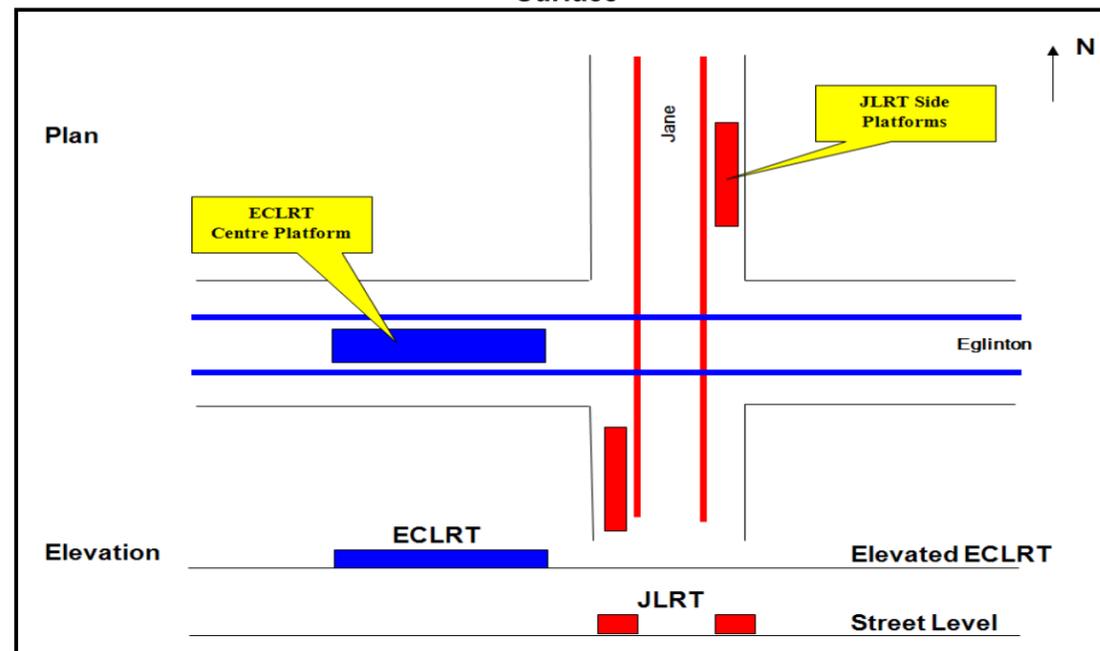


2.6.2.5 Option 5 – Eglinton Crosstown LRT Elevated in Center of Roadway and Jane LRT Surface

Under Option 5, shown on **Exhibit 33**, since the Eglinton Crosstown LRT is elevated, the eastbound and westbound left turns at the Eglinton Avenue and Jane Street intersection can operate as protected and permitted. Northbound and southbound left turns remain protected only.

Similar to Option 1, all passenger transfers will occur at the Eglinton Avenue at Jane Street intersection. Transferring passengers will have to vertically transfer and cross one leg of Eglinton Avenue and one leg of Jane Street to make their transfer.

Exhibit 33: Option 5 - Eglinton Crosstown LRT Elevated in Centre of Roadway and Jane LRT Surface



2.6.3 Evaluation

A traffic analysis (computerized traffic simulation) was performed for the above options to determine their effect on traffic operations at the intersection.

The Synchro traffic assessment indicated that traffic at the intersection of Eglinton Avenue and Jane Street operates best under options 2 and 3 due to the prohibition and re-rerouting of left turns, while operations at the intersection of Eglinton Avenue and Emmett are best under options 1, 4, and 5 since the intersection does not require a phase to transfer the Eglinton Crosstown LRT in and out of the right-of-way and accommodate rerouted left turns.

To obtain a measure of the overall traffic operation in the study area, the Total Intersection Delay was computed for each of the five interface options. The Total Intersection Delay was calculated as the total delay for all vehicles approaching the five intersections in the study area. A comparison of the Total Intersection Delay indicates that Option 2 has the best traffic operations. While Option 3 is the most accommodating to pedestrian transfers, it has the worst traffic operation of the five interface options considered. Under options 4 and 5, traffic performance is better than under traditional operation, but is not improved as much as under Option 2.

Option 2 allows for the lowest cycle length, as there are no protected turn phases at the Eglinton Avenue and Jane Street intersection. Option 3 also allows for a low cycle length in the AM peak period, but has a higher cycle length in the PM peak period due to protected right turn phases. Options 1, 4, and 5, all require a high cycle length due to the protected left turn phases at the Eglinton Avenue and Jane Street intersection.

In terms of passenger transfer, Option 3 is the only interface option where the passengers do not have to cross the Eglinton Avenue and Jane Street intersection to transfer between LRT lines.

In terms of cost, the cost estimate of the interface options reveals that the surface interface options (Options 1, 2 and 3) have similar costs at approximately \$70 million, while the above-grade options (Option 4 and 5) are approximately 60% or 70% higher at \$110 million and \$120 million respectively.

2.6.4 Recommendation

Based on the evaluation of traffic operations at and around the Eglinton Avenue/Jane Street intersection, Option 1 was selected as the preferred option for the following reasons:

- Adequate traffic operations;
- No property implications;
- Less travel time, less LRT delay; and
- Lower cost.

2.7 Vertical Alignment Options from Jane Stop to Keele Station

Feasibility studies conducted during preliminary planning recommended further review and analysis of vertical alignment options for the 2.4 km section of the alignment from Jane Street to Keele Street. This segment is of key importance, as it passes through an area that presents multiple technical constraints and includes the proposed location for the Maintenance and Storage (M&S) Facility, which is planned to serve three LRT lines. The Toronto Transit Commission (TTC) undertook this study to find a quality, cost effective solution to the constraints that minimizes property impacts. The report documenting this study is provided in **Appendix K**.

The purpose of this study is to develop and assess concept options for the vertical alignment from Jane Street to Keele Street. The objective is to recommend an alignment that provides a high quality transit service, a flexible yard connection and maintains the opportunities for development and growth consistent with the City of Toronto's Official Plan. This study is part of a Transit Project Assessment for the Eglinton Crosstown LRT line.

This report presents the development and evaluation of the following eight (8) options:

- Surface alignment;
- Elevated south side alignment;
- Elevated north side alignment;
- Underground alignment;
- Elevated north side option alignment; and
- Hybrid alignment (Mixed surface and elevated)
- Underground alignment, without Black Creek Station (Councillors option)

- Hybrid alignment (Mixed surface and underground) (Community option)

This study of the vertical alignment was completed by the Transit City Group (TCG), the consultant, with direct input from the TTC ECLRT project team and the ECLRT Black Creek Working Group. The ECLRT Black Creek Working Group (the “Working Group”) consists of members of TTC Service planning, TTC Yard Operations, City Planning Urban Design, City Planning Transportation Planning, and GO Transit.

As a separate project, TTC is planning for a Maintenance and Storage Facility which is proposed to be located in the study area. This study included early coordination with the planning of that facility.

2.7.1 Study Area

This study evaluated the area from west of Jane Street to east of Keele Street, a total length of approximately 2.4 km. Generally, the Eglinton Crosstown LRT Transit Project Assessment includes the area within the Eglinton Avenue Right-of-Way. However, this study included the evaluation of property north and south of the existing right of way to evaluate all possible options. As a result, the study area for this report encompasses the Eglinton Avenue right-of-way as well as some properties north and south of the Right-Of-Way.

The proposed M&S Facility is not within the scope of this study, however it is necessary to take the planning of the facility into consideration to ensure a quality connection is provided.

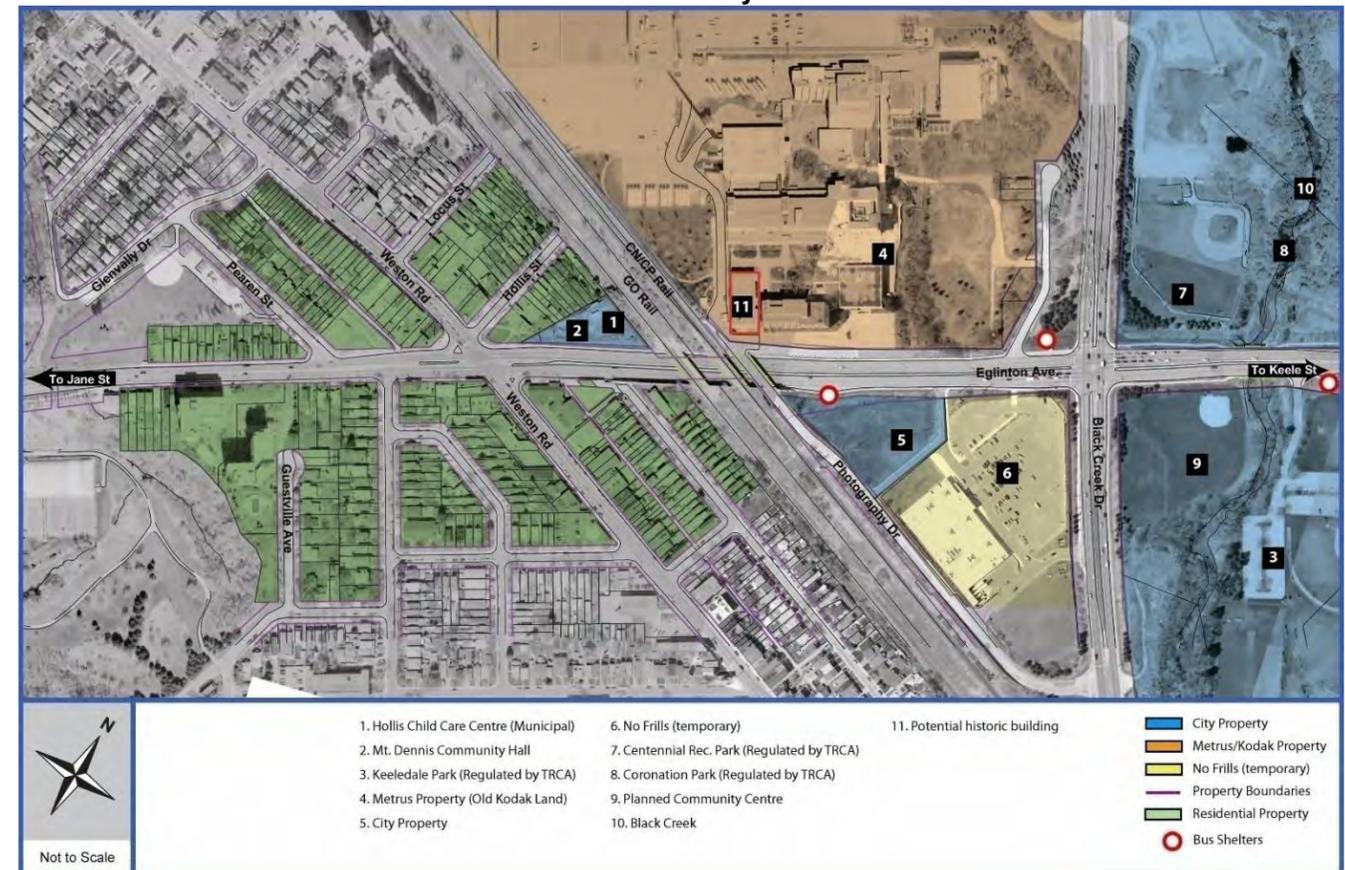
The existing lane configuration varies through the study area. From Jane Street to Weston Road and Black Creek Drive to Keele Street, Eglinton Avenue has 2 lanes in each direction. Between Weston Road and Black Creek Drive there are 3 lanes in each direction.

The roadway passes over Black Creek, and lies within the regional (500 yr) flood plain. Parks and open areas are located at the north-east and south-east quadrants of Black Creek Drive and Eglinton Avenue, and are regulated by the Toronto and Region Conservation Authority (TRCA).

The property along Eglinton Avenue has many uses. As shown in Exhibit 34, these uses include the M&S Facility (historically Kodak land), heavy rail corridors, commercial properties, potential for future high-density development, potential for future transit facilities, public recreational areas, a future planned community centre, and private residential land uses.

The study area is shown in **Exhibit 34**.

Exhibit 34: Study Area



2.7.2 Key Requirements

There are many important details about this study area that affect the planning of the LRT alignment along Eglinton Avenue. Outlined below are the LRT components that are required for this study area.

2.7.2.1 Station and Stop Locations

The stops and stations proposed within this study area are:

- Jane Street
- Weston Road
- Black Creek Drive; and
- Keele Street

Two of these locations are common between the options presented, the Jane Street surface stop and the Keele Street station.

2.7.2.2 Crossover and Storage Track Requirements

Special track work is a required operational component of the LRT system. Storage (pocket) tracks are used to turn back trains, temporarily store disabled trains, and they also protect for Automatic Train

Operation. Crossovers are also used to turn back trains and protect for Automatic Train Operation. To facilitate these functions, storage (pocket) tracks and crossovers are required at the last station of a grade separated section of the LRT. The length of the required storage (pocket) track is approximately 200 metres, and the length of the required crossover is approximately 90 metres. These tracks are placed in combination before and after a station.

2.7.2.3 Connection to Proposed Maintenance and Storage (M&S) Facility

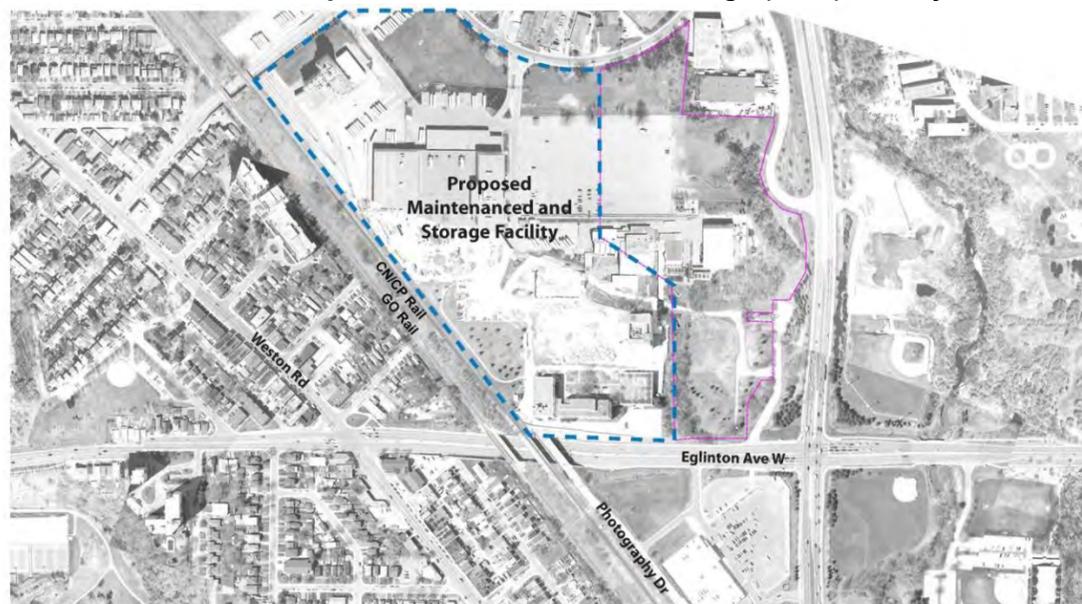
TTC has proposed that the Maintenance and Storage (M&S) Facility be located on the north side of Eglinton Avenue, west of Black Creek Drive. This facility is intended to serve three LRT lines: the Eglinton Crosstown LRT, St. Clair LRT and Jane LRT. The proposed facility will have a storage capacity of approximately 150 LRT vehicles, and will be used for loading and offloading Light Rail Vehicles (LRV) throughout the day.

The LRT connection between Eglinton Avenue and the proposed M&S Facility is an important consideration in the development and selection of the ECLRT alignment, as it will be important to provide a connection capable of handling the LRV traffic required to meet the service demand of the system.

The site proposed to hold the M&S Facility was, historically, the Kodak facility. The majority of buildings on the site have been demolished and removed. However, one building near Eglinton Avenue currently remains.

Exhibit 35 shows the approximate boundary of the proposed M&S Facility.

Exhibit 35: Proposed Maintenance and Storage (M&S) Facility



2.7.2.4 GO Transit

GO Transit owns and operates a rail service (Georgetown line) that intersects with, and passes above, Eglinton Avenue on the railway bridge shown in Error! Reference source not found.. Currently there is no stop in the study area.

To meet the goals of interconnectivity, an interface between ECLRT and GO Transit is possible in the study area. GO Transit does not currently have a plan for a stop at this platform, therefore future coordination with GO Transit will be required to optimize this interface. Opportunities and quality of connection vary between options. This connection was considered in this study, but at a very high level.

Go Transit also operates a GO Bus service (King-Rutherford line) that passes through the study area on Black Creek Drive, but there is currently no stop location in the study area.

2.7.3 Technical Constraints

2.7.3.1 Narrow Right-of-Way

Over the 2.4 km section of Eglinton Avenue, 1.8 kilometres or 85% is at least 36 metres wide. Select sections (340 metres) are less than 35 metres wide.

The diagram and table below, Exhibit 36 shows the existing width of roadway and the length of the roadway that it applies to. The lengths shown account for approximately 15% of the length of the study area. Exhibit 37 shows the proximity of existing houses to the roadway

Exhibit 36: Existing Width Roadway



	Width of Road (north-south)	Distance
West of Pearen	22 metres	150 metres
Pearen to Weston	30 to 32 metres	90 metres
Railway Underpass	30 metres	100 metres
TOTAL		340 metres

Exhibit 37: Proposed Cross Section



Note: View looking west from the intersection of Eglinton Avenue and Pearen Street.

The standard cross section for the Transit City LRT lines is 36 metres. This cross section, as shown in **Exhibit 37**, includes two lanes of traffic in each direction, two LRT tracks, a bike path in each direction and a sidewalk and boulevard.

There are three locations within the study area that can not support the standard cross section.

2.7.3.2 Construction Method

Two basic alignment concepts are available for the segment west of the rail lines, which are surface or underground. The method of construction for the underground options is important to consider as part of this study. Two methods of construction are identified for the underground portions of the LRT which are tunnel boring or cut and cover construction. Tunnel boring machines work below the earth's surface with little impact to the area above the surface. Cut and cover construction requires open cut excavation from the surface. Cut and cover construction has significant impact to the surface area. This method is proposed for all stations and special track work areas of the Eglinton Crosstown LRT. For options that are fully grade separated from Keele Street to Weston Road, the total length of cut and cover construction for a station at Weston Road is 440 metres. This accommodates a 200 metres storage (pocket) track, a 150 metres station and a 90 metres crossover track.

Tunnel boring is not a cost effective means to construct a tunnel that is shorter than one kilometre because of high startup costs. Therefore, the options that are presented that include a short tunnel segment would be constructed by the cut and cover construction method.

2.7.3.3 Existing Bridges

There are three existing bridges crossing above Eglinton Avenue between Weston Road and Black Creek Drive, just west of the proposed M&S Facility. From west to east, they are:

- GO Transit railway bridge;
- CN/CP railway bridge; and
- Photography Drive bridge.

The three bridges are shown in **Exhibit 38**, **Exhibit 39**, and **Exhibit 40**.

Exhibit 38: GO Rail Bridge (Westward View)



Exhibit 39: CN/CP Railway Bridge (Westward View)



Exhibit 40: Photography Drive Bridge (Westward View)



All three bridges have piers in the centre of the road, between the two directions of traffic. The existing cross section is approximately 30 metres wide and does provide sufficient horizontal and vertical clearance to accommodate the proposed cross section.

2.7.3.4 Elevation

There is a significant elevation difference between Eglinton Avenue and the surrounding area in the vicinity of the bridges. The elevation of the carhouse within the proposed M&S Facility is proposed to be approximately +/-123.5m. The low point of Eglinton Avenue in this section is +/-115m, resulting in an approximate elevation difference of +/-9m. The retaining wall shown in **Exhibit 40** provides some visual context of the elevation challenge that is faced. The proposed M&S Facility is proposed to be located on the right hand side in this picture.

2.7.3.5 Traffic

The intersections at Weston Road, the proposed M&S Facility access driveway and Black Creek Drive were carefully planned for the options that are surface through these intersections. LRV's travelling along Eglinton Ave and/or entering and exiting the proposed M&S Facility will require sufficient green time to cross each of these intersections. The acceleration and deceleration time of the LRV as well as the time required to operate track switches and turn LRV's was considered as part of this planning.

2.7.3.6 Railroads

Some of the elevated options considered are located north or south of Eglinton Avenue at the railway bridges. The presence of the rail lines restricts the ability for the ECLRT to be elevated one level in this area because surface rail intersections are not permitted. The location of connection in the elevated options is primarily dictated by this constraint.

Another important consideration is the number, type and use of the bridges. Replacing a bridge can typically offer many solutions. In this case however, there are three bridges, two of which are railway bridges. Reconstructing the bridges would be very costly and cumbersome, as such, bridge replacement is not considered feasible.

2.7.3.7 Black Creek River Valley

The Black Creek River Valley is located just east of Black Creek Drive. The regional (500 yr) floodplain in this area is above the existing bridge over Black Creek.

All concepts outside the right of way near the river valley would require new structures to carry the LRT over the river. This is a feasible concept, though it does have environmental impacts. For the underground option, the tunnel would pass beneath the river.

2.7.4 Options

A principle of the Transit City program is "surface first". This ensures that cost effective solutions are provided for the program. In this instance, the right of way constraints required further investigation into options, other than surface to minimize the impacts to private properties.

To begin this study, work was done to evaluate the surface option to determine if it could support the operation of the LRT. An initial traffic analysis for a proposed yard entrance on the north side of Eglinton Avenue, using a Light Rail Vehicle (LRV) loading plan provided by the TTC was completed. The analysis showed that the intersection could not be designed with enough capacity to load the LRT based upon the loading profile provided by TTC Service Planning. In general, the elevated and underground options provide more loading capacity and flexibility without the impact to normal traffic operations.

The results of the preliminary traffic analysis and the narrow right of way restrictions justified the investigation into option alignments.

High level concepts available for an LRT are surface, below-ground, and elevated. Further, these can be applied in the centre of the roadway or north and south of the roadway. The primary constraints to overcome technically in developing the options are the elevation difference, location of the rail lines, and right of way constraints.

Initially, a total of four (4) option alignments were considered: surface; underground; elevated north; and elevated south. A fifth alignment, elevated north-side option, was later added to provide a better transit connection. A sixth option, hybrid, was added to try to provide the benefits of an elevated alignment without incurring the cost of the underground option, since the elevated options require tunnelling due to the elevation difference.

The initial six options were presented to the public as part of a consultation round. Two additional options were developed through the public consultation.

The eight options differ in alignment configuration, elevation (surface, elevated or underground), platform location and type (stop or station).

To provide a basis for comparison, each option is considered to provide 2 LRT tracks entering and 2 tracks exiting the facility. Some options provide the additional access route by way of a bi-directional track and crossover, and not an additional track. The placement of the LRT entrance and exit will vary depending on

the ECLRT alignment option. The justification for 2 inbound and 2 outbound tracks is to provide redundancy in the system. In the event that one track is out of service due to a disabled vehicle, accident, etc., LRT service can continue. This is an important consideration as the facility is intended to serve 3 LRT lines.

The following section presents a summary of the characteristics of each option.

The exhibits in this section are intended to be graphical representations of the options. Scaled drawings for each option are included as part of **Appendix K**.

2.7.4.1 Option 1: Surface

For the surface option, the ECLRT running way and stop platforms are located in an Eglinton Avenue centre median right of way at the surface. Within the study area, the LRT would replace the existing two lanes at the centre of Eglinton Avenue (one in each direction), and run beneath the three bridges (GO Rail, CN/CP Rail and Photography Drive overpasses), on both sides of the centre piers.

Two LRT stop locations lie within the study area, Weston Road and Black Creek Drive. For this option, a centre platform is located immediately west of Weston Road, and far-side platforms are planned for Black Creek Drive.

One north access driveway will be provided for the connection to the proposed M&S Facility surface, onto Eglinton Avenue. Two tracks entering and exiting the facility in each direction (westbound and eastbound) have been assessed for this option. These are intended for one-way LRV movement during normal operation, however they are capable of allowing bi-directional movement to provide redundancy within the system in case of emergency (e.g. if one or more tracks is out of service, or an LRV breakdown occurs on the track). The connection is dependant upon surrounding traffic, so LRV movement into and out of the M&S Facility will be coordinated with traffic signal timing at Weston Road, North Access Driveway and Black Creek Drive.

A challenge faced in the surface option that does not affect the other options is the narrow right of way west of the rail lines. West of the rail lines, property acquisition will be required for this option. Two options were analyzed in an effort to minimize property impact. The first option is to locate the LRT in the existing centre of Eglinton Avenue and expand the ROW on both sides of the roadway to accommodate the cross section. The second option is to hold the south curb line, and expand the ROW to the north side of Eglinton. Both options were assessed to determine which would provide the least property impact. Widening to the north minimizes the property required in this segment.

Another challenge with the surface option, as outlined earlier, is the significant elevation difference where Eglinton Avenue passes beneath the three bridges in front of the proposed M&S facility. The work performed in this study has been coordinated with the preliminary work of the proposed M&S Facility. The elevation challenge can be resolved by providing a long runout track within the yard that will provide the distance needed to make up the elevation difference.

Throughout the development and evaluation, meetings were held in order to present options and gather input from the Working Group. Following the presentation of the elevated and tunnelling options, the Working Group asked that a sensitivity analysis be performed.

As previously mentioned, an initial traffic analysis found that the surface option could not support the required operation of the LRT. The M&S Facility and transit city planning progressed in planning development in parallel with this study. A revised loading plan was provided by TTC.

The purpose of the sensitivity analysis was to „test’ some possible solutions to particular constraints for the surface option, and determine if the solutions could offer significant benefits that make the surface alignment operational. The sensitivity analysis used a revised LRV loading plan provided by the TTC in July 2009. An order of magnitude cost estimate had shown that there was a significant cost difference between the surface option and the preferred grade-separated option. TCG subsequently performed the sensitivity analysis using the revised LRV loading plan. The analysis showed that measures could be implemented to allow the surface connection to provide sufficient residual capacity during peak periods. This analysis is documented in a technical memorandum, included in Appendix C.

The traffic analyses performed for the surface option showed that it can provide an adequate capacity to load/unload LRV's to the proposed M&S Facility (including sufficient LRV loading and unloading capacity) if measures are taken to increase the connection capacity. These measures include:

- Adjusting LRT operation by increasing AM loading period from 1 hour 40 minutes to 2 hours 30 minutes;
- Reducing signal cycle lengths, e.g. by re-routing left turns, removing left turn phase, introducing two-stage north-south pedestrian crossings, introduce pedestrian buttons and/or introduce pedestrian overpass; and
- Restricting access driveway for the south side property to be right-in/right-out only.

The additional traffic analysis, sensitivity analysis, and reduced capacity requirement for the M&S Facility allow the surface alignment to support the LRT operational requirements.

It was recommended by the working group that a traffic impact study be conducted to evaluate the order of magnitude of impact to development potential that would be incurred by the right-in right-out access for the development on the south-west corner of Black Creek Drive and Eglinton Avenue. The City of Toronto provided a traffic report for DRENA Development York City Centre that was completed in 1990. The traffic report considered the impacts of the proposed subway, changes to the Eglinton Avenue and changes to Black Creek Drive. The report included a full moves access onto Eglinton Avenue.

The traffic impact study conducted by TCG considered the land development proposal of the DRENA report, with an assumption of 35% LRT ridership with the inclusion of a right-in right-out access onto Eglinton Avenue, the analysis concluded that the development would face approximately a 5% reduction in trip capacity. The analysis is included as part of **Appendix K**.

An overview showing the aerial plan and outline elevation is shown in **Exhibit 41**.

Exhibit 41: Option 1 – Surface Alignment - Plan and Elevation

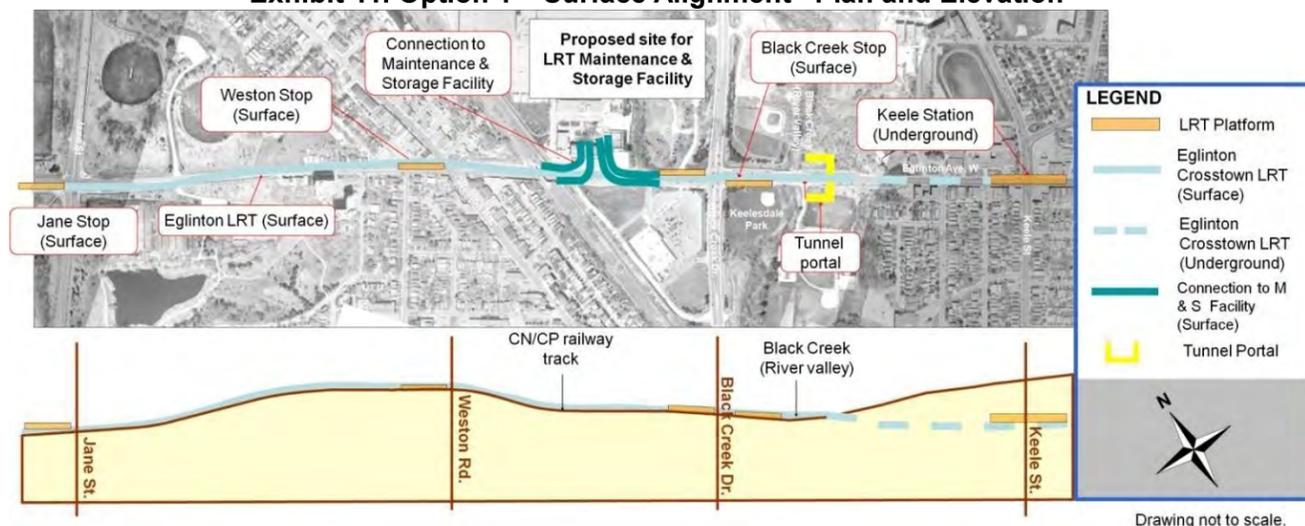


Exhibit 42: Emergency (Secondary) Access to Proposed M&S Facility for At-Grade Alignment



For the surface option, a secondary (emergency) LRV access route is provided to/from the proposed M&S Facility via another surface track on Photography Drive, which, at the north end, connects to the M&S Facility and, at the south end, loops to Black Creek Drive, from there connecting to Eglinton Avenue. The secondary connection comprises a single track, capable of handling bi-directional LRV movement. It would operate in mixed traffic and would be used only in the event of a major incident that closed the Eglinton access to the yard for an extended period of time. This access will not be used as a regular entrance as it would be slower and inconvenient for regular operations.

2.7.4.2 Option 2 - Elevated South Side

For the elevated south side option, the ECLRT travels underground from east of Jane Street (on the west side of the study area) to east of the Photography Drive bridge overpass. The underground tunnel travels beneath Eglinton Avenue until Photography Drive, where it exits south of the ROW. The ECLRT is then elevated on a dedicated structure south of the Eglinton Avenue ROW until it enters the main tunnel portal east of the Black Creek river valley. The LRT then travels underground until east of Brentcliffe Road, which is consistent with all options.

For this option, one underground station is located west of Weston Road, and a second elevated centre platform is located near the Black Creek Drive intersection.

The connection to the proposed M&S Facility comprises four dedicated tracks leading to/from Eglinton Avenue. Three of the tracks are elevated, and the fourth is underground (i.e. tunnel). The three elevated tracks in this option would require structures to be built over Eglinton Avenue. The tracks are intended for one-way LRV movement into and out of the M&S Facility in each direction (eastbound and westbound), however they are capable of allowing bi-directional movement to provide redundancy in case of emergency (e.g. if one or more track is out of service, or an LRV breakdown occurs on the track). The proposed M&S Facility connection is not dependant upon surrounding traffic, since it uses grade-separated tracks.

This option is fully grade separated from Weston Road to Keele Street. As previously discussed, the special trackwork would be located at Weston Station. Also, because of the short tunnel section, this would be constructed by cut and cover construction. The proposed station layout is shown in **Exhibit 43**.

A detailed layout drawing for this option is included as part of **Appendix K**.

An overview showing the aerial plan and outline elevation is shown in **Exhibit 44**.

Exhibit 43: Proposed Weston Station Layout



2.7.4.3 Option 3 - Elevated North Side

For the elevated north side option, the ECLRT travels underground from east of Jane Street (on the west side of the study area) to east of the Photography Drive bridge overpass. The underground tunnel travels beneath Eglinton Avenue until Photography Drive, where it surfaces north of the ROW. The ECLRT is then elevated on a dedicated structure north of the Eglinton Avenue ROW until it enters the main tunnel portal east of the Black Creek river valley. The LRT then travels underground until east of Brentcliffe Road, which is consistent with all options.

For this option, one underground station is located west of Weston Road. A second elevated centre platform is located near the Black Creek Drive intersection.

The connection to the proposed M&S Facility comprises four dedicated tracks leading to/from Eglinton Avenue. Three of the tracks are elevated with respect to Eglinton Avenue, and the fourth is underground (i.e. tunnel). The tracks are intended for one-way LRV movement into and out of the M&S Facility in each direction (eastbound and westbound), however they are capable of allowing bi-directional movement to provide redundancy in case of emergency (e.g. if one or more track is out of service, or an LRV breakdown occurs on the track). The proposed M&S Facility connection is not dependant upon surrounding traffic in this option, since it uses grade separated tracks.

This option is fully grade separated from Weston Road to Keele Street. As previously discussed, the special trackwork would be located at Weston Station. Also, because of the short tunnel section, this would be constructed by cut and cover construction. The proposed station layout is shown in Exhibit 43.

A detailed layout drawing for this option is included as part of Appendix K.

An overview showing the aerial plan and outline elevation of this option is shown in Exhibit 45.

Exhibit 44: Option 2 – Elevated South Side Alignment - Plan and Elevation

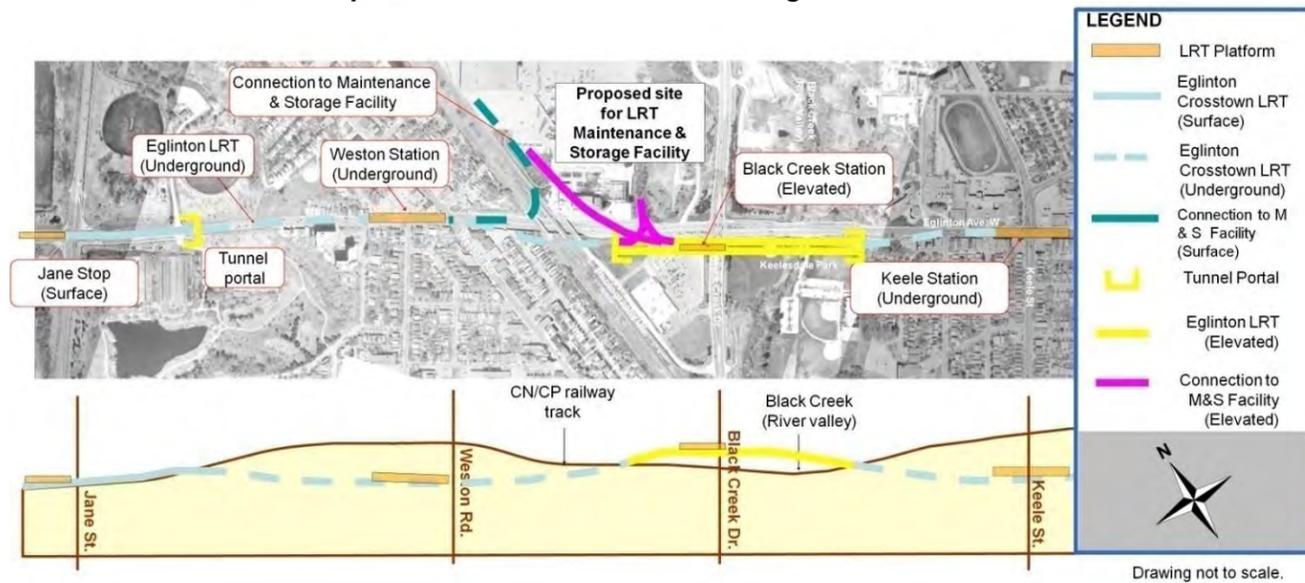
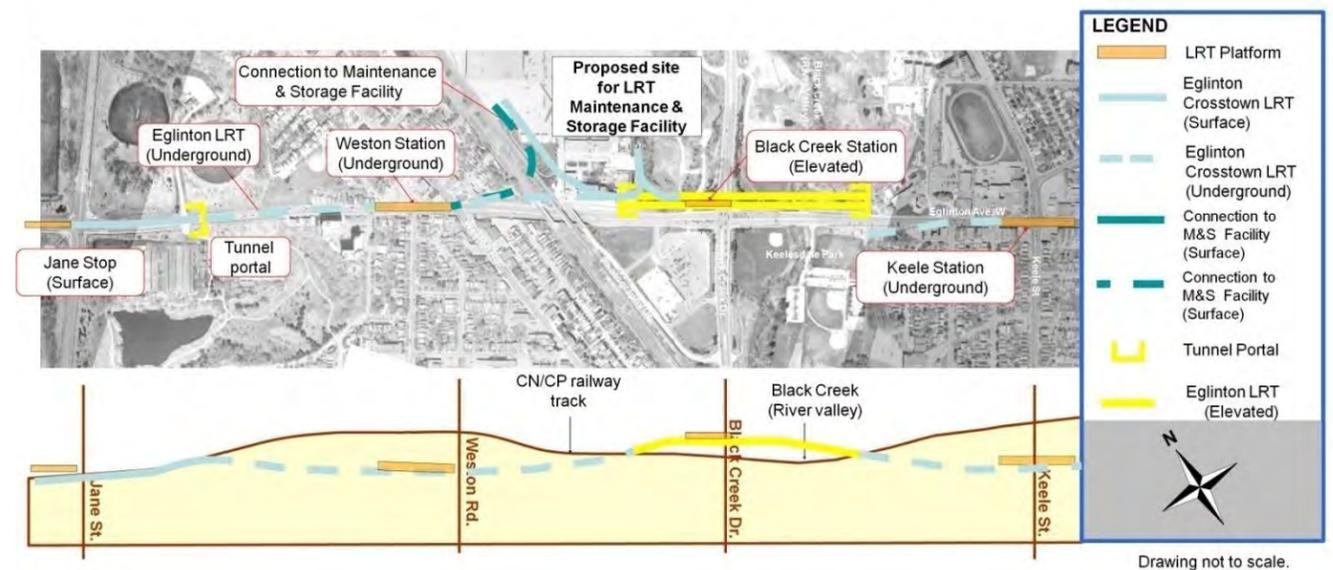


Exhibit 45: Option 3 – Elevated North Side Alignment - Plan and Elevation



2.7.4.4 Option 4 - Underground

For the underground option, the ECLRT travels underground through the entire study area, from east of Jane street to east of Brentcliffe Drive. The underground tunnel travels beneath the Eglinton Avenue ROW through the entire study area.

For this option, one underground station is located west of Weston Road, and a second underground station is located west of Black Creek Drive.

The connection to the proposed M&S Facility comprises two dedicated underground tracks to/from the ECLRT alignment. The tracks are intended for bi-directional use. It is possible to build additional, redundant connections to the M&S Facility, however because these would need to be underground they would incur very high cost.

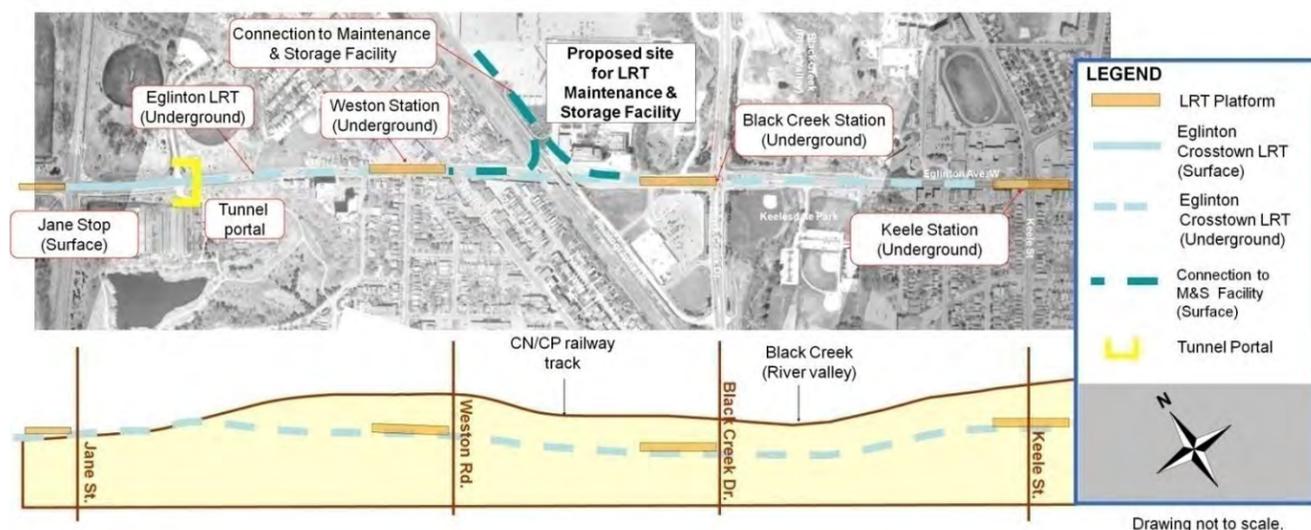
The underground option provides at least two fewer connection tracks than the other options, which means there is less redundancy in case of emergency (e.g. if one or both tracks are out of service, or an LRV breakdown occurs on the track).

This option is fully grade separated from Weston Road to Keele Street. As previously discussed, the special trackwork would be located at Weston Station. The construction method for this tunnel section would use tunnel boring machines. The station and special trackwork at Weston Station would be constructed by cut and cover. The proposed station layout is shown in **Exhibit 43**.

A detailed layout drawing for this option is included as part of **Appendix K**.

An overview showing the aerial plan and outline elevation is shown in **Exhibit 46**.

Exhibit 46: Option 4 – Underground Alignment - Plan and Elevation



2.7.4.5 Option 5 - Elevated North Side Alternative

For the elevated north side option alignment, the ECLRT travels underground from east of Jane Street (on the west side of the study area) to midway between Photography Drive and Black Creek Drive. The underground tunnel travels beneath the Eglinton Avenue ROW until Photography Drive, where it curves northward and exits at a portal north of the ROW. The ECLRT is then elevated on a dedicated structure north of the Eglinton Avenue ROW until it enters the main tunnel portal east of the Black Creek river valley. The LRT then travels underground until east of Brentcliffe Road, which is consistent with all options.

For this option alignment, one underground station is located east of Weston Road. There is no second platform.

The connection to the proposed M&S Facility comprises four dedicated tracks leading to/from Eglinton Avenue. Two of the tracks are elevated, while another two are underground (i.e. tunnel). The tracks are intended for one-way LRV movement into and out of the M&S Facility in each direction (eastbound and westbound), however they are capable of allowing bi-directional movement to provide redundancy in case of emergency (e.g. if one or more track is out of service, or an LRV breakdown occurs on the track). The proposed M&S Facility connection is not dependant upon surrounding traffic, since it is uses grade separated tracks.

This option is fully grade separated from Weston Road to Keele Street. As previously discussed, the special trackwork would be located at Weston Station. Also, because of the short tunnel section, this would be constructed by cut and cover construction. The proposed station layout is shown in **Exhibit 47**.

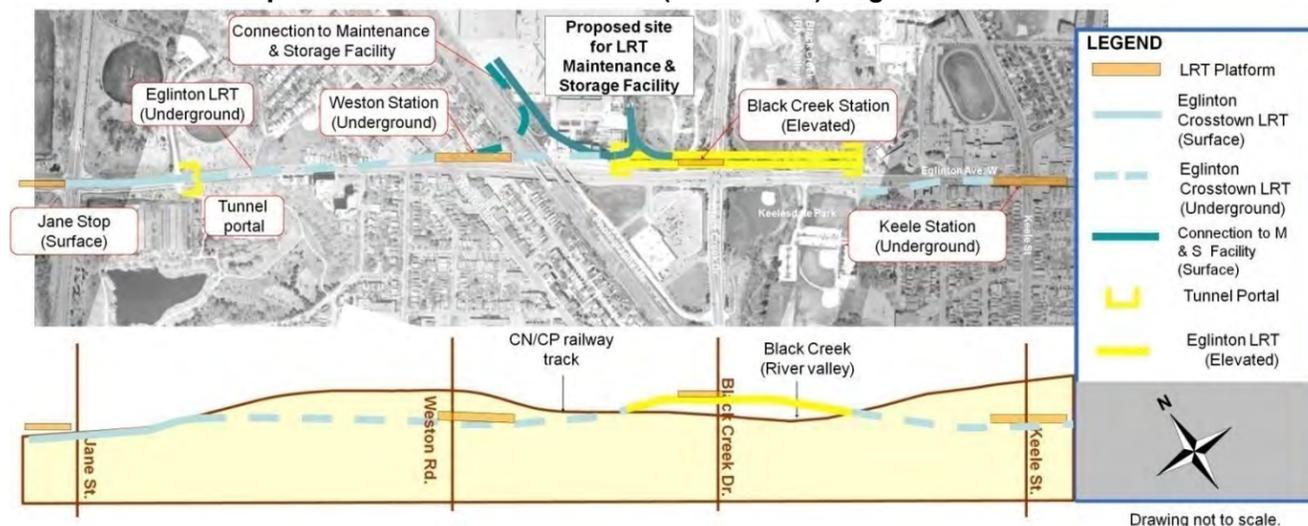
A detailed layout drawing for this option is included as part of **Appendix K**.

An overview showing the aerial plan and outline elevation is shown in **Exhibit 48**.

Exhibit 47: Westion Station Alternate Layout



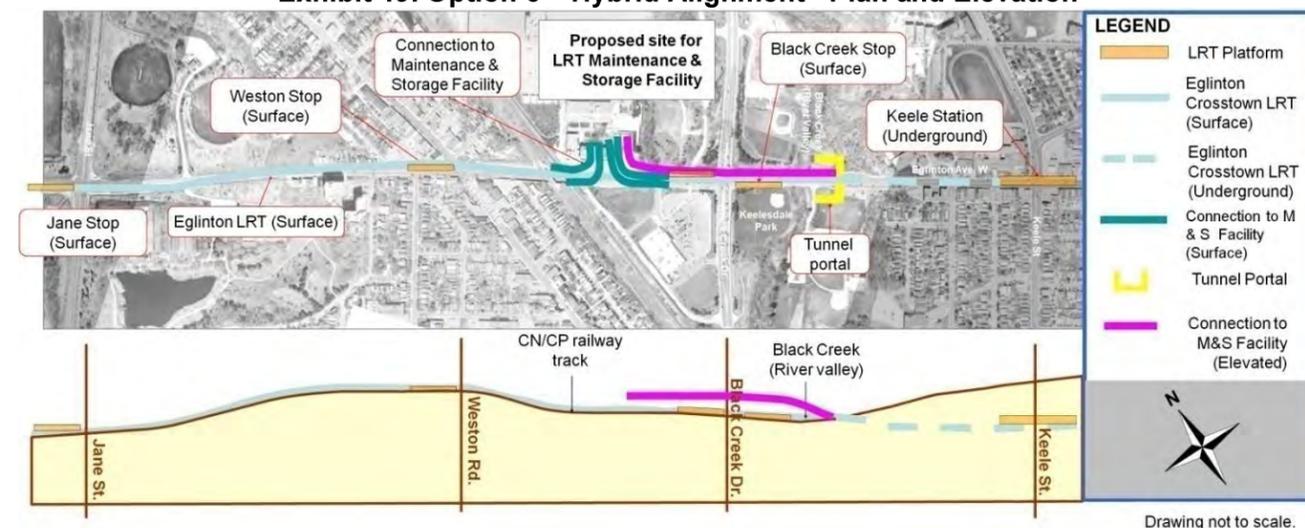
Exhibit 48: Option 5 – Elevated North Side (Alternative) Alignment - Plan and Elevation



A detailed layout drawing for this option is included as part of **Appendix K**.

An overview showing the aerial plan and outline elevation is shown in **Exhibit 49**.

Exhibit 49: Option 6 – Hybrid Alignment - Plan and Elevation



2.7.4.6 Option 6 - Hybrid Alignment

A hybrid option was created in an attempt to gain the connection benefits of an elevated alignment without the high cost of tunnelling required in the elevated options. The objectives for this option are:

- Provide an elevated connection to the maintenance and storage facility to eliminate any potential conflicts with general traffic;
- Avoid/minimize the property requirements on the north or south side of Eglinton Avenue associated with the other elevated options; and
- Provide a grade separated option with a lower cost than the other grade-separated options.

The hybrid option has the same ECLRT alignment and same primary surface connection to the proposed M&S Facility as the surface option (Section 4.1). The difference is that instead of a surface emergency access route to the M&S Facility on Photography Drive, the hybrid option has an elevated emergency or secondary connection to the M&S Facility on Eglinton Avenue.

The other grade separated options require tunnelling under the three bridges over Eglinton Avenue, which greatly increases the cost. The hybrid option provides an elevated connection, but due to the presence of the three existing structures to the west of the M&S facility, it can only be provided to the east. Due to the close proximity of Black Creek Drive, the elevated structure cannot begin to return to grade until it crosses Black Creek Drive. Therefore the track reaches the existing grade approximately 500 metres east of the yard, after entering the main tunnel portal. From this point, any LRV destined to travel to the west would use the crossover, and begin to travel to the west another 500 metres before reaching the maintenance and storage facility interface point. This path results in a dead head round trip of approximately 1 kilometre, with a turnback required. Additionally, because the track cannot meet the existing grade until it is already into the tunnel, the special track work designated within that segment of the tunnel for operational purposes would likely need to be moved further to the east, which would have further implications on the location of Keele Station.

The hybrid option has many negative operational impacts, which are greater than the potential benefits.

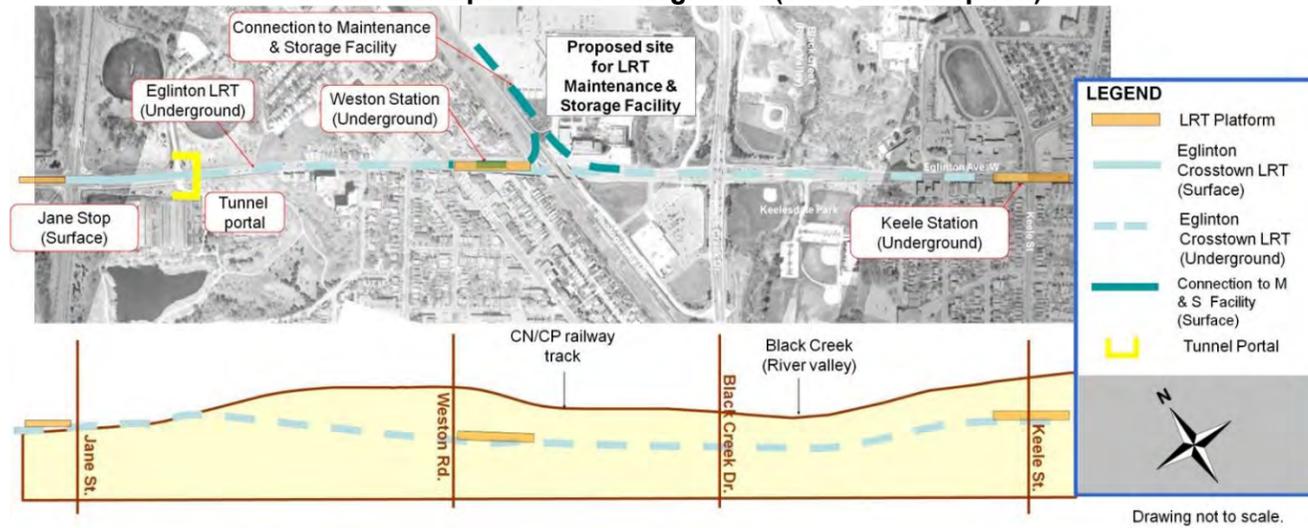
2.7.4.7 Option 7 – Underground (councillors’ option)

Through public consultation, a modified underground option was created in an effort to reduce the cost for the underground option. This option is similar to the underground option, but does not include a station at Black Creek. The impacts of this option are similar to option 4, which have been identified in Section 3.5 of this report.

A detailed layout drawing for this option was not developed. The vertical and horizontal alignments are similar to the underground option, Option 4, without the station at Black Creek Drive.

An overview showing the aerial plan and outline elevation is shown in **Exhibit 50**.

Exhibit 50: Option 7 – Underground (councillors’ option)



2.7.5 Recommendation

The recommended alignment is Option 1, the surface alignment. The primary reasons for the recommendation are that the option:

- Adequately supports the traffic operation and LRT operation within the study area.
- Has significantly less cost than the other options (at least \$200 million); and
- Results in similar property impacts as the other options. The underground option would reduce the number of full properties required from 26 to 18 (8 less than surface).

2.8 Keele Street Bus Terminal Configuration

Facilities are required at Keele Street to effectively accommodate transfers to and from buses on four surface transit routes. Two options were identified:

- On-street bus transit stops; and
- Off-street stops at a transit terminal.

On-street transit stops will likely include the implementation of bus bays, and transit vehicle routing which will optimize transit operations without the use of a transit terminal. An off-street transit terminal could possibly be designed with queue jump lanes and transit signal phasing to quickly progress transit vehicles into and out of the terminal.

The following five intersections are included in the study area as shown in **Exhibit 52**:

- Eglinton Avenue and Trethewey Drive/ Keele Street (Signalized);
- Trethewey Drive and Yore Road (Signalized);
- Keele Street and Yore Road (Stop Controlled);
- Keele Street and Lester Avenue (Stop Controlled); and
- Eglinton Avenue and Keele Street (Stop Controlled).

2.7.4.8 Option 8 – Hybrid (residents’ option)

Through public consultation, an additional option was suggested for review by the residents of the Mt. Dennis community. This option suggests the use of the north side of the roadway for the location of the LRT east of the rail bridges. It then suggests that the LRT begin to go underground just west of the existing bridges. The residents’ option was evaluated at a high level. The vertical alignment for this concept is feasible, though this option does not offer many other advantages.

A detailed layout drawing for this option is was not developed.

An overview showing the aerial plan and outline elevation is shown in **Exhibit 51**.

Exhibit 51: Option 8 – Hybrid (residents’ option)

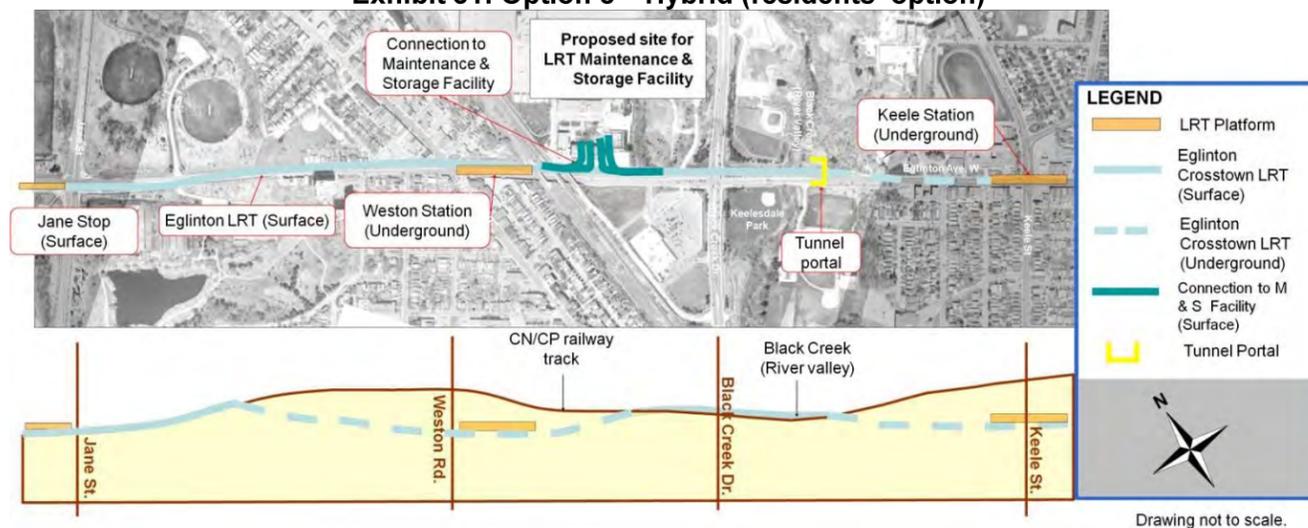
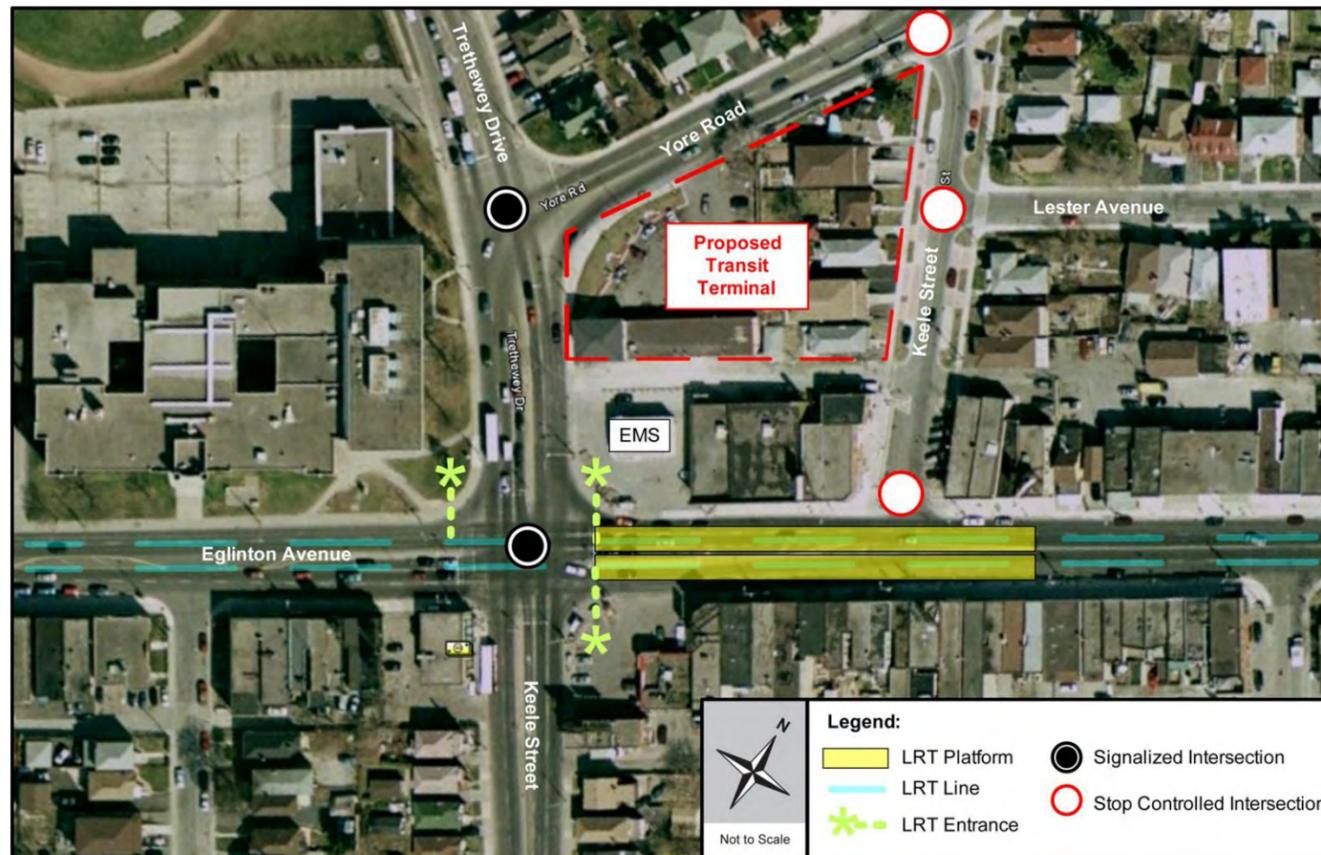


Exhibit 52: Keele Street Bus Terminal Configuration – Study Area



The Eglinton Avenue Crosstown Light Rail Transit (Eglinton Crosstown LRT) will operate underground at the Eglinton Avenue at Trethewey Drive/ Keele Street signalized intersection. Therefore, this intersection and surrounding road network would not be impacted by the implementation of the LRT. Under future conditions, the implementation of the LRT does not alter the existing roadway lane configurations.

There is an Emergency Medical Service (EMS) station located on the northeast corner at the intersection of Eglinton Avenue and Trethewey Drive/ Keele Street. As the LRT will be underground, its operation will not interrupt EMS operations. However, the EMS operation may be complicated by on-street transit and vehicle operation.

The pedestrian accesses to the underground Keele Street LRT station are proposed to be located directly north of the EMS station (underground access) and at the northwest and southeast corners of Eglinton Avenue and Trethewey Drive/ Keele Street.

2.8.1 Key Challenges and Constraints

There are several branches of the 32 Eglinton West bus service which operate throughout the area today but only two will continue after construction of the LRT: 32C (Eglinton West – Trethewey), 32D (Eglinton West – Emmett). The Keele bus services will continue to operate through the area. Under existing operations routes 32C and 32D originate from the Yonge and Eglinton West Subway station. Under future

conditions, these routes will originate at Keele. Route 32C will only service the segment Trethewey Drive West. The 32D line will serve the Emmet Avenue area originating at Keele Station. Route 41 Keele services will continue to pass through the area traveling north-south. All bus routes may operate using alternative routing and transit stops under future conditions.

The signalized intersection of Eglinton Avenue and Trethewey Drive/ Keele Street currently operates at a very poor level of service during both peak periods. There is limited northbound left turn capacity since there is high opposing traffic. The signalized intersection of Trethewey Drive and Yore Road operates at a poor level of service with the westbound left movement operating at close to capacity during the PM peak period. All other movements operate at a good level of service. All traffic movements at the unsignalized intersections are operating without capacity issues, with the exception of the northbound right turn movement at Keele Street and Yore Road.

2.8.2 Options

A total of five Keele Street Bus Terminal scenarios were considered including two on-street transit stop and three off-street transit terminal configurations. A traffic analysis was conducted to evaluate each option with respect to their expected impact on traffic movements and associated activities in the study area. The analysis used the projected transit vehicle routings within the study area.

The five scenarios analysed are as follows:

- Option 1 - On-Street Route 32C Left Turn (**Exhibit 53**);
- Option 2 - On-Street Route 32C Right Turn (**Exhibit 54**);
- Option 3 - Off-Street Bus Terminal A (**Exhibit 55**);
- Option 4 - Off-Street Bus Terminal B (**Exhibit 56**); and
- Option 5 - Off-Street Bus Terminal C (**Exhibit 57**).

2.8.2.1 Option 1 - On-Street Route 32C Left Turn

In this option, all future transit routes operate with on-street bus bays for passenger boarding and alighting. Route 32C and Route 41 southbound have lay-by transit bus bays located south of Yore Road on Trethewey Drive. The Route 32C routing will include a southbound left turn from Trethewey Drive onto Eglinton Avenue and then perform an eastbound left turn to travel north on Keele Street. Route 32C transit vehicles will then continue by entering Yore Road via a northbound right turn and use Irving Road to the north to return to Trethewey Drive. The on-street bus bay for Route 41 northbound is a northbound nearside stop at Trethewey Drive and Yore Road. Lastly, Route 32D will operate with a northbound on-street transit stop on Trethewey Drive between Eglinton Avenue and Yore Road.

Comments from TTC staff suggested that the routing plan for Option 1 is problematic since the routing is circuitous and would place buses on local residential streets (Irving Road) and through a school zone. TTC staff also advised that it would be very difficult for Route 32C southbound transit vehicles on Trethewey Drive to manoeuvre into the left turn lane from the southbound bus bay.

Under this scenario, the EMS station would remain at its current location.