ST. CLAIR AVENUE WEST AT THE GEORGETOWN GO UNDERPASS

TRANSPORTATION INFRASTRUCTURE PLANNING STUDY

REF: 9309.280

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1.0 Introduction

The St. Clair Avenue West railway underpass between Keele Street/Weston Road and Old Weston Road was constructed in 1931-32, replacing a level crossing. The structure has a centre median pier; each span accommodates a 6.4 m wide roadway with one transit lane and one general purpose travel lane per direction and a 2.66 m wide sidewalk. The total width between abutments is 19.2 m. The underpass is structurally sound and in good condition. The ownership, operation, and maintenance of the structure are defined by a multi-party Board Orders going back to the 1930s.

The rail crossing is a critical link in the area transportation system, as the street grid of the area is disrupted by the rail corridors and traffic is focused on few road crossings (Dupont Street, St. Clair Avenue West, Old Weston Road / Junction Road (closed to 2014) and Rogers Road). St. Clair Avenue West is the primary crossing because the road is the only continuous east-west major arterial in the area. The rail structure carries GO Transit, VIA, CN, CP, and Union Pearson Express trains, while the ownership of the rail corridor is divided by specific track between Metrolinx and CP.

The rail crossing fell within the study area of the St. Clair Avenue West Transit Improvements EA Study (2004). As per the recommendations of that study, the pre-existing four-lane cross section of shared streetcar / traffic median lanes and curbside traffic lanes was altered to make the median lane exclusive to transit, leaving a single curb lane in each direction for general traffic. This single-lane operation differs from the two lanes per direction offered general traffic on the rest of St. Clair Avenue West.

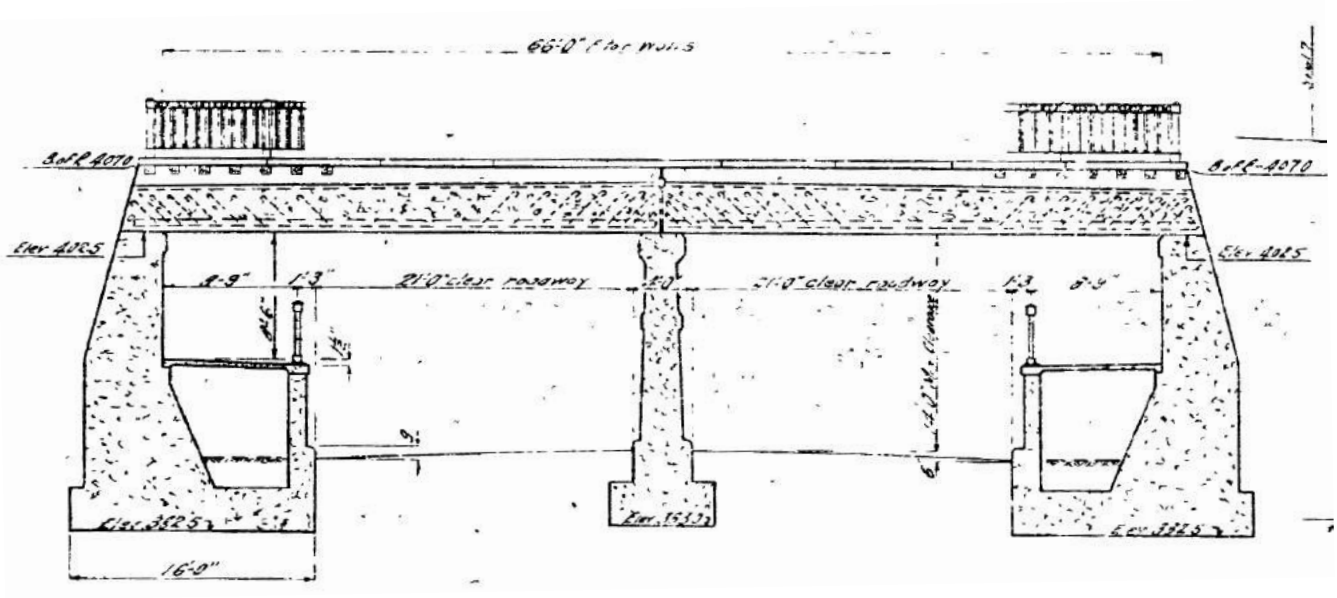


Figure 1-1: Typical Cross-Section for the Rail Underpass at St. Clair Avenue West

The congestion present on St. Clair Avenue West prior to the change in streetcar configuration, in the vicinity of the rail crossing, has been highlighted as a major concern by the local Business Improvement Area, local residents, and road users.

Following the construction of the streetcar right-of-way, the increased congestion observed in the study area was caused primarily by two things:

1) the closing of a major alternative routing across the railway corridor via Junction Rd for several years; and,
2) a delay in implementing the intersection capacity improvements that were recommended in the St. Clair West Transit Improvements EA Study due primarily to property issues.

Congestion has since improved with of Junction Rd. reopening, and the implementation of some of the recommended capacity improvements eastbound at Old Weston Road and St. Clair Avenue West. The travel delays along St. Clair Avenue West do however persist due to the turning demands at the intersections adjacent to the rail corridor (Keele Street / Weston Road and Old Weston Road) as motorists converge on one of the few rail crossings available in the area and the redevelopment of the Stockyard area to the west of Weston Road into retail and residential uses. As a result of the lack of connections across the rail corridor, motorists infiltrate through the grid of local streets which serve stable residential neighbourhoods.

This study will scope and assess long-term alternatives to increase traffic capacity across the rail corridor within the study area that will enable accommodation of continued area growth, including local intersection improvements, widening of the St. Clair Avenue West rail underpass, and additional road connections. It will also examine local road improvements that could be made more immediately (i.e. short-term options) to see if such alternatives could provide sufficient net benefit to warrant implementation.

This report proceeds by first defining its scope and context. It is being conducted to provide a technical supporting document for the forthcoming Transportation Master Plan/Environmental Assessment process. As such, the needs of this process define the structure of the report and its recommendations. **Section 2.0** reviews the existing conditions with respect to the social and economic, cultural landscape and built heritage, archaeological, natural, and transportation environments. The traffic conditions considering the planned level of development is demonstrated in **Section 3.0**. Considering the existing conditions combined with the planned development, the project need and justification is identified in **Section 4.0**. The potential solutions are presented and reviewed in **Sections 0 and 6.0**, while the overall recommendations are outlined in **Section 7.0**.

1.1 Study Area

The City of Toronto has identified a two-part study area for the project: a Main Study Area and an Extended Study Area (**Figure 1-2**). The Main Study Area, highlighted on **Figure 1-2**, extends west to east from Keele Street/Weston Road to Old Weston Road and south to north from Junction Road to Lavender Road. The Extended Study Area shown on **Figure 1-2** is bounded by Humber Boulevard North and Rogers Road to the north, Caledonia Road and Lansdowne Avenue to the east, Dundas Street West and Dupont Street to the south and Runnymede Road and Rockcliffe Boulevard to the west. The Main Study Area (herein referred to as the study area) is the focus of this report, while the extended study area is used to inform the transportation analysis.

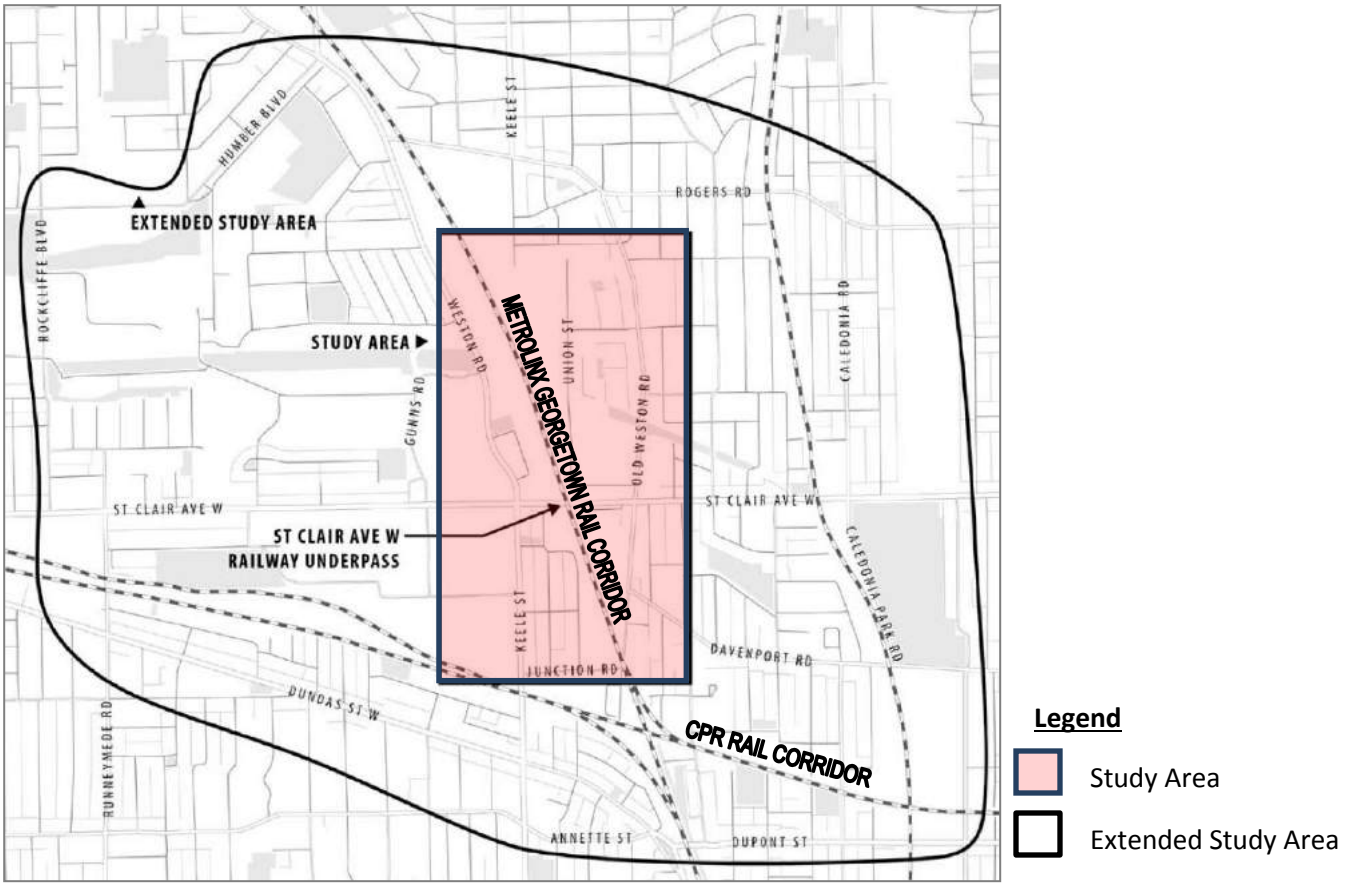


Figure 1-2: Study Area

1.2 Process

The City of Toronto has conducted a Functional Planning Study to develop, identify and evaluate the feasibility of short-term and long-term alternatives that address traffic operations, safety conditions and city building initiatives along St. Clair Avenue West between Keele Street and Old Weston Road.

As a functional planning study, the project has been designed to comprehensively review, evaluate, and recommend modifications required to improve the traffic constraints identified along St. Clair Avenue West at the Georgetown Metrolinx/GO Rail Corridor. In doing so the study has included the following steps:

- Review existing conditions and background planning framework for the study area;
- Assess the structural condition of the St. Clair Avenue West underpass based on the available Limited Condition Survey;
- Determine the impacts of approved and future development in the area;
- Identify the problems and opportunities experienced in the study area;
- Propose and review alternative solutions to addressing the identified problem/opportunities; and,
- Recommend a follow-up study scope(s) that would be required to bring the proposed plan(s) to fruition.

2.0 Existing Conditions

The Functional Planning Study requires that existing built, cultural, and natural heritage be examined in order to determine the impacts the proposed alternatives would have and consequently could be evaluated. This section describes existing conditions for each component required to evaluate the proposed alternatives.

2.1 Structural Conditions

The construction of the existing rail bridge over St. Clair Avenue West was completed in 1932 with an overall width of 43.5 m and allows for a grade separated crossing of the St. Clair Avenue West. The structure is precast concrete, with cast-in-place concrete substructure. Retaining walls and elevated sidewalks extend to the east and west of the bridge on both sides of the roadway. Stairways were incorporated into the retaining walls and in the adjacent embankments to provide access to the adjacent local area.

The bridge has two spans, each extending 9.45m, with the bridge having an overall length of 20.12m. The centre pier is an open spandrel system set on a common base. The pier is made up of 10 columns, spaced 3.05m apart. The distance between the base and the centre of the arch is 2.82m high. The design drawings specify a vertical clearance of 4.27m, although a vertical clearance advisory of 4.0m is currently displayed on the structure.

The deck consists of precast sections each, 1.91m wide and 0.91m high. Although typically, the tracks were installed directly on the precast deck slab structure, historical photographs illustrate that for the St. Clair Avenue West structure waterproofing was first laid down, before the ballasts and crossties were installed.

Originally, the structure accommodated two tracks; the Weston Subdivision (now owned by Metrolinx/GO Transit) and CP MacTier Subdivision. As part of the Georgetown South Project, the expansion of the Kitchener/Georgetown GO Rail service and the development of the Union-Pearson Express (UP Express) was anticipated by GO Transit to expand the number of rail lines to 5. The bridge was rehabilitated first in 1952[1] and last rehabilitated in 1988[2], when the elevated sidewalks/retaining walls were replaced, in addition to other minor patch repairs. This also included widening the roadway by approximately 1.2 metres.

A visual inspection of the bridge over the rail corridor was carried out in November of 2012. Through this review, it was determined that the bridge was in good condition, with only minor deterioration of isolated elements. Regarding the condition of the existing structure the following items were identified:

- Abutments: light to severe scaling, with some spalling and delamination evident
- Railings: light corrosion with a minor deterioration of the protective coating
- Deck: spalling and delamination evident in the southeast quadrant, with some narrow cracks

[1] Source: *Municipality of Metropolitan Toronto Department of Roads and Traffic Design Drawings S-683-27*
[2] Source: *Ontario Bridge Management System* and *Municipality of Metropolitan Toronto Department of Roads and Traffic Design Drawings S-683-23-26*

- Piers and Pier Caps: narrow map cracking and light-to-severe scaling
- Retaining Walls: narrow to wide cracks, with light-to-severe scaling and evident spalling and delamination
- Sidewalks: light scaling and narrow cracks

None of the items identified require immediate repair and the bridge was identified for minor rehabilitation to occur within 1-5 years.

2.2 Socio-Economic Environment

2.2.1 Land Use

Lands within the study area are primarily designated to be a mix of employment areas and Neighborhoods under the City of Toronto Official Plan **(Figure 2-1).** Neighborhoods, according to the 2010 Official Plan, permits residential uses in lower scale buildings but may also include small-scale retail, service and office uses given that the buildings contained these uses prior to the approval of the 2010 Official Plan. Criteria given for neighborhoods include a gradual change that "fits" the existing character.

According to the City of Toronto Official Plan, growth is to be directed to key Centres, Avenues, Employment Districts, and the Downtown, which is consistent with the Growth Plan's policies toward intensification along corridors and around major transit stations. The study area holds both corridors and transit stops. The Official Plan stresses that these areas will make efficient use of land, infrastructure and services by encouraging employment growth, promoting mixed use development, offering affordable housing, and protecting green spaces from encroaching development. Further, the Plan addresses the issues of transportation and city building, indicating a need to integrate transportation and land use planning at both the local and regional scales, by achieving a more intense, mixed use pattern of development.

The Official Plan emphasizes making efficient use of road space to move people instead of vehicles and on looks to overall reduce the demands for vehicle travel. Reducing car dependency requires planning for better and more transit and making walking and cycling attractive alternatives. The Official Plan highlights transportation corridors where higher order transit is advisable, including the area along St. Clair Avenue.

According the City of Toronto Official Plan, employment areas are permitted to include offices, manufacturing, warehousing, hotels, hotels, restaurants and small scale stores and services. Policies from the Official Plan states that the presence of Large-Scale, stand-alone retail stores within employment areas are not permitted. The study area currently features retail stores such as: Metro, Future Shop, Home Depot and Staples and also features two churches. These uses cater to the need of the neighborhoods in the area and are situated within reasonable distances. According to the Official Plan, these uses along with schools and businesses located within employment areas may only be located on major streets like St. Clair Avenue West, Weston Road, Keele Street and Rogers Road.

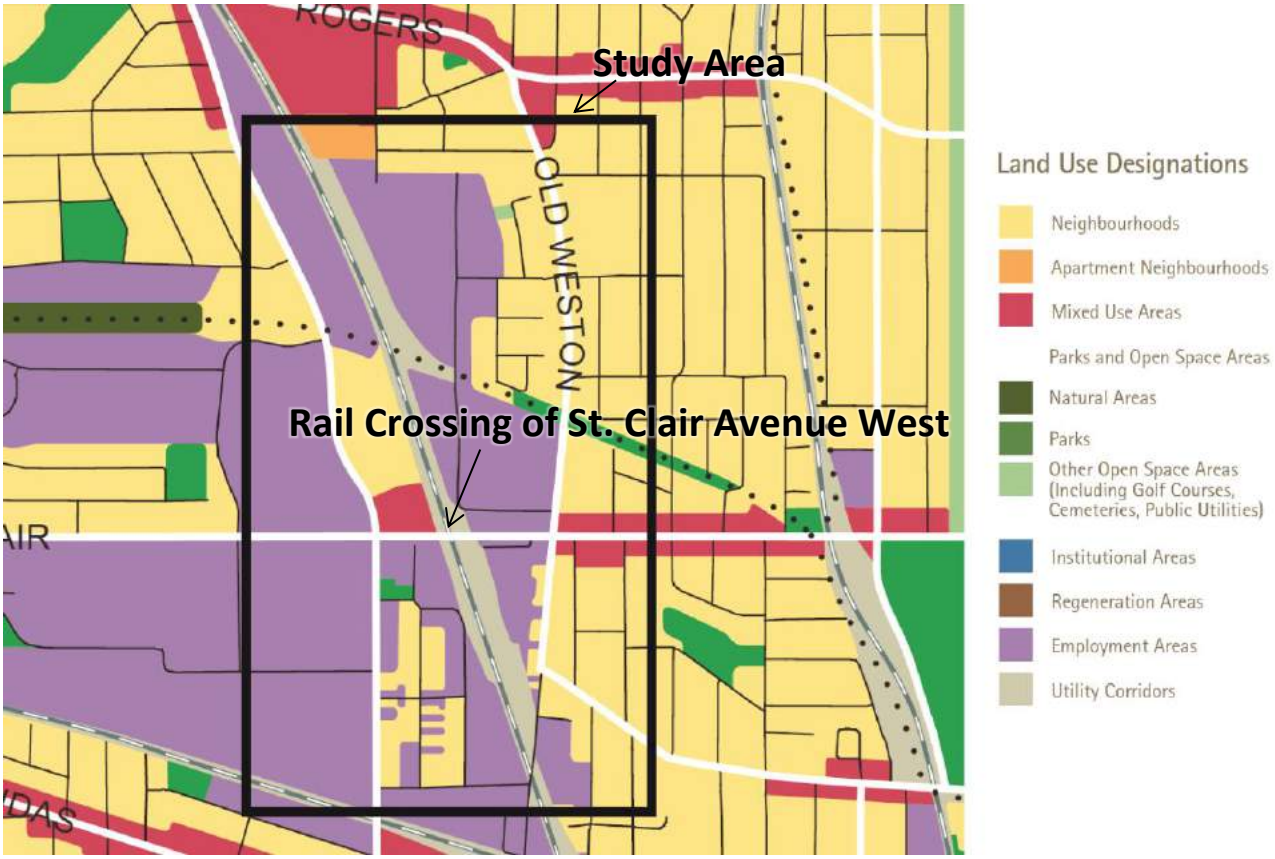


Figure 2-1: City of Toronto (2010) Official Plan Designation

2.2.2 Demographics

The Study area contains portions of census tract areas 5350106.00, 5350107.00 and 5350108.00. Census tract data from Statistics Canada (2011) show the total population living within these areas was 15,890 in 2011 compared to 15,797 in 2006. This indicates a total population increase of less than 1%, signifying a very slow growth of the population in the area. The median age population of 37.2 years with 69% of the population being of working-class age (18-64) and can be attributed to the proximity of the area to the downtown core where high concentration of employment uses are found. **Figure 2-2** locates the census tracts relative to the study area and shows the population density therein as persons per square kilometre.

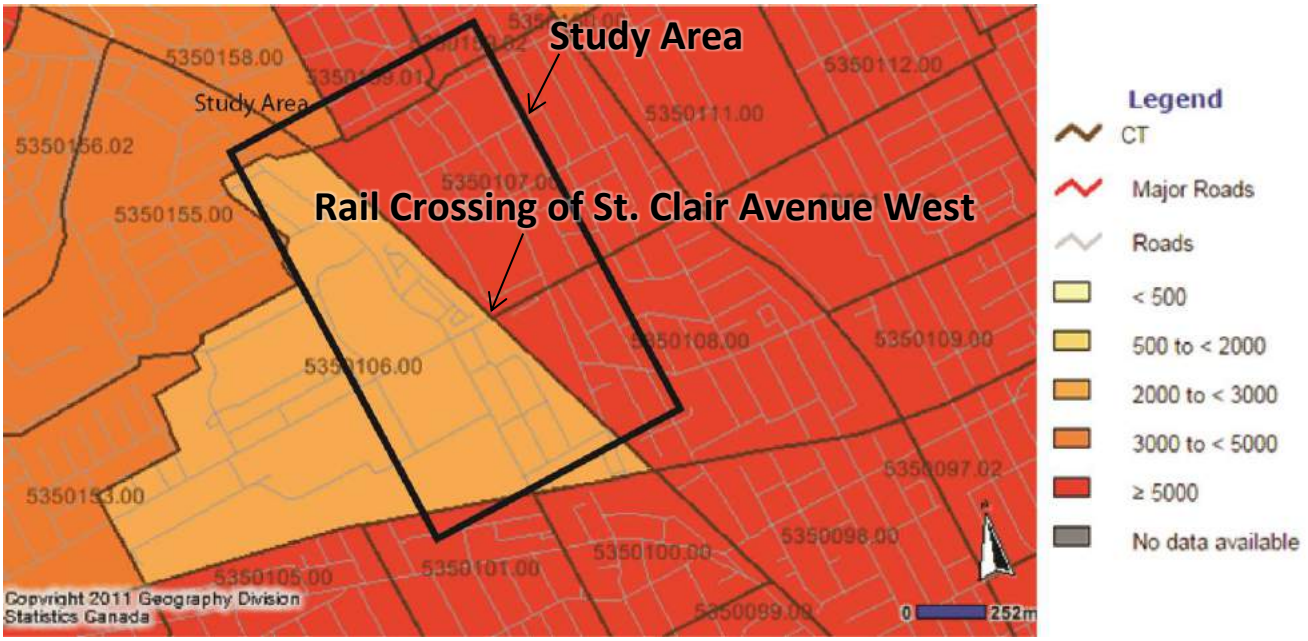


Figure 2-2: 2011 Census Tract Boundaries (Density in persons per sq. km.)

2.2.3 Land Ownership

The majority of lands within the study area are privately owned properties. The City of Toronto has property rights for the entirety of St. Clair Avenue West. Also owned by the City are 1941, 1821 and 1860 St. Clair Avenue West and properties in the northeast quadrant of the intersection of Gunns Road and Weston Road. Metrolinx/GO owns the majority of the railway line which intersects St. Clair Avenue West. Two (2) small properties located at 1850 St. Clair Avenue West and in the northwest quadrant of the intersection of Old Weston Road and Townsley Street are owned by the TTC. Three (3) properties bound by St. Clair Avenue West to the north, Old Weston Road to the east, Keele Street to the west and Junction Road to the south are Toronto Community Housing. **Figure 2-3** displays the location of these properties within the study area.

With regards to the St. Clair Avenue West structure itself, the ownership and maintenance is determined by a multi-part board order (Order No. 48682), where the City of Toronto is responsible for 45%, rail authority is responsible for 45% and the TTC is responsible for 10%. Utilities are responsible for the costs associated with their respective facilities. Sidewalks are wholly the responsibility of the City of Toronto, and the tracks and streetcar catenary are the responsibility of the TTC.

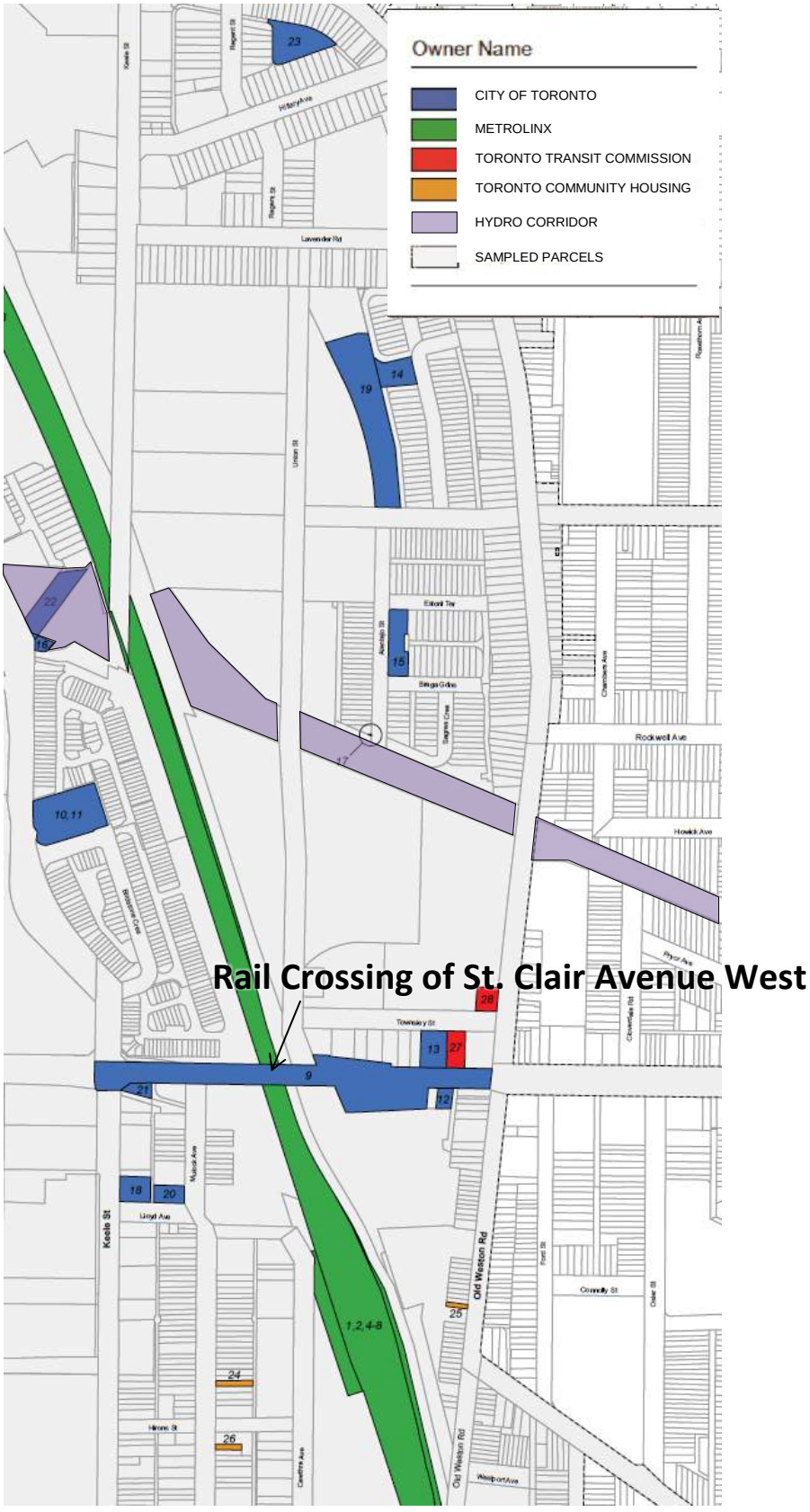


Figure 2-3: Property Parcel Ownership

2.3 Cultural Landscape and Built Heritage

Unterman McPhail Associates, Heritage Management Resource Consultants, was retained to conduct a cultural heritage resource assessment for cultural landscapes and built resources for the current study. The existing conditions review of the Cultural Heritage assessment completed in November 2013 identifies twenty-two (22) cultural heritage resources within the study area. Of the twenty-two (22) cultural heritage resources identified, one (1) property is listed in the City of Toronto's Inventory of Heritage Properties and designated under Part IV of the Ontario Heritage Act. The remaining twenty-one (21) cultural heritage resources have been identified as having some cultural significance but are not designated.

Figure 2-4 illustrates the location of identified built/cultural heritage resources in relation to the various transportation improvement corridors assessed in this study. Details of each resource are described in the existing conditions report prepared by Unterman McPhail Associates which has been included in **Appendix A-1.**

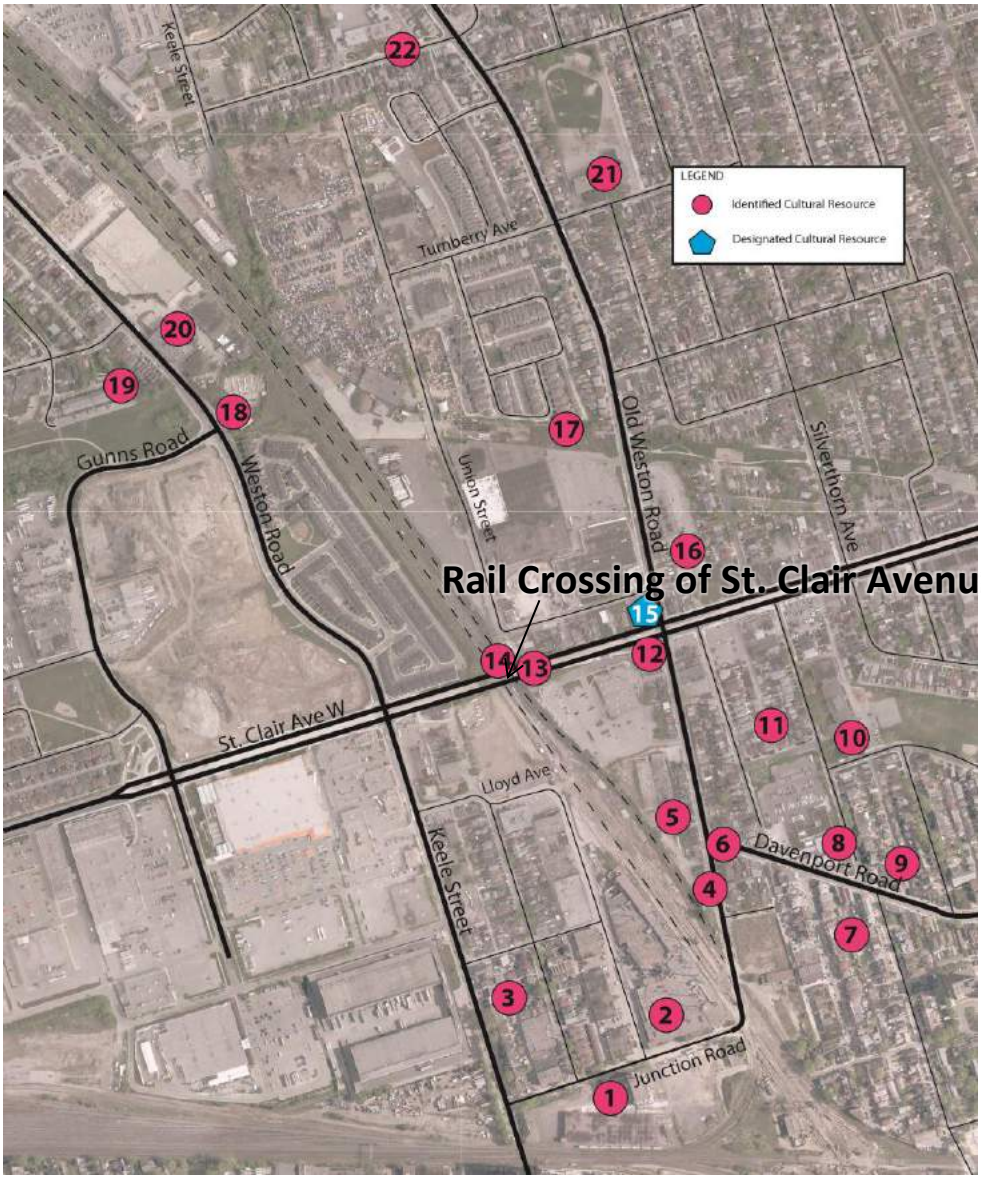


Figure 2-4: Identified Built/Cultural Resources in relation to the Alternatives

Table 2-1 summarizes the built/cultural heritage resources that are located in the vicinity of the main alternative corridors assessed in this study.

Site #	Name	Location	Designated under Part IV of Ontario Heritage Act	Listed under City of Toronto's Inventory of Heritage Properties
1	Maple Leaf Mills (former) Grain Elevator (Campbell Flour Mills Co. Ltd.) (CHL, Industrial)	43 Junction Road	No	No
2	National Rubber Co. (former Gurney Foundry Co.) (CHL, Industrial)	35 Cawthra Avenue	No	No
3	Residential Neighbourhood (CHL, Residential)	Bounded by Junction Road (south), Keele Street (west), St Clair Avenue (north) and Cawthra Avenue (east)	No	No
4	Old Weston Road (CHL, Transportation Roadscape)	Old Weston Road through Study Area Focus Area from Junction Road to Lavender Road	No	No
5	Workers' Housing (CHL, Residential)	224-316 Old Weston Road	No	No
6	Davenport Road (CHL, Roadscape)	Davenport Road in the Study Focus Area from Old Weston Road to Osler Avenue	No	No
7	Residential Neighbourhood (CHL, Residential)	Bounded by CP tracks (south), Old Weston Road (west), to St. Clair Avenue West (north) and Osler	No	No
8	Division 11 Police Station (Carleton Public School) (BHR, Institutional School)	2054 Davenport Road	No	No
9	Residence (BHR, Residential)	257 Osler Street	No	No
10	Carelton Village Public School (Osler Senior Public School) (BHR, Institutional School)	315 Osler Street	No	No

Table 2-1: Summary of Cultural Heritage Landscapes and Built Heritage Resources in relation to the Alternatives

CHL – Cultural Heritage Landscapes

BHR – Built Heritage Resources

Site #	Name	Location	Designated under Part IV of Ontario Heritage Act	Listed under City of Toronto's Inventory of Heritage Properties
11	Centre Charismatique Parole de Grace (West Toronto Fire Hall No. 2) (BHR, Public Works Fire Hall)	65 Ford Street	No	No
12	Community of Carelton (CHL, Settlement)	St. Clair Avenue West and Old Weston Road	No	No
13	St. Clair Avenue West Railway Underpass (BHR, Transportation Bridge)	St. Clair Avenue West between Keele Street and Old Weston Road	No	No
14	CP and GO Transit Rail Corridor (CHL, Transportation Railway)		No	No
15	Heydon House Hotel (BHR, Commercial Hotel)	1834 St. Clair Avenue West on northwest corner of St. Clair Avenue West and Old Weston Road	Yes	Yes
16	Housing (CHL, Residential)	373-411 Old Weston Road; East side of Old Weston Road, north of St. Clair Avenue West	No	No
17	Toronto & Niagara Transmission Corridor (CHL, Industrial Transmission Corridor)	Runs east to west across the study area to the north of St. Clair Avenue West	No	No
18	ABC Lumber (BHR, Industrial)	153 Weston Road	No	No
19	Workers' Housing (CHL, Residential)	180-192 Weston Road	No	No
20	Canada Cycle & Motor Co. Ltd. And Willys-Overland Motor Company (BHR. Industrial)	201 Weston Road	No	No
21	General Mercer Public School (BHR, Institutional School)	30 Turnberry Avenue	No	No
22	St. Matthew Catholic School (BHR, Institutional School)	18 Lavender Road	No	No

Table 2-1: Summary of Cultural Heritage Landscapes and Built Heritage Resources in relation to the Alternatives cont'd

CHL – Cultural Heritage Landscapes

BHR – Built Heritage Resources

2.3.1 St. Clair Avenue West Railway Underpass

The design of the St. Clair Avenue West Underpass (Subway) is associated with the Northwest Toronto Grade Separation project in Toronto that was undertaken from 1922 to 1932. Most of the rail crossings throughout the city were at-grade until increased traffic and safety concerns led to the introduction of grade separated structures called subways or overheads, also known as underpasses and overpasses. The bridge was designed in 1931 by the office of the Bridge Engineer of the CN Central Region. The structure was substantially completed by January of 1932 but the official opening was dated May 14th, 1932 and cost $430,000 which was divided among the City of Toronto, CN and CP Rail, and the TTC who split the cost of construction and maintenance 45%, 45% and 10% respectively. The bridge was rehabilitated first in 1952[3] and last rehabilitated in 1988[4], when the elevated sidewalks/retaining walls were replaced, in addition to other minor patch repairs. This also included widening the roadway by approximately 1.2 metres. The sidewalks on the original structure have also been repaired but the original pipe railings were retained on top of the retaining walls. Overall the structure retains its dominant design and character.

Structure

The St. Clair Avenue West Underpass is defined as a precast concrete deck slab. The structure uses reinforced, cast-in-place concrete substructure and reinforced, precast concrete deck slab. Originally, grade separations along CN and CP Rail corridors were constructed using steel girders. By the end of the 1920s, CN began researching the use of reinforced concrete bridge designs and began implementing them by the early 1930s. This made bridges more attractive and ultimately cheaper to construct.

Significance

The St. Clair Avenue West Underpass is not listed municipally under the *Ontario Heritage Act* but still contains some cultural heritage value. When evaluated using the Ontario Regulation 9/06 of the *Ontario Heritage Act*, the underpass meets all three measures for the Historical or Associative Value criteria as well as the three measures for the Contextual Value criteria. Under the Design/Physical Value criteria, the underpass meets the criteria which require the bridge to be a rare, unique, representative or early example of a style, type, expression, material, or construction method. As CN only began to utilize reinforced concrete in the early 1930s and the underpass was designed in 1931 and completed in 1932, it is considered an early example of this construction method.

For these reasons, it can be determined through the Criteria for Determining Cultural Heritage Value under Ontario Regulation 9/06 that the St. Clair Avenue West Underpass is of cultural heritage value. A detailed review and assessment of the St. Clair Avenue West Underpass can be found in **Appendix A-2.**

[3] Source: *Municipality of Metropolitan Toronto Department of Roads and Traffic Design Drawings S-683-27*
[4] Source: *Ontario Bridge Management System* and *Municipality of Metropolitan Toronto Department of Roads and Traffic Design Drawings S-683-23-26*

2.4 Archaeology

Archeoworks Inc. undertook a Stage 1 Archaeological Assessment (Stage 1 AA) for the current study area on August 14th, 2014. The study area contains three (3) historic settlement roads that were laid down during early Euro-Canadian settlements, namely: present day Old Weston Road, Keele Street and St. Clair Avenue West. As per the *2011 S&G published by* Ministry of Tourism, Culture and Sport (MTCS), areas with a history of Euro-Canadian as well as pioneer settlements are considered to have archaeological potential. This section provides a summary of the archaeological assessment while the full report can be found in **Appendix B.**

Data gathered from background research in combination with an on-site visual inspection were used to create the assessment of archaeological potential. A generalized identification of areas of archaeological potential has been established, i.e., those lands which have not been obviously impacted by twentieth-century development to such a degree to eliminate any possibility for the survival of original ground surfaces, subsurface deposits or features, etc. This assessment was conducted in compliance with the 2011 Standards and Guidelines for Consulting Archaeologists. **Table 2-2** which is tied to **Figure 2-5** outlines the rationale employed for the identification of archaeological potential within specific areas.

Area # shown on Figure 2-5	**Archaeological Potential**
1	All potentially undisturbed lands have potential for yielding archaeological remains, given the prehistoric and historic significance of the area. This assessment is consistent with the criteria outlined in the *Ministry of Tourism & Culture 2011 Standards and Guidelines for Consultant Archaeologists* (MTC 2011).
2	All potentially undisturbed lands have potential for yielding archaeological remains, given the prehistoric and historic significance of the area. This assessment is consistent with the criteria outlined in the *Ministry of Tourism & Culture 2011 Standards and Guidelines for Consultant Archaeologists* (MTC 2011).

Table 2-2: Identification of Archaeological Areas and Rationale

The remainder of the study area is deemed to exhibit no archaeological potential due to the scale and intensity of landscape alterations as a result of development. All original deposits have been removed or redistributed to such a degree as to seriously compromise the potential for the presence of any archaeological deposits. In the highly unlikely event that such deposits have not been completely removed, they are likely to have been compromised severely.

Figure 2-5: Stage 1 Identification of Archeological Potential within Study Area

2.5 Natural Environment

LGL Limited undertook a natural heritage review of the study area. The existing environmental conditions and features are summarized in the section below. The study area is currently within a highly urbanized environment with disturbed vegetation, park areas and street trees. This section provides a summary of the natural heritage assessment, while the full report can be found in **Appendix C.**

Aquatic Habitats and Communities

Based on review of Ontario Base Map 30M-11 and Toronto and Region Conservation Authority subwatershed mapping, it was identified that there are no watercourses located within the study area. This needs to be confirmed once TRCA data is received.

Vegetation and Vegetation Communities

Vegetation and vegetation communities within the study area are highly disturbed. The vegetation communities generally contain a high proportion of invasive and non-native plant species. The Natural vegetation is limited to a small deciduous forest community and within the City of Toronto park system. A total of 708 street trees, comprised of 67 different species are located within the main study area. Of the identified species within the study area, 3 Kentucky coffee trees were noted. Kentucky coffee trees are regulated as Threatened under Ontario *Endangered Species Act* and the Canada *Species at Risk Act.* These trees were likely planted by the City of Toronto as streetscape features. According to previous correspondence with Mr. Bohdan Kowalyk (MNRF Aurora District Forester), streetscape Kentucky coffee trees are not considered within the context of the *Endangered Species Act.*

Wildlife and Wildlife Habitat

Habitat within the study area is highly disturbed by urban activity, as natural areas are limited to parks with manicured gardens and trees and a small deciduous forest community south of the Keele Street and Lavender Road intersection. Wildlife present in the study area will generally be common to the urban areas due to their adaptation to human activities and noise. A field investigation was conducted on November 26, 2013 to confirm the presence/absence of Barn Swallow nests under the CN Rail Bridge located on St Clair Avenue West just east of Keele Street. No Barn Swallow nests were noted during LGL's field investigation and it was determined the bridge structure does not provide suitable nesting habitat for Barn Swallow.

Designated Natural Areas

A portion of the study area directly south of Keele and West of Turnberry is within the City of Toronto's Ravine and Natural Feature Protection (RNFP) By-law limits directly south of Keele and West of Turnberry. Removal of vegetation from within this area will require a permit from City of Toronto Urban Forestry.

Based on the preliminary existing conditions review, there have been no significant natural heritage features identified within the study area. This will be confirmed in the next stage of the study as TRCA data and detailed drawings of the proposed options are made available.

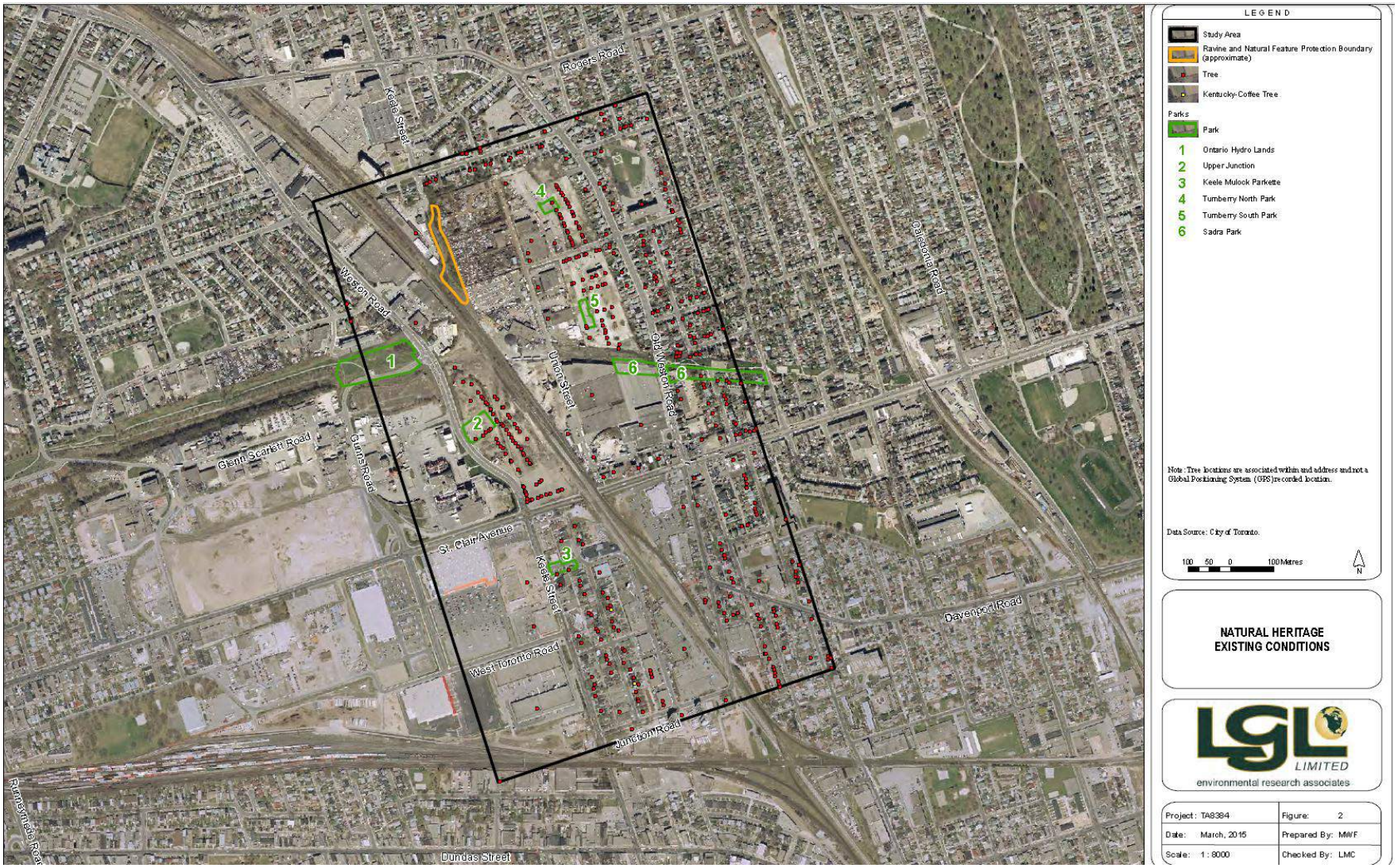


Figure 2-6: Natural Heritage Existing Conditions

2.6 Transportation

2.6.1 Network

For the purposes of the transportation assessment the Extended Study Area has been considered. As previously noted it is bounded by Humber Boulevard North and Rogers Road to the north, Caledonia Road and Lansdowne Avenue to the east, Dundas Street West and Dupont Street to the south and Runnymede Road and Rockcliffe Boulevard to the west. Road classifications are determined based on the City of Toronto's 2012 Road Classification System. The roadways are summarized into three generic classifications; arterials, collectors and local roads. Arterials facilitate large volumes of vehicle progression with limited access. Collector roads have a moderate capacity, which serve to progress vehicles from local streets to the arterial networks, while local roads primarily serve to provide access to adjacent properties.

The following sections provide detail characteristics of each roadway located within the study area. Internal links which operate within the study area are summarized in **Figure 2-7.**

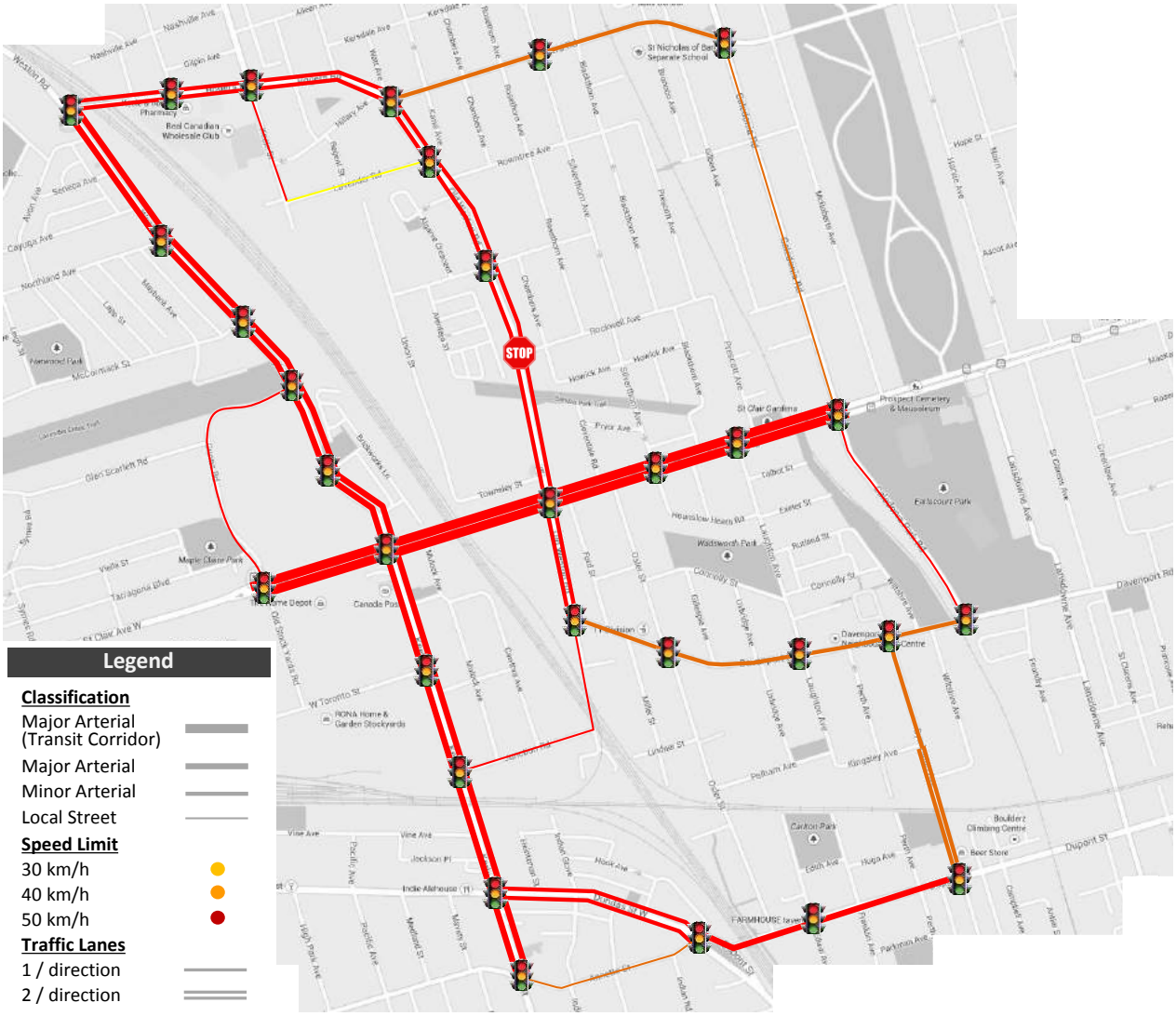


Figure 2-7: Study Area Road Network

Arterial Roads

St. Clair Avenue West is a major arterial road crossing the study area from east to west. It has a designated Right-of-Way (ROW) width of 30m with a 4-lane cross-section for most of its length, with a dedicated streetcar ROW in the middle of the road. Between Weston Road / Keele Street and Old Weston Road, St. Clair Avenue West narrows to a 2-lane cross-section with centre streetcar lanes.

Weston Road / Keele Street is a major north-south arterial road. It operates as a 4-lane road in a designated 20-m ROW. It includes a two-way centre left-turning lane between Gunn's Road and St. Clair Avenue West.

Dundas Street West is an arterial road crossing the south-west corner of the study area from west to south. It operates in a designated 20-m ROW, with a 4-lane cross-section. West of Keele Street it is designated as a major arterial, while east of Keele Street it becomes a minor arterial. It includes on-street parking during off-peak hours.

Rogers Road is an east-west minor arterial road. It operates in a designated 20-m ROW, with a 4-lane section between Weston Road and Old Weston Road, and with a 2-lane cross-section east of Old Weston Road.

Old Weston Road is a minor north-south arterial road, operating in a designated 20-m ROW. It has a 4-lane cross-section between Rogers Road and Davenport Road, and terminates as a 2-lane road at Junction Road.

Dupont Street is a minor east-west road initiating at Keele Street, and operating in a designated 20-m ROW with a 2-lane cross-section throughout the study area. It includes on-street parking in both directions for most of its length.

Caledonia Parkway is a minor north-south arterial road terminating at Davenport Road. It operates in a designated 20-m ROW with a 2-lane cross-section.

Davenport Road is a minor east-west arterial road initiating at Old Weston Road. It operates in a designated 20-m ROW with a 2-lane cross-section and on-street parking.

Collector Roads

The study area includes a number of short collector roads that provide additional connections between the arterial roads presented above. Most noteworthy are:

Gunn's Road is a collector road with a 2-lane cross-section that provides a by-pass to the Weston Road / Keele Street and St. Clair Avenue West intersection.

Junction Road is a short collector road with a 2-lane cross-section that functions as the termination of Old Weston Road. It provides the closest alternative railway crossing to St. Clair Avenue West. It is important to note that at the time of the study, Junction Road was closed for construction. The construction related to the West Toronto Diamond Grade Separation project required Junction Road to be closed for extended periods over the 3.5 years following May 2011.

Local Roads

Numerous local roads are present within the study area. Typically, local roads have the lowest capacity and are used only to service the adjoining land uses.

The lane configurations and turn restrictions in place on the study area road network are illustrated in **Figure 2-8**.

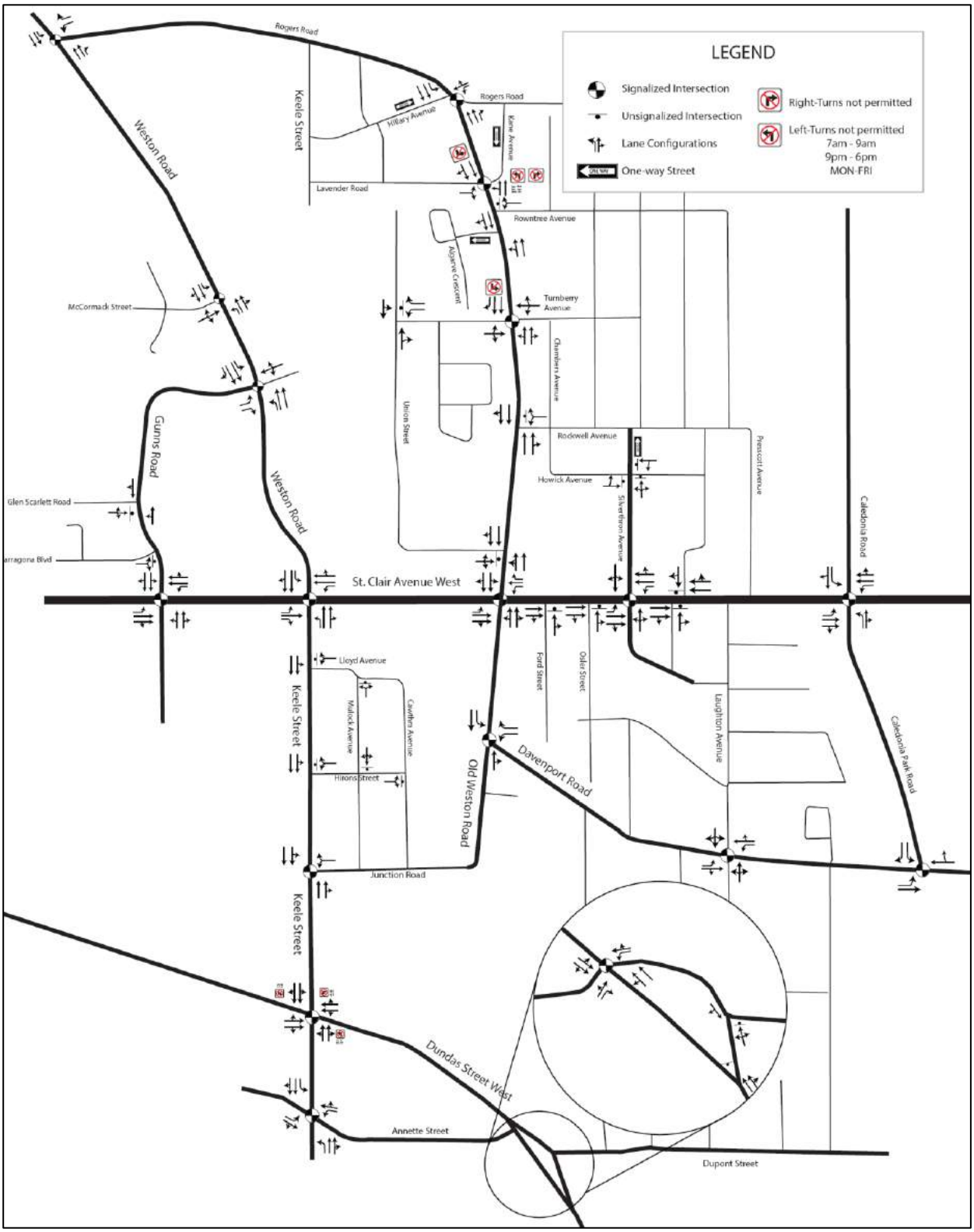


Figure 2-8: Intersection Lane Configuration

2.6.2 Existing Traffic Conditions

Travel Times

In order to derive an adequate understanding of vehicular circulation through the study area, we conducted travel time surveys during a weekday AM peak period, using test vehicles equipped with GPS tracking units. Each route was travelled several times in both directions in order to capture travel times across the full peak period. The average observed vehicular travel times are summarized in **Table 2-3**. These travel times are subsequently used to validate the transportation model.

Segment		Observed TT		
		Min - SD	Avg.	Max + SD
St. Clair Avenue West, between Gunns Road to Caledonia Park Road	EB	0:03:51	0:05:27	0:07:02
	WB	0:04:43	0:05:03	0:05:22
Keele Street, between Rogers Road to Dundas Street	SB	0:06:16	0:07:30	0:08:41
	NB	0:05:50	0:07:21	0:08:51
Old Weston Road, between Keele Street and Caledonia Park Road	SB	0:07:42	0:08:02	0:08:22
	NB	0:08:50	0:09:28	0:10:07

Table 2-3: Travel Times Surveyed on the Road Network

Traffic Volumes

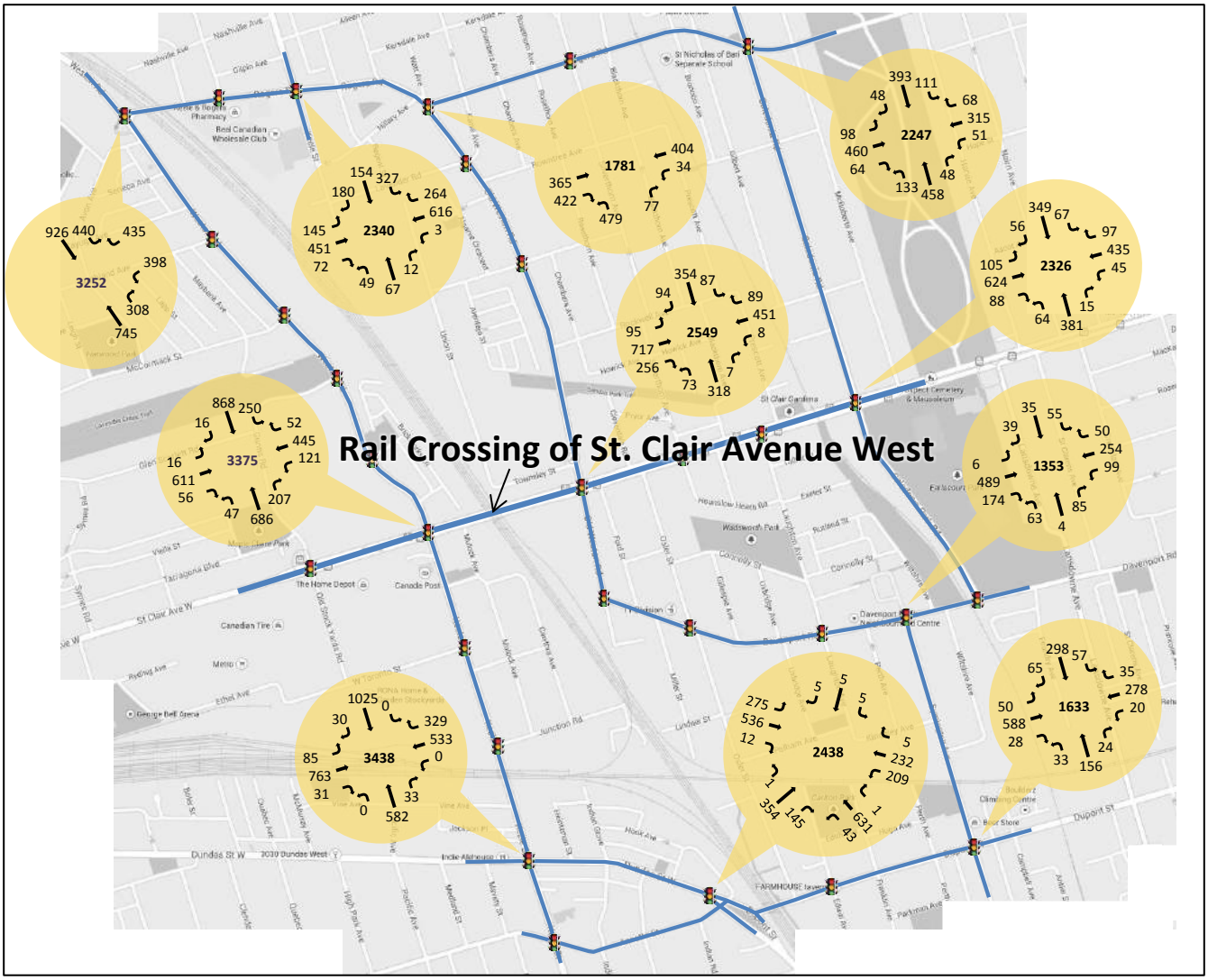
Existing turning movement volumes within the study area are derived from turning movement count (TMC) data collected by LEA and procured from the City of Toronto. All counts used in the analysis were collected no later than 2011. The AM peak hour occurs between 8:00 AM and 9:00 AM. The intersection TMC data used is summarized in **Table 2-4**.

At the time of this study, Junction Road was closed between Old Weston Road and Keele Street for the construction of the rail grade separation between the CP tracks and the Metrolinx GO tracks. As noted, Junction Road was required to be closed for extended periods over the 3.5 years following May 2011. Specifically, beginning in May 2011 Junction Road was closed until August 31, 2012 and then reclosed between January 26, 2013 to December 1, 2014. Since the TMC data reflects a disconnected Junction Road, our analysis was adjusted to account for Junction Road's re-opening in early 2015.

Intersection	Source	Date
Keele St. and Lavender Rd.	LEA Consulting Ltd.	2014-Oct-8
Old Weston Rd. and Lavender Rd. / Kane Ave.	LEA Consulting Ltd.	2014-Oct-8
Union St. and Turnberry Ave.	LEA Consulting Ltd.	2014-Oct-8
Old Weston Rd. and Turnberry Ave.	LEA Consulting Ltd.	2014-Oct-14
Old Weston Rd. and Rockwell Ave.	LEA Consulting Ltd.	2014-Oct-14
St. Clair Avenue West and Old Weston Rd.	LEA Consulting Ltd.	2014-Oct-14
Old Weston Rd. and Davenport Rd.	LEA Consulting Ltd.	2014-Oct-14
Weston Rd. and Gunns Rd	LEA Consulting Ltd.	2014-Oct-15
St. Clair Avenue West and Gunns Rd.	LEA Consulting Ltd.	2014-Oct-15
St. Clair Avenue West and Weston Rd./ Keele St.	LEA Consulting Ltd.	2014-Oct-15
Keele St. and Lloyd Ave.	LEA Consulting Ltd.	2014-Oct-16
Keele St. and W. Toronto St.	LEA Consulting Ltd.	2014-Oct-16
Keele St. and Hirons St.	LEA Consulting Ltd.	2014-Oct-16
Keele St. and Junction Rd.	LEA Consulting Ltd.	2014-Oct-16
Keele St. and Dundas St.	City of Toronto	2012-Nov-15
Annette St and Dundas St/ Dupont St./ Keele St	City of Toronto	2011-Feb-16
Dupont St. and Symington Ave	City of Toronto	2011-Feb-15
Davenport Rd. and Symington Ave	City of Toronto	2011-Oct-7
St Clair Ave W. and Caledonia Rd	City of Toronto	2012-Nov-15
Weston Rd and Rogers Rd	City of Toronto	2012-Nov-15
Old Weston Rd. and Rogers Rd.	City of Toronto	2012-Nov-15
Rogers Road and Black Creek Mall Access	City of Toronto	2013-Apr-17
Weston Road and McCormack	City of Toronto	2010-Sep-11
St. Clair Avenue West and Laughton Ave	City of Toronto	2011-May-4
Davenport Rd and Osler St.	City of Toronto	2012-Oct-1
Davenport Rd. and Laughton Ave	City of Toronto	2012-Nov-12
Dupont St and Edwin Ave	City of Toronto	2012-Apr-3
Keele St. and Annette St	City of Toronto	2011-Feb-8
Weston Road and Birdstone Crescent (North)	City of Toronto	2013-Apr-24
Weston Road and Birdstone Crescent (South)	City of Toronto	2013-Apr-24
Rogers Road and Silverthorne	LEA Consulting Ltd.	2015-Oct-2
Rogers Road and Caledonia Rd	LEA Consulting Ltd.	2015-Oct-2

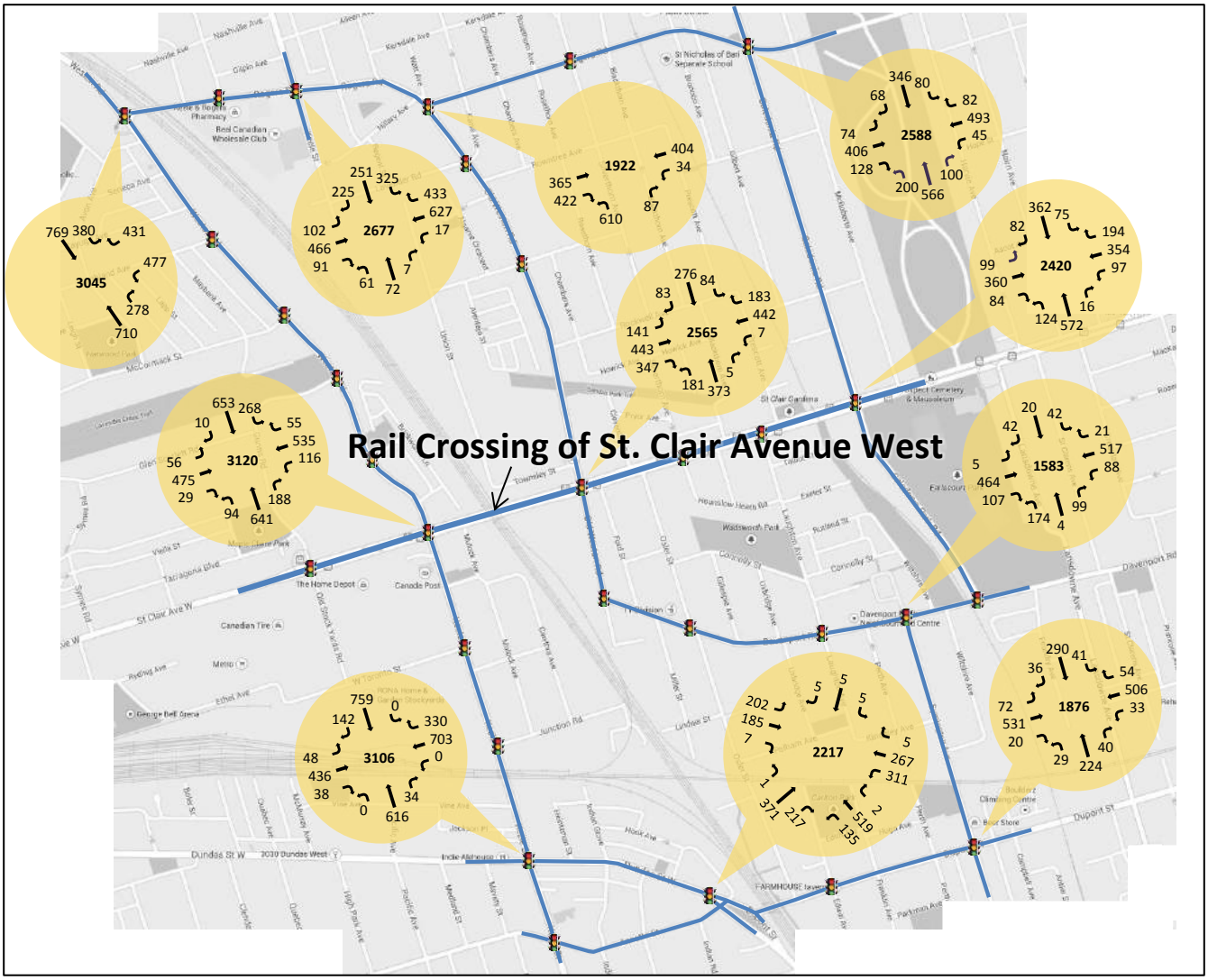
Table 2-4: Traffic Movement Counts considered for report

The TMC data shows that the study area experiences significant north-south volumes along Weston Road / Keele Street, and high east-west volumes along St. Clair Avenue West. This flow conflicts with significant southbound-left movements during the weekday AM peak hour, and northbound-left movements during the weekday PM peak hour.



Note: Base traffic conditions were observed prior to December 2014

Figure 2-9: Existing (Fall 2014) Traffic Volumes Weekday AM Peak Hours



Note: Base traffic conditions were observed prior to December 2014

Figure 2-10: Existing (Fall 2014) Traffic Volumes Weekday PM Peak Hours

2.6.3 Travel Behaviour

A review of the travel patterns through the study area was carried out using travel data from the 2011 Transportation Tomorrow Survey (TTS). The 2011 TTS data is the latest dataset available to the public through the University of Toronto Data Management Group database.

The destination of trips produced in the peak morning period (for all purposes) according to the zoning system defined in the Transportation Tomorrow Survey 2011 Data Guide (**Figure 2-11**). To simplify the assessment, planning districts are grouped as following:

- Downtown Toronto (PD 1);
- Study area, bounded by Eglinton Avenue West, Dufferin Street, Bloor Street and Jane Street;
- Planning Districts 2 and 3 of the City of Toronto, which are the closest to the study area;
- Other Planning Districts within the city of Toronto;
- Outside of Toronto.

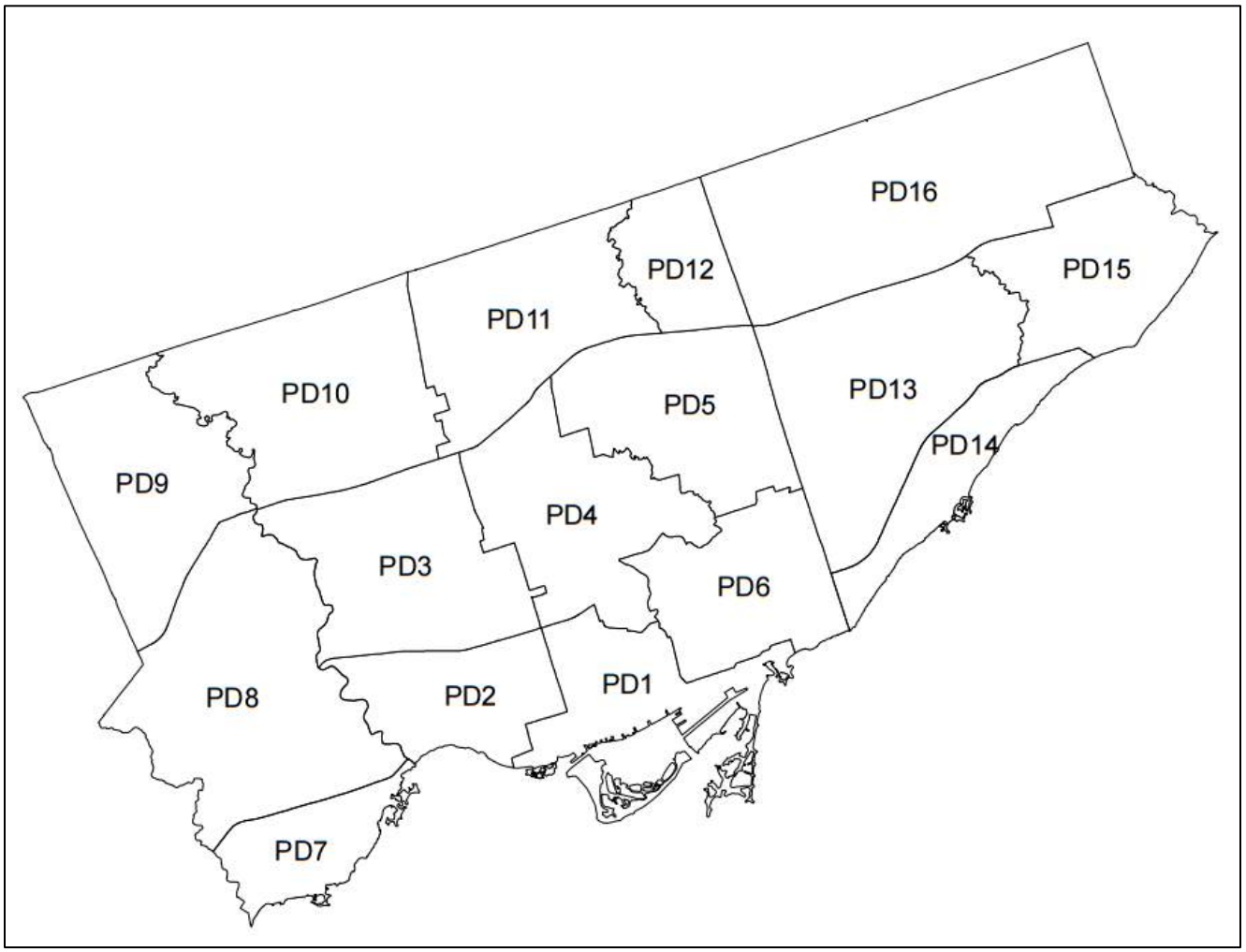


Figure 2-11: Transportation Tomorrow Survey Planning District (PD) Map for the City of Toronto

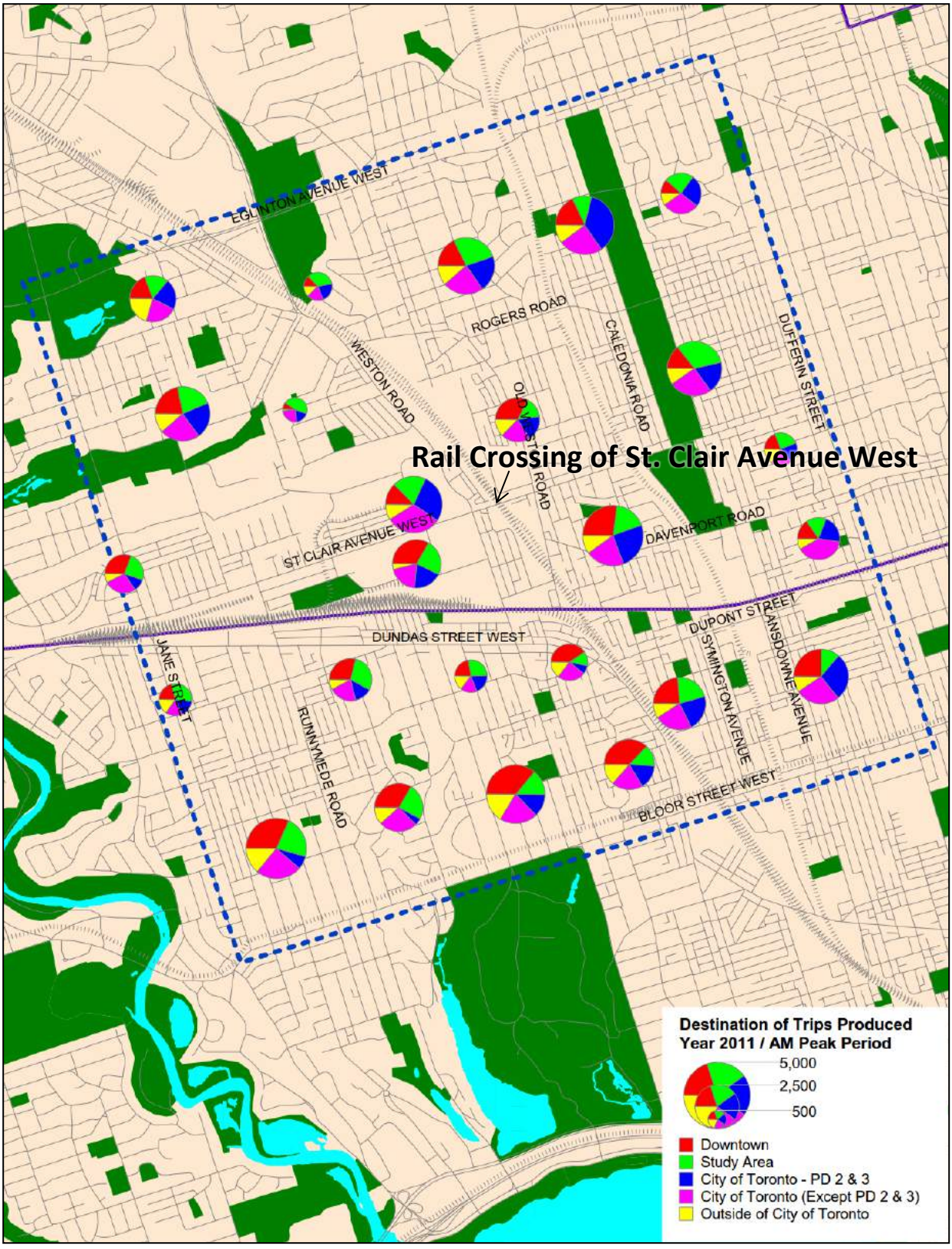
Overall the data shown in **Figure 2-12** indicates that the majority of trips produced in the study area during the weekday AM peak period are destined locally (within the City of Toronto). Over 25% of all of these trips are destined to Downtown Toronto, while 21% of trips remain within the study area, and 19% are destined to the rest of the two planning districts covering the Junction area. Only 11% of trips produced in the study area during the weekday AM peak period are destined outside of the City of Toronto.

At the same time, the TTS data shows that the majority of trips produced in the study area during the weekday AM peak period are made primarily by car (53% of trips). In contrast, 37% of trips are made by transit, and only 11% of trips are made through active modes of transportation like walking and cycling (see **Figure 2-13**). The relatively high proportion of transit trips is explained by the good public transit service available in the area.

The trip destination and mode choice data is summarized in **Table 2-5**.

O\D	Downtown (PD 1)	Study Area	City of Toronto PD 2 & 3	City of Toronto Other PD	Out of City of Toronto	Total	
Auto	4,344	7,651	7,982	9,107	7,002	36,086	53%
Transit	11,625	1,637	3,810	7,160	815	25,047	37%
Active	935	5,040	1,383	103	24	7,485	11%
Total	16,904	14,328	13,175	16,370	7,841	68,618	
	25%	21%	19%	24%	11%		

Table 2-5: TTS 2011 Trip Production Summary during the AM Peak Period



Note: includes all trip purposes

Figure 2-12: Destination of Trips Produced by the Study Area / 2011 AM Peak Period

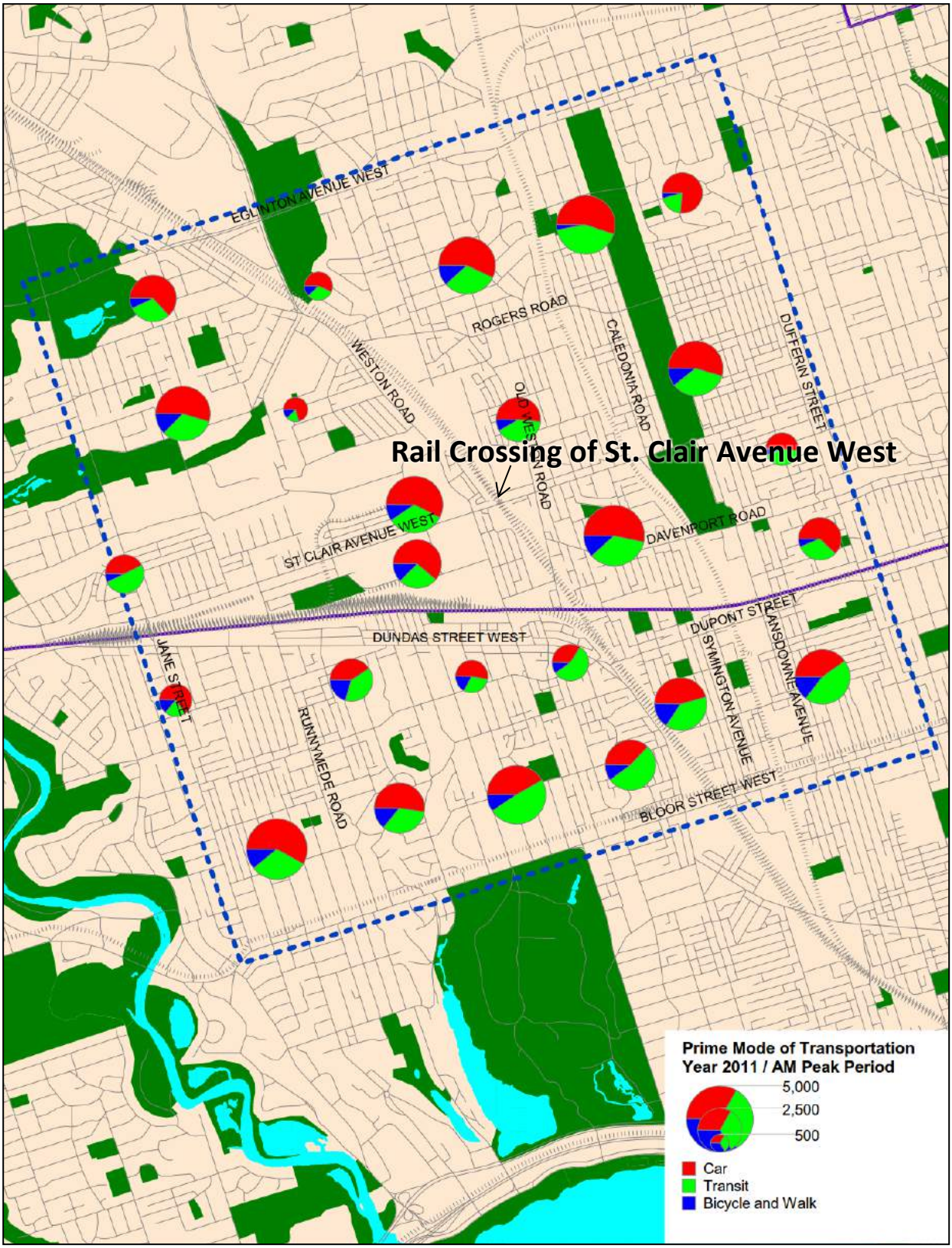


Figure 2-13: Mode Choice of Trips Produced by the Study Area / 2011 AM Peak Period

2.6.4 Public Transit

The study area is currently well serviced by TTC local bus and streetcar transit routes. Six bus routes operate in mixed traffic, and one streetcar route operates in a dedicated right of way. **Figure 2-14** shows all transit routes within and surrounding the study area and **Table 2-6** provides additional details for these routes. The 512 St. Clair streetcar provides a protected right-of-way and direct connections to St. Clair Subway Station and St. Clair West Subway Station along the Yonge-University Subway (Line 1), allowing for travel to downtown in about 40 minutes.

Figure 2-14: Current Public Transit Network in the Study Area

Transit Line	Description	Weekday Service Frequency (Trips/h)		
		AM	PM	Midday
512 St. Clair	Streetcar along St. Clair Avenue West from Gunns Road to Yonge Street	21 / dir	19 / dir	13 / dir
41 Keele	Bus running on or parallel to Keele Street from York University to Keele Station	10 / dir	10 / dir	7 / dir
168 Symington	Bus running along Syminton Avenue between Weston Road and Dundas West Station	13 / dir	10 / dir	6 / dir
89 Weston	Bus running along Weston Road from Albion Road to Keele Station	13 / dir	8 / dir	7 / dir
161 Rogers Rd	Bus running along Rogers Road and Dovercourt Road between Jane Street and Ossington Station	6 / dir	6 / dir	4 / dir
127 Davenport	Bus running along Davenport Road from St Clair Avenue West to Spadina Station	4 / dir	3 / dir	3 / dir
71A Runnymede	Bus running Along St Clair Avenue West and Runnymede Road between the Gunns Loop and Runnymede Station	3 / dir	3 / dir	3 / dir

Note: Transit Frequencies are based on the TTC's March 29, 2015 Scheduled Service Summary

Table 2-6: Existing Public Transit Services

2.6.5 Active Transportation

In addition to being well serviced by public transit routes, the study area also accommodates a number of active transportation facilities that tie the area to the city's broader active transportation network. **Figure 2-15** summarizes the active transportation network. It is noteworthy that there are painted separated bike lanes along the entire stretch of Annette Street, Dupont Street, and Davenport Road within our study area, as well as along Rogers Road from Old Weston Road to the eastern limit. There are also three recreational bike trails (Lavender Creek Trail, Sandra Park Trail, and the West Toronto Railpath) which typically follow the hydro/rail corridors through the study area. Sidewalks are present on both sides of the road along all major and minor arterials within the study area. All local roads within the study area provide sidewalks on at least one side of the street. Sidewalks along St. Clair Avenue West are typically wider than the other areas. Streetcar stops along St Clair Avenue West are located in the center of the right-of-way, providing a protected and partially covered waiting area for transit riders.

There are six (6) Pedestrian Crossovers (PXO) containing amber flashing beacons within the study area. The locations of these pedestrian crossovers are summarized below:

- Dundas Street West, at Indian Road Crescent
- Annette Street, at Indian Road Crescent
- Dupont Street, at Perth Avenue
- Caledonia Road, at Norman Avenue
- Caledonia Road, at Innes Avenue
- Rogers Road, at Bronco Avenue.

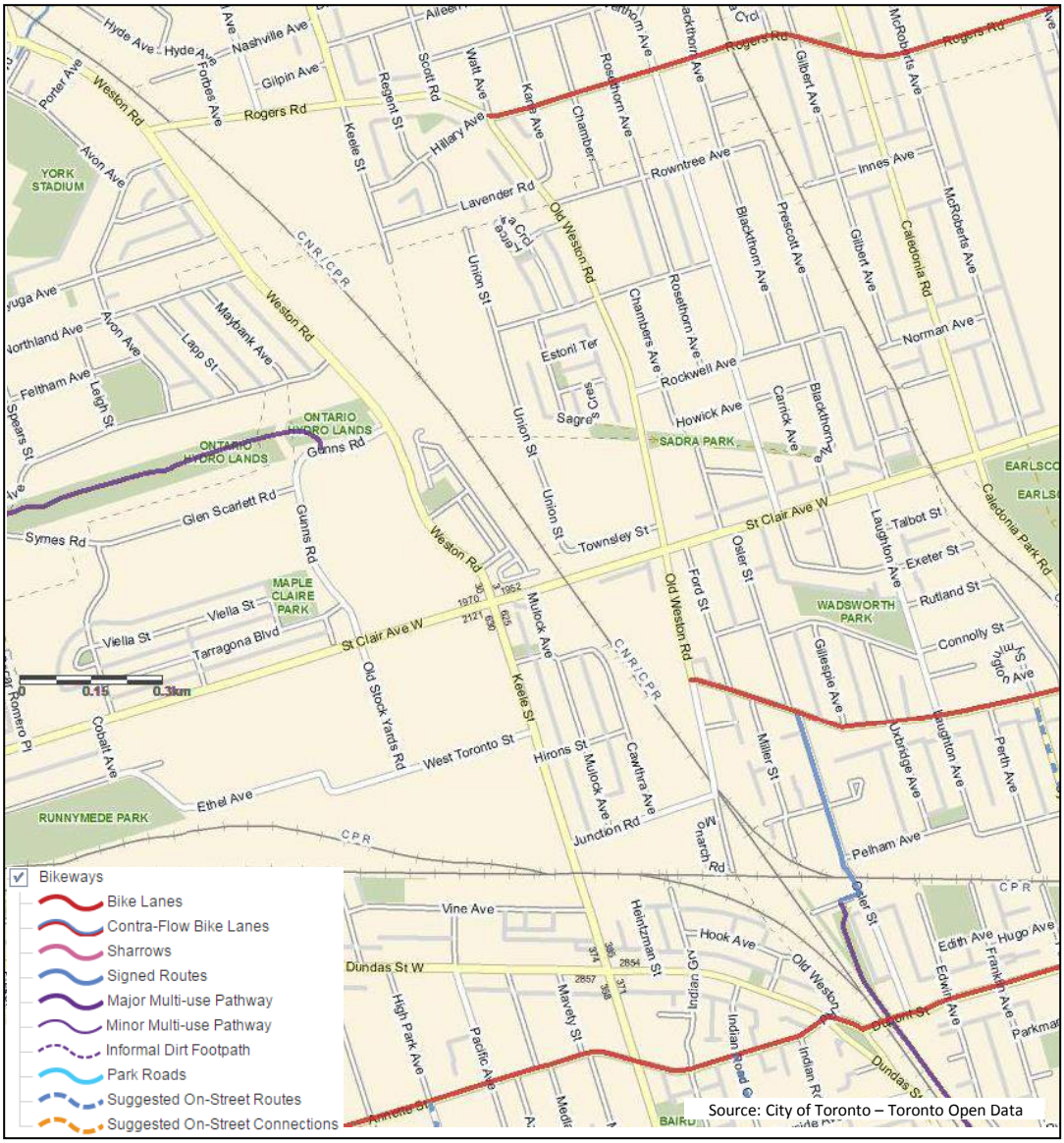


Figure 2-15: Current Active Transportation Network

2.6.6 Parking

On-street parking is allowed on most local roads within the study area, as well as along sections of Rogers Road, Davenport Road and Dupont Street West. Additional on-street parking exists along St Clair Avenue West between Old Weston Road and the eastern limit of the study area during the off-peak direction during the weekday AM and PM peak periods. The presence of on-street parking was incorporated into the calibration process of the mesoscopic transportation model.

3.0 Transportation Modelling

In order to assess traffic operations in the study area under existing and future conditions, a transportation model was developed. An existing model was first built to replicate existing travel patterns through the study area, and subsequently used to forecast travel patterns to the 2031 horizon. This section presents the methodology used to develop the model.

3.1 Methodological Approach

The modelling exercise consisted of a two-level approach.

- The City of Toronto regional Emme Model was first of all used to forecast traffic through the study area at a regional scale, based on population and employment forecasts;
- A mesoscopic Aimsun model relying on Dynamic Traffic Assignment (DTA) was subsequently produced to assign the forecasted traffic through the study area, to allow operational assessment of the study area transportation network.

This approach is summarized in **Figure 3-1.**

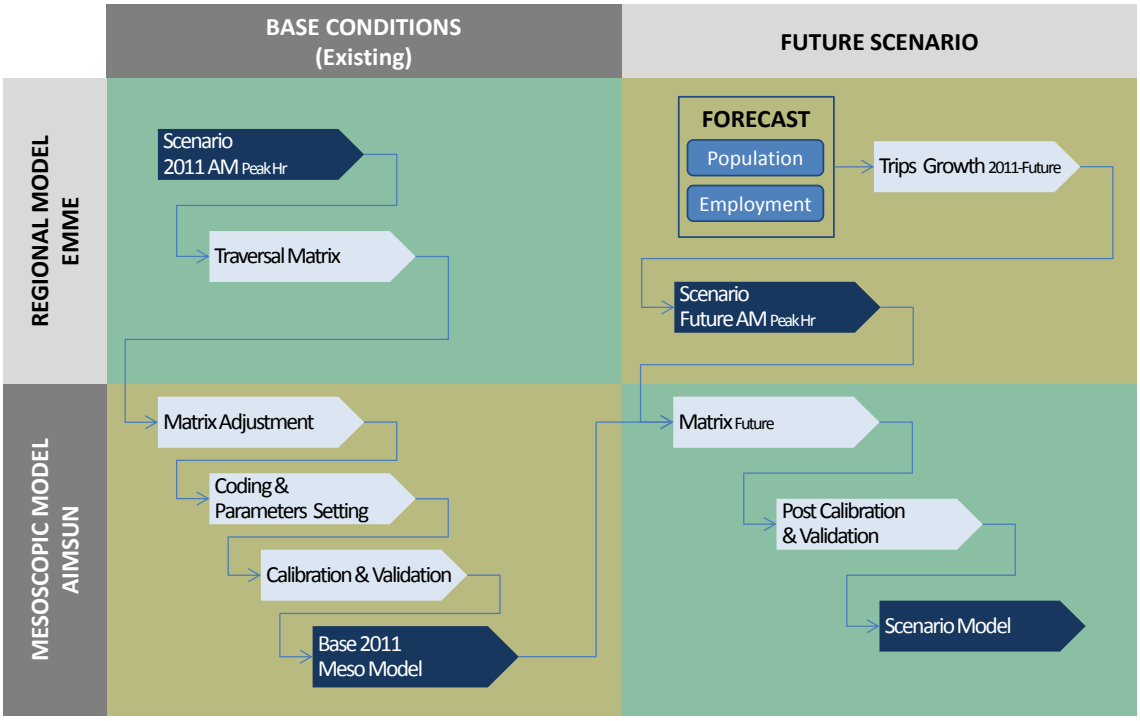


Figure 3-1: Transportation Modelling Framework

According to the DTA primer published by the Transportation Research Board in 2011, operational planning for assessing improvements on the transportation networks such as changes of roadway configuration, HOV lanes, integrated corridor improvements, transit priority and travel demand management strategies, is best carried out through DTA modelling.

Modelling at a regional scale presents a problem in that the framework is not sensitive to congestion at the local, microscopic level (intersections). Since the study area model had to be sensitive to congestion (delays and queues) at the intersection level, the development of a mesoscopic model was more appropriate.

The interface between the outputs of the regional Emme model and the mesoscopic Aimsun model was achieved through the extraction of traversal matrices comprising the edges of the study area and transportation zones within this area. These traversal matrices form the inputs travel demand feeding the mesoscopic Aimsun model.

3.2 Regional Model

The regional model developed by the City of Toronto is only for the morning peak period (6 to 9 AM) and generates traffic forecasts for the peak hour.

Figure 3-2 shows the transportation network defined in the strategic model for the extended study area (comprised within Jane Street, Eglinton Avenue, Dufferin Street and Bloor Street) that takes into account the zonal system used for the Transportation Tomorrow Survey (TTS). It also shows the gates considered for vehicles entering or exiting the extended study area.

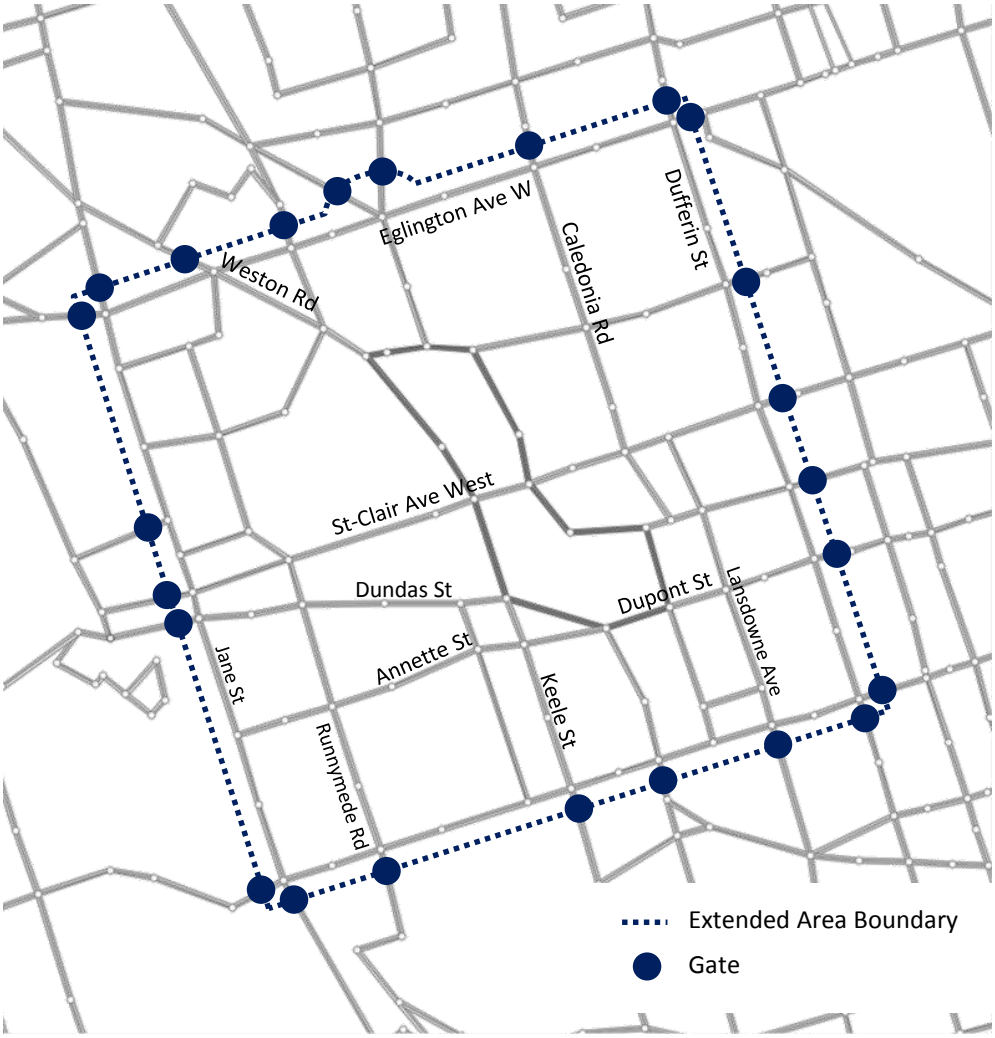


Figure 3-2: City of Toronto Emme Model / Network of the Extended Study area

3.3 Study Area Mesoscopic Model

3.3.1 Mesoscopic Aimsun Model Network

As mentioned before, the connection between the City of Toronto strategic model (Emme) and the mesoscopic model (Aimsun) is through traversal matrices (comprising the edges of the study area and transportation zones within this area) produced in Emme and feeding the Aimsun mesoscopic model.

Figure 3-3 shows the network modelled in Aimsun that considers all road characteristics (classification, speed, lane utilization, transit services, signal timings, etc.)

Figure 3-3: Network modelled at Mesoscopic Level

It is important to note that the traversal matrix generated by the City of Toronto strategic model is adjusted to properly match the zones at the mesoscopic level as well as the counted volumes, both at gates and major arterial road intersections. A module in Aimsun allows adjustments by taking into account the network physical characteristics.

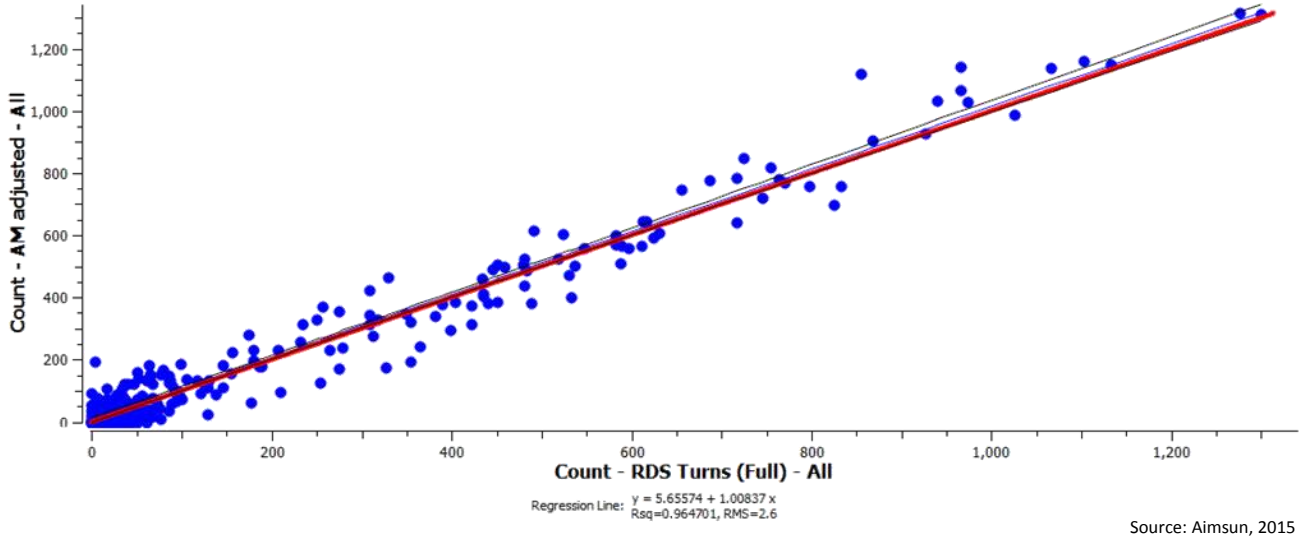
3.3.2 Model Calibration and Validation

Validation and calibration of the mesoscopic model are performed based on recent turning movement counts and travel time surveys to ensure adequate representativeness of simulations in regard to the situation observed. Once validated and calibrated, the area model developed on Aimsun serves as the Baseline to evaluate effects of growth scenarios and road improvements.

The following sections show the representativeness of the model by comparing with actual observations.

3.3.3 Turning Movement Volumes

The graph below (**Figure 3-4**) shows the relationship between turning volumes simulated (Y axis) and counted (X axis). The linear regression curve generated demonstrates that the mesoscopic model reproduces well the situation observed in term of turn volumes given $R^2 > 0.9$.



Source: Aimsun, 2015

Figure 3-4 Mesoscopic Model / Linear Regression / Turning Movement Volumes at major intersections / AM Peak

The GEH Statistic is a formula used to compare two sets of traffic volumes. The formula for the "GEH Statistic" is:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Where

M is the hourly traffic volume from the traffic model

C is the observed hourly traffic count.

A GEH of less than 5.0 is considered a good match between the modelled and observed hourly volumes while a GEH under 10 of 5.0 to 10.0 may warrant investigation but is still satisfactory if it applies to only a few cases. The objective is that close to 85% of the volumes in the mesoscopic model have a GEH less than 5.0.

The results presented in **Table 3-1** demonstrate that the model is well calibrated with respect to the traffic volumes.

GEH	Major Arterial Intersections
Under 5	83%
Between 5 and 10	100%

Table 3-1: Mesoscopic Model / Validation of Turning Movement Volumes / GEH / AM Peak

3.3.4 Travel Time

As is the case in common practices, the proposed approach to validate travel times is to target the average modelled journey time within 15% or one minute of average observed journey time (observed) for full length of route. The model achieves that target closely, exceeding the observed travel times in only one case by a minor margin.

Table 3-2 shows that the vehicle travel times simulated in the mesoscopic model are representative of the surveyed times on the road network.

Segment		Observed TT			Simulated TT	Difference		Simulated TT within SD
		Min - SD (A1)	Avg. (A2)	Max + SD (A3)	(B)	Abs (B)-(A2)	% [(B)-(A2)]/(A2)	Yes or No?
St. Clair Avenue West, between Gunns Road to Caledonia Park Road	EB	0:03:51	0:05:27	0:07:02	0:04:55	0:00:32	10%	Y
	WB	0:04:43	0:05:03	0:05:22	0:04:59	0:00:04	1%	Y
Keele Street, between Rogers Road to Dundas Street	SB	0:06:19	0:07:30	0:08:41	0:08:00	0:00:30	7%	Y
	NB	0:05:50	0:07:21	0:08:51	0:07:05	0:00:16	4%	Y
Old Weston Road, between Keele Street and Caledonia Park Road	SB	0:07:41	0:08:02	0:08:22	0:09:25	0:01:23	17%	N
	NB	0:08:50	0:09:28	0:10:07	0:09:40	0:00:12	2%	Y

Table 3-2: Mesoscopic Model / Validation of Travel Times / AM Peak

3.4 Baseline Model

The validated and calibrated existing model was developed at a time when Junction Road was closed between Old Weston Road and Keele Street for the construction of the rail grade separation between the CP tracks and the Metrolinx GO tracks. Furthermore, at the same time of the turning movement count data gathering the Stockyards retail development was only 90% occupied. By the end of December 2014, Junction Road was re-opened following the completion of construction activity, and the Stockyards development was also fully occupied.

In order to reflect these changes from the existing conditions, a baseline scenario was developed, assuming the existing travel demand as estimated and validated in the mesoscopic model, and taking into account the fully open Junction Road and fully-occupied Stockyards development.

The baseline scenario therefore includes a full connection between Junction Road and Old Weston Road. Additionally all of the trips originating from and destined to the Stockyards development, at 1970-1980 St. Clair Avenue West on the northwest corner of the St. Clair Avenue West and Weston Road intersection, have been factored to reflect its full occupancy from an estimated 495,000 ft2 to 550,000 ft2. This was done using trip generation rates from the Institute of Traffic Engineers (ITE) Trip Generation Manual, 9th Edition, for Shopping Centres (Land Use Code 820). The resulting factor calculations are presented in **Table 3-3**.

ITE Rates LU 820	Size	AM			PM		
		In	Out	Total	In	Out	Total
		62%	88%		48%	52%	
Full Development	550,000 sq. ft.	273	168	441	901	976	1877
90% Development	495,000 sq. ft.	257	157	414	840	909	1749
Factor		1.062	1.07	1.065	1.073	1.074	1.073

Table 3-3: Stockyards Development Trip Factoring

It must be noted that the Target store that had opened at the Stockyards development has closed and liquidated its assets by the beginning of April 2015. It is understood that the large retail location vacated by Target will be occupied by a Best Buy store. It is therefore assumed that the travel demand generated by the Target store will still materialize with the Best Buy store as similar retail areas will be maintained.

The results of the mesoscopic Aimsun model trip assignment were subsequently used in the Synchro intersection capacity analysis software to assess operations at the major study area intersections.

For the weekday PM peak hour analysis, the surveyed PM peak hour volumes were adjusted to reflect the calibration process undertaken for the weekday AM peak hour Aimsun model. The adjustment was derived through the following formula:

$$Volume_{PM}^{Baseline} = Volume_{PM}^{Existing} + (Volume_{AM}^{Baseline} - Volume_{AM}^{Existing})$$

Figure 3-5 and **Figure 3-6** show the turning movement volumes and levels of service estimated for the Baseline Scenario during the weekday morning and evening peak hour respectively.

Figure 3-5: Baseline (2014) / Turning Movement Volumes and Levels of Service / AM Peak Hour

During the weekday AM peak hour, the intersection capacity analysis shows that overall most through movements at the signalized intersections in the study area operate with good levels of service, particularly on the arterial roads. The analysis does, however, indicate that there are some capacity constraints on the minor movements, due to the prioritization of the major movements at those intersections, and due to the heavy through volumes they experience.

Figure 3-6: Baseline (2014) / Turning Movement Volumes and Levels of Service / PM Peak Hour

Conditions during the weekday PM peak hour are generally the reverse of the weekday AM peak hour. We do note, however, that most signalized intersections in the study area generally operate at better levels of service than during the weekday AM peak hour.

4.0 Needs and Justification

This project's need and justification is developed out the identified operational constraints along St. Clair Avenue West in the vicinity of the rail corridor. Due to the rail corridor, the transportation network in the study area is characterized by a limited number of continuous east-west or north-south roads. Specifically, only Dupont Street, St. Clair Avenue West, Junction Road, and Rogers Road provide east-west connections across the rail corridor, with the only major arterial roads being Dupont Street and St. Clair Avenue West. Even north-south travel is affected, as Keele Street is discontinuous between Rogers Road and St. Clair Avenue West.

With the improvements to the eastbound operations at St. Clair Avenue West and Old Weston Road and the reopening of Junction Road improving the east-west traffic operations along St. Clair Avenue West, operational constraints have been identified associated with the high demand for turning vehicles at the intersections east and west of the rail corridor (Keele Street / Weston Road and Old Weston Road). With the forecasted growth in from the full retail and residential build-out of the stockyards, as well as the surrounding area, the congestion experienced for critical movements is expected to increase. While additional analysis with Junction Road open would be beneficial, is it not part of this study.

Considering a review of the study area transportation patterns, particularly the turning movements in relation to the limited crossings, there is an opportunity in this project to consider improving the operations along St. Clair Avenue West by broadening the road network in the surrounding area. Overall, there are three main travel flow patterns through the area that result in the high traffic demand along St. Clair Avenue West between Weston Road/Keele Street and Old Weston Road. The three main flow patterns are 1) east and west along St. Clair Avenue West 2) northwest and southeast and 3) northeast and southwest, as illustrated in **Figure 4-1** to **Figure 4-3**

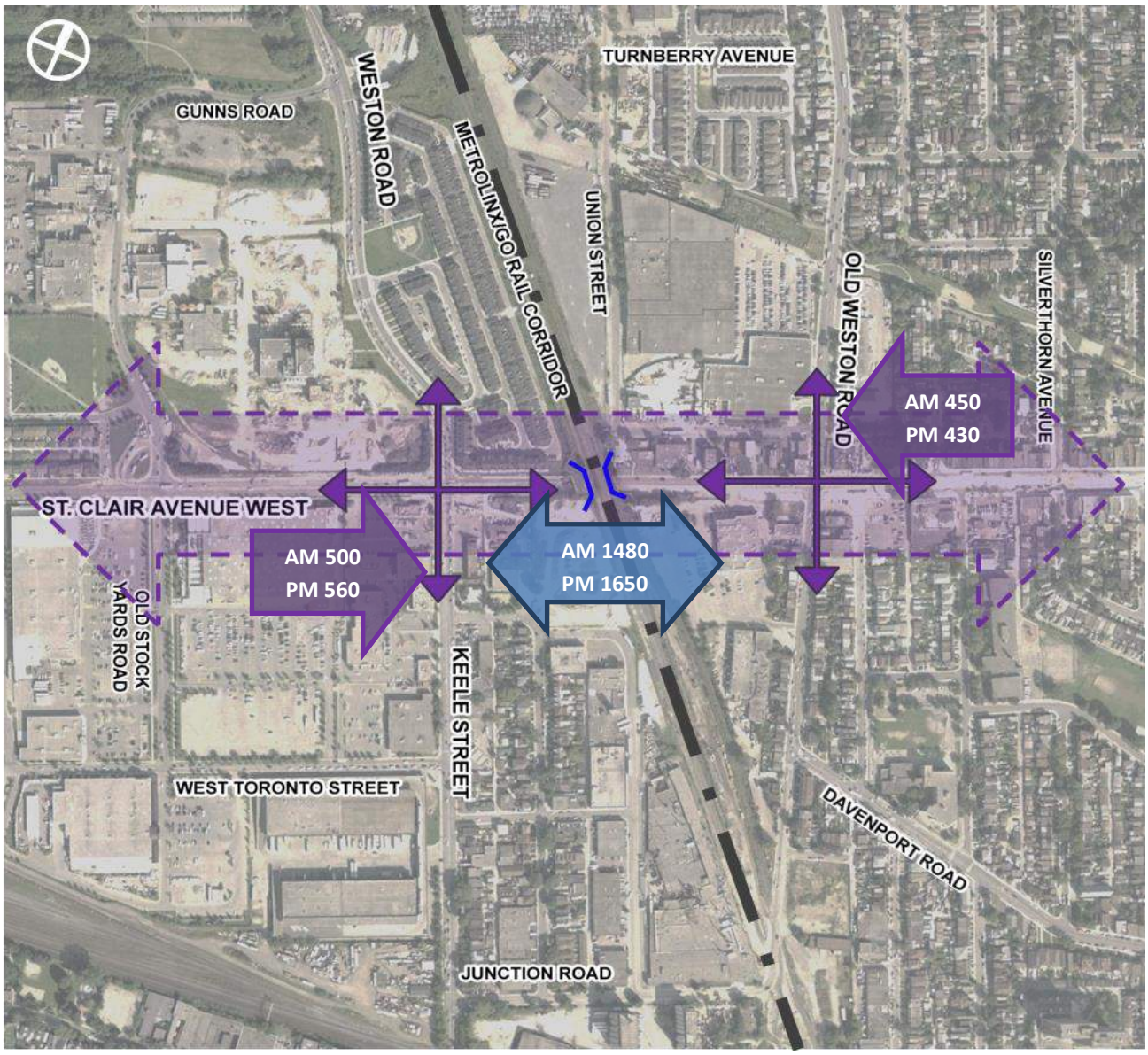


Figure 4-1: Eastbound and Westbound Traffic Patterns along St. Clair Avenue West

Existing traffic counts indicate that there are approximately 1480 and 1650 two-way vehicles that travel along St. Clair Avenue West between Keele Street and Old Weston Road during the weekday AM and PM peak hours, respectively. Approximately 500 to 600 of these vehicles come from the eastbound direction on St. Clair Avenue West, west of Keele Street, while approximately 450 westbound vehicles come from the westbound direction on St. Clair Avenue West east of Old Weston Road. The remainder of traffic that travels along this one-lane section of St. Clair Avenue West are observed to come from Keele Street and Old Weston Road corridors as shown in the subsequent figures.

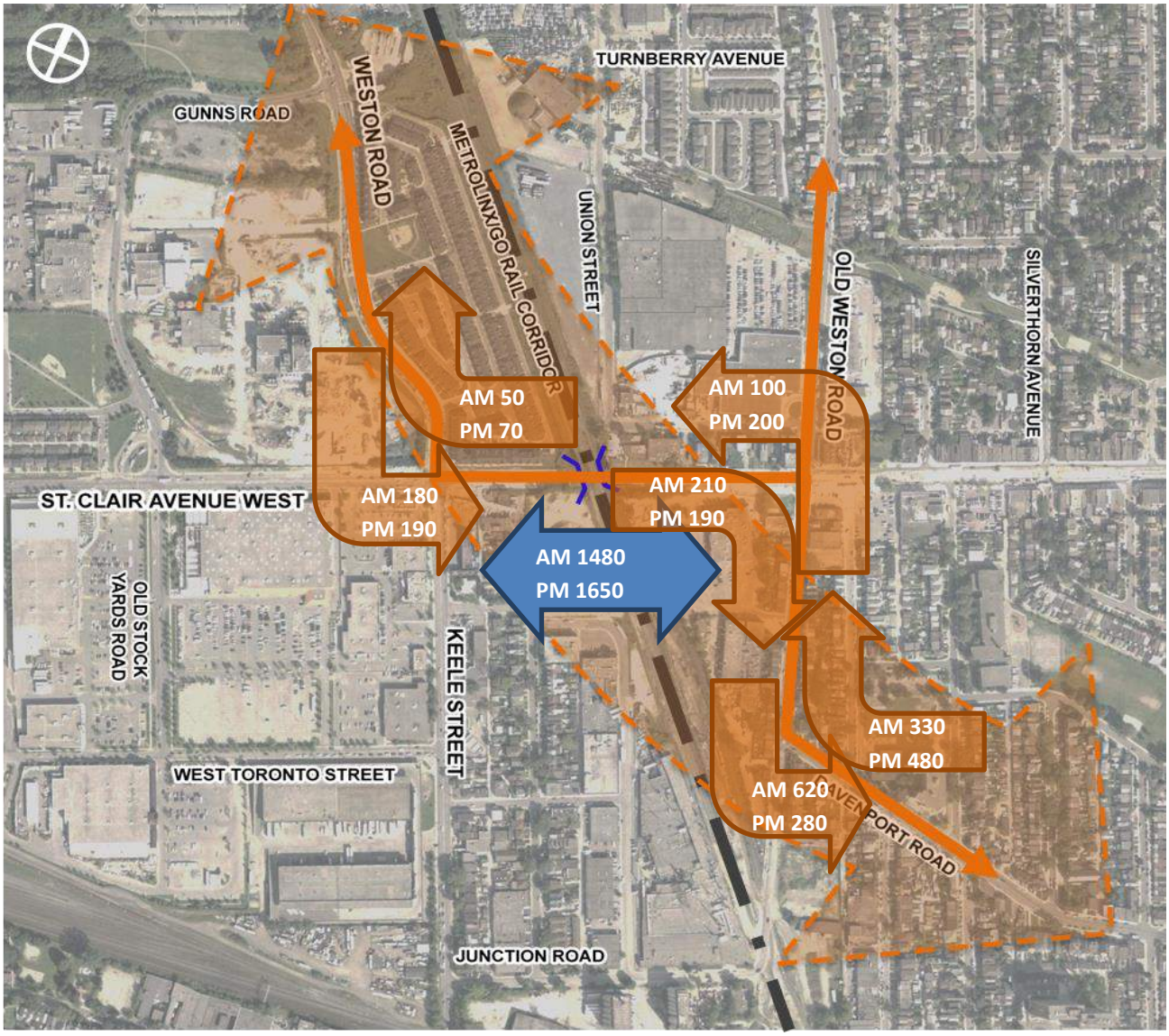


Figure 4-2: Northwest and Southeast Traffic Patterns in the Study Area

A northwest and southeast travel desire line is observed in the study area as Davenport Road serves as a key roadway connection to areas southeast of the study area and provides connection to major north-south arterials of Dufferin Street and Bathurst Street to the east which are key routes to Downtown Core. This trend is evident in the peak hour southbound left turn and eastbound right turn volumes at the intersection of Old Weston Road/Davenport Road.

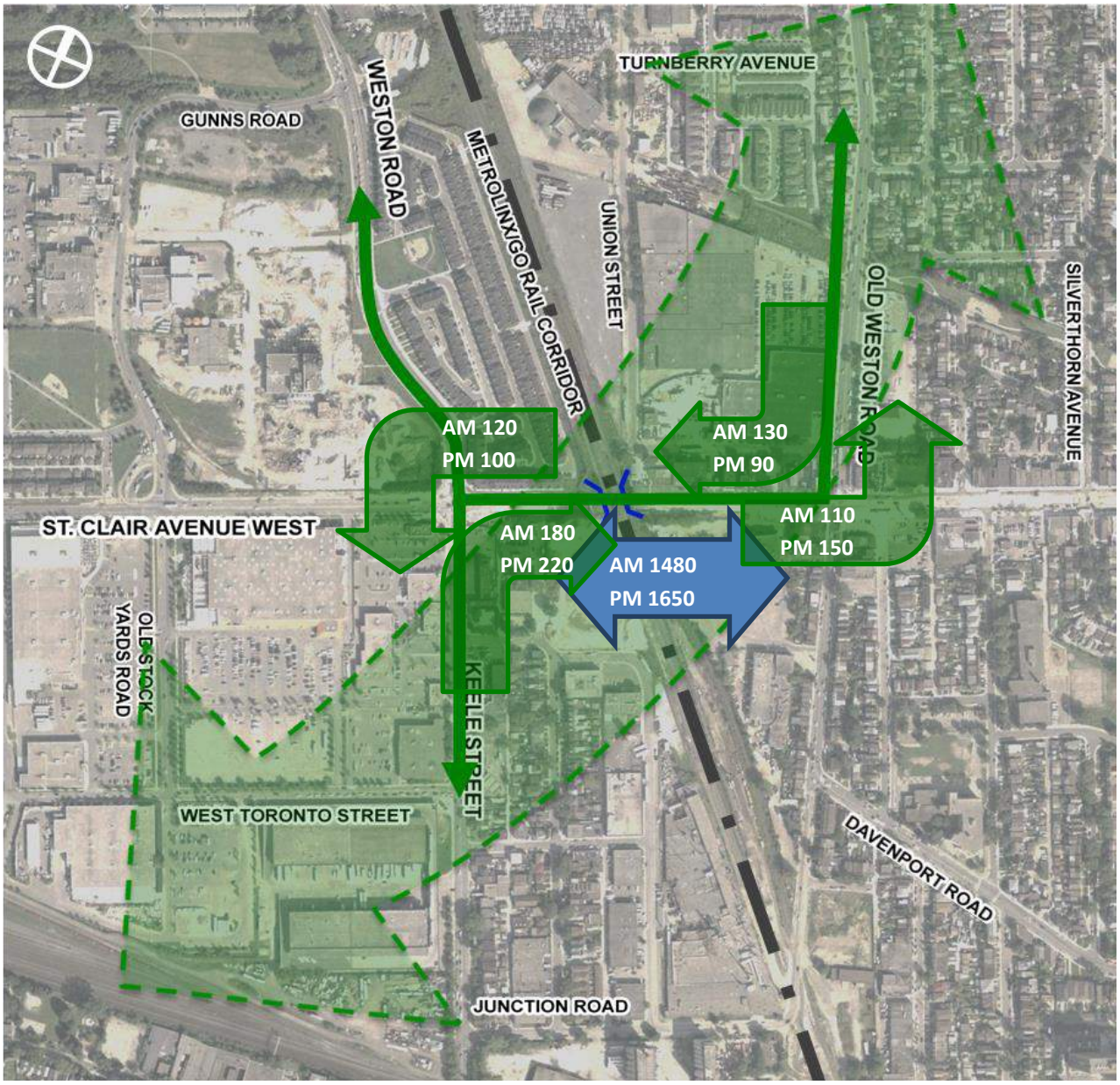


Figure 4-3: Traffic Pattern Northeast and Southwest along St. Clair Avenue West

A northeast and southwest travel desire line is also observed in the study area. Since Keele Street North terminates south of Rogers Road, the existing road network connection between Keele Street North and Keele Street south of St. Clair Avenue West can only be made via Rogers Road, Old Weston Road and St. Clair Avenue West or via Rogers Road and Weston Road.

As observed in the above travel patterns, the section of St. Clair Avenue West between Keele Street and Old Weston Road functions as a key roadway connection for many directions of travel to/from and through the study area. Considering the existing travel patterns and forecasted traffic growth, there is a need to consider long-term improvements that are needed to relieve this expected congestion. Further, with this study there is an opportunity to consider if there are any short-term modifications that with minor changes could be implemented to provide significant immediate benefits to the traffic operations in the study area. It is however

recommended that additional existing analysis be conducted to analyze the traffic conditions incorporating the improvements at the St. Clair Avenue West and Old Weston Road intersection as well as the opening of Junction Road to demonstrate for the need and impact of the modifications.

5.0 Short-Term Alternative Solutions

The City of Toronto has provided direction to consider options for identifying any short-term mitigation measures that would provide significant immediate benefits to the traffic operations during the interim conditions. Due to the timing of the report it is recognized that surveyed conditions do not incorporate the improvements at the St. Clair Avenue West and Old Weston Road intersection, as well as the opening of Junction Road. While the following section preliminarily proposes a selection of short-term modifications, it is recommended that they be reviewed in greater detail, including updated traffic analysis, to determine both their need and impact, particularly on the transit operations in the study area.

The measures developed focus on increasing the traffic capacity at the intersections east and west of the rail corridor along St. Clair Avenue West. In all cases, the short-term alternatives build upon the road work undertaken by the City to extend the eastbound through/right-turn lane at the Old Weston Road/St. Clair Avenue West intersection (**Figure 5-1**). This has been constructed recently by modifying the sidewalk curbs fronting the Delta Bingo property located at 1799 St. Clair Avenue West. These changes have been incorporated into this study as the existing conditions.

Figure 5-1: Recent Improvements at Old Weston Road/St. Clair Avenue West Intersection

5.1 Development of Short-Term Alternative Solutions

The short-term alternatives have been developed to increase the capacity with respect to the:

- Number of eastbound receiving lanes east of Keele Street on St. Clair Avenue West;
- Number of westbound receiving lanes west of Old Weston Road on St. Clair Avenue West; or
- Number of general purpose traffic lanes under the rail corridor along St. Clair Avenue West.

Eastbound Receiving Lanes East of Keele Street on St. Clair Avenue West

The addition of a second receiving lane east of Keele Street/Weston Road at St. Clair Avenue West would allow for the conversion of the eastbound right turn approach lane into a shared through right lane increasing eastbound through capacity at the intersection.

Westbound Receiving Lanes West of Old Weston Road on St. Clair Avenue West

The EA design for the St. Clair Avenue West dedicated streetcar lanes had proposed that the tracks shift to the south through the Old Weston Road intersection in order to accommodate a second westbound receiving lane. Under as built conditions, the transition to a single westbound through lane occurs east of Old Weston Road, reducing the overall westbound through capacity.

Number of General Purpose Traffic Lanes under the Rail Corridor along St. Clair Avenue West

With changes to the number of receiving lanes either east of Keele Street/Weston Road or west of Old Weston Road, the number of general purpose traffic lanes provided mid-block was considered with respect to providing consistency to the cross-section. In doing so, given the constraints posed by the existing rail corridor bridge, it would require permitting vehicles to travel on the existing dedicated streetcar lanes.

Based on these considerations, nine (9) short-term alternatives were developed, details are provided in **Appendix D**:

- Do Nothing
- Option 1: Southbound left-turn from Weston Road directed into dedicated streetcar lanes
- Option 2: Eastbound traffic permitted to merge into dedicated streetcar lanes east of Keele Street/Weston Road
- Option 3A: Provision of eastbound left, through and right-through lanes at Keele Street/Weston Road, where the left through lane is directed into dedicated streetcar lanes east of Keele Street/Weston Road
- Option 3B: Provision of two through lanes and a right-turn lane at Keele Street/Weston Road, where the left through lane is directed into dedicated streetcar lanes east of Keele Street/Weston Road and the eastbound-left turn is prohibited at Keele Street/Weston Road
- Option 4: Relocate the TTC stop east of Old Weston Road, where the stop would be located in mixed traffic (accommodating the left-through vehicle movements) and vehicles would be permitted in the dedicated streetcar lanes west of Old Weston Road.
- Option 5: Sharing of the westbound dedicated streetcar lanes east of Keele Street/Weston Road and mixing the streetcar traffic with the westbound left-turns at Keele Street/Weston Road
- Option 6: Sharing of the westbound dedicated streetcar lanes east of Keele Street/Weston Road, where vehicle traffic is directed out of the dedicated streetcar lanes into a through lane east of Keele Street/Weston Road
- Option 7: Sharing of the Westbound dedicated streetcar lanes east of Keele Street/Weston Road, where the vehicles are directed out of the dedicated streetcar lanes into the left-turn lane east of Keele Street/Weston Road

To provide for a consistency in the westbound cross-sections, it was determined that the Option 4 would be applicable to both Option 5 and Option 6. Further, it was determined that due to potential conflicts between people merging out of the left turn lane in advance of Weston Road Option 7 was screened out from the analysis at a preliminary stage.

5.2 Short-Term Alternative Solution Evaluation

The following criteria were used to evaluate the feasibility of the short term objectives:

Factor	Measures	Description
Transportation Operations Impact	*Overall Delay (seconds)*	Total delay within the network at Keele/Weston and Old Weston during peak hours
	Queue Length (metres)	50th and 95th percentile queue lengths for AM and PM peaks
	Transit Operations Impact	Possibility of delays due to configuration
Safety	*Potential for Collisions*	Number of merging points available
		Legibility of road configuration
Cost/Practicality	*Cost to Implement Alternative*	Construction cost for the construction/implementation of the alternative
	Magnitude of Construction	How much construction work is required
	Compatibility with short term objectives	Is the alternative feasible for short-term implementation
		Can the work required be accomplished within the allocated time frame

The purpose of the above criteria was to confirm that the short-term option could be implemented, recognizing that assessing the detailed impact of the alternative, selection of the preferred design, and determining how it would be implemented would be conducted through a follow-up study. Considering the magnitude of the options proposed, it is anticipated that they would be further evaluated as part of an internal process, implemented individually through a Schedule A or A+ Municipal Class Environmental Assessment. **Appendix D-3** presents the evaluation matrix for each of the short-term alternatives.

5.2.1 Transportation Operations Impact

The impact on the transportation system is a vital aspect in determining which short-term alternative is selected. Short-term solutions are designed to show immediate results and as such, it is important these results

show improvement to the transportation systems. The overall delays and queue lengths have been calculated with respect to auto traffic. Transit vehicles will not experience benefits from queue or time reductions as they are operate on their own right-of-way.

Overall Delay (seconds)

A majority of the delay along St. Clair Avenue West occurs at the intersections with Keele Street/Weston Road and Old Weston Road. With the implementation of the lengthened eastbound through-right approach lane and the re-opening of Junction Road, the City of Toronto has identified some improvement to the traffic operations in the area, particularly at the St. Clair Avenue West and Old Weston Road intersection. Considering this, the review of the traffic operations has focused on the St. Clair Avenue West and Keele Street/Weston Road Intersection.

Table 5-1 summarizes the overall results evaluated for each short term improvements considered at the St. Clair Avenue West and Keele Street/Weston Road intersection. Detailed summaries of the analysis are provided in **Appendix E**, including a description of all associated signal timing modifications.

	Weekday Peak Hour					
	AM			PM		
	Volume	Avg. Delay	LoS	Volume	Avg. Delay	LoS
Baseline	3,390	78.8	E	3,195	50.4	D
Option 1	3,390	60.3	E	3,195	50.3	D
Option 2	3,390	59.8	E	3,195	50.6	D
Option 3A	3,390	40.8	D	3,195	38.7	D
Option 3B	3,390	38.3	D	3,195	36.5	D
Option 5	3,390	40.5	D	3,195	36.2	D
Option 6	3,390	56.2	E	3,195	47.2	D

Table 5-1: Traffic Operations Summary (St. Clair Avenue West and Keele Street/Weston Road Intersection)

For Options 1 and 2, there is some improvement in the overall delay time from a Do Nothing scenario, particularly during the weekday AM peak hour. Option 6 also shows a similar overall reduction in delay time.

Options 3A and 5 produce similar improvements to the overall delay during both weekday AM and PM peak hours. While Option 3B, shows an even greater reduction than this, reducing weekday AM delay times by approximately half. This option shows the greatest improvement to the delay time via St. Clair Avenue West.

Queue Length (metres)

Queue length was identified as an important factor as it provides for a direct comparison of the improvements provided by the options as well as potentially highlighting where the vehicle operations may affect that of the streetcars.

	Weekday Peak Hour							
	AM				PM			
	EBT 50th	WBT 50th	NBT 50th	SBL 50th	EBT 50th	WBT 50th	NBT 50th	SBL 50th
Baseline	169.2	85.4	110.8	59.4	97.1	49.7	70.9	50.6
Option 1	131.8	102.1	91	81.1	111.4	46	59.2	62.2
Option 2	131.8	96.2	91	82.7	111.4	46	59.2	63.6
Option 3A	71.2	102.1	91	63.9	53.4	46	59.2	22.7
Option 3B	64.2	102.1	91	63.4	49.6	46	59.2	34.1
Option 5	132.9	69.1	91	63.9	93.9	92.8	60	27.1
Option 6	131.8	69.1	91	82.7	111.4	92.3	59.2	63.6

Table 5-2: Queue Length Summary (metres) (St. Clair Avenue West and Keele Street/Weston Road Intersection)

Options 1, 2, 5, and 6 will result in similar average of queue lengths at St. Clair Avenue West and Keele Street/Weston Road intersection for the eastbound direction, while Options 5 provides for greater improvement to the westbound queues.

Option 3A creates a drastic decrease in eastbound through queue lengths at St. Clair Avenue West and Keele Street/Weston Road. Option 3B is expected to produce the best results in reduces queue lengths for both the east and westbound directions as well as for the southbound left turn during the weekday AM peak hour and the eastbound and southbound left turn during the weekday PM peak hour.

Transit Operations

As all the options incorporate the permitting vehicles to use the dedicated streetcar lanes, this section preliminarily considers the affect that the modifications could have on the transit operations. As part of the follow-up study, the impact on the transit operations and potential mitigating measures should be considered in greater detail. However, for the initial review consideration was focused on the potential for:

- Additional intersection delay for transit vehicles due to changes in the Transit Signal Priority;
- Challenges in merging between transit and vehicles due to speed differential;
- Issues in car driver expectancy across the other segments of dedicated streetcar lanes along St. Clair Avenue West increasing the potential for accidents; and,
- Additional delay due to transit vehicles queuing in mixed traffic.

In reviewing the modifications to the eastbound through-right approach lane at St. Clair Avenue West and Old Weston Road, sufficient queue storage space has been identified to accommodate the increase in vehicle demand ensuring eastbound vehicles queued at St. Clair Avenue West and Old Weston Road will be accommodated fully on the roadway. This will permit the streetcars to capitalize on the transit signal priority at this intersection.

For Options 2, 3A, and 3B, transit vehicles would be subject to additional delay at the St. Clair Avenue West and Keele Street/Weston Road intersection. This is due in part because of modifications that will be required in

order to minimize the potential for collisions between streetcars and vehicles at the new merging point that is introduced. It is understood that the risks could be mitigated through appropriate signage (i.e. yield to all transit vehicles) and transit priority measures for the eastbound approach (i.e. advanced transit phase). Recognizing this further study and consultation with the TTC would be required to determine what could be implemented, how the risks could be managed, and what the magnitude of the impact could be, in relation to the benefit provided to the vehicle operations along St. Clair Avenue West at the rail crossing and immediately surrounding area.

Although a priority transit signal is proposed for streetcar movements, illustrated in **Figure 5-2** is the maximum theoretical delay estimated to be experienced by eastbound streetcar movements during an east-west through phase. **Figure 5-2** shows the travel plots of four vehicles.

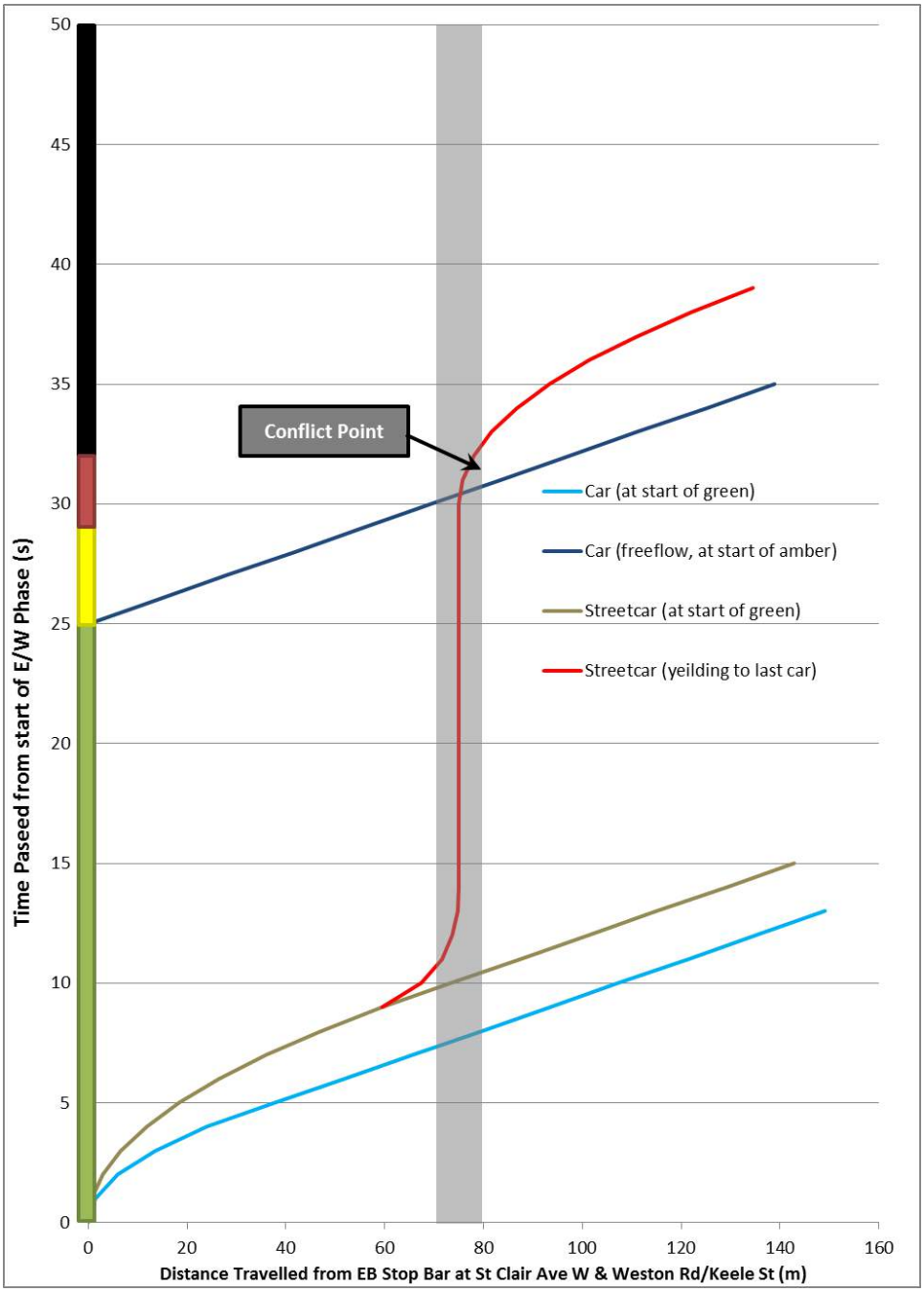


Figure 5-2: Vehicular Travel Profile

The light blue line shows the travel profile of a car at the start of the east-west green time. The brown line shows the travel profile of a streetcar at the start of the east-west green time. The dark blue line shows the travel profile of a car travelling free-flow speed (50km/hr) which arrives at the intersection at the start of the amber phase, representing the last vehicle within the traffic flow (i.e. last vehicle a streetcar would have to yield for). Finally, the red line shows the travel profile of a streetcar having to yield to vehicles for the entire east-west green phase, up until the last vehicle. Hence, estimated is that the maximum theoretical delay to the

streetcar due to the merge point is equal to the maximum vertical distance between the brown and red lines, which is approximately 25 seconds.

A review of Option 4 was determined to have a high potential for affecting the operations of the streetcar along St. Clair Avenue West. Specifically, it requires traffic to merge with transit vehicles particularly in free flow conditions during the off-peak times, in addition to requiring transit vehicles to queue behind vehicles that are turning left to go south on Old Weston Road during the peak periods. In either case, the reducing the potential for conflicts or mitigating the potential additional delay will be difficult to achieve.

Similar to Option 4, with Option 5 transit vehicles would be required to queue behind vehicles turning left onto Keele Street. Further, in order to mitigate the additional delay to the westbound streetcar, it has been considered that the westbound left turn will operate as a permissive phase. While the westbound left turn at St. Clair Avenue West and Keele Street/Weston Road is expected to operate at a good level of service, having a low volume to capacity ratio and short average queue, there is a higher risk for a collision between the westbound left turning vehicles and the eastbound streetcars.

Comparatively, Option 6 separates the westbound left turning vehicles from the streetcar traffic. This separation will allow for the streetcars to operate during the east-west through green phase as is currently the case. That being said, during peak periods the queuing for the westbound approach is expected to be in the order of 50-75 metres. This length of queue will pose a potential issue of the queuing vehicles blocking the westbound streetcars.

5.2.2 Safety

The potential for collisions was determined based on two key considerations; the number of conflict points created and the impact on legibility of the changes.

Number of Conflict Points

Conflict points are locations in the path of travel for vehicles where they converge with another path of travel. These locations require vehicles to determine the right-of-way between two approaching vehicles which can result in an accident if the right-of-way is not yielded. As a result, it is preferable to either reduce the number of conflict points or, where conflict points must exist, clarify the right-of-way conditions between the approaching vehicles. This can be accomplished means such as signage. An example of signage for transit vehicles merging into traffic is shown in **Figure 5-3**.

Figure 5-3: Signage Allowing the Merging of Exclusive Transit Lane with General Purpose Lane (GPL)

Options 1 and 2 have one conflict point when vehicles to merge with the streetcar. With both of these options, the streetcar would have the right-of-way in the lane that the vehicles would be merging into. The merging in this case could be further improved through the provision of signage and pavement markings illustrating merge point.

Options 3A and 3B are similar to Options 1 and 2, except that right-of-way would be given to vehicles, therefore requiring streetcars to yield. This yielding will create a speed differential between the streetcars and other vehicles making it more difficult for the merge to occur. To mitigate this impact as previously discussed, it would require transit priority measures to be implemented at the St. Clair Avenue West and Keele Street/Weston Road intersection.

Option 4 has 2 conflict points: one in which vehicles must merge with the streetcars, and another between the westbound left turn movements at St. Clair Avenue West and Old Weston operating in a permissive phase and the eastbound streetcars. In either case, while the right-of-way would be clear, and could be supplemented with signage, the combination of these two conflict points within a short distance results in this option being less preferred.

Option 5 creates 2 conflict points, namely the permitted westbound left movement shared with transit and the vehicles merging into the shared lane, but produces the lowest safety evaluation. As through traffic is aligned with the left turn lane, this can trigger late lane changes and incorrect moves at Keele/Weston.

Option 6 produces 1 conflict point similar with options 1 and 2 in which vehicles must merge with the shared lane. There are also concerns about the ability of vehicles to exit the streetcar lanes safely.

Legibility of the Road Configuration

Legibility of the road configuration is characterized by ability for the drivers to perceive the road ahead without requiring prompting. This is particularly evident with respect to the options that include a significant shift laterally for the flow of traffic, namely Options 3A, 3B, 5, and 6. With these options, in order to stay in their lanes vehicles are required to shift a full lane either to the left or right. In conditions with poor visibility, such as low light, rain, and snow conditions, the lane markings can become difficult to perceive and could cause vehicles not to shift laterally when required.

5.2.3 Cost/Practicality

In addition to the above criteria, the feasibility of the short-term options was considered in relation to the cost to implement them as well as the practicality to do so. Cost was defined in part by the magnitude of work that is required for each option, while the practicality of the alternative is defined by its ability to fit within a short-term schedule recognizing the approvals and permits that would be required.

Cost to Implement Alternative

Options 1, 3A, 3B, 5 and 6 will cost within the same value range to implement ($30,000 to $50,000), while Options 2 and 4 have the highest preliminary cost estimate ($50,000 to $100,000). The costs associated with Options 5 and 6 are dependent on the configuration at Old Weston Road. Should either of these options be implemented along with Option 4, their cost will increase greatly.

Magnitude of Construction

The magnitude of construction is partly reflected in the cost to implement each alternative. All the options involve the removal of the barrier curb which currently separates the vehicle lane from the dedicated streetcar lane. For Options 1, 5 and 6, the removal of this curb along with relative signage are the only works required for implementation.

Option 2, along with the removal of the barrier curb, the sidewalk on the south side of St. Clair Avenue West is also required to be realigned in order to properly direct traffic. The same work is required for Option 3B but to a lesser degree.

Option 3A requires the modification of the island currently separating the streetcar lane from the vehicle lane. This is required in order to accommodate the two receiving lanes. Option 3B requires the complete removal of this median due to the alignment of the approach lanes.

Option 4 includes the greatest cost of all the alternatives as it requires that the streetcar platform currently located to the west of the intersection of St Clair Avenue West and Old Weston Road to be relocated to the east of the intersection. Should Options 5 and 6 be implemented in tandem with Option 4, their magnitude of road work required will also include the relocation of the streetcar stop.

Compatibility with Short-Term Objectives

Ultimately, each of the options aims to meet the objectives laid out for the short-term options. This includes the magnitude of work required being able to fit into the short-term time frame. All options except for Option 4 are expected to be able to fit into the timeframe. Comparatively, Option 4 would require additional consideration and approval by the TTC. Again, should Options 5 and 6 be implemented with Option 4, their compatibility will reflect the ability of Option 4 to fit within short-term objectives.

6.0 Long-Term Alternative Solutions

A comprehensive set of long-term alternative solutions was developed that could improve the existing identified congestion in the network and accommodate the forecasted traffic growth. These options were considered initially in relation to physical impacts and functional constraints. Options that were not, as a result, determined to be feasible were then screened-out from further consideration.

Overall the options developed can be categorized into 4 types based on the corridor in which they were located:

1. Modification of the St. Clair Avenue West crossing;
2. Crossing north of St. Clair Avenue West;
3. Crossing south of St. Clair Avenue West; and,
4. Extension of Keele Street.

Within each of these categories, a selection of sub-options was developed. The sub-options were established with regards to minor adjustments in the alignments or alternative approaches to crossing the rail corridor.

Once a long-list of alternatives was determined, an exercise was conducted that related each of the options to critical constraints in the study area. The long list of alternative solutions proposed and assessed is described in **Appendix F-1**, while detailed plan and profile drawings are provided in **Appendix F-2**. In doing so the feasibility inherent with each option was assessed. Considering this, the following long-term improvement options were screened out from further evaluation for the following reasons:

- **Option 1(A)(iii) Replace Existing St. Clair Avenue West Underpass and widen to the north side** – this option will have significant property and building impacts to existing townhouse developments located at the northeast corner of Weston Road and St. Clair Avenue West.
- **Option 1(C) New Overpass for All Streetcar and Traffic Lanes on St. Clair Avenue West** – this option will have significant property requirements, as well as not meeting the TTC design standards for the grades either of the road segment or at the platforms for the streetcar stops, affecting the usability of this segment by individuals with mobility devices.
- **Option 2A (i) Extend Gunn's Road to Union Street with Underpass: to Union Street –** it was determined that this option lacked direct connections to the north portion of Keele Street and Old Weston Road, providing limited benefit to the network and therefore was not feasible.
- **Option 2B Gunns Road Overpass Extension** – this option requires the existing grades at the Weston Road/Gunns Road intersection to be raised by approximately 3 metres which would significantly impact the surrounding road network and land uses.
- **Option 3A (ii) Davenport Extension with Overpass to West Toronto Road** – this option involves major impacts to local roads in the area east of the rail corridor. It will also feature significant private property impacts in the area west of the rail corridor, affecting residential homes.
- **Option 3B Davenport Underpass Extension** – this option will require a reconstruction of newly installed caisson wall structures along the Metrolinx/GO corridor.

- **Option 4A Extend Keele Street to the south to Union Street or Turnberry Avenue North of St. Clair Avenue West –** this option was determined to encroach on the CP Rail and Hydro One properties when it connected to Union Street south of Turnberry Avenue. Comparatively, connecting at Turnberry Avenue was determined to be acceptable. Considering this, it was agreed that this option be modified to avoid the aforementioned properties and instead, connect at Turnberry Avenue via a Gunns Road extension. This option was renamed **Option 4**.
- **Option 4B Keele Street Extension to Davenport Road** – this option lacked east-west connectivity and had rail property impact, so was modified to incorporate the Keele Street and Gunns Road extensions as well as the extension of Union Street to Davenport Road. With these changes it was renamed to **Option 5**.

Following the screening out process, a set of eight (8) long-term alternatives was determined. These alternatives (illustrated in **Figure 6-1**) included:

- **Option 1A(i) Replace Existing St. Clair Avenue West Underpass and widen to the both sides**
- **Option 1A(ii) Replace Existing St. Clair Avenue West Underpass and widen to the south sides**
- **Option 1B(i) New Underpass Structure South of St. Clair Avenue West for Eastbound Traffic Lanes**
- **Option 1B(ii) New Overpass Structure South of St. Clair Avenue West for Eastbound Traffic Lanes**
- **Option 2A (ii) Extend Gunns Road to Turnberry Avenue with Underpass**
- **Option 3A(i) Extend Davenport Road to Lloyd Avenue with Overpass**
- **Option 4 Extend Keele Street to a Gunns Road Extension Only**
- **Option 5 Extend Keele Street to a Gunns Road Extension and Union Street Crossing Over St. Clair Avenue West to Connect with Davenport Road**

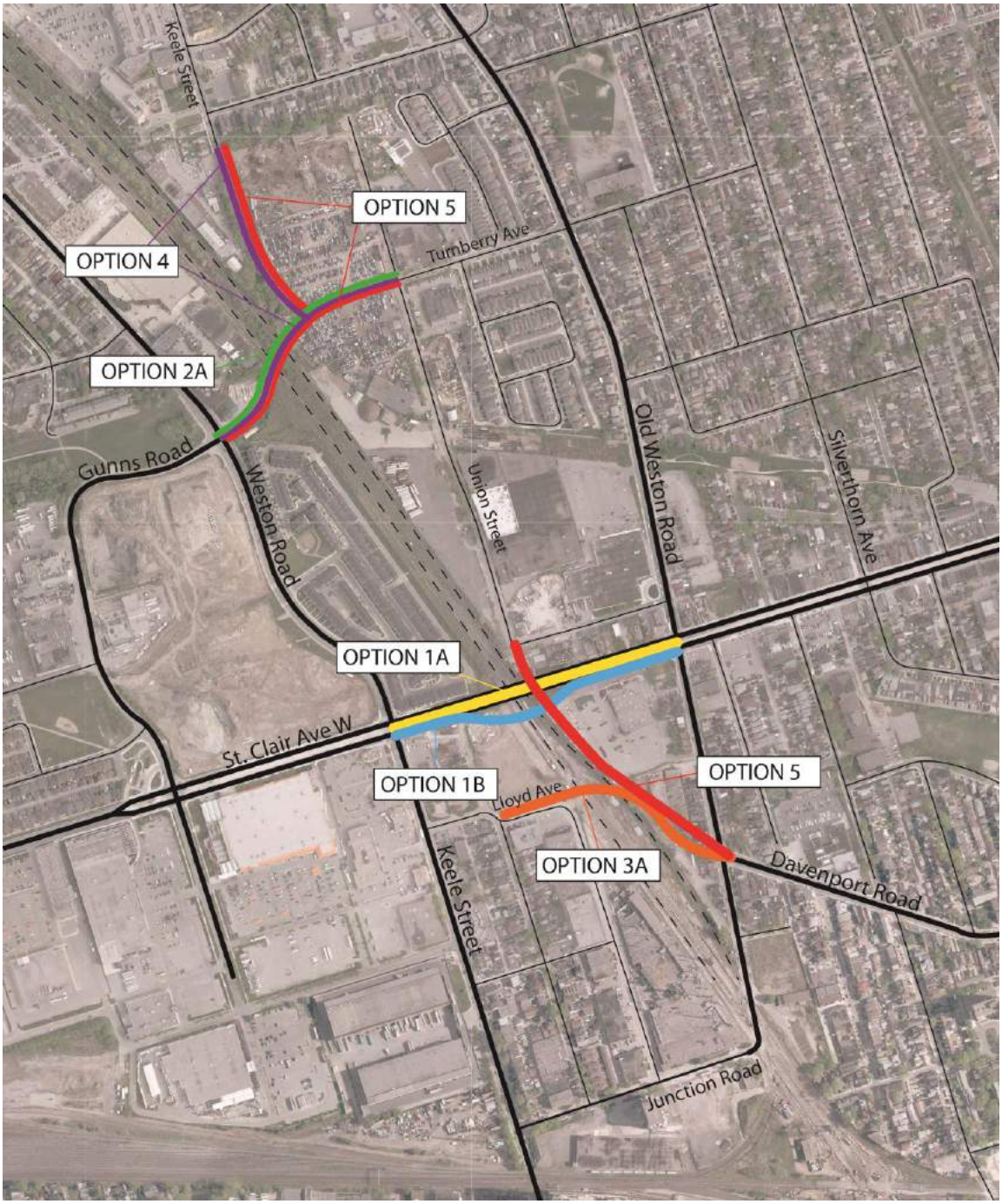


Figure 6-1: Contextual Location of Long-Term Options

6.1 Long-Term Alternative Solution Evaluation

The following criteria were used in evaluating the feasibility of each long term improvement option:

Factor	Measures	Description
Property Impact	*Private property impact*	Magnitude of private property affected by the new alignment?
		Full taking vs. Partial taking
	Public property impact	Magnitude of public property affected by the new alignment?
Transportation Planning	*Eastbound traffic time across Rail Corridor via St. Clair Avenue West*	Time it takes to move across the Rail Corridor via St. Clair Avenue West
	Ability to accommodate future widening and other facilities	Ability for the new alignment to accommodate bicycle lanes
	Potential road alignment shift	Magnitude to which old alignment needs to be shifted to accommodate the new alignment
Archaeology/Built Heritage	*Potential impact on archaeological features*	Possibility of latent archaeological potential
	Potential impact on heritage properties	Number of affected heritage properties
Natural Environment	*Potential impacts on existing trees/vegetation*	Magnitude of impact on vegetation/trees

Factor	Measures	Description
Transportation Operations/Engineering/ Constructability	*Complexity of tie-in to existing network*	Difficulty required to ties the new alignment back into the road network
	Potential impact on stormwater management and drainage	New alignment requires removal of stormwater management systems
		New alignment requires creation of new stormwater management systems
	Potential impact on existing transportation operations during construction (rail, road & transit)	Magnitude of disruption to rail, road and transit operations within the alignment
Estimated Construction Cost	*Structural cost*	Cost required to build bridge structures
	Roadwork cost	Cost required to integrate the new road alignment
	Total construction cost	Total cost to build the new road alignment and associated structures

A long-term alternative evaluation matrix is presented in **Appendix F-3**.

6.1.1 Property Impact

Impact on the properties within the subject area is something that must be taken into consideration. This factor takes into account the impact both on public and private properties within the subject area and the magnitude as to which each is affected. **Figure 6-2** through **Figure 6-8** displays the public and private properties that are affected by each long-term alternative.

Option 1A(i)

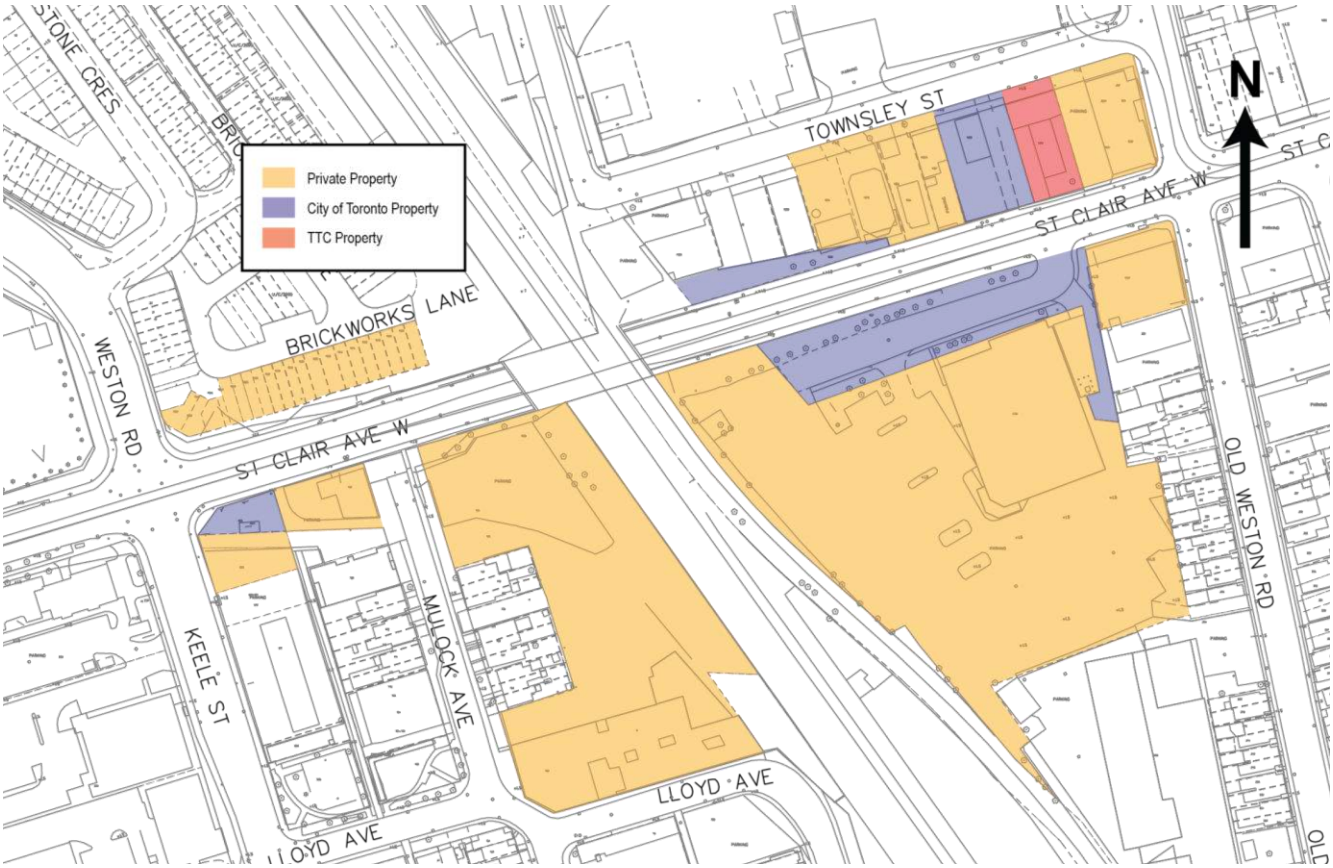


Figure 6-2: Option 1A(i) Property Impact

Private Properties Imapcted:

St. Clair Avenue West – 1797, 1799, 1832, 1834, 1850, 1860, 1862, 1866, 1868, 1870, 1876, 1885, 1906, 1908, 1910, 1912, 1916, 1918, 1920, 1922, 1926, 1928, 1930, 1932, 1936, 1938, 1940, 1941, 1942, 1946, 1948, 1950, 1952

Keele Street – 623, 625

Lyod Avenue – 6

Mulock Avenue – 159, 185, 192, 195

Option 1A(ii)

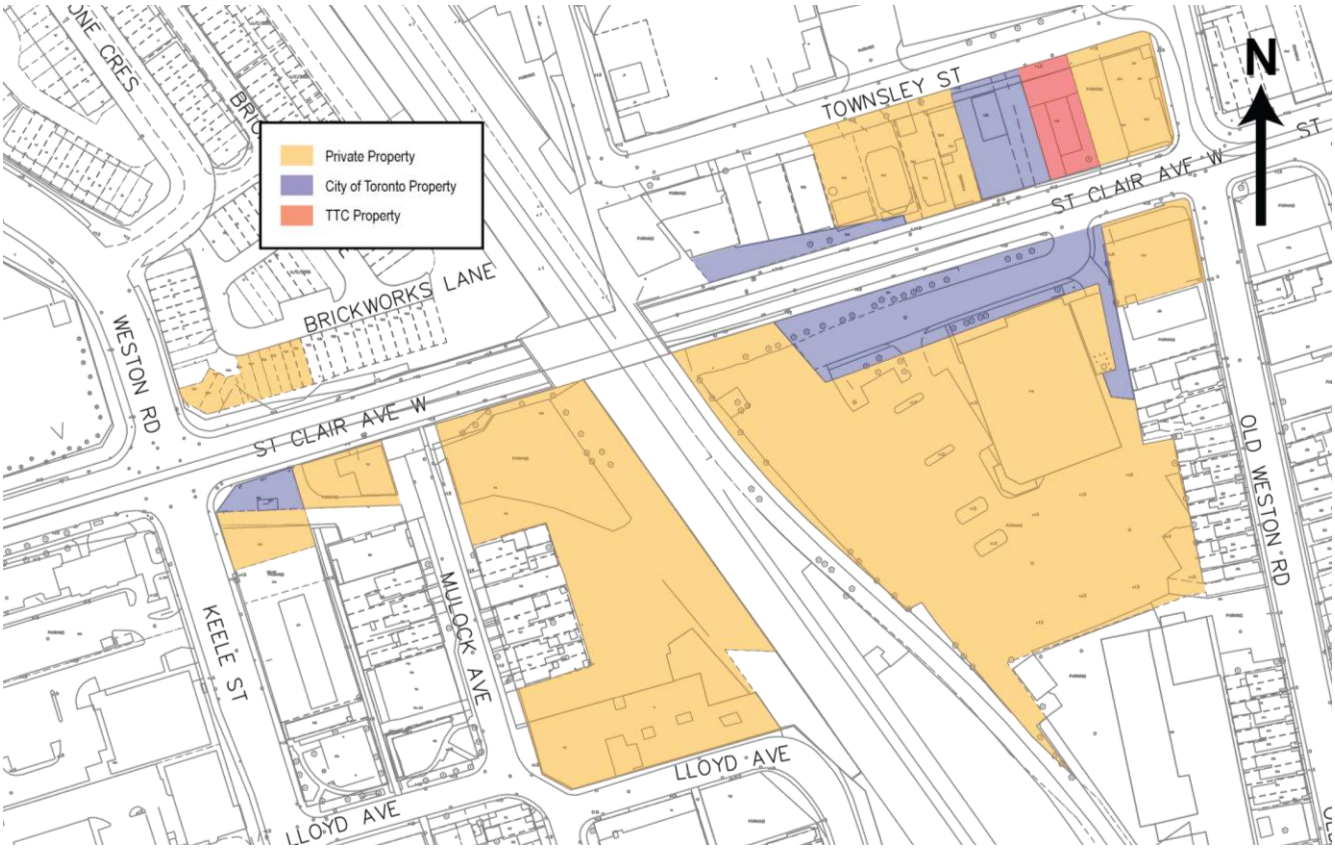


Figure 6-3: Option 1A(ii) Property Impact

Private Properties Imapcted:

St. Clair Avenue West – 1797, 1799, 1832, 1834, 1850, 1860, 1862, 1866, 1868, 1870, 1876, 1885, 1906, 1930, 1932, 1936, 1938, 1940, 1941, 1942, 1946, 1948, 1950, 1952

Keele Street – 623, 625

Lyod Avenue – 6

Mulock Avenue – 159, 185, 192, 195

Option 1B(i)

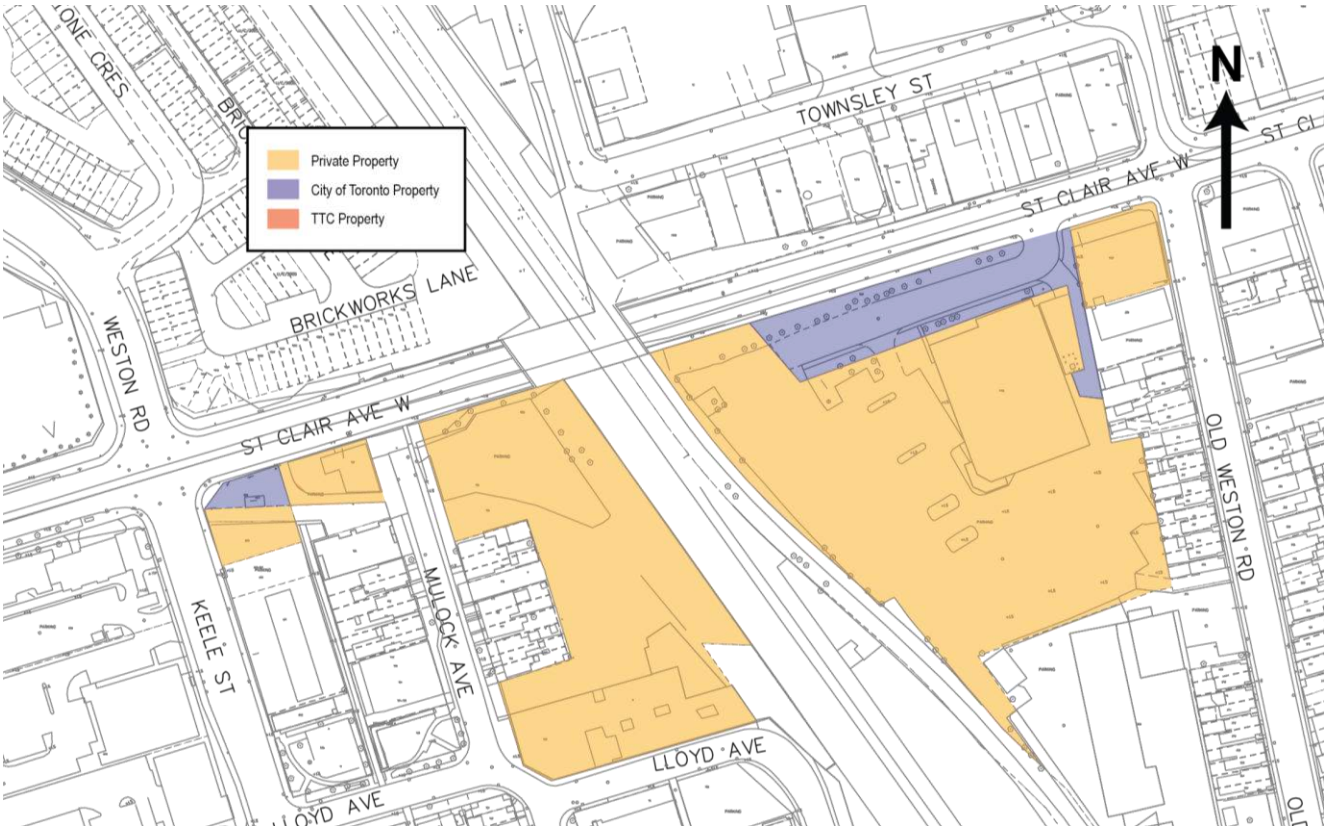


Figure 6-4: Option 1B(i) Property Impact

Private Properties Imapcted:

St. Clair Avenue West – 1799, 1885, 1941

Keele Street – 623, 625

Lyod Avenue – 6

Mulock Avenue – 159, 185, 192, 195

Option 2A(ii)

Figure 6-5: Option 2A(ii) Property Impact

Private Properties Imapcted:

Union Street – 126, 144

Option 3(i)

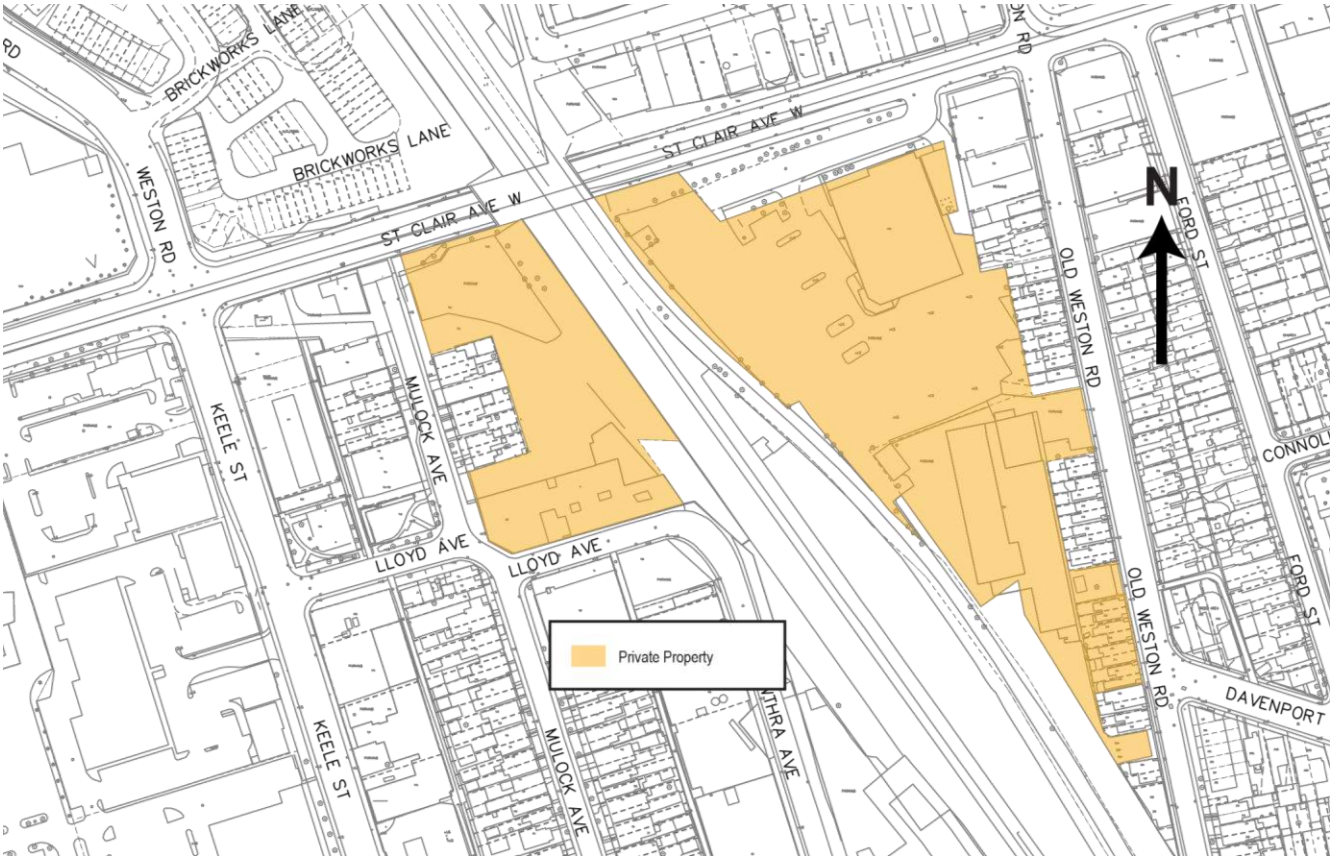


Figure 6-6: Option 3(i) Property Impact

Private Properties Imapcted:

St. Clair Avenue West – 1799, 1885

Old Weston Road – 226X, 228X, 230X, 238, 240, 242, 244, 246, 248, 250, 252, 290, 294

Lyod Avenue – 6

Mulock Avenue – 159, 185, 195

Option 4(i) & Option 5 (Part 1)

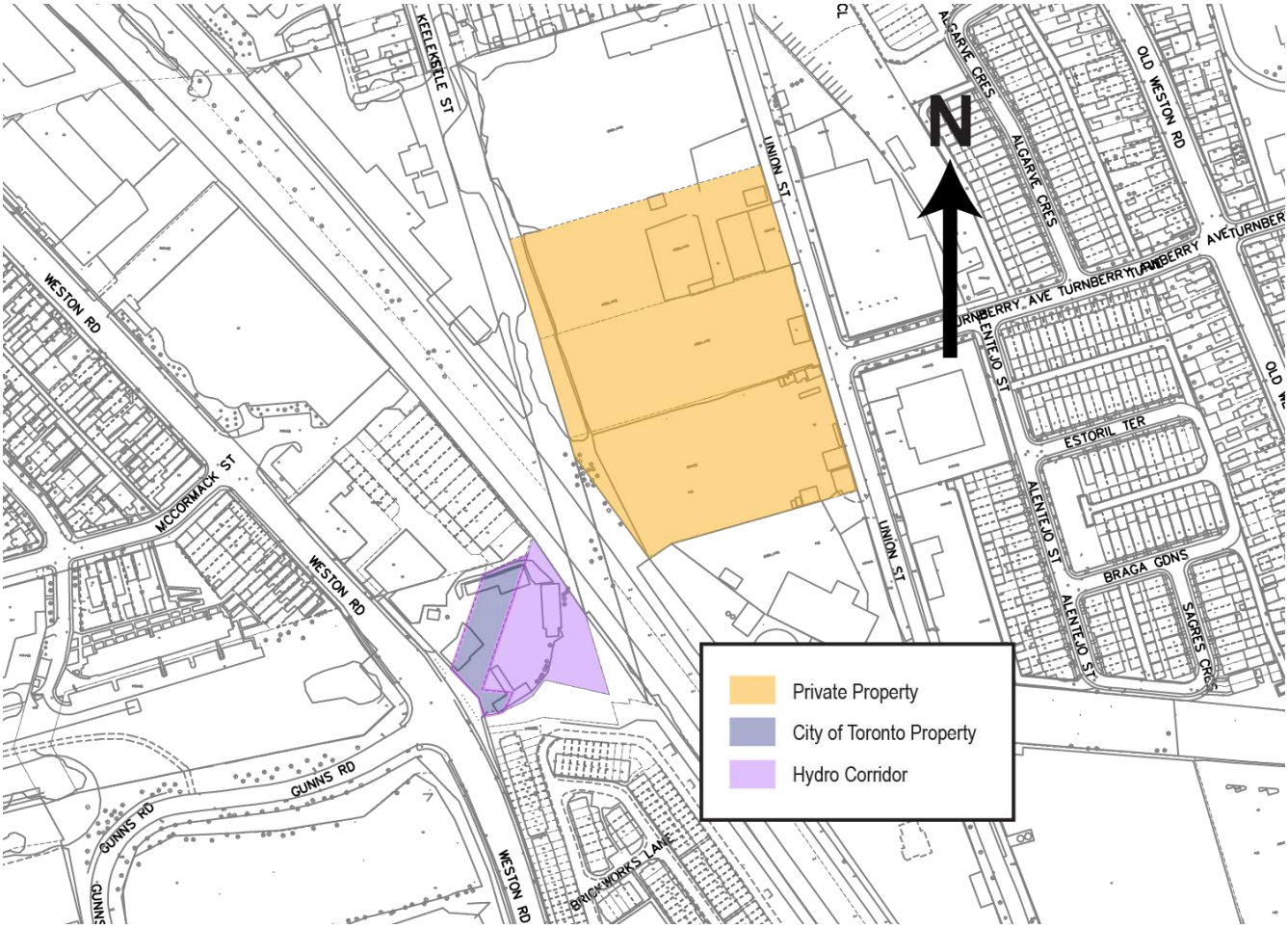


Figure 6-7: Option 4(i) and Option 5 (Part 1) Property Impact

Private Properties Imapcted:

Union Street – 126, 144, 160

Option 5 (Part 2)

Figure 6-8: Option 5 (Part 2) Property Impact

Private Properties Imapcted:

St. Clair Avenue West – 1799, 1900

Old Weston Road – 226X, 228X, 230X, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 290, 294

Townsley Street – 6, 16

Private Property Impact

Private property impact is dictated by the number of privately owned properties that will be affected by the implementation of a road alignment. This can further be analyzed by the results associated with the magnitude of each impact and whether it results in the total taking of a property or a partial taking of a property. What discerns the separation between a full taking and a partial taking is based on how much land is required from each property and the location within the property that is affected. This is dictated by the ability of the property to continue its functions given the lands that are taken.

For Options 1A(i), 1A(ii), 1B(i) and 1B(ii) to be selected, the City is likely required to purchase the 1926 St Clair Avenue West property in its entirety. The road alignments for the aforementioned options encroach on a large portion of the property which does not allow for its operations to continue. Option 1A(i) would have an impact on properties to the north and the south on St. Clair Avenue West whereas option 1A(ii) would have a greater impact than 1A(i) but focused to the south. Options 1B(i) and 1B(ii) would have very similar impacts on private properties to the south of St. Clair Avenue West.

For option 2A(ii) and option 4 to be selected, the city would be required to purchase a fairly large portion of industrial properties between the rail corridor and Union Street. The presence of the new road alignment will also impact townhomes in the southeast quadrant of the Gunns road extension and Weston Road based on their proximity to the alignment.

Option 3A(i) requires the full taking of multiple residential properties along the road alignment between Davenport Road and Keele Street. The alignment runs directly over these properties and with the added ROW, the road spans over a number of properties. Included in this is the full taking of an unused property to the east of the rail corridor. Although this land is currently not in use, the location of the alignment will not allow for any significant use on the property.

For option 5 to be selected, the same amount of lands would need to be purchased as described for option 2A(ii) and also impact lands to the south of St Clair Avenue West. The implementation of this road alignment will greatly impact multiple residential properties to the south of St Clair. This option will also require the partial taking of some CP Rail property in order to accommodate the alignment. Option 5 requires the most private land to implement of the alternatives.

Public Property Impact

Public property impact is dictated by the magnitude of public lands that will be required in order to implement the alignment of each alternative. All of the alternatives will require a change in ROW and as such, all of the alternatives will impact public properties to an extent.

Options 1A(i) and 1A(ii) will require an expansion of St. Clair Avenue West by a total of two lanes. Each alternative will require the City to acquire additional public lands not dedicated to the right-of-way to accommodate these expansions. Options 1B(i) and 1B(ii) will require more public properties than Option 1A as it requires that an additional structure be built to the south of St. Clair Avenue West. However, these options will have less impact to the north of St. Clair Avenue West than option 1A.

Options 2A(ii), 3A(i) and 4 will require little public property as the lands that they require are predominantly private properties. Option 5 requires the largest amount of public property as the extension of Union Street to the south will require quite a large amount of publicly owned lands.

6.1.2 Transportation Planning

Transportation planning is a major factor in the decision as to which alternative will ultimately be implemented. The purpose of the long term alternatives is to improve the transportation operations on St. Clair Avenue West, as well as the surrounding roads and streets. This factor was also voiced as an important aspect to the evaluation of the alternatives by TAC members.

Future Do Nothing

The assessment of the long-term solutions was conducted by testing against a 2031 'Do Nothing' scenario that would reflect baseline conditions in the 2031 horizon without the implementation of any improvements.

The 2031 model was developed using inputs from the City of Toronto 2031 AM Regional Model, calibrated to the Baseline model. More specifically, the following equation was used to forecast trips for each OD Pair:

$$Volume_{OD}^{2031} = Volume_{OD}^{Baseline} + (Emme_{OD}^{2031} - Emme_{OD}^{2011})$$

Where:

$Emme_{OD}^{2031}$: Traffic Forecast from City of Toronto Regional Model in 2031
$Emme_{OD}^{2011}$: Traffic Volume from City of Toronto Regional Model in 2011
$Volume_{OD}^{Baseline}$: Traffic Volume from the calibrated Aimsun Baseline Model

This means that travel growth forecast by the City of Toronto's Regional Emme Model between the 2011 base year and the 2031 horizon year was added to the adjusted Baseline travel demand.

Table 6-1 outlines the traffic forecast, while **Table 6-2** summarizes the volumes crossing east-west at the Metrolinx GO Rail corridor.

Origin	Destination	Baseline	2031	Difference %	Growth Rate
Out Study Area	Out Study Area	4,513	6,285	39%	1.67%
In Study Area	Out Study Area	3,107	3,206	3%	0.16%
Out Study Area	In Study Area	2,745	2,876	5%	0.23%
In Study Area	In Study Area	504	508	1%	0.04%
Total		10,869	12,874	18%	0.85%
West of Rail Line	East of Rail Line	2,521	3,067	22%	0.99%
East of Rail Line	West of Rail Line	1,764	2,302	31%	1.34%
North of St-Clair	South of St-Clair	2,830	3,632	28%	1.26%
South of St-Clair	North of St-Clair	2,140	2,819	32%	1.39%

Table 6-1: Travel Demand Growth Assumptions

	Eastbound	Westbound
Rogers Rd	675	650
St-Clair Avenue	925	800
Junction Rd	450	200
Dupont St	675	525

Table 6-2: 2031 "Do Nothing" Volumes Crossing the Metrolinx GO Corridor

Each long-term alternative solution was tested separately against the Do Nothing scenario by comparing volumes passing across the Metrolinx GO rail corridor and by the difference in travel time across select routes. **Table 6-3** summarizes these screenline volumes in the eastbound direction, while **Table 6-4** summarizes westbound volumes. The travel time comparison is summarized in **Table 6-5**.

Scenario	Baseline with Junction Rd	Do Nothing	Improvement Options						
			1			2A	3A	4	5
		Future	Ai	Aii	Bi-ii	ii	i		
Demand	2014	2031	**2031 Volumes**						
Rogers Rd	625	675	750	775	825	700	600	575	475
St-Clair Avenue	975	925	1,075	1,100	1,025	1,000	700	875	850
Junction Rd	425	450	400	475	375	425	550	425	500
Dupont St	550	675	650	650	700	625	625	675	700
Gunns Rd						250		425	475
Davenport Rd							575		

Table 6-3: Long Term Improvement Options: Vehicular Trip Forecast Eastbound at Railroad Screen Line / AM Peak Hour

Scenario	Baseline with Junction Rd	Do Nothing	Improvement Options						
			1			2A	3A	4	5
		Future	Ai	Aii	Bi-ii	ii	i		
Demand	2014	2031	2031 Volumes						
Rogers Rd	550	650	600	675	650	475	650	475	400
St-Clair Avenue	625	800	975	975	1,050	750	725	725	750
Junction Rd	225	200	200	225	125	100	200	150	175
Dupont St	425	525	500	475	550	525	400	475	475
Gunns Rd						350		475	550
Davenport Rd							375		

Table 6-4: Long Term Improvement Options: Vehicular Trip Forecast Westbound at Railroad Screen Line / AM Peak Hour

Scenario		Baseline	Do Nothing	Improvement Options						
				1			2A	3A	4	5
				Ai	Aii	Bi-ii	ii	i		
Demand		2014	2031	2031 Difference from Baseline 2014						
St. Clair Avenue West, Gunns Road to Caledonia Pkwy	EB	276	380	(74)	(76)	(74)	1	(63)	60	(8)
	WB	257	313	(11)	(17)	(25)	(3)	(10)	(1)	(8)
Keele Street, Rogers Road to Dundas Street West	NB	390	655	(32)	(8)	(86)	22	179	51	171
	SB	407	601	126	260	(172)	(140)	353	(83)	(69)
Old Weston Road, Roxwell Avenue to Davenport Road	NB	512	689	9	(145)	(100)	(491)	-	39	-
	SB	525	602	44	259	10	105	(16)	5	(36)
Caledonia Pkwy, Rogers Road to Davenport Road	NB	129	260	75	28	(52)	(61)	(93)	61	(132)
	SB	143	170	99	89	5	537	196	11	(33)
				x (x) = time increase (time decrease)						

Table 6-5: Long-Term Improvement Options: Travel Time (in seconds) on Select Routes / AM Peak Hour

The resulting variation between some of the options is indicative of some movements in the network operating near capacity, particularly the southbound left turn at Weston Road and St. Clair Avenue West, and the sensitivity of drivers to change routes. As a result, since the functional changes to the network between Options 1A(i), 1A(ii), 1B(i) and 1B(ii) are similar, these options are considered to have similar traffic conditions although there are some instances of variation. Considering the level of variation possible as a result of the forecasted operating conditions, a net network travel time comparison cannot be conducted between the variations of Option 1. Furthermore, the identified travel times only represent defined road segments, and not the network in its entirety, so a net network travel time comparison cannot be prepared across the various options.

Eastbound Travel Time across Rail Corridor via St. Clair Avenue West

As the main focus of this Functional Planning Study is increase road capacity across the rail corridor to accommodate expected growth (to 2031) while improving travel times on St. Clair Avenue West in the study

area. Considering this, a measure of how well each alternative functions is the time it takes to cross the rail corridor via St. Clair Avenue West. Based on the Aimsun transportation model developed, it takes 380 seconds in order to move across the rail corridor from Gunns Road to Caledonia Parkway given the existing road network.

The modelling results for Options 1A(i), 1A(ii), 1B(i), 1B(ii) and Option 3A(ii) indicate that the eastbound travel time across the rail corridor via St. Clair Avenue West will reduce. While Options 3A(i) and 5 demonstrate no significant changes, while Option 4 was found to increase the travel time along St. Clair Avenue West.

Westbound Travel Time across Rail Corridor via St. Clair Avenue West

As for westbound travel times across the rail corridor via St. Clair Avenue West, the model indicates that the travel times may experience a slight reduction across all options. This slight reduction is primarily attributed to the westbound direction being the off-peak direction during the weekday AM peak hour.

Ability to accommodate future widening and other facilities

This measure looks at the facilities that can be accommodated through the implementation of each of the alternatives. Currently along St Clair, there is no room for bicycle lanes so the implementation of similar facilities represents a positive feature for each of the alternatives. All options except for option 1B(i) can incorporate bicycle facilities into their design.

Potential Road Alignment Shift

Potential road alignment shift speaks the magnitude by which an existing alignment will have to change in order to accommodate a new alignment. This is quantified based on a lateral shift in metres.

Options 1A(i) and 1A(ii) incorporate minimal shifts to the existing road alignment along St. Clair Avenue West. Option 1A(i) requires a shift of the exterior of the road alignment outwards by 1 lane on either side. Options 1A(ii) requires a shift of two lanes to the south. Both are minimal shift of less than 15 metres

Options 1B(i) and 1B(ii) require a southerly shift of the St. Clair Avenue West eastbound lanes to the south by 15-20 metres. Option 3A(i) also likely requires a shift of the entirety Lloyd Avenue to the north in order to accommodate the extension of Davenport Road, however the magnitude of the shift is not as much as that of options 1B(i) and 1B(ii).

For option 5 to be implemented, Townsley Street will have to be sectioned off into a cul-de-sac in order to allow for the extension of Union Street to the south. This road shift is not very significant in terms of alignment, however it impacts traffic flow along Townsley Street and its connection to Union Street. Options 4 and 2(A)ii do not require road alignment shifts as their road alignment require the building of entirely new roads and connections.

6.1.3 Archaeology/Built Heritage

The evaluation of this factor is based on the magnitude of impacts to the existing archaeological and built heritage resources that each alternative will create. Impacts on areas with archaeological potential will require for a Stage 2 Archaeological Assessment to be completed before further work can be done in the area. Areas that impact designated/listed built cultural heritage properties will require that a heritage impact assessment be completed before further development can be done. The results of the aforementioned assessments could greatly impact the direction of the development as they may require that road alignments be changed or options be discontinued.

Potential Impact on Archaeological Features

Areas that have not received extensive disturbances in the past century or similar are believed to possess archaeological potential. A Stage 1 Archaeological Assessment looks at the extent of disturbances within the study area and determines areas that have been disturbed enough to remove all traces of archaeological content. Areas that have not been disturbed to such an extent will require a Stage 2 Archaeological Assessment in order to determine if it may contain archeological content before further development may continue. The majority of the study area has been already disturbed by the development of the community in the area.

Options 1A(i), 1A(ii), 1B(i), and 1B(ii) have road alignments that do not coincide with areas that may contain archaeological potential. However, the remaining options' alignments are situated within areas with archaeological potential. As such, for the option to be implemented, a stage 2 archaeological assessment will be required in order to proceed with development should they be chosen as the alternative to be implemented.

Potential Impact on Heritage Properties

Properties with heritage value can be a determining factor in which alternative is implemented. Twenty-two (22) properties within the study area were identified to be of heritage value with one (1) as a designated under Part IV of Ontario Heritage Act and listed under the City of Toronto's Heritage properties. Properties that will be affected by the implementation of a road alignment will require a Heritage Impact Assessment (HIA) to be completed before any further actions can be taken towards development.

Options 1A(i) and 1A(ii) have road alignments that will impact 2 heritage properties—1 unlisted and 1 listed property due to the alignment coincidence with the heritage properties. Option 5 also impacts a listed heritage property. As these options impact a listed property, they are the most impactful of the alternatives.

Option 3A(i) also impacts a heritage property however, this property is not listed under the City of Toronto's heritage properties. An unlisted property such as this holds less weight in determining if an option will be implemented. However, a HIA will still be required in order for this option to be implemented.

6.1.4 Natural Environment

The natural environment encompasses undeveloped features such as bodies of water, wildlife and their habitat and vegetation. This factor is important in a similar fashion to archaeological/built heritage as it can determine the final outcome of the alternatives. Certain plant species as well as wildlife are protected under the Ontario Species at Risk Act. This means that if any of the species are considered to be naturally growing in the area or have made the area their primary home, mitigation measures would either be required to move them safely away to accommodate the new alignment or the alignment cannot be continued altogether.

As the study area neither contains bodies of water not any endangered or protected wildlife nor their habitats, they are all on equal standing in this regard. The evaluation of this factor is based entirely on the impact the options pose on vegetation and trees in the study area.

Potential Impact on Existing Trees/Vegetation

As mentioned before, this measure determines the overall evaluation of the Natural Environment factor. Options that will require the removal of any domestic plants, trees or vegetation that are protected by the province of Ontario cannot proceed without further evaluation on mitigation measures.

Options 1A(i) to 1B(ii) have alignments that do not encroach on any existing vegetation within the study area. Option 3A(i) will result in a minor impact to trees and vegetation located to the east of the rail corridor. These trees will require removal for the alignment to be implemented.

Options 2A(ii), 4 and 5 will have larger effects on the natural environment. All three options will impact a Ravine and Natural Forest Area which is protected by the by-law. Removal of any trees within this area will require approval by the City of Toronto Urban Forestry. Options 4 and 5 will also have impacts on other vegetation areas located to the east of the rail corridor and at the base of Keele Street. These trees will also require removal but are not under by-law protection.

6.1.5 Transportation Operations/Engineering/Constructability

This factor highlights the various technical issues and concerns related to each of the alternative options. As mentioned in previous sections, the measures featured in this factor can ultimately be cause for an alternative to be discontinued if they pose too great an issue to be implemented.

Complexity to Tie-In to Existing Network

New alignments are required to be tied-in to existing alignments. The complexity to tie-in the option is important as it can determine if the option is feasible or not. Issues associated with this are grading issues associated with the integration of underpasses and overpasses.

Options 1A(i) and 1A(ii) require minor regarding along St. Clair Avenue West but not significant enough to cause concern to the feasibility of the option. Options 1B(i) and 1B(ii) have a higher degree of difficulty than Option 1A(i) and 1A(ii) because it requires that St Clair Avenue West to be either elevated to create an overpass (1B(ii)) or new alignment to be established that creates an underpass (1B(i)).

For Options 4 and 5 to be implemented, Keele Street will have to be lowered to the same level as Gunns Road so that the extension of Keele Street can meet the Gunns Road extension at-grade. This option can also be implemented by realigning the Keele Street extension further east. If Option 2A(ii) is implemented with Options 4 or 5, it will share the same level of complexity due to the grading issues at the intersection of the Gunns and Keele extensions.

Option 3A(i) poses the greatest grading issues of the other options as due to the required elevation crossing the rail corridor, a greater slope will be required to mitigate the impacts at the Old Weston Road and Davenport Road intersection, while it will not be possible to tie-in to Lloyd Avenue.

Potential Impact on Stormwater Management

Stormwater management features like stormwater drains are required on new roads in order to mitigate overland flow. All options that require any road work will require added stormwater features, therefore all options share this measure equally.

Potential Impact on Existing Transportation Operations during Construction (Rail, Road & Transit)

In order to implement the alternatives, road work must be done. This measure evaluates the extent of roadwork that must be completed and if it will impact traffic operations for all modes. Specifically, options that require that a major road, or piece transportation infrastructure, be closed off for an extended times will have significant effects on the road network.

Option 1A(i) requires a large amount of work to be done along St. Clair Avenue West as this option will also require the rehabilitation of the St. Clair Avenue West Underpass to new code specifications. Option 1A(ii) also shares the same impacts as Option 1A(i); they both will require staged closure of the rail corridor at the underpass in order for the work on the structure to be finished. Staged closure along St. Clair Avenue West will also be required between Old Weston Road and Keele Street/Weston Road. Transit operations will also be temporarily interrupted or will need to be diverted from St. Clair Avenue West.

Options 1B(i) and 1B(ii) will require temporary closure of the rail corridor crossing around St. Clair Avenue West for the underpinning of the existing footings as well as staged closures in order to maintain full train operations. Temporary closures of all eastbound lanes along St. Clair Avenue West between Old Weston and Weston Road in order to tie the new alignment into the network are also required. This in turn will require that streetcar tracks be protected for the duration. Transit operations will be subject to a temporary interruption of service.

For Options 2A(ii) and 4 to be implemented, it requires only minor disruptions of rail services during its construction. With this exception, there are no other impacts on traffic operations created by these options. Option 3A(i) requires track protection and staged closures during construction in order to maintain full train service. Similar to option 2A(ii), there are no other impacts created by this option.

Option 5 also has the same impacts posed by options 2A(ii) and 4 but also includes a slight interruption on St. Clair Avenue West during the construction of the overpass. Possible disruptions to transit operations on Davenport are also likely.

6.1.6 Estimated Construction Cost

The estimated construction cost does not include land acquisition costs that are associated with the procurement of lands to be used for the new road alignments. It also does not include existing structure rehabilitation or improvements to existing roadways. Although the cost is important, it is not of primary concern in determining which option will be implemented. The costs of the long-term improvement options are summarized in **Table 6-6**.

Scenario	Improvement Options							
	1				2A	3A	4	5
	Ai	Aii	Bi	Bii	ii	i		
Estimated Cost (millions)	$47	$47	$25	$18	$29	$30	$30	$39

Table 6-6: Estimated Costs for Long-Term Improvement Options

Options 1A(i) and 1A(ii) are expected to cost approximately $47 million due primarily to the length of the bridge required. For Option 1B, the alternative to construct an overpass (1B(ii)) is slightly cheaper than to construct the underpass (1B(i)), this is due primarily to the additional staging that is required to accommodate the rail activities - $18 million and $25 million, respectively. Although Option 2A(ii) is expected to have a narrower structure than a crossing would have at St. Clair Avenue West, its longer length contributes to its overall cost of approximately $29 million. While having a similar structure cost to Option 2A(ii), the construction costs for Option 3A(i) are slightly greater ($30 million) due to the additional roadworks required for the tie-ins at Keele Street and at Davenport Road. Likewise, Option 4 constructs the same overpass as Option 2A(ii), but incurs additional roadworks associated with the extension of Keele Street, resulting in an overall construction cost of $30 million. Finally, building upon Option 4, Option 5 incurs additional costs associated with the extension of Union Street, overpass of St. Clair Avenue West, and connection to Davenport Road, resulting in an overall construction cost of approximately $39 million.

6.2 Constructability Review of Long-Term Alternative Solutions

It is our understanding that four (4) Metrolinx/GO and one (1) CP Rail track will be operating in this corridor. This includes the new Metrolinx Union Pearson Express rail line. In order to implement the long term options mentioned within **Section 6.0**, two options were considered for the construction of rail crossings.

Option 1 – Staged Replacement

The implementation of staged replacement would require permanent track realignment of up to 3.0m. This is needed in order to construct new steel girder bridges for the structure replacement at St. Clair Avenue West. When the existing track layout and the constraint of the grade separation structures at Old Weston Road 500m south of the St. Clair Avenue West crossing is analyzed, it is apparent that track realignment is not a feasible option without reconstructing the grade separation.

Temporary closures of two of the five tracks would be required for extended periods of time ranging from one to two months each. In addition to this, construction access would also be very complex when replacing the bridges along the inner tracks. Based on these reasons, staged replacement is not recommended and therefore was not developed further in detail.

Option 2 – Open Cut and Jack in place

A secondary method considered for the construction of the rail crossing was open cut and jack in place. This is a proven method of construction evident through its use on the Kings Road Grade Separation in the City of Burlington. This option is also feasible for each of the long term improvement options that require bridge structures. Open Cut and Jack in place would be performed for Options 1A(i), 1A(ii), 1B(i), 2A(ii), 4 and 5.

Track closures would occur when the bulk of the excavation and bridge removals take place and the new tunnel structures are jacked in to place. During this period, four of the Metrolinx/GO tracks would need to be closed down temporarily and removed while the CP Rail track would remain open. The tracks would be restored after new tunnel structures have been jacked into their final positions and backfilled. It is also possible to keep one of the four (4) Metrolinx/GO tracks open during construction; however this will require a longer closure of one of the four tracks prior to replacement. During the second phase of construction, the existing structure carrying CP Rail will be replaced in the same manner, but accomplished by working from the opposite direction.

It is estimated that the bridge serving the four Metrolinx tracks could be installed with a track closure of approximately 8 to 10 days for three cells, or three separate track blocks of four days each for a total of 12 days, using 24-hour continuous operation. The replacement of the bridge carrying CP Rail would then follow.

The construction of a grade separation at the proposed Gunns Road extension is estimated to require a full closure of four days for the four Metrolinx/GO tracks. A similar length of closure time will then be required for the CP Rail structure.

During the replacement of the St. Clair Avenue West Underpass, all vehicular, pedestrian and streetcar traffic would need to be closed for an extended period of time. It is estimated that the replacement of the St. Clair Avenue West structure will span over a three year period, starting from utility relocations until full traffic is restored. The construction of the grade separation at Gunns Road can be completed within one year.

A construction methodology and sequence of work for this option can be viewed in **Appendix G**. Upon review of these construction staging options by CP and Metrolinx it was noted that full day closures of the rail corridor are not acceptable and closures can only occur for hours. As such as part of the Environmental Assessment and Detailed Design, should Options 1A(i), 1A(ii), 1B(i), 2A(ii), 4 and 5 be chosen as the preferred alternative combinations of structure type and construction method would need to be investigated further.

7.0 Recommendations

After consultation with various members within the City of Toronto and outside proponents, we have refined the alternatives to be brought forward to the Environmental Assessment. The summary of the overall evaluations presented in **Sections 5.2** and **6.1**.

7.1 Short-Term Alternative Solutions

The development and feasibility evaluation of the short-term alternatives conducted as part of this study has identified a number of considerations that need to be addressed before a short-term alternative can be implemented. Specifically, the evaluation has demonstrated the need to further evaluate the impact of the short-term alternatives on the streetcar operations along St. Clair Avenue West. A short-term alternative evaluation matrix is presented in **Appendix D-3**.

Based on the evaluation, a short-list of options can be developed for further consideration. Specifically, considering the potential to improve the operations and ability to mitigate impacts to the transit corridor, **Options 3A, 3B, 5, and 6** are recommended for further consideration.

Given that all of the short-term alternatives were identified as Schedule A or A+ activities under the Municipal Class EA, it is recommended that their impacts be detailed further as part of an internal review between the City and the TTC.

7.2 Long-Term Alternative Solutions

With the initial screening on feasibility for the long-term options previously conducted the secondary evaluation was focused on determining the likelihood the alternative would fulfill the goals and objectives necessary to address the identified constraints in the study area. As a result the objective of this evaluation was to select solutions that were both feasible and effective. A long-term alternative evaluation matrix is presented in **Appendix F-3**.

Based on the evaluation of the refined alternative options, we recommend that **Option 1A(ii)** be carried forward above all other **Option 1** sub-options and variations, as it meets the most City requirements. **Option 1A(ii)** incorporates the widening of St. Clair Avenue West to the south by two lanes and will be beneficial to the flow of traffic through the network. The impacts on the residential properties to the north are limited as is the shift in the road alignment and the impact on the natural environment. This option also allows for the incorporation of bicycle lanes which currently is not a possibility on St. Clair Avenue West.

Regarding **Option 2A(ii)**, it was recognized that its benefits are limited given where it connects to roads with limited connectivity and does not facilitate the northwest to southeast or east-west traffic flows through the study area. Comparatively, **Option 3A(i)** does facilitate this flow of traffic and does provide another connection to an east-west arterial in the study area. Considering this it is recommended that **Option 2A(ii)** not be carried forward to the EA process, while **Option 3A(i)** be carried forward.

Similarly, in comparing **Option 4 and 5**, it can be seen that the key points that differentiate these options are their ability to provide a connection via Davenport and increase the flow of traffic within the study area. It can be seen that without the direct connection to another east-west arterial in the study area that the option will ultimately focus traffic into the existing constraint points at intersections of Weston Road/Keele Street and St. Clair Avenue West and Old Weston Road and St. Clair Avenue West. Considering this it is recommended that **Option 4** not be carried forward to the EA process, while **Option 5** be carried forward.

Considering the above options, a Transportation Master Plan Environmental Assessment process should be undertaken that will consider all four (4) phases for each of the alternatives.

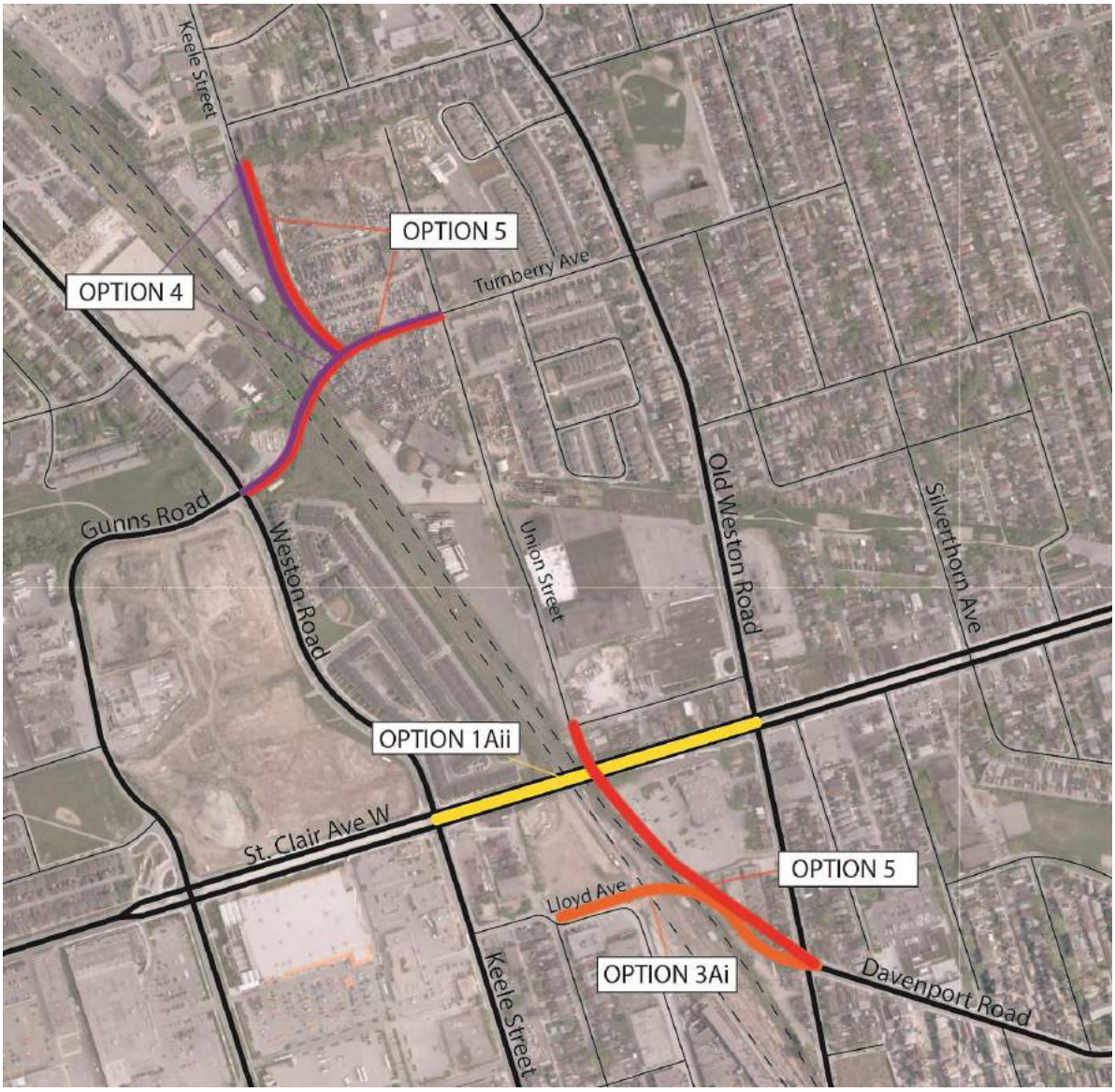


Figure 7-1: Short Listed Long-Term Alternatives