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Appendix A5

Ontario Line Project

Lakeshore East Joint Corridor Early Works – Traffic and Transportation Early Works Report

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Metrolinx

Traffic and Transportation Early Works Report

Ontario Line Lakeshore East Joint Corridor Early Works

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Project #: 60611173

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AECOM: 2015-04-13

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Executive Summary

ES.1 Ontario Line Lakeshore East Joint Corridor Early Works

The Ontario Line Project (the Project) is being assessed in accordance with Ontario Regulation 341/20: Ontario Line Project under the Environmental Assessment Act. Ontario Regulation 341/20: Ontario Line Project outlines a Project-specific environmental assessment process that includes an Environmental Conditions Report, Environmental Impact Assessment Report, and an opportunity for Early Works Report(s) for assessment of works that are ready to proceed in advance of the Environmental Impact Assessment Report. The Environmental Conditions Report documents the local environmental conditions of the Ontario Line Study Area and provides a preliminary description of the potential environmental impacts from the Project. Information outlined in the Environmental Conditions Report is used to inform the Early Works Report(s) and Environmental Impact Assessment Report, which study environmental impacts in further detail and confirm and refine preliminary mitigation measures identified in the Environmental Conditions Report.

Ontario Line early works are components of the Project that are proposed to proceed before the completion of the Ontario Line environmental impact assessment process. An overview of the Project is provided in **Section 1.2**. Early works are defined in Ontario Regulation 341/20: Ontario Line Project under the Environmental Assessment Act as follows:

> "any components of the Ontario Line Project that Metrolinx proposes to proceed with before the completion of the Ontario Line assessment process, such as station construction, rail corridor expansion, utility relocation or bridge replacement or expansion."

The Lakeshore East Joint Corridor early works are considered to be of strategic importance in enabling the timely implementation of the Project. These early works are being advanced where the Project interfaces with GO Expansion and the East Harbor Station (East Harbour Station is situated immediately to the west of the Lakeshore East Joint Corridor early works). Advancing early works and supporting environmental and technical studies in this area provides planning and design efficiencies for the Project, GO Expansion and the East Harbour Station, and facilitates the timely implementation of these projects.

These early works will set the groundwork for other major construction for the Project, reducing risk of construction delays to the main contracts by completing the joint corridor work in advance of the main contracts.

AECOM Canada Limited (AECOM) was retained by Metrolinx and Infrastructure Ontario to complete the Ontario Line Lakeshore East Joint Corridor Early Works Report for the Project. This Final Traffic and Transportation Early Works Report (this Report) supports the Ontario Line Final Lakeshore East Joint Corridor Early Works Report and has been prepared for the Project to document the traffic and transportation impact assessment of Lakeshore East Joint Corridor early works (**Figure ES-1**).

The Lakeshore East Joint Corridor early works are planned along the Lakeshore East rail corridor between approximately Eastern Avenue and Pape Avenue and will include:

- Reconfiguration of existing GO tracks to support future Ontario Line infrastructure;
- Replacement of the existing rail bridges at Queen Street East, Dundas Street East and Logan Avenue;
- Construction of new bridges at Dundas Street East and Logan Avenue to support future Ontario Line tracks;
- Construction of the foundations for GO Overhead Catenary System (OCS) poles and supporting infrastructure to accommodate future fourth GO track;
- Construction of retaining walls; and
- Construction of noise barriers, including east of Pape Avenue.

The Lakeshore East Joint Corridor early works components and construction activities are further described in **Section 1.2**.

The purpose of this Report is to:

- Describe the local environmental conditions related to the identified transportation network and transit network within the Lakeshore East Joint Corridor Study Area;
- Assess the potential impacts of Lakeshore East Joint Corridor early works construction activities on the identified transportation network and transit network; and,
- Identify mitigation measures and monitoring activities for any potential negative impacts on traffic and transportation operations within the Lakeshore East Joint Corridor Study Area.

This Report supports the Ontario Line Lakeshore East Joint Corridor Early Works Report prepared in accordance with Ontario Regulation 341/20: Ontario Line Project.

Refer to **Section 1** of this Report for more information related to the Project and a detailed early works description.

Figure ES-1: Lakeshore East Joint Corridor Early Works Conceptual Design

Figure ES-1: Lakeshore East Joint Corridor Early Works Conceptual Design

ES.2 Methodology

This Report documents the assessment of Lakeshore East Joint Corridor early works construction impacts related to traffic and transportation operations. Impacts associated with Project operations will be addressed as part of the Environmental Impact Assessment Report, under a separate cover. Detailed methodology is provided in **Section 2**.

Local Environmental Conditions

The following traffic and transportation elements within the Lakeshore East Joint Corridor Study Area were assessed:

- Transportation network:
  - Road Network
  - Pedestrian Network
  - Cycling Network
  - Rail Network
- Transit network.

AECOM received available traffic data (i.e., turning movement counts and signal timing plans) at the intersections within the Lakeshore East Joint Corridor Study Area from the City of Toronto. In addition, the following secondary sources were used to conduct the background information review as part of the Ontario Line Final Environmental Conditions Report (AECOM, 2020)[1]:

- City of Toronto's website:
  - Open Data Portal (City of Toronto, no date);
  - Road Classification System Update (City of Toronto, 2018); and
  - Application Information Centre (City of Toronto, no date);
  - Vision Zero Mapping Tool (City of Toronto, 2020).
- Transit schedule and route information:
  - GO Transit (GO Transit, 2020);
  - VIA Rail (VIA Rail, 2020); and
  - Toronto Transit Commission schedules (Toronto Transit Commission, 2019).

A quantitative multi-modal level of service assessment was undertaken at the intersections and road segments within the Lakeshore East Joint Corridor Study Area where traffic data was available. The automobile level of service assessment was completed using

1. The Ontario Line Final Environmental Conditions Report (AECOM, 2020) was published on November 30, 2020 in accordance with Ontario Regulation 341/20: Ontario Line Project.

Synchro 9 capacity analysis software in accordance with the methodologies outlined in the Highway Capacity Manual and in line with the capacity analysis guidelines outlined in the City of Toronto's Guidelines for Using Synchro 9 (City of Toronto, 2016). The City of Ottawa's Multi-Modal Level of Service Guidelines (City of Ottawa, 2015) were generally followed to determine the level of service for non-auto modes of travel (i.e., pedestrians, cyclists, and transit). The City of Ottawa's Multi-Modal Level of Service Guidelines are widely used in transportation studies within Ontario and specifically the City of Toronto which has approved multiple studies in which they were used (e.g., Yorkdale Transportation Master Plan, Golden Mile Transportation Master Plan, etc.).

The level of service designation for all modes of travel range from level of service 'A' to level of service 'F' based on the relative attractiveness (e.g., the amount of average delay for automobile and transit users, the level of comfort, safety, and convenience experienced by pedestrians and cyclists) of the traffic and transportation elements within the Lakeshore East Joint Corridor Study Area. A level of service target was set for each mode of travel to ensure that the respective mode users experience a minimum desirable level of service which is consistent with both the surrounding land use designation and the road classification. The levels of service targets set for motorized vehicles (i.e., automobiles and transit) and active transportation users are level of service 'D' and level of service 'C', respectively. This indicates that for motorized vehicles, level of service 'A' through 'D' typically indicate acceptable operations, while level of service 'E' or 'F' indicate critical operations. For active transportation users, level of service 'A' through 'C' indicate acceptable operations, while level of service 'D' through 'F' indicate critical operations.

The Ontario Line Final Environmental Conditions Report (AECOM, 2020) notes that turning movement counts and signal timing plans were not available at some intersections within the Ontario Line Study Area, and were not collected through new traffic surveys considering the uncharacteristic traffic conditions as a result of the COVID-19 pandemic. As a result of the data limitations related to the identified road network within the Lakeshore East Joint Corridor Study Area, a quantitative traffic assessment of some intersections could not be undertaken.

Impact Assessment

This early works impact assessment and development of mitigation measures and monitoring activities considered the following in accordance with Ontario Regulation 341/20: Ontario Line Project under the Environmental Assessment Act:

- Lakeshore East Joint Corridor early works components as described in **Section 1.3.1**;
- The Lakeshore East Joint Corridor Early Works Project Footprint and Lakeshore East Joint Corridor Study Area as described in **Section 1.3.2**;

- Lakeshore East Joint Corridor construction activities as described in **Section 1.3.3**; and,
- Local environmental conditions within the Lakeshore East Joint Corridor Study Area as described in **Section 3**.

A quantitative impact assessment was not completed at this stage as the detailed construction staging schemes that describe the potential modifications to the existing transportation network were not available. Quantitative impact assessment will be completed, if required, as detailed design progresses and this information becomes available. The quantitative impact assessment may include a larger study area.

ES.3 Local Environmental Conditions

The findings of the quantitative multi-modal level of service assessment of the existing transportation and transit networks within the East Harbour Study Area are summarized as follows:

- Automobiles experience acceptable Automobile Level of Service ‘C’ or better at all the Lakeshore East Joint Corridor Study Area intersections in both the AM and PM peak hours;
- Pedestrians experience critical Pedestrian Level of Service ‘D’ at all the Lakeshore East Joint Corridor Study Area intersections except at the intersection of Gerrard Street and Logan Avenue where pedestrians experience acceptable Pedestrian Level of Service ‘C’. Pedestrians experience critical Pedestrian Level of Service ‘D’ or ‘E’ along all the studied road segments, except along the studied section of Queen Street where pedestrian experience acceptable Pedestrian Level of Service ‘B’;
- Cyclists experience acceptable Bicycle Level of Service ‘B’ at all the Lakeshore East Joint Corridor Study Area intersections. Cyclists accommodate through the on-street bike lanes along Dundas Street and Logan Avenue experience acceptable Bicycle Level of Service ‘B’. Along the remaining road segments, cyclists experience critical Bicycle Level of Service ‘D’ or ‘E’; and
- Transit vehicles operate at acceptable Transit Level of Service ‘C’ or ‘D’ at all signalized intersection within the Lakeshore East Joint Corridor Study, except for the intersection of Gerrard Street and Carlaw Avenue which operates at critical Transit Level of Service ‘E’ in the PM peak hour but acceptable Transit Level of Service ‘C’ in the AM peak hour. Along road segments, all transit vehicles experience an acceptable Transit Level of Service ‘D’.

Local environmental conditions are further described in **Section 3**.

ES.4 Potential Impacts, Mitigation Measures and Monitoring Activities

Section 3.2.2 includes information related to potential impacts, mitigation measures, and monitoring activities for the Lakeshore East Joint Corridor early works. Potential impacts may result from early works construction activities, including temporary closures and realignment of transportation network components (i.e., lanes, sidewalks, and rail tracks) and increased traffic within the Lakeshore East Joint Corridor Study Area. Mitigation measures and monitoring activities are recommended to minimize the potential impacts during construction.

Refer to **Table ES-1** for a complete list of potential impacts, mitigation measures, and monitoring activities for the Lakeshore East Joint Corridor early works.

ES.5 Permits and Approvals

Section 5 notes that federal or provincial permits and approvals related to traffic and transportation are not required for the Lakeshore East Joint Corridor early works. Metrolinx will co-ordinate with the City of Toronto and Toronto Parking Authority for transportation-related permits and approvals (e.g., street occupation permit) prior to construction, as required.

Table ES-1: Potential Impacts, Mitigation Measures and Monitoring Activities for the Lakeshore East Joint Corridor Early Works

Environmental Component	Potential Impacts	Mitigation Measure(s)	Monitoring Activities
Transportation Network – Roads	■ If required, temporary lane closures along some of the Lakeshore East Joint Corridor Study Area roads (i.e., Queen Street East, Dundas Street East, and Logan Avenue) may result in impeding traffic flow and increased average delay of vehicles, including emergency vehicles. ■ Construction vehicle traffic may impact traffic operations resulting in increased vehicular delays and queue lengths, especially at intersections where construction traffic is required to make left-turning movements. ■ Potential overlapping construction timelines with other planned projects (e.g., capital projects and local developments) nearby may result in impacts to the transportation network and its road users.	■ A quantitative traffic impact assessment will be completed, if required, as project planning progresses to consider vehicular traffic impacts as a result of the Lakeshore East Joint Corridor early works. ■ Develop and implement a transit and traffic management plan(s), which could include temporary changes to intersection lane configurations, traffic signal timing optimization, modifications to existing signal timing plans, etc. The transit and traffic management plan(s) will also address specific emergency services requirements in consultation with the City of Toronto. ■ Traffic signal timing optimization may be assessed/implemented to increase capacity of affected intersections and to aid in the movement of traffic. Traffic signal timing adjustments would require coordination between Metrolinx and City of Toronto, and will be undertaken if required, to determine appropriate changes to traffic signal timings. ■ Consider scheduling construction activities during off-peak periods and weekends to minimize disruptions to road users during the critical peak periods. ■ Co-ordinate with the City of Toronto regarding other ongoing construction projects when scheduling the early works activities to maintain the mobility of road users. ■ Metrolinx will work with the City of Toronto and corresponding Business Improvement Areas to maintain access to businesses and minimize the potential impacts of the early works.	■ The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period and adjustments will be made based on actual field observations, as needed.
Transportation Network – Active Transportation	■ Potential traffic congestion along the Lakeshore East Joint Corridor Study Area roads, as a result of the increase in heavy vehicle traffic, could increase pedestrians' and cyclists' exposure to traffic. ■ If required, temporary realignment of the existing sidewalks along some of the Lakeshore East Joint Corridor Study Area roads (i.e., Queen Street, Dundas Street, and Logan Avenue) may increase walking distances and impact the convenience of pedestrians.	■ Reduce interference with pedestrians and cyclists. This may include fencing, hoarding (minimum 2 meters high, solid, and secured), shared-lane markings, signals, wayfinding signs, and lighting as required to provide pedestrians and cyclists with safe, accessible, and continuous routes. ■ If required, co-ordinate with the City of Toronto to ensure any modifications to pedestrian crossing distances at signalized intersections are reflected in revised pedestrian clearance timings. ■ Any temporary pedestrian facilities including temporary or relocated Toronto Transit Commission transit stops will be designed to meet Toronto Transit Commission accessibility standards. ■ Implement flagging where construction vehicles are present to ensure construction vehicle operators are aware of pedestrian and vehicular traffic within the construction area.	■ The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period and adjustments will be made based on actual field observations, as needed.
Transportation Network – Rail	■ Early works construction may require temporary full or partial closure of existing rail tracks, which may disrupt existing commuter and freight rail operations. The extent of track closures is dependent on the type of equipment used and construction sequencing.	■ Consult with rail operators with current service along the rail corridor (i.e., VIA Rail, Canadian National Railway, and Canadian Pacific Railway) to assess how track closures would impact their service and co-ordinate temporary schedules to accommodate all rail services on the open tracks.	■ The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period. Adjustments to the construction staging plans and transit and traffic management plan(s) will be made based on actual field observations, as needed.
Transit Network	■ Potential increase of construction vehicles traffic could result in travel time delays to existing surface transit routes (i.e., streetcar routes #301 Queen Blue Night, #306 Carlton Blue Night, #501 Queen, #503 Kingston, and #506 Carlton, and bus routes #72 Pape, #143 Downtown/Beach Express, and #325 Don Mills Blue Night) that pass through the Lakeshore East Joint Corridor Study Area intersections.	■ Co-ordinate with the Toronto Transit Commission and notify transit users regarding travel delays to the bus/streetcar services in advance. ■ Consider scheduling some construction activities during off-peak periods and weekends to minimize delays to bus services during the critical peak periods.	■ Transit services will be monitored through actual field observations throughout the construction period and additional mitigation measures will be considered, as needed.

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1. Introduction

1.1 Purpose of the Ontario Line Early Works

The Ontario Line Project (the Project) is being assessed in accordance with Ontario Regulation 341/20: Ontario Line Project under the Environmental Assessment Act. Ontario Regulation 341/20: Ontario Line Project outlines a Project-specific environmental assessment process that includes an Environmental Conditions Report, Environmental Impact Assessment Report, and an opportunity for Early Works Report(s) for assessment of works that are ready to proceed in advance of the Environmental Impact Assessment Report. The Environmental Conditions Report documents the local environmental conditions of the Ontario Line Study Area and provides a preliminary description of the potential environmental impacts from the Project. Information outlined in the Environmental Conditions Report is used to inform the Early Works Report(s) and Environmental Impact Assessment Report, which study environmental impacts in further detail and confirm and refine preliminary mitigation measures identified in the Environmental Conditions Report.

Ontario Line early works are components of the Project that are proposed to proceed before the completion of the Ontario Line environmental impact assessment process. An overview of the Project is provided in **Section 1.2**. Early works are defined in Ontario Regulation: 341/20: Ontario Line Project under the Environmental Assessment Act as follows:

> "any components of the Ontario Line Project that Metrolinx proposes to proceed with before the completion of the Ontario Line assessment process, such as station construction, rail corridor expansion, utility relocation or bridge replacement or expansion."

Lakeshore East Joint Corridor early works are considered to be of strategic importance in enabling the timely implementation of the Project. The early works are being advanced where the Project interfaces with GO Expansion and the East Harbour Station. Advancing early works and supporting environmental and technical studies in this area provides planning and design efficiencies for the Project and GO Expansion and facilitates the timely implementation of both.

Lakeshore East Joint Corridor early works are described in detail in **Section 1.2**.

1.1.1 Purpose of this Report

AECOM Canada Limited (AECOM) was retained by Metrolinx and Infrastructure Ontario to complete the Ontario Line Lakeshore East Joint Corridor Early Works Report for the

Project. This Traffic and Transportation Early Works Report (this Report) supports the Ontario Line Final Lakeshore East Joint Corridor Early Works Report and has been prepared for the Project to document the traffic and transportation impact assessment of Lakeshore East Joint Corridor early works (**Figure 1-1**). The early works components and construction activities are described in **Section 1.3**.

The purpose of this Report is to:

- Describe the local environmental conditions related to the identified transportation network and transit network within the Lakeshore East Joint Corridor Study Area;
- Assess the potential impacts of Lakeshore East Joint Corridor early works construction activities on the identified transportation network and transit network; and
- Identify mitigation measures and monitoring activities for any potential negative impacts on traffic and transportation operations within the Lakeshore East Joint Corridor Study Area.

This Report has been prepared in accordance with Ontario Regulation 341/20: Ontario Line Project and contains the information outlined in **Table 1-1.**

Table 1-1: Report Contents in Accordance with Ontario Regulation 341/20: Ontario Line Project

Reg. Section	Requirement	Report Section
Section 8(2)2	The rationale for proceeding with the early works.	**Section 1.1**
Section 8(2)4	A description of the local environmental conditions at the site of the early works.	**Section 3**
Section 8(2)6	Metrolinx's assessment and evaluation of the impacts that the preferred method of carrying out the early works and other methods might have on the environment, and Metrolinx's criteria for assessment and evaluation of those impacts.	**Section 3.2.2**
Section 8(2)7	A description of any measures proposed by Metrolinx for mitigating any negative impacts that the preferred method of carrying out the early works might have on the environment.	**Section 3.2.2**
Section 8(2)8	A description of the means Metrolinx proposes to use to monitor or verify the effectiveness of mitigation measures proposed.	**Section 3.2.2**
Section 8(2)9	A description of any municipal, provincial, federal or other approvals or permits that may be required for the early works.	**Section 5**

Figure 1-1: Lakeshore East Joint Corridor Early Works Conceptual Design

Figure 1-1: Lakeshore East Joint Corridor Early Works Conceptual Design

1.2 Ontario Line Project Overview

Metrolinx, an agency of the Province of Ontario, is proceeding with the planning and development of the Ontario Line, extending from Exhibition/Ontario Place to the Ontario Science Centre in the City of Toronto.

The Project is a new approximately 15.6-kilometre subway line with connections to Line 1 (Yonge-University) subway service at Osgoode and Queen Stations, Line 2 (Bloor-Danforth) subway service at Pape Station, and Line 5 (Eglinton Crosstown) light rail transit service at the future Science Centre Station. Fifteen stations are proposed, with additional connections to three GO Transit lines (Lakeshore East, Lakeshore West and Stouffville), and the Queen, King, Bathurst, Spadina, Harbourfront, and Gerrard/Carlton streetcar routes. The Project will reduce crowding on Line 1 and provide connections to new high-order rapid transit neighbourhoods. The Project will be constructed in a dedicated right-of-way with a combination of elevated (i.e., above existing rail corridor/roadway), tunnelled (i.e., underground), and at-grade (i.e., at grade with existing rail corridor) segments at various locations.

1.3 Early Works Description

1.3.1 Project Description

The Lakeshore East Joint Corridor early works are planned along the Lakeshore East rail corridor between approximately Eastern Avenue and Pape Avenue and will include:

- Reconfiguration of existing GO tracks to support future Ontario Line infrastructure,
- Replacement of the existing rail bridges at Queen Street East, Dundas Street East and Logan Avenue,
- Construction of two new bridges at Dundas Street East and Logan Avenue to support future Ontario Line tracks,
- Construction of the foundations for GO Overhead Catenary System (OCS) poles and supporting infrastructure to accommodate future fourth GO track;
- Construction of retaining walls; and
- Construction of noise barriers, including east of Pape Avenue.

The Lakeshore East Joint Corridor early works will support the future Ontario Line infrastructure located between Eastern Avenue and Pape Avenue (e.g., Leslieville and Gerrard stations, and Ontario Line tracks). These early works will also streamline implementation of GO Expansion through the construction of supporting infrastructure for the future fourth track for the Lakeshore East GO corridor and the foundations for GO Overhead Catenary System (OCS) poles. The noise barriers constructed as part of these early works will mitigate noise impacts from both Ontario Line and GO operations.

The Lakeshore East Joint Corridor early works components are shown in **Figure 1-1**.

Rail corridor and third-party utility relocations and protection will be completed to facilitate the work described above as well as the future Ontario Line tunnel facilities. Utilities to be relocated include, but are not limited to, Bell 360 and existing Canadian National/GO signal underground fibre optic cables.

1.3.2 Early Works Project Footprint and Study Area

The Lakeshore East Joint Corridor Early Works Project Footprint, shown in **Figure 1-2**, is defined as the area of direct disturbance associated with the early works construction activities, including anticipated required construction staging and laydown areas[2] and construction access. Construction is anticipated to occur primarily within the existing Metrolinx right-of-way (Metrolinx-owned rail corridor/properties). The extent of lands anticipated to be temporarily impacted by construction staging/laydown and access will continue to be refined and reduced to the extent feasible as project planning progresses.

The Lakeshore East Joint Corridor Early Works Project Footprint extends from approximately 325 metres east of the Lower Don River in the west, follows the Lakeshore East rail corridor northeast from Eastern Avenue in the south to Jones Avenue in the north.

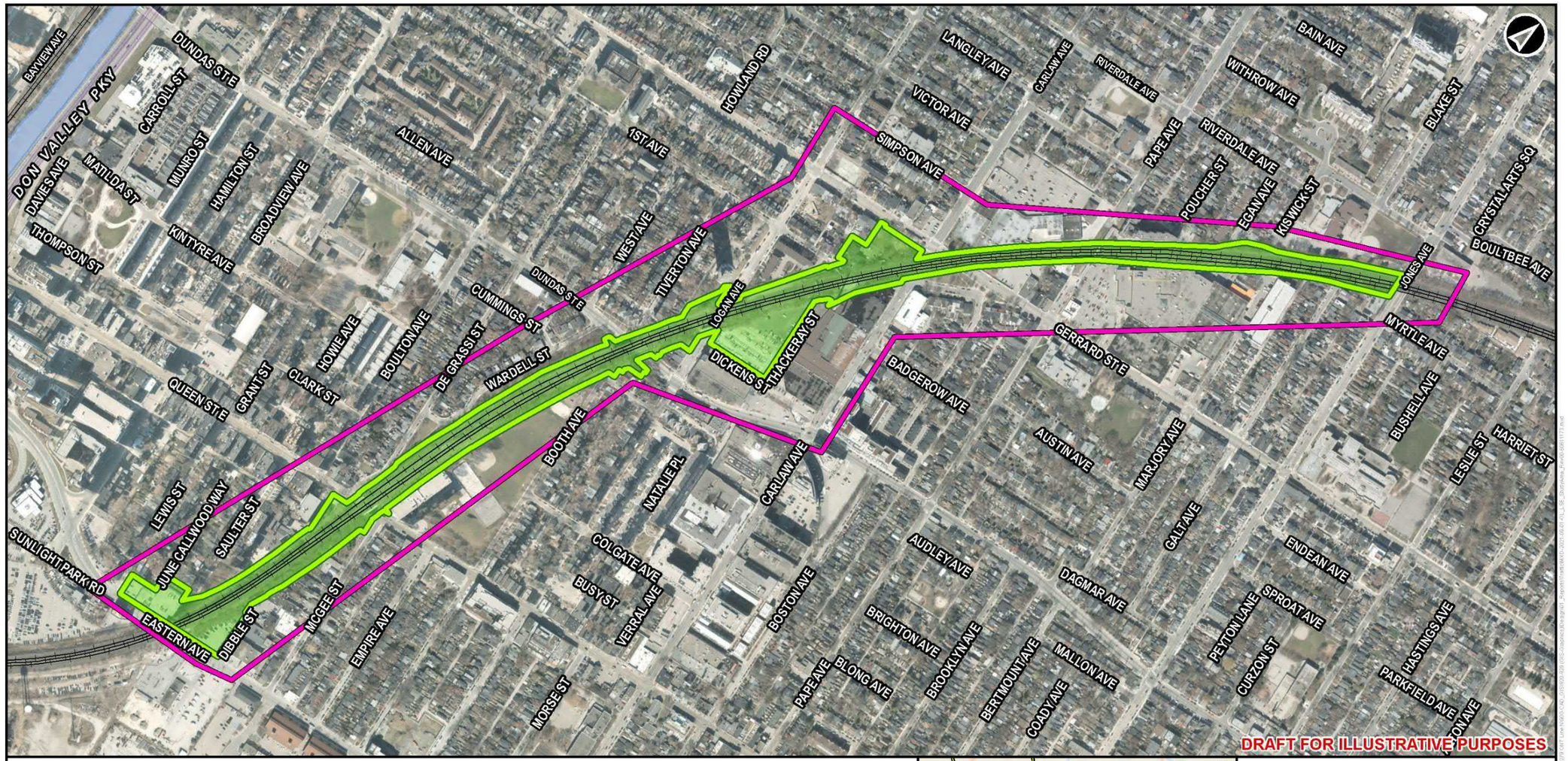
For the purpose of this Report, the Lakeshore East Joint Corridor Study Area, also shown in **Figure 1-2**, includes the Lakeshore East Joint Corridor Early Works Project Footprint and adjacent road segments and intersections. The adjacent road segments and intersections within the Lakeshore East Joint Corridor Study Area were identified as they meet either of the following criteria:

- Directly impacted by the early works activities within the Lakeshore East Joint Corridor Early Works Project Footprint (i.e., construction of the new rail brides is anticipated to result in potential lane closure along Queen Street, Dundas Street, and Logan Avenue); or,
- Provide connection to the Lakeshore East Joint Corridor Project Footprint (i.e., Eastern Avenue, Queen Street, Dundas Street, Gerrard Street, Logan Avenue, Carlaw Avenue, Jones Avenue, Booth Avenue, and McGee Street) and therefore may be considered as a route for construction vehicles, where heavy vehicles are permitted.

The Lakeshore East Joint Corridor Study Area assessed in this Report is specific to the traffic and transportation impact assessment. The study areas for other environmental disciplines are outlined in the Ontario Line Final Lakeshore East Joint Corridor Early Works Report.

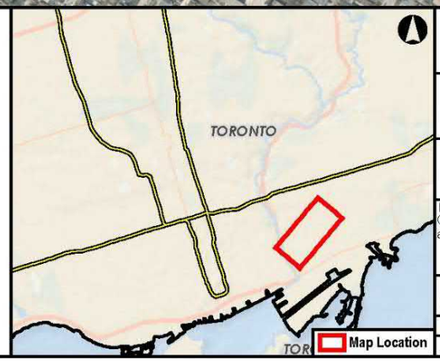
2. Staging and laydown areas are areas for the temporary storage of construction equipment and materials.

Figure 1-2: This figure shows the Lakeshore East Joint Corridor Early Works Project Footprint and Lakeshore East Joint Corridor Study Area



Legend

- Existing Track
- Waterbody
- Lakeshore East Joint Corridor Early Works Project Footprint
- Lakeshore East Joint Corridor Study Area



Ontario Line Project

Lakeshore East Joint Corridor Early Works Project Footprint and Lakeshore East Joint Corridor Study Area

0 50 100 200 300 400
Meters
DATUM: NAD 1983 UTM Zone 17N

Data Sources:
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Figure 1-2

1.3.3 Construction Activities

Table 1-2 provides a description of the anticipated construction activities for the Lakeshore East Joint Corridor early works. These typical activities serve as the basis for the assessment of construction-related potential environmental impacts. These activities may be expanded, further refined, or found to be unnecessary as the Project progresses through detailed design and construction.

Table 1-2: Anticipated Construction Activities for the Ontario Line Lakeshore East Joint Corridor Early Works

Anticipated Construction Activity	Description	Associated Equipment
Site Preparation	■ Mobilization of equipment and temporary facilities to the site. ■ Clearing and grubbing of vegetation, tree removal and protection. ■ Protection of trees & sensitive environmental features. ■ Erection of temporary and permanent fences. ■ Installation of environmental management features (e.g., erosion and sediment controls). ■ Dewatering works. ■ Preparation of temporary laydown areas including access roads, fencing and lighting. ■ Preparation of temporary access roads to construction sites including temporary shoring, access roads, fencing, signage, gate and lighting. ■ Temporary closure of road curb lanes. ■ Removal of roadway, sidewalks, buildings and retaining walls impacted by temporary or permanent conditions.	■ Site compaction equipment and grading equipment. ■ Vegetation removal equipment. ■ Excavation equipment. ■ Haulage/dump trucks.
Site Servicing/ Removals/ Demolition	■ Relocation and/or extension of services and utilities on the site; which may include both underground and aerial services and utilities (e.g., sewers, water, electrical, communications, gas). This may also involve installation of utilities within the site. Includes utilities on the rail corridor and off the rail corridor. ■ Demolition and/or alteration of existing buildings and/or structures such as retaining walls and existing bridges. ■ Removal and reinstatement of railway track. ■ Locates and daylighting of underground utilities.	■ Excavation equipment including backhoe, dump trucks, spoil removal equipment, jackhammers, vacuum truck and high rail equipment. ■ Track stabilizer. ■ Hand tools. ■ Mobile crane. ■ Flatbed trucks. ■ Boom truck. ■ Spreader for track work.
Construction of Structures	■ All structures will be constructed using standard civil construction techniques. ■ Includes noise walls, pre-cast and cast-in-place retaining walls including stormwater management, grounding, bonding and backfill using selected material.	■ Foundation placement equipment. ■ Augured piles or rammed aggregate piers. ■ Drill rigs. ■ Mobile cranes and hoists. ■ Concrete trucks, pumps and vibrators.
Construction of Bridges	■ Will be constructed using standard civil construction techniques. ■ Dewatering is anticipated. ■ Includes stormwater management grounding and bonding.	■ Augured piles or rammed aggregate piers. ■ Drill rigs. ■ Mobile cranes and hoists. Concrete trucks, pumps and vibrators. ■ Flatbed trucks, crane, excavators, and light equipment. ■ Back hoe. ■ Jack hammers.
Temporary Road /Sidewalk Closures	■ All road / sidewalk closures will follow standard traffic control management guidelines.	■ Temporary traffic control devices such as signs, signals, barriers, traffic barrels.
Site Grading and Earthworks	■ Removal of topsoil and excavation of unsuitable material and disposal off site ■ Borrow additional material for fill ■ Grading and compaction of track bed including subdrain ■ Installation of sub ballast and pre-ballasting	■ Excavator. ■ Dozer. ■ Motor grader. ■ Compactor. ■ Water truck. ■ Dump trucks.
Management of Stormwater	■ All precipitation falling within the site will be managed as stormwater within a designed system of collection, conveyance, retention and discharge features, as required. The system will be designed and operated in compliance with applicable standards and regulatory requirements. Surface flows within the site will be managed within the site to ensure discharge to off-site receivers (i.e., municipal storm sewers) is appropriate in terms of water quantity and quality.	■ Site compaction equipment and general grading equipment. ■ Groundwater pumping equipment.
Track construction	■ Staged realignment of existing tracks (rail on timber ties). ■ Installation of 4 tracks in final position including ballast utilizing new rail and new concrete ties.	■ High rail excavators, Track laying machine, ballast regulator, stabilizer.
Signaling infrastructure alteration/installation	■ Staged upgrade of track signals to reflect temporary staged realignment of tracks and installation of four tracks in a final position. ■ Relocation of existing bridge and bungalow including temporary track crossings, bridge foundations, aspects, bungalow, power supply, conduits and cables. Removal from site of existing signal bridge and bungalow.	■ Backhoe. ■ Vacuum truck. ■ High rail crane. ■ Drill rig. ■ Concrete pump and concrete trucks.
Fiber Optic Cable (FOC) relocation	■ Staged relocation of multiple Fiber Optic Cable (FOC) to reflect temporary staged realignment of tracks and installation of four tracks in a final position, including multiple conduits, hand wells, split steel casings and splicing.	■ Backhoe. ■ Vacuum truck.

2. Methodology

This Report documents the assessment of Lakeshore East Joint Corridor early works construction impacts. Impacts associated with Project operations will be addressed as part of the Environmental Impact Assessment Report, under a separate cover.

2.1 Local Environmental Conditions

The following traffic and transportation elements within the Lakeshore East Joint Corridor Study Area were assessed:

- Transportation network:
  - Road Network
  - Pedestrian Network
  - Cycling Network
  - Rail Network
- Transit network.

The types and sources of traffic data collected for the above-noted transportation elements are summarized in **Section 2.1.1**. The methodology and assumptions followed in the quantitative assessment of the transportation elements in the existing conditions are discussed in detail in **Section 2.1.2**.

2.1.1 Data Collection

Most recent available Turning Movement Count data at intersections within the Lakeshore East Joint Corridor Study Area were provided by the City of Toronto, consisting of eight-hour counts of vehicles (cars, trucks, and buses), pedestrians, and bicycles and collected at 15-minute intervals during the weekday peak periods. The Turning Movement Count data are presented in **Appendix A**.

In addition, the signal timing plans for the signalized intersections within the Lakeshore East Joint Corridor Study Area were provided by the City of Toronto and are presented in **Appendix B**.

AECOM completed a desktop background review of secondary source information to complement the data provided by the City of Toronto and establish local traffic and

transportation conditions within the Lakeshore East Joint Corridor Study Area. The desktop resources included the following:

- Review of City of Toronto's Open Data Portal (City of Toronto, n.d.) to obtain mapping data related to roads, pedestrian and cyclist routes related to the Lakeshore East Joint Corridor Study Area;
- Review of City of Toronto's Road Classification System Update (City of Toronto, 2018) and Vision Zero Mapping Tool (City of Toronto, 2020) to obtain road classification and speed information related to roads within the Lakeshore East Joint Corridor Study Area;
- Review of City of Toronto's Application Information Centre (City of Toronto, n.d.) to obtain some of the missing traffic data at the Lakeshore East Joint Corridor Study Area intersections; and,
- Review of the GO Transit website (GO Transit, 2020), VIA Rail website (VIA Rail, 2020), and Toronto Transit Commission website (Toronto Transit Commission, 2019) to obtain transit schedule and route data related to the Lakeshore East Joint Corridor Study Area.

The Ontario Line Final Environmental Conditions Report (AECOM, 2020)[3] notes that turning movement counts and signal timing plans were not available at some intersections within the Ontario Line Study Area, and were not collected through new traffic surveys considering the uncharacteristic traffic conditions as a result of the COVID-19 pandemic. As a result of the data limitations related to the identified road network within the Lakeshore East Joint Corridor Study Area, a quantitative traffic assessment of some intersections could not be undertaken.

2.1.2 Multi-Modal Level of Service Assessment

2.1.2.1 Automobile Level of Service

The intersection capacity analyses for the intersections within the Lakeshore East Joint Corridor Study Area were completed using Synchro 9 capacity analysis software in accordance with the methodologies outlined in the Highway Capacity Manual (Transportation Research Board, 2000) and in line with the capacity analysis guidelines outlined in the City's Guidelines for Using Synchro 9 (City of Toronto, 2016). Synchro models were developed to replicate local traffic conditions within the Lakeshore East

3. The Ontario Line Final Environmental Conditions Report (AECOM, 2020) was published on November 30, 2020 in accordance with Ontario Regulation 341/20: Ontario Line Project.

Joint Corridor Study Area as the 2020 Existing Conditions[4] (herein referred to as Existing Conditions) during the AM and PM peak hours on a typical weekday.

The measures of effectiveness used to assess an intersection's operations are level of service and volume-to-capacity ratio. Level of service is an indicator describing the performance of individual intersection movements and of an overall intersection from the traffic operations standpoint. The level of service designation ranges from level of service 'A' to level of service 'F' based on the amount of average delay that a motorist experiences before taking a specific manoeuvre at an intersection. Level of service 'A' through 'D' typically indicate acceptable operations, while level of service 'E' indicates increasing congestion and at capacity operations, and level of service 'F' indicates long delays and, in some cases, severe traffic congestion. The level of service criteria for signalized and unsignalized intersections are attached in **Appendix C**. The level of service target (i.e., the minimum desirable level of service) for automobiles is set to level of service 'D' which implies that intersections and movements with level of service 'E' or worse are considered to be operating at critical levels.

The volume to capacity ratio is another indicator representing the capacity utilization at an intersection or for a specific movement. A volume to capacity ratio of 1.00 indicates that a movement or an intersection is operating at capacity. The target volume to capacity ratio is 0.84 which implies that intersections and movements with volume to capacity ratio exceeding 0.84 are considered to be operating at critical levels.

The key assumptions and modifications made to the default values of the Synchro parameters in the traffic modelling exercise are summarized in **Appendix D**.

2.1.2.2 Pedestrian Level of Service

The City of Ottawa's Multi-Modal Level of Service tool was used to assign a Pedestrian Level of Service to both road segments and signalized intersections along a stretch of road, based on level of comfort, safety, and convenience experienced by pedestrians as they travel along that stretch of road. The City of Ottawa's Multi-Modal Level of Service Guidelines are widely used in transportation studies within Ontario and specifically the City of Toronto which has approved multiple studies in which they were used (e.g., Yorkdale Transportation Master Plan and Golden Mile Transportation Master Plan).

4. Traffic data were collected between 2015 and 2018 and were projected to year 2020 using an annual growth rate of 1% to account for the ambient growth in traffic volumes. The observed turning movement counts from 2015 and 2018 are provided in Appendix A. The assumptions used in the analysis, including the adopted growth rate, are presented in Appendix D.

The key determining factors in evaluating the Pedestrian Level of Service are summarized in **Table 2-1**. The Pedestrian Level of Service on a road segment is determined based on the quality of pedestrian facilities and impact of adjacent motorized traffic on pedestrians. It should be noted that sidewalk crowding was not considered in determining the segment Pedestrian Level of Service due to the absence of accurate pedestrian volumes along the sidewalks of the studied road segments. At the intersection level, and as per the City of Ottawa's Multi-Modal Level of Service Guidelines, the Pedestrian Level of Service is evaluated separately for each approach to a signalized intersection. For any given approach to a signalized intersection, the Pedestrian Level of Service is considered as the worst of the following two levels of service for the specific approach: (1) the level of service determined based on average delay to pedestrians crossing the specific intersection approach as per the Highway Capacity Manual methodology and (2) the level of service determined as per the pedestrian exposure to traffic at signalized intersections scoring technique. The overall intersection Pedestrian Level of Service is determined as the worst Pedestrian Level of Service among the intersection approaches. In evaluating the Pedestrian Level of Service along the road segments and at the signalized intersections within the Lakeshore East Joint Corridor Study Area, the following assumptions were made in estimating the key determining factors (identified in **Table 2-1**):

- The sidewalk width, boulevard width, and corner radius were estimated using aerial street views in Google Maps;
- For any given road segment, the average daily curb lane traffic volume was estimated separately for each direction of travel by assuming that the average traffic volumes of the AM and PM peak hours represent 10% of the average daily traffic volumes in the corresponding direction of travel and that the traffic lanes are equally utilized by motorized vehicles;
- For any given approach to the intersection, the pedestrian green time / effective walk time was calculated as per the formula included in the Addendum to the City of Ottawa's Multi-Modal Level of Service Guidelines (2015) by conservatively assuming that no pedestrian is initiating their crossing during the Flashing Do Not Walk time; and,
- For any given road segment within the Lakeshore East Joint Corridor Study Area, the vehicular operating speed is assumed to be equal to the corresponding posted speed on the road segment.

Table 2-1: Key Determining Factors for Pedestrian Level of Service

Segment Pedestrian Level of Service	Intersection Pedestrian Level of Service
■ Sidewalk width ■ Boulevard width ■ Average daily curb lane traffic volume ■ Average vehicular operating speed ■ Presence of on-street parking	■ Street width (number of lanes to be crossed) ■ Right- and left-turn conflicts based on signal phasing (e.g., permitted, protected/permitted, protected, and prohibited) and exclusive pedestrian phases (leading pedestrian interval) ■ Right-turn on red restrictions ■ Corner radius and type of right turn channel (e.g., no channel, right-turn channel with receiving lane, and smart right-turn channel) ■ Crosswalk type (e.g., standard transverse marking, textures/coloured crosswalks, and high visibility markings) ■ Cycle Length and pedestrian green time

Source: City of Ottawa's Multi-Modal Level of Service Guidelines (2015)

As per the City of Toronto's Official Plan (2019), land use designations within the Lakeshore East Joint Corridor Study Area vary between "Employment Areas", "Mixed Use Areas", and "Neighbourhoods". As shown in Exhibit 22 in the City of Ottawa's Multi-Modal Level of Service Guidelines, the Pedestrian Level of Service target for these areas is generally Level of Service 'C'. With the noted Pedestrian Level of Service target, the intersections, individual intersection approaches, and road segments within the Lakeshore East Joint Corridor Study Area with Pedestrian Level of Service 'D' or worse are considered to be operating at critical levels.

2.1.2.3 Bicycle Level of Service

The City of Ottawa's Multi-Modal Level of Service tool assigns a Bicycle Level of Service to both road segments and signalized intersections on a stretch of road, based on the level of traffic stress experienced by cyclists as they travel along the stretch of road. The level of traffic stress of a cycling facility in turn represents the degree of comfort experienced by a cyclist and the targeted category of cyclists (e.g., novice cyclists and experienced cyclists) that are comfortable using the facility. The key determining factors in evaluating the Bicycle Level of Service are dependent on the cycling facility / intersection type as summarized in **Table 2-2**. For any given road segment, the Bicycle Level of Service is considered as the worst of the following two levels of service for the specific road segment: (1) the level of service determined based on the number of lanes and operating speed and (2) the level of service determined based on the cyclist crossing configuration at unsignalized crossings. For any given approach to a signalized intersection, the Bicycle Level of Service is qualitatively

assessed based on the cycling facility type and the intersection's lane configuration. The overall intersection Bicycle Level of Service is determined as the worst Bicycle Level of Service among the intersection approaches.

Table 2-2: Key Determining Factors for Bicycle Level of Service

Segment Bicycle Level of Service	Intersection Bicycle Level of Service
■ Cycling facility type ■ Bike lane width ■ Number of travel lanes ■ Average vehicular operating speed ■ Frequency of bike lane blockages ■ Presence of on-street parking	■ Right-turn lane characteristics (number of right-turn lanes, length of right-turn lane, turning speed) ■ Left-turn accommodation (presence of bike box, number of left-turn lanes, number of lanes crossed) ■ Average vehicular operating speed

Source: City of Ottawa's Multi-Modal Level of Service Guidelines (2015)

For the purpose of the Bicycle Level of Service assessment, the cycling facilities within the Lakeshore East Joint Corridor Study Area, namely along Dundas Street and Logan Avenue are assumed to be designated as an equivalent to the City of Ottawa's cycling "spine route". As per the City of Ottawa's Official Plan, a cycling "spine route" is described as a cycling route that follows major roadways (typically arterials) and may provide reserved space for cyclists, ideally either a cycle track or a buffered bike lane and it provides access along major corridors, connecting the Cross-Town Bikeways, defined as the top designation in the hierarchy of the cycling facilities in the City of Ottawa's Official Plan, and major off-road bike paths to local routes and Neighbourhood Bikeways. As per the City of Ottawa's Multi-Modal Level of Service Guidelines, the Bicycle Level of Service target for any arterial road designated as a cycling "spine route", regardless of its land use designation, is recommended to be Level of Service 'C'.

Given the above, the Bicycle Level of Service target for cycling facilities as well as the mixed traffic network within the Lakeshore East Joint Corridor Study Area is set at Level of Service 'C'. With the noted minimum desirable Bicycle Level of Service, the intersections, individual approaches, and road segments within the Lakeshore East Joint Corridor Study Area with Bicycle Level of Service 'D' or worse are considered to be operating at critical levels.

2.1.2.4 Transit Level of Service

The City of Ottawa's Multi-Modal Level of Service tool assigns a Transit Level of Service to both road segments and signalized intersections along a stretch of road based on the relative attractiveness of transit facilities and services as compared to other modes of travel and especially autos. The relative attractiveness, for the purposes of Transit Level

of Service, is evaluated based on transit travel time and level of transit priority given to transit vehicles based on varying facility types and conditions. The key determining factors in evaluating Transit Level of Service are presented in **Table 2-3**. As per the City of Ottawa's Multi-Modal Level of Service Guidelines, the Transit Level of Service for each approach to an intersection is evaluated separately. For any given approach to a signalized intersection, the Transit Level of Service is evaluated based on the average vehicular delay of each intersection approach, obtained from the traffic modelling output through Synchro. The overall intersection Transit Level of Service is considered to be the worst Transit Level of Service among all the intersection approaches on which buses are travelling. In evaluating the Transit Level of Service along the road segments and at the signalized intersections within the Lakeshore East Joint Corridor Study Area, the following assumption was made in estimating the key determining factors (identified in **Table 2-3**):

- Average delay at a signalized intersection for transit vehicles is considered to be equal to the average vehicular delay obtained as one of the outputs of the Synchro modelling analysis. This indicates that the impact of transit signal priority measures is not factored into the assessment of Transit Level of Service at the intersection level.

Table 2-3: Key Determining Factors for Transit Level of Service

Segment Transit Level of Service	Intersection Transit Level of Service
■ Facility Type (e.g., Mixed Traffic, Bus Lane, and Segregated Right-of-Way) ■ Ratio of average transit speed to posted speed	■ Average Signal Delay

Source: City of Ottawa's Multi-Modal Level of Service Guidelines (2015)

None of the road segments within the Lakeshore East Joint Corridor Study Area are designated as a transit priority corridor. Accordingly, the studied streets are considered to have some isolated transit priority measures (e.g., transit signal priority, exclusive bus/streetcar lanes) or no transit priority measures at all, and for the purposes of identifying a level of service target, are considered as "Transit Priority with Isolated Measures". As per the City of Ottawa's Multi-Modal Level of Service Guidelines, the Transit Level of Service target for any road designated as "Transit Priority with Isolated Measures" is recommended to be Level of Service 'D'. With the noted minimum desirable Transit Level of Service, the intersections, individual approaches, and road segments within the Lakeshore East Joint Corridor Study Area with Transit Level of Service 'E' or worse are considered to be operating at critical levels.

2.2 Impact Assessment

The early works impact assessment and development of mitigation measures and monitoring activities considered the following:

- Lakeshore East Joint Corridor early works components as described in **Section 1.3.1**;
- The Lakeshore East Joint Corridor Early Works Project Footprint and Lakeshore East Joint Corridor Study Area as described in **Section 1.3.2**;
- Lakeshore East Joint Corridor construction activities as described in **Section 1.3.3**; and,
- Local environmental conditions within the Lakeshore East Joint Corridor Study Area as described in **Section 3**.

Mitigation measures and monitoring activities have been recommended for each of the transportation and transit network components within the Lakeshore East Joint Corridor Study Area. The results of the impact assessment are provided in **Section 4**.

A quantitative impact assessment was not completed at this stage as the detailed construction staging schemes that describe the potential modifications to the existing transportation network were not available. Quantitative impact assessment will be completed, if required, as planning progresses and this information becomes available. The quantitative impact assessment may include larger study area. Prior to construction, Transit and Traffic Management Plan(s) shall be developed to provide more specific mitigation measures and monitoring activities. Transit and Traffic Management Plan(s) will outline the potential haul routes, staging and laydown areas, construction access, and road closures and potential detour routes.

3. Local Environmental Conditions

3.1 Transportation Network

3.1.1 Road Network and Intersection Operations

3.1.1.1 Road Network

An overview of the roads located within the Lakeshore East Joint Corridor Study Area is described below. All the described roads are under the jurisdiction of the City of Toronto and are classified according to the City of Toronto's Road Classification System Update (City of Toronto, 2018). As part of the City of Toronto's Vision Zero strategy, the City has been implementing speed reductions for several streets within the City (City of Toronto, 2020). Posted speed reductions that have already been implemented on the roads located within the Lakeshore East Joint Corridor Study Area, if any, are reflected in the description below. **Figure 3-1** presents the existing road network, road classification, and the traffic control devices of the intersections within the Lakeshore East Joint Corridor Study Area.

Eastern Avenue is a major east-west arterial road with a four-lane cross-section and a posted speed of 30 kilometres per hour.

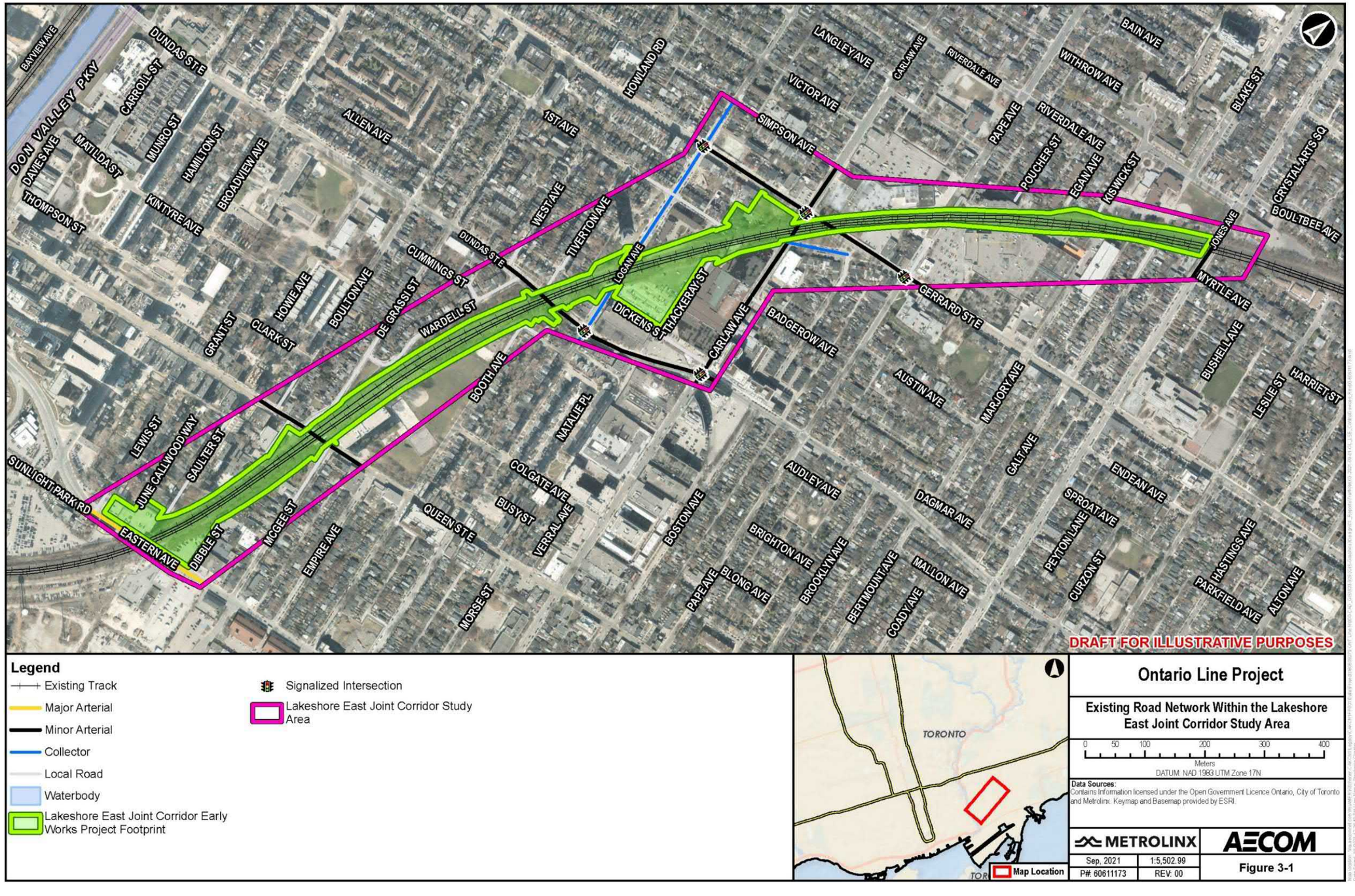
Queen Street East and **Gerrard Street East** are minor east-west arterial roads with four-lane cross-sections and posted speeds of 40 kilometres per hour. The median lane in each direction is shared by general vehicles and streetcars.

Dundas Street East is a minor east-west arterial road with a two-lane cross-section and a posted speed of 40 kilometres per hour.

Jones Avenue is a minor north-south arterial road with a two-lane cross-section and a posted speed of 40 kilometres per hour.

Carlaw Avenue is a minor north-south arterial road with a four-lane cross-section. Within the Lakeshore East Joint Corridor Study Area, the section of Carlaw Avenue between Eastern Avenue and Queen Street has a posted speed of 40 kilometres per hour and the section between Queen Street and Gerrard Street is assumed to have a statutory speed limit of 50 kilometres per hour, with the absence of posted speed signs.

Figure 3-1: Existing Road Network Within the Lakeshore East Joint Corridor Study Area



Logan Avenue is a north-south collector road with a two-lane cross-section. Within the Lakeshore East Joint Corridor Study Area, the section of Logan Avenue between Gerrard Street and Dundas Street has a posted speed of 40 kilometres per hour and the section between Dundas Street and Eastern Avenue has a posted speed of 30 kilometres per hour.

Pape Avenue is a north-south local road with a two-lane cross-section and a posted speed of 30 kilometres per hour.

Booth Avenue and **McGee Street** are local roads that run one-way in the southbound direction. Both roads have a posted speed of 30 kilometres per hour.

3.1.1.2 Intersection Operations

The analysis findings on traffic operations at the Lakeshore East Joint Corridor Study Area intersections in the Existing Conditions (2020) are summarized in **Table 3-1**. The detailed Highway Capacity Manual (Transportation Research Board, 2000) reports from Synchro pertaining to the existing conditions analysis are presented in **Appendix E**.

As shown in **Table 3-1**, all the Lakeshore East Joint Corridor Study Area intersections operate at acceptable level of service ‘C’ or better and within capacity in both the AM and PM peak hours. In addition, all individual movements at the studied intersections operate at acceptable level of service ‘C’ or better.

Table 3-1: Traffic Operations at the Lakeshore East Joint Corridor Study Area Intersections under Existing Conditions (2020) during the AM and PM Peak Hours

Synchro ID: Intersection	Movement	AM Peak Hour Volume to capacity Ratio	AM Peak Hour Delay (sec)	AM Peak Hour Level of service	AM Peak Hour 95th Percentile Queue (metres)	PM Peak Hour Volume to capacity Ratio	PM Peak Hour Delay (sec)	PM Peak Hour Level of service	PM Peak Hour 95th Percentile Queue (metres)
320: Gerrard Street and Logan Avenue (Signalized)	EBLTR	0.21	6.1	A	15.6	0.51	9.5	A	48.5
320: Gerrard Street and Logan Avenue (Signalized)	WBLTR	0.51	3.3	A	13.3	0.26	14.1	B	30.3
320: Gerrard Street and Logan Avenue (Signalized)	NBLT	0.37	23.0	C	29.5	0.38	21.5	C	32.3
320: Gerrard Street and Logan Avenue (Signalized)	NBR	0.04	20.7	C	6.7	0.35	21.4	C	27.7
320: Gerrard Street and Logan Avenue (Signalized)	**Overall**	**0.47**	**6.8**	**A**	**-**	**0.47**	**13.2**	**B**	**-**
321: Gerrard Street and Carlaw Avenue (Signalized)	EBLTR	0.20	20.8	C	24.7	0.77	19.1	B	49.6
321: Gerrard Street and Carlaw Avenue (Signalized)	WBLTR	0.77	14.8	B	80.1	0.57	32.1	C	49.6
321: Gerrard Street and Carlaw Avenue (Signalized)	NBLTR	0.25	15.2	B	18.5	0.38	11.6	B	28.9
321: Gerrard Street and Carlaw Avenue (Signalized)	SBLTR	0.53	18.3	B	43.7	0.62	22.7	C	42.6
321: Gerrard Street and Carlaw Avenue (Signalized)	**Overall**	**0.66**	**16.6**	**B**	**-**	**0.65**	**21.0**	**C**	**-**
322: Gerrard Street and Pape Avenue (Signalized)	EBLTR	0.27	14.7	B	23.1	0.47	5.7	A	15.4
322: Gerrard Street and Pape Avenue (Signalized)	WBLTR	0.35	4.9	A	4.4	0.35	16.6	B	44.2
322: Gerrard Street and Pape Avenue (Signalized)	NBLTR	0.10	16.0	B	12.7	0.16	16.5	B	17.1
322: Gerrard Street and Pape Avenue (Signalized)	SBLTR	0.07	15.7	B	9.0	0.23	17.3	B	21.7
322: Gerrard Street and Pape Avenue (Signalized)	**Overall**	**0.25**	**9.7**	**A**	**-**	**0.37**	**11.7**	**B**	**-**
323: Dundas Street and Logan Avenue (Signalized)	EBL	0.14	9.2	A	7.1	0.15	7.6	A	10.9
323: Dundas Street and Logan Avenue (Signalized)	EBTR	0.31	10.0	A	36.3	0.57	11.7	B	86.7
323: Dundas Street and Logan Avenue (Signalized)	WBL	0.15	3.9	A	m3.4	0.18	13.9	B	m14.1
323: Dundas Street and Logan Avenue (Signalized)	WBTR	0.63	6.3	A	22.4	0.41	16.0	B	70.0
323: Dundas Street and Logan Avenue (Signalized)	NBLTR	0.45	23.8	C	43.6	0.79	34.3	C	72.1
323: Dundas Street and Logan Avenue (Signalized)	SBL	0.07	18.6	B	7.1	0.21	21.8	C	10.7
323: Dundas Street and Logan Avenue (Signalized)	SBTR	0.40	22.3	C	43.6	0.28	21.8	C	26.7
323: Dundas Street and Logan Avenue (Signalized)	**Overall**	**0.56**	**12.1**	**B**	**-**	**0.64**	**18.5**	**B**	**-**
324: Dundas Street and Carlaw Avenue (Signalized)	EBL	0.18	16.3	B	m9.9	0.17	6.9	A	m5.2
324: Dundas Street and Carlaw Avenue (Signalized)	EBTR	0.26	14.7	B	38.5	0.83	20.2	B	#162.2
324: Dundas Street and Carlaw Avenue (Signalized)	WBL	0.29	12.0	B	23.7	0.59	30.4	C	#28.3
324: Dundas Street and Carlaw Avenue (Signalized)	WBTR	0.70	18.3	B	106.9	0.40	12.6	B	50.0
324: Dundas Street and Carlaw Avenue (Signalized)	NBLTR	0.30	18.5	B	21.9	0.49	20.8	C	40.8
324: Dundas Street and Carlaw Avenue (Signalized)	SBLTR	0.59	22.3	C	53.6	0.46	20.7	C	35.2
324: Dundas Street and Carlaw Avenue (Signalized)	**Overall**	**0.65**	**18.6**	**B**	**-**	**0.69**	**19.0**	**B**	**-**

Notes: #: 95th percentile cycle volume exceeds capacity, queue may be longer
m: Volume for the 95th percentile queue is metered by an upstream signal

3.1.2 Pedestrian Network and Operations

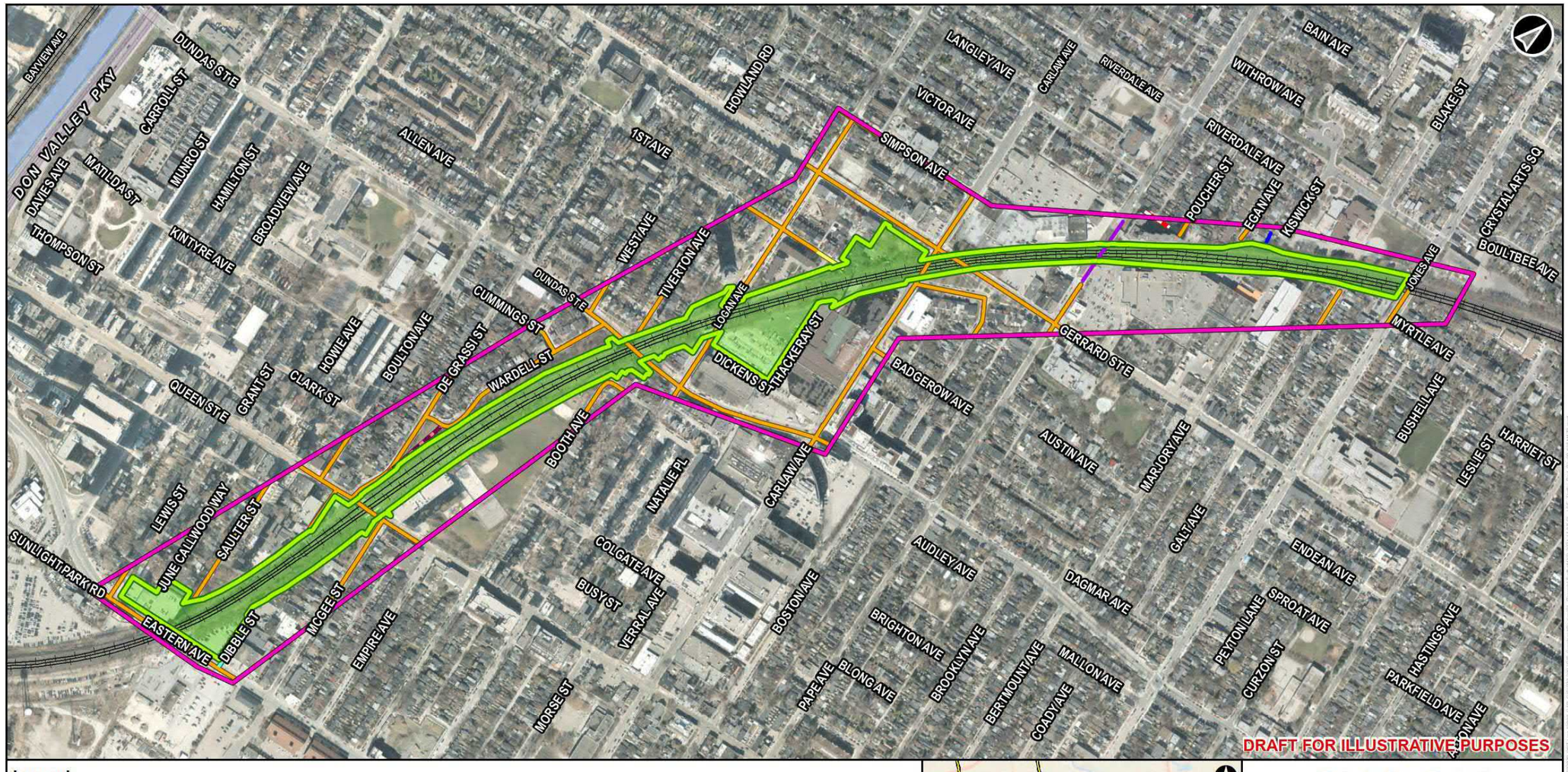
3.1.2.1 Pedestrian Network

Pedestrians are accommodated through sidewalks provided along both sides of the following streets located within the Lakeshore East Joint Corridor Study Area:

- Eastern Avenue;
- Queen Street East;
- Dundas Street East;
- Gerrard Street East;
- Logan Avenue;
- Carlaw Avenue;
- Pape Avenue;
- Jones Avenue;
- Booth Avenue; and,
- McGee Street.

In addition, painted crosswalks are provided across all legs of the signalized intersections located within the Lakeshore East Joint Corridor Study Area. **Figure 3-2** illustrates the location and type of pedestrian facilities provided within the Lakeshore East Joint Corridor Study Area.

Figure 3-2: Existing Pedestrian Network Within the Lakeshore East Joint Corridor Study Area



3.1.2.2 Pedestrian Operations

The findings of the Pedestrian Level of Service analysis at the signalized intersections and road segments within the Lakeshore East Joint Corridor Study Area in the Existing Conditions (2020) are summarized in **Table 3-2** and **Table 3-3**, respectively, and illustrated in **Figure 3-3**. The detailed Pedestrian Level of Service analysis results at the individual intersection approach level under the Existing Conditions (2020) are presented in **Appendix F**.

Table 3-2: Pedestrian Level of Service at the Lakeshore East Joint Corridor Study Area Intersections under Existing Conditions (2020)

Signalized Intersections	Pedestrian Level of Service
Gerrard Street and Logan Avenue	C
Gerrard Street and Carlaw Avenue	D
Gerrard Street and Pape Avenue	D
Dundas Street and Logan Avenue	D
Dundas Street and Carlaw Avenue	D

Note: The intersections that operate below the Pedestrian Level of Service target 'C' are highlighted in grey.

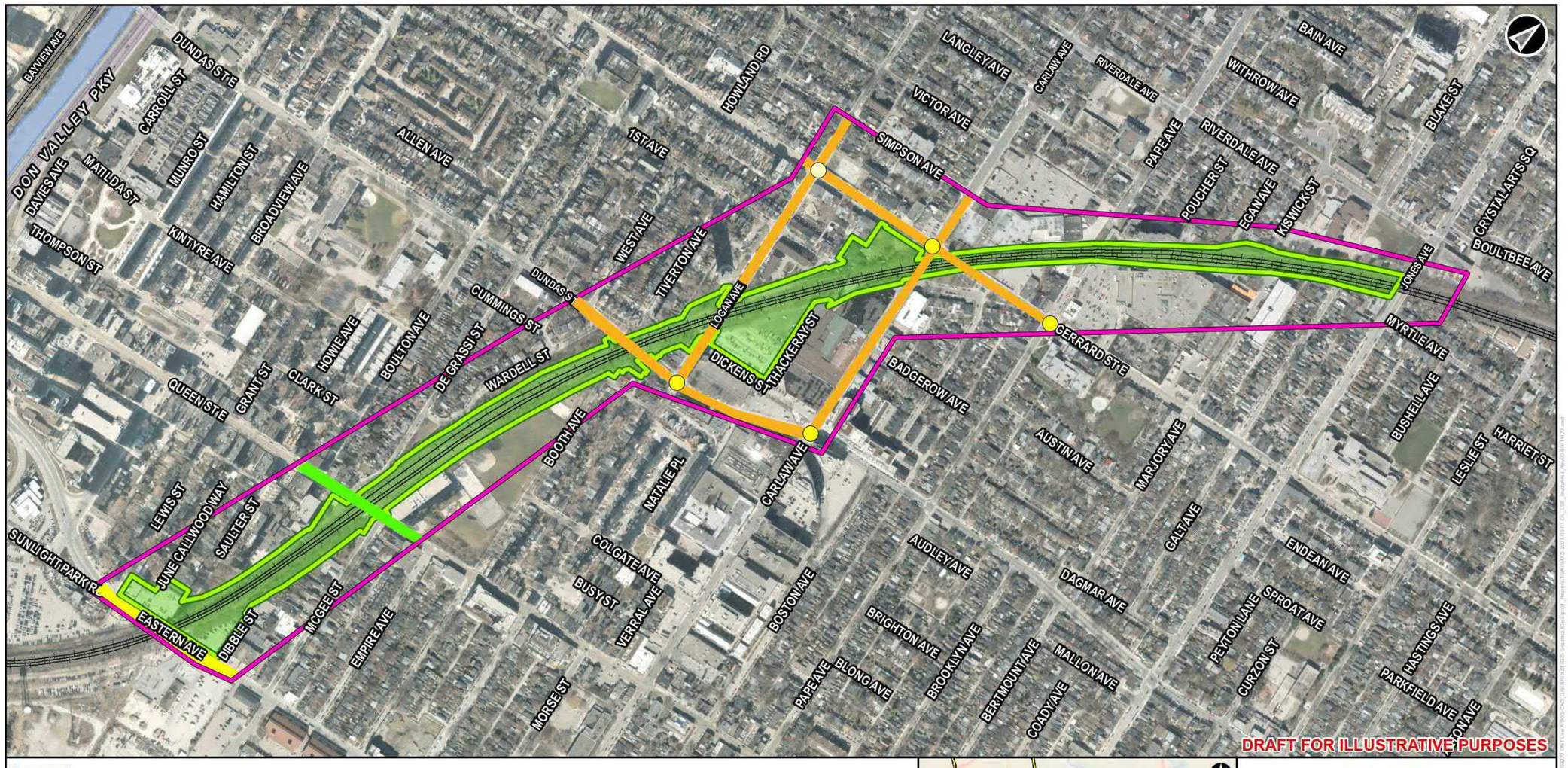
Table 3-3: Pedestrian Level of Service at the Lakeshore East Joint Corridor Study Area Road Segments under Existing Conditions (2020)

Road Segments	Pedestrian Level of Service
Gerrard Street between Logan Avenue and Pape Avenue	E
Dundas Street between Logan Avenue and Carlaw Avenue	E
Queen Street between Boulton Avenue and Empire Avenue	B
Eastern Avenue between Lewis Street and Dibble Street	D
Logan Avenue between Gerrard Street and Dundas Street	E
Carlaw Avenue between Gerrard Street and Dundas Street	E

Note: The road segments that operate below the Pedestrian Level of Service target 'C' are highlighted in grey.

As shown in **Table 3-2**, pedestrians experience critical Pedestrian Level of Service 'D' at all the Lakeshore East Joint Corridor Study Area intersections except at the intersection of Gerrard Street and Logan Avenue where pedestrians experience acceptable Pedestrian Level of Service 'C'. This is mainly attributed to the long average delays/waiting times that pedestrians experience before they receive Walk Time and start crossing the arterial roads within the Lakeshore East Joint Corridor Study Area such as Gerrard Street, Dundas Street, and Carlaw Avenue.

Figure 3-3: Pedestrian Level of Service Within the Lakeshore East Joint Corridor Study Area



In addition, as they start crossing at the signalized intersections, they experience significant “exposure to traffic” due to the generally wide crossing distances (i.e., number of lanes to be crossed, the potential conflicts with left-turning and right-turning vehicular traffic, and the absence of right-turn-on-red restrictions or pedestrian signal leading intervals at the majority of the intersections).

As shown in **Table 3-3**, the pedestrian facilities along the studied sections of Gerrard Street, Dundas Street, Eastern Avenue, Logan Avenue, and Carlaw Avenue operate at critical Pedestrian Level of Service ‘D’ or ‘E’. This is mainly attributed to the narrow sidewalks along the noted sections. The studied section of Queen Street generally provides wider sidewalk and boulevard widths and hence pedestrians experience acceptable Pedestrian Level of Service ‘B’.

3.1.3 Cycling Network and Operations

3.1.3.1 Cycling Network

Cyclists are accommodated through on-street bike lanes provided along both sides of the Dundas Street East, Logan Avenue, and Jones Avenue sections within the Lakeshore East Joint Corridor Study Area. In addition, crossrides[5] are provided across the north and south legs of the intersection of Dundas Street East and Logan Avenue and bike boxes are provided at the eastbound approach to the noted intersection.

Figure 3-4 illustrate the location and type of cycling facilities provided within the Lakeshore East Joint Corridor Study Area.

3.1.3.2 Cycling Operations

The findings of the Bicycle Level of Service analysis at the Lakeshore East Joint Corridor Study Area signalized intersections and road segments under Existing Conditions (2020) are summarized in **As shown** in Error! Not a valid bookmark self-reference., all the Lakeshore East Joint Corridor Study Area signalized intersections operate at acceptable Bicycle Level of Service ‘B’ overall. This is mainly attributed to the presence of designated cycling facilities on some of the individual approaches to the studied intersections (e.g., bicycle left-turn box, pocket bike lanes, cross-rides, etc.) which facilitate the movement of left-turning cyclists without the need to weave through and cross general-purpose traffic lane(s) before making a left turn. In addition, cyclists travelling with mixed traffic and approaching the studied intersections from individual

5. A crossride is part of the roadway where cyclists are permitted to ride within the crossing, rather than dismounting and crossing as pedestrians. A crossride is indicated by signs, pavement markings, and a traffic signal if the crossing is signalized.

approaches that lack similar cycling facilities would have to simply change lanes to be able to make a left-turn movement, instead of crossing general-purpose traffic lanes.

Table 3-4 and **Table 3-5**, respectively, and illustrated in **Figure 3-5**. The detailed Bicycle Level of Service analysis results for the Existing Conditions (2020) are presented in **Appendix F**.

Figure 3-4: Existing Cycling Network Within the Lakeshore East Joint Corridor Study Area

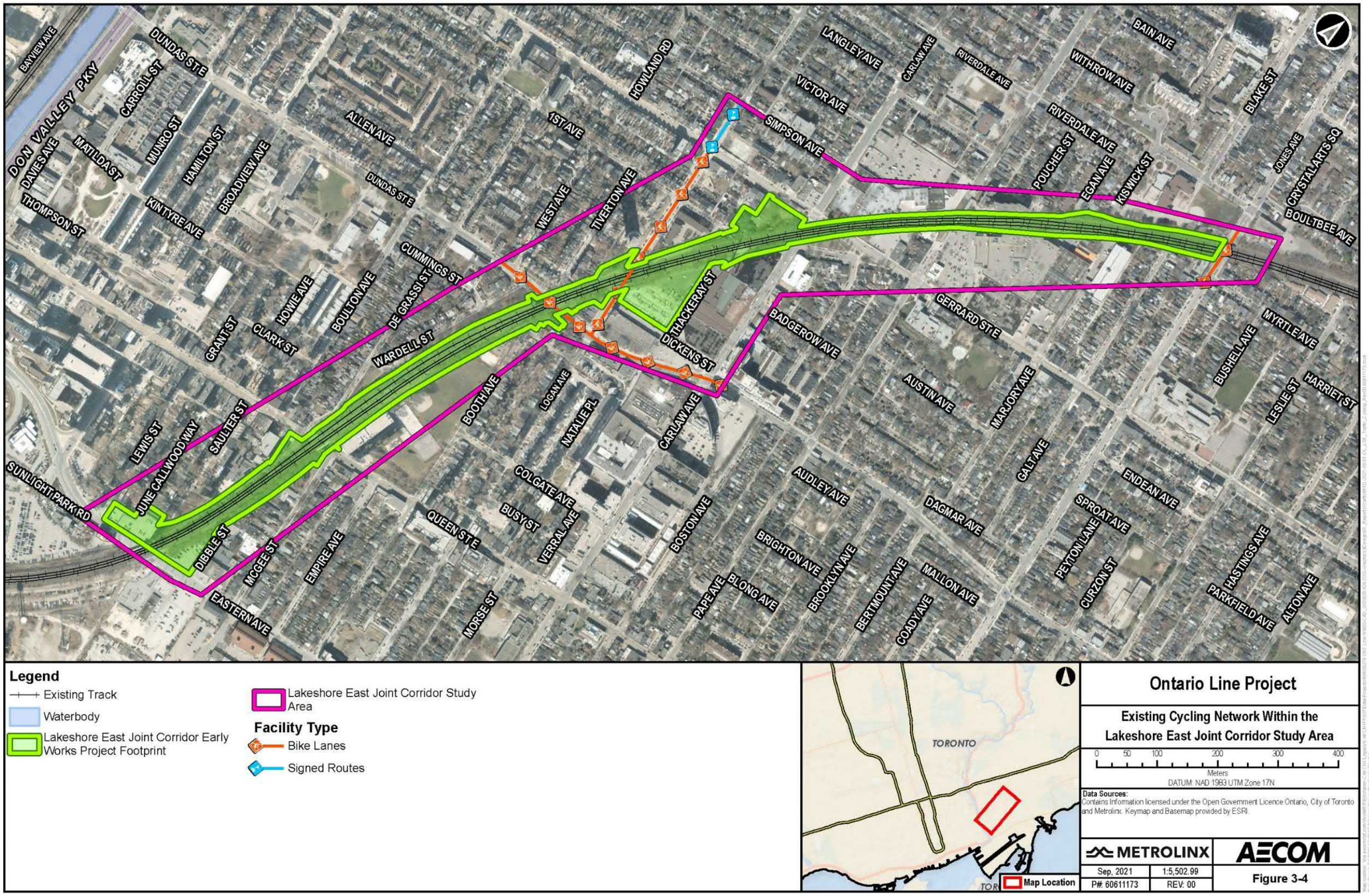
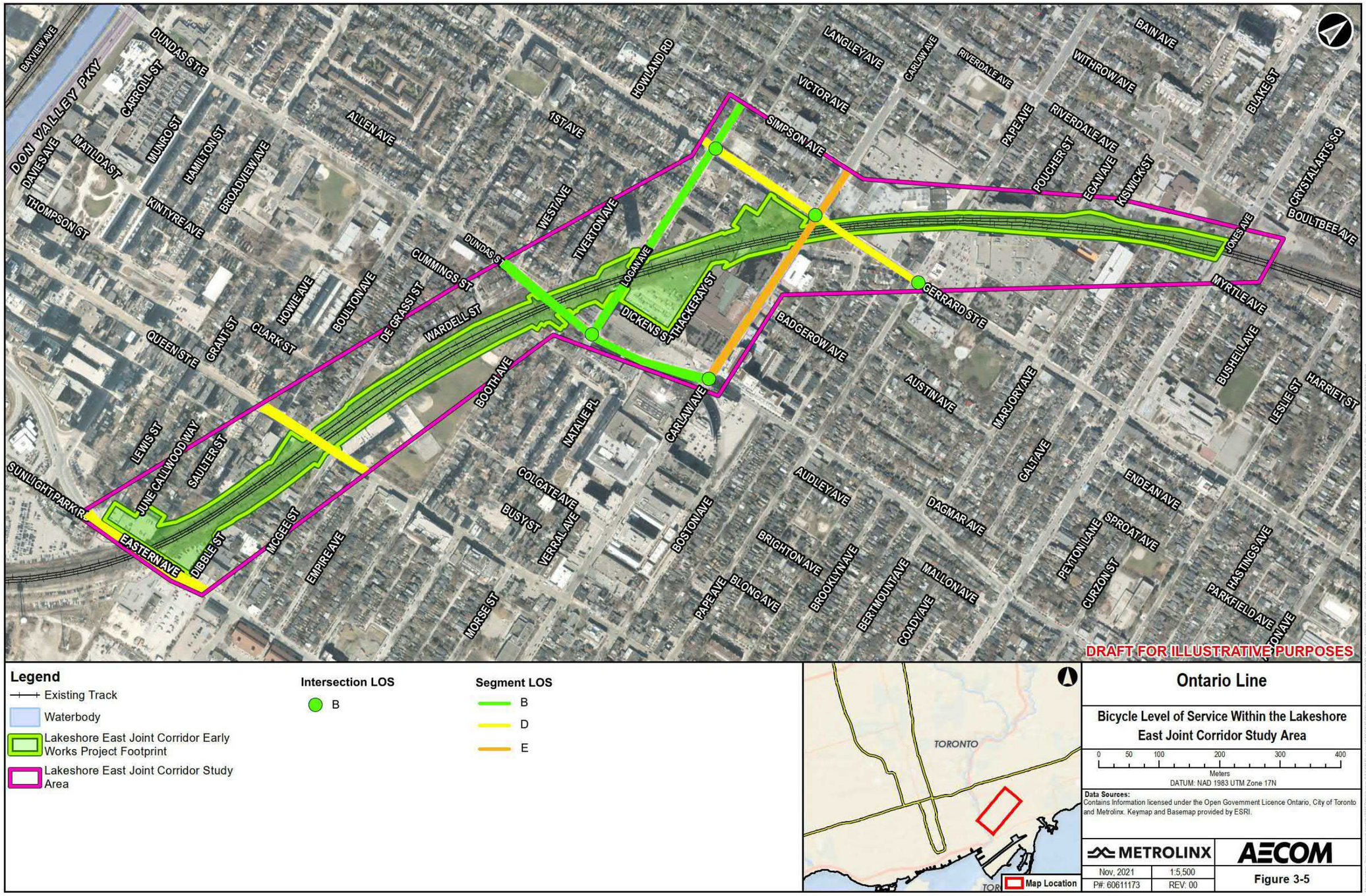


Figure 3-5: Bicycle Level of Service Within the Lakeshore East Joint Corridor Study Area



As shown in Error! Not a valid bookmark self-reference., all the Lakeshore East Joint Corridor Study Area signalized intersections operate at acceptable Bicycle Level of Service 'B' overall. This is mainly attributed to the presence of designated cycling facilities on some of the individual approaches to the studied intersections (e.g., bicycle left-turn box, pocket bike lanes, cross-rides, etc.) which facilitate the movement of left-turning cyclists without the need to weave through and cross general-purpose traffic lane(s) before making a left turn. In addition, cyclists travelling with mixed traffic and approaching the studied intersections from individual approaches that lack similar cycling facilities would have to simply change lanes to be able to make a left-turn movement, instead of crossing general-purpose traffic lanes.

Table 3-4: Bicycle Level of Service at the Lakeshore East Joint Corridor Study Area Intersections under Existing Conditions (2020)

Signalized Intersections	Bicycle Level of Service
Gerrard Street and Logan Avenue	B
Gerrard Street and Carlaw Avenue	B
Gerrard Street and Pape Avenue	B
Dundas Street and Logan Avenue	B
Dundas Street and Carlaw Avenue	B

As shown in **Table 3-5**, cyclists accommodated through the on-street bike lanes along Dundas Street and Logan Avenue experience acceptable Bicycle Level of Service 'B'. Along Gerrard Street, Queen Street, Eastern Avenue, and Carlaw Avenue, cyclists travel with a total of four mixed traffic lanes and hence experience critical Bicycle Level of Service 'D' or 'E' along the studied road segments of the noted roads.

Table 3-5: Bicycle Level of Service at the Lakeshore East Joint Corridor Study Area Road Segments under Existing Conditions (2020)

Road Segments	Bicycle Level of Service
Gerrard Street between Logan Avenue and Pape Avenue	D
Dundas Street between Logan Avenue and Carlaw Avenue	B
Queen Street between Boulton Avenue and Empire Avenue	D
Eastern Avenue between Lewis Street and Dibble Street	D
Logan Avenue between Gerrard Street and Dundas Street	B
Carlaw Avenue between Gerrard Street and Dundas Street	E

Note: The road segments that operate below the Cyclist Level of Service target 'C' are highlighted in grey.

3.1.4 Rail Network

There are multiple existing rail tracks within the Lakeshore East Joint Corridor Study Area. These rail tracks are owned by Metrolinx and currently service the following commuter train lines:

- Lakeshore East and Stouffville GO lines; and
- VIA Rail Toronto-Ottawa and Toronto-Montreal lines.

The identified commuter train routes are further described in **Section 3.2**. Canadian National Railway and Canadian Pacific Railway freight trains also operate on these rail tracks.

3.2 Transit Network and Operations

3.2.1 Transit Network

The existing transit routes that operate within the Lakeshore East Joint Corridor Study Area are summarized in **Table 3-6** and illustrated in **Figure 3-6**. All transit routes described in **Table 3-6** are operated by the Toronto Transit Commission, with the exception of the Lakeshore East and Stouffville GO lines operated by Metrolinx and the Toronto-Ottawa and Toronto-Montreal lines operated by VIA Rail.

The service headways provided in **Table 3-6** represent the hours of peak transit service within the AM peak period (6:00 AM to 9:00 AM) and PM peak period (4:00 AM to 7:00 PM). Off-peak transit services are generally less frequent than AM and PM peak period services; therefore, only AM and PM peak period service headways are provided in **Table 3-6** to represent the maximum transit service that could be impacted by construction to form the transit impact assessment.

Table 3-6: Existing Transit Routes Within the Lakeshore East Joint Corridor Study Area

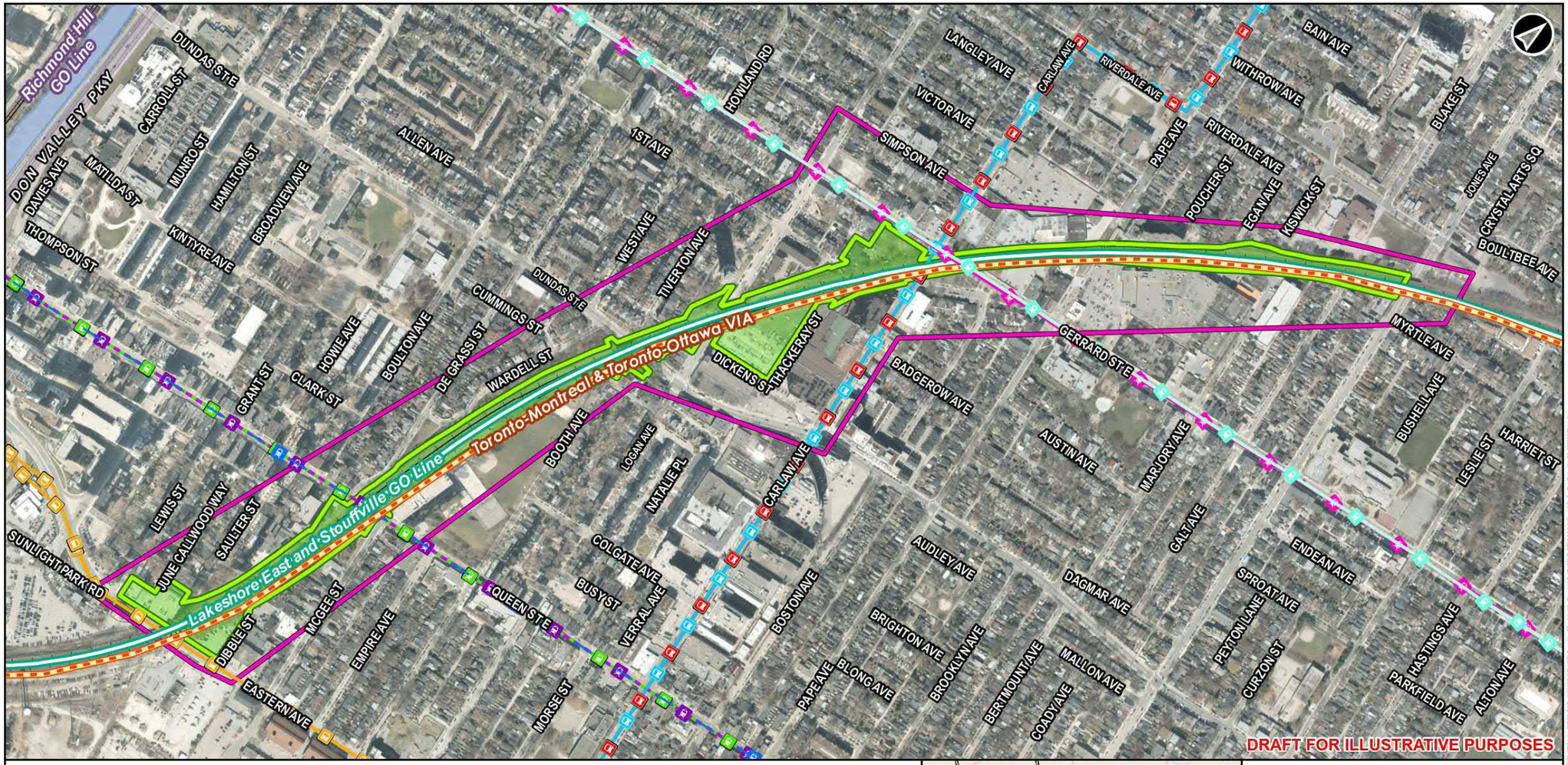
Route Number – Name and Description	Service Headway during Peak Periods
Lakeshore East GO line operates between Union Station in Toronto and Oshawa GO Station in Oshawa, generally in an east-west direction. The train service operates seven days a week between 5 AM and 2 AM. The line does not have any designated stops at the rail tracks section within the Lakeshore East Joint Corridor Study Area, but the eastbound and westbound trains pass through the noted rail tracks section shortly after each scheduled departure from Union Station and shortly before each scheduled arrival at Union Station.	15-minute for the peak direction (i.e., westbound in the AM peak hour and eastbound in the PM peak hour) 30-minute for the non-peak direction
Stouffville GO line operates between Union Station in Toronto and Lincolnville GO Station in Whitchurch-Stouffville, generally in a north-south direction. The train service operates seven days a week between 9 AM and 7 PM. A bus service complements the train service by operating from 5 AM to 9 AM and from 7 PM to 2 AM. The Line does not have any designated stops at the rail tracks section within the Lakeshore East Joint Corridor Study Area, but the eastbound and westbound trains pass through the noted rail tracks section shortly after each scheduled departure from Union Station and shortly before each scheduled arrival at Union Station.	30-minute for the peak direction (i.e., southbound in the AM peak hour and northbound in the PM peak hour) 60-minute for the non-peak direction
Toronto-Ottawa VIA Rail line operates between Union Station in Toronto and Ottawa Station in Ottawa, generally in an east-west direction. The train service operates seven days a week. The line does not have any designated stops at the rail tracks section within the Lakeshore East Joint Corridor Study Area, but the eastbound and westbound trains pass through the noted rail tracks section shortly after each scheduled departure from Union Station and shortly before each scheduled arrival at Union Station.	60-minute for the peak direction (i.e., westbound in the AM and PM peak periods and eastbound in the PM peak period) 180-minute for the non-peak direction
Toronto-Montreal VIA Rail line operates between Union Station in Toronto and Gare Centrale in Montreal, generally in an east-west direction. The train service operates seven days a week. The line does not have any designated stops at the rail tracks section within the Lakeshore East Joint Corridor Study Area, but the eastbound and westbound trains pass through the noted rail tracks section shortly after each scheduled departure from Union Station and shortly before each scheduled arrival at Union Station.	60-minute for the peak direction (i.e., westbound in the AM and PM peak periods and eastbound in the PM peak period) 180-minute for the non-peak direction

Route Number – Name and Description	Service Headway during Peak Periods
#72 – Pape bus route operates between Pape Station on Line 2 Bloor-Danforth and Commissioners Street, and between Pape Station and Union Station on Line 1, generally in a north-south direction. Three services are operated: The **72A (Pape Station-Eastern)** operates at all times except the morning and afternoon peak periods from Monday to Friday. The **72B (Pape Station-Union Station** via Queens Quay) operates all day, every day. The **72C (Pape Station - Commissioners)** operates during the morning and afternoon peak periods from Monday to Friday. Service between Pape Station and Eastern Avenue is part of the 10-minute network and operates at 10-minute or better headways, all day, every day. Within the Lakeshore East Joint Corridor Study Area, the bus route operates along Carlaw Avenue. The closest northbound stop to the Lakeshore East Joint Corridor Early Works Project Footprint is located far side at the intersection of Carlaw Avenue and Gerrard Street East. The closest southbound stop is located nearside at the intersection of Carlaw Avenue and Gerrard Street East.	6-minute in the AM peak period 7-minute in the PM peak period
#143 – Downtown / Beach Express bus route operates between the intersection of Charlotte Street and King Street and the Neville Park Loop, generally in an east-west direction. Within the Lakeshore East Joint Corridor Study Area, the bus route operates along Eastern Avenue. The closest eastbound and westbound stops to the Lakeshore East Joint Corridor Early Works Project Footprint are located nearside at the intersection of Eastern Avenue and Carlaw Avenue.	15-minute in the AM peak hour 25-minute in the PM peak hour
#301 – Queen Blue Night streetcar route operates between Neville Park Loop and Long Branch Loop, generally in an east-west direction. Two services are operated: the **301 (Neville Park-South Kingsway)** and the **301L (South Kingsway-Long Branch)** which is temporarily operated by buses. Both branches operate during the overnight period, seven days a week. Within the Lakeshore East Joint Corridor Study Area**,** the streetcar route operates along Queen Street East with designated eastbound and westbound stops located at Empire Avenue, Boulton Avenue, and Saulter Street.	30-minute
#306 – Carlton Blue Night streetcar route operates between Main Street Station and Dundas West Station on Line 2 Bloor-Danforth, generally in an east-west direction. A single service is operated: the **306 (Main Street Station-Dundas West Station)**, which operates during the overnight period, seven days a week. Within the Lakeshore East Joint Corridor Study Area**,** the streetcar route operates along Gerrard Street with designated eastbound and westbound stops located at Logan Avenue, Carlaw Avenue, and Pape Avenue.	30-minute

Route Number – Name and Description	Service Headway during Peak Periods
#325 – Don Mills Blue Night bus route operates between the area of Steeles Avenue East and Don Mills Road and the area of Eastern Avenue and Carlaw Avenue, generally in a north-south direction. One single service is operated: The **325 (Steeles-Eastern via Pape)**, which operates during the overnight period, seven days a week. Within the Lakeshore East Joint Corridor Study Area**,** the bus route operates along Carlaw Avenue with designated northbound and southbound stops located at the intersection of Carlaw Avenue and Gerrard Street and the intersection of Carlaw Avenue and Dundas Street.	30-minute
#501 – Queen streetcar route operates between Neville Park Loop and Long Branch Loop, generally in an east-west direction. It serves Queen and Osgoode Station on Line 1 (Yonge-University). The route is part of the 10-minute network, and operates at 10-minute or better headways, all day, every day. During the daytime and early evening, seven days a week, two services are operated: **501 (Humber-Neville Park)** and **501 (Long Branch-Humber)**. Within the Lakeshore East Joint Corridor Study Area**,** the streetcar route operates along Queen Street with designated eastbound and westbound stops located at Empire Avenue, Boulton Avenue, and Saulter Street.	4-minute in the AM peak hour 5-minute in the PM peak hour
#503 – Kingston streetcar route operates between the area of Kingston Road and Victoria Park Avenue, and the area of King Street West and York Street, generally in an east-west direction. It serves the King Station on Line 1 (Yonge-University), and it also passes within one block of the Union and St. Andrew Station on Line 1. One single service is operated: The **503 (Victoria Park-York)**, which operates during the peak periods, from Monday to Friday only. Within the Lakeshore East Joint Corridor Study Area**,** the streetcar route operates along Queen Street with designated stops located at Empire Avenue, Boulton Avenue, and Saulter Street.	12-minute in the AM and PM peak hours
#506 – Carlton streetcar route operates between Main Street Station on the Bloor-Danforth Subway and High Park Loop, generally in an east-west direction. It also serves the College and Queen's Park Stations on the Yonge-University-Spadina Subway. A single service is operated: the **506 (Main Street Station-High Park),** which operates at all times, seven days a week. The route is part of the 10-minute network, and operates at 10-minute or better headways, all day, every day. Within the Lakeshore East Joint Corridor Study Area**,** the streetcar route operates along Gerrard Street with designated stops located at Logan Avenue, Carlaw Avenue, and Pape Avenue.	5-minute in the AM and PM peak hours

Sources: GO Transit, 2020; VIA Rail, 2020; and Toronto Transit Commission, 2019. Accessed in July 2021.

Figure 3-6: Existing Transit Network Within the Lakeshore East Joint Corridor Study Area



3.2.2 Transit Operations

The findings of the Transit Level of Service analysis at the Lakeshore East Joint Corridor Study Area signalized intersections, and road segments under Existing Conditions (2020) are summarized in **Table 3-7** and **Table 3-8**, respectively, and illustrated in **Figure 3-7**. The detailed Transit Level of Service analysis results are presented in **Appendix F**.

As shown in **Table 3-7**, all the signalized intersections within the Lakeshore East Joint Corridor Study Area operate at acceptable Transit Level of Service 'C' or 'D', except for the intersection of Gerrard Street and Carlaw Avenue which operates at critical Transit Level of Service 'E' in the PM peak hour but acceptable Transit Level of Service 'C' in the AM peak hour. This is mainly attributed to the long average delays that streetcars along route #506 experience in the PM peak hour when going through the noted intersection in the westbound direction.

As shown in **Table 3-8**, all transit vehicles travelling along the road segments within the Lakeshore East Joint Corridor Study Area experience an acceptable Transit Level of Service 'D', meeting the minimum desirable Transit Level of Service for the studied sections.

Table 3-7: Transit Level of Service at the Lakeshore East Joint Corridor Study Area Intersections under Existing Conditions (2020)

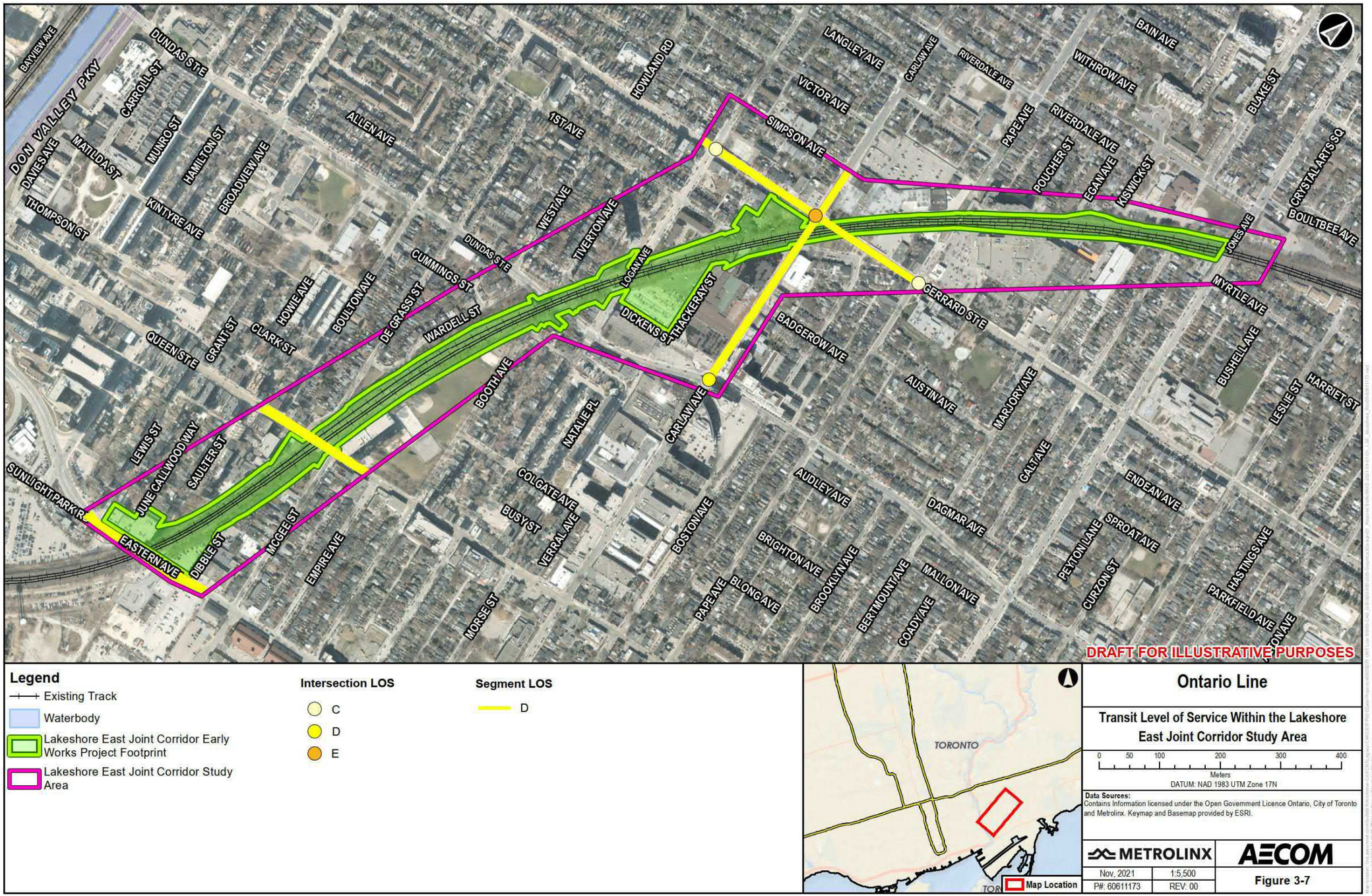
Signalized Intersections	Transit Level of Service
Gerrard Street and Logan Avenue	C
Gerrard Street and Carlaw Avenue	E
Gerrard Street and Pape Avenue	C
Dundas Street and Logan Avenue	-
Dundas Street and Carlaw Avenue	D

Note: The intersection that operates below the Transit Level of Service target 'D' is highlighted in grey.

Table 3-8: Transit Level of Service at the Lakeshore East Joint Corridor Study Area Road Segments under Existing Conditions (2020)

Road Segments	Transit Level of Service
Gerrard Street between Logan Avenue and Pape Avenue	D
Dundas Street between Logan Avenue and Carlaw Avenue	-
Queen Street between Boulton Avenue and Empire Avenue	D
Eastern Avenue between Lewis Street and Dibble Street	D
Logan Avenue between Gerrard Street and Dundas Street	-
Carlaw Avenue between Gerrard Street and Dundas Street	D

Figure 3-7: Transit Level of Service Within the Lakeshore East Joint Corridor Study Area



4. Potential Impacts, Mitigation Measures and Monitoring Activities

In accordance with Sections 8(2)6, 8(2)7 and 8(2)8 of Ontario Regulation 341/20: Ontario Line Project, this section describes the potential impacts, mitigation measures, and monitoring activities to verify the effectiveness of mitigation measures associated with the Lakeshore East Joint Corridor early works.

Potential impacts to traffic and transportation operations as a result of the Lakeshore East Joint Corridor early works have been assessed and are presented in **Table 4-1**, in addition to mitigation measures and monitoring activities.

The Lakeshore East Joint Corridor early works may require temporary lane restrictions on some of the Lakeshore East Joint Corridor Study Area roads (i.e., Queen Street, Dundas Street, and Logan Avenue), which may result in impediment of the traffic flow and increased average vehicular delay of motorists and existing surface transit routes travelling in the Lakeshore East Joint Corridor Study Area (i.e., Toronto Transit Commission Bus #72 – Pape, #143 – Downtown/Beach Express, and #325 – Don Mills Blue Night, and streetcar route #301 – Queen Blue Night, #306 – Carlton Blue Night, #501 – Queen, #503 – Kingston, and #506 – Carlton). The extent of such implications will depend on the level of encroachment into the right-of-way of the noted roads.

It is expected that construction vehicles will be travelling within the Lakeshore East Joint Corridor Study Area, considering the extent of construction, rehabilitation, and excavation and grading activities required. Depending on the available haul routes, the addition of these construction vehicles to the road network may impact traffic operations resulting in increased vehicular delays and queue lengths, especially at intersections where construction traffic is required to make left-turning movements. Construction vehicles are expected to be accommodated at off-road launch sites, and therefore it is not anticipated that these vehicles will occupy curb lanes of roads within the Lakeshore East Joint Corridor Study Area.

Other planned projects (e.g., capital projects, local development, etc.) nearby with construction timelines that potentially overlap with the Lakeshore East Joint Corridor early works may result in impacts to the transportation network and its road users within the Lakeshore East Joint Corridor Study Area.

The Lakeshore East Joint Corridor early works may require temporary realignment of sidewalks along Queen Street, Dundas Street, and Logan Avenue, which would result in

increased pedestrian walking distances and times and therefore compromised convenience. Increased traffic along the noted roads and other adjacent roads as a result of the potential lane closures could increase pedestrians' exposure to vehicular traffic.

Similarly, the on-street bike lanes located along both sides of Dundas Street and Logan Avenue may be potentially realigned which would disrupt cyclists and compromise their convenience.

The Lakeshore East Joint Corridor early works may require partial or full closure of the existing rail tracks. The extent of track closure is dependent on the type of equipment used and the installation process applied. If partial or full closures are implemented, the operations of the existing commuter (i.e., Lakeshore East GO Line, Stouffville GO Line, Toronto-Ottawa VIA Rail line, and Toronto-Montreal VIA Rail line) and freight rail corridors may be temporarily disrupted.

Table 4-1 provides mitigation measures and monitoring activities to be implemented for potential impacts that may result from the Lakeshore East Joint Corridor early works.

Table 4-1: Potential Impacts, Mitigation Measures and Monitoring Activities for the Lakeshore East Joint Corridor Early Works

Environmental Component	Potential Impacts	Mitigation Measure(s)	Monitoring Activities
Transportation Network – Roads	■ If required, temporary lane closures along some of the Lakeshore East Joint Corridor Study Area roads (i.e., Queen Street East, Dundas Street East, and Logan Avenue) may result in impeding traffic flow and increased average delay of vehicles, including emergency vehicles. ■ Construction vehicle traffic may impact traffic operations resulting in increased vehicular delays and queue lengths, especially at intersections where construction traffic is required to make left-turning movements. ■ Potential overlapping construction timelines with other planned projects (e.g., capital projects and local developments) nearby may result in impacts to the transportation network and its road users.	■ A quantitative traffic impact assessment will be completed, if required, as project planning progresses to consider vehicular traffic impacts as a result of the Lakeshore East Joint Corridor early works. ■ Develop and implement a transit and traffic management plan(s), which could include temporary changes to intersection lane configurations, traffic signal timing optimization, modifications to existing signal timing plans, etc. The transit and traffic management plan(s) will also address specific emergency services requirements in consultation with the City of Toronto. ■ Traffic signal timing optimization may be assessed/implemented to increase capacity of affected intersections and to aid in the movement of traffic. Traffic signal timing adjustments would require coordination between Metrolinx and City of Toronto, and will be undertaken if required, to determine appropriate changes to traffic signal timings. ■ Consider scheduling construction activities during off-peak periods and weekends to minimize disruptions to road users during the critical peak periods. ■ Co-ordinate with the City of Toronto regarding other ongoing construction projects when scheduling the early works activities to maintain the mobility of road users. ■ Metrolinx will work with the City of Toronto and corresponding Business Improvement Areas to maintain access to businesses and minimize the potential impacts of the early works.	■ The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period and adjustments will be made based on actual field observations, as needed.
Transportation Network – Active Transportation	■ Potential traffic congestion along the Lakeshore East Joint Corridor Study Area roads, as a result of the increase in heavy vehicle traffic, could increase pedestrians' and cyclists' exposure to traffic. ■ If required, temporary realignment of the existing sidewalks along some of the Lakeshore East Joint Corridor Study Area roads (i.e., Queen Street, Dundas Street, and Logan Avenue) may increase walking distances and impact the convenience of pedestrians.	■ Reduce interference with pedestrians and cyclists. This may include fencing, hoarding (minimum 2 meters high, solid, and secured), shared-lane markings, signals, wayfinding signs, and lighting as required to provide pedestrians and cyclists with safe, accessible, and continuous routes. ■ If required, co-ordinate with the City of Toronto to ensure any modifications to pedestrian crossing distances at signalized intersections are reflected in revised pedestrian clearance timings. ■ Any temporary pedestrian facilities including temporary or relocated Toronto Transit Commission transit stops will be designed to meet Toronto Transit Commission accessibility standards. ■ Implement flagging where construction vehicles are present to ensure construction vehicle operators are aware of pedestrian and vehicular traffic within the construction area.	■ The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period and adjustments will be made based on actual field observations, as needed.
Transportation Network – Rail	■ Early works construction may require temporary full or partial closure of existing rail tracks, which may disrupt existing commuter and freight rail operations. The extent of track closures is dependent on the type of equipment used and construction sequencing.	■ Consult with rail operators with current service along the rail corridor (i.e., VIA Rail, Canadian National Railway, and Canadian Pacific Railway) to assess how track closures would impact their service and co-ordinate temporary schedules to accommodate all rail services on the open tracks.	■ The effectiveness of the transit and traffic management plan(s) will be monitored throughout the construction period. Adjustments to the construction staging plans and transit and traffic management plan(s) will be made based on actual field observations, as needed.
Transit Network	■ Potential increase of construction vehicles traffic could result in travel time delays to existing surface transit routes (i.e., streetcar routes #301 Queen Blue Night, #306 Carlton Blue Night, #501 Queen, #503 Kingston, and #506 Carlton, and bus routes #72 Pape, #143 Downtown/Beach Express, and #325 Don Mills Blue Night) that pass through the Lakeshore East Joint Corridor Study Area intersections.	■ Co-ordinate with the Toronto Transit Commission and notify transit users regarding travel delays to the bus/streetcar services in advance. ■ Consider scheduling some construction activities during off-peak periods and weekends to minimize delays to bus services during the critical peak periods.	■ Transit services will be monitored through actual field observations throughout the construction period and additional mitigation measures will be considered, as needed.

5. Permits and Approvals

No federal or provincial permits and approvals related to traffic and transportation are required for the Lakeshore East Joint Corridor early works.

Metrolinx will co-ordinate with the City of Toronto and Toronto Parking Authority for transportation-related permits and approvals (e.g., street occupation permit) prior to construction, as required.

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Appendix A

Turning Movement Counts

City of Toronto - Traffic Safety Unit

Turning Movement Count Summary Report

CARLAW AVE AT GERRARD ST (PX 372)

Survey Date: 2018-Sep-20 (Thursday)

Survey Type: Routine Hours

Time Period	Vehicle Type	NORTHBOUND Exits	Left	Thru	Right	Total	EASTBOUND Exits	Left	Thru	Right	Total	SOUTHBOUND Exits	Left	Thru	Right	Total	WESTBOUND Exits	Left	Thru	Right	Total		Peds	Bike	Other
08:15-09:15	CAR	289	40	162	60	262	302	27	165	58	250	593	77	388	94	559	828	147	694	100	941	N	181	40	0
	TRK	3	3	2	2	7	7	0	5	3	8	6	0	1	1	2	11	2	7	1	10	S	93	11	0
AM PEAK	BUS	11	0	9	0	9	11	0	11	0	11	11	0	11	1	12	16	0	15	2	17	E	134	63	0
																						W	90	23	0
	TOTAL:	**303**	**43**	**173**	**62**	**278**	**320**	**27**	**181**	**61**	**269**	**610**	**77**	**400**	**96**	**573**	**855**	**149**	**716**	**103**	**968**				
17:00-18:00	CAR	564	86	352	83	521	786	75	586	62	723	408	117	291	71	479	463	55	306	137	498	N	239	22	0
	TRK	4	0	1	2	3	4	2	2	1	5	7	0	5	3	8	4	1	1	1	3	S	120	23	0
PM PEAK	BUS	8	0	8	0	8	10	0	10	0	10	11	0	11	0	11	11	0	11	0	11	E	145	28	0
																						W	129	66	0
	TOTAL:	**576**	**86**	**361**	**85**	**532**	**800**	**77**	**598**	**63**	**738**	**426**	**117**	**307**	**74**	**498**	**478**	**56**	**318**	**138**	**512**				
OFF HR AVG	CAR	345	31	185	77	293	467	53	278	45	376	361	112	246	75	433	421	70	315	107	492	N	147	17	0
	TRK	9	2	7	4	13	13	1	7	3	11	19	2	11	3	16	8	5	3	1	9	S	95	8	0
	BUS	8	0	8	0	8	12	0	12	0	12	8	0	8	0	8	11	0	11	0	11	E	71	23	0
																						W	70	19	0
	TOTAL:	**362**	**33**	**200**	**81**	**314**	**492**	**54**	**297**	**48**	**399**	**388**	**114**	**265**	**78**	**457**	**440**	**75**	**329**	**108**	**512**				
07:30-09:30	CAR	529	84	316	108	508	549	58	311	92	461	1,076	130	703	186	1,019	1,548	281	1,278	155	1,714	N	275	63	0
	TRK	10	5	4	7	16	18	2	11	4	17	9	0	3	2	5	19	2	12	4	18	S	150	20	0
2 HR AM	BUS	18	0	16	0	16	27	0	27	0	27	19	0	18	1	19	31	1	30	2	33	E	213	103	0
																						W	132	32	0
	TOTAL:	**557**	**89**	**336**	**115**	**540**	**594**	**60**	**349**	**96**	**505**	**1,104**	**130**	**724**	**189**	**1,043**	**1,598**	**284**	**1,320**	**161**	**1,765**				
16:00-18:00	CAR	1,045	134	642	136	912	1,482	149	1,102	112	1,363	787	244	556	135	935	891	119	622	254	995	N	455	42	0
	TRK	12	0	7	2	9	7	2	3	4	9	15	2	8	3	13	6	3	3	3	9	S	233	42	0
2 HR PM	BUS	15	0	15	0	15	18	0	18	0	18	18	0	18	0	18	20	0	20	0	20	E	250	44	0
																						W	207	105	0
	TOTAL:	**1,072**	**134**	**664**	**138**	**936**	**1,507**	**151**	**1,123**	**116**	**1,390**	**820**	**246**	**582**	**138**	**966**	**917**	**122**	**645**	**257**	**1,024**				
07:30-18:00	CAR	2,955	343	1,699	551	2,593	3,895	419	2,523	382	3,324	3,305	821	2,243	622	3,686	4,124	680	3,159	837	4,676	N	1,319	173	0
	TRK	56	14	37	23	74	72	9	40	20	69	97	9	54	18	81	58	23	26	10	59	S	762	94	0
8 HR SUM	BUS	64	1	61	0	62	92	1	92	0	93	67	0	66	2	68	95	1	92	2	95	E	748	239	0
																						W	619	214	0
	TOTAL:	**3,075**	**358**	**1,797**	**574**	**2,729**	**4,059**	**429**	**2,655**	**402**	**3,486**	**3,469**	**830**	**2,363**	**642**	**3,835**	**4,277**	**704**	**3,277**	**849**	**4,830**				

Total 8 Hour Vehicle Volume: 14,880

Total 8 Hour Bicycle Volume: 720

Total 8 Hour Intersection Volume: 15,600

Comment:

Printed On: 08 Apr, 2020 12:16:06PM

City of Toronto - Traffic Safety Unit

Turning Movement Count Summary Report

GERRARD ST AT PAPE AVE (PX 371)

Survey Date: 2018-Jan-02 (Tuesday)

Survey Type: Routine Hours

Time Period	Vehicle Type	NORTHBOUND Exits	Left	Thru	Right	Total	EASTBOUND Exits	Left	Thru	Right	Total	SOUTHBOUND Exits	Left	Thru	Right	Total	WESTBOUND Exits	Left	Thru	Right	Total		Peds	Bike	Other
08:30-09:30	CAR	93	14	33	17	64	288	53	254	27	334	63	17	10	19	46	509	26	476	7	509	N	56	0	0
	TRK	1	0	1	0	1	1	0	1	0	1	1	0	0	1	1	2	1	1	0	2	S	43	2	0
AM PEAK	BUS	2	0	1	1	2	22	1	21	1	23	1	0	0	1	1	16	0	15	0	15	E	61	4	0
																						W	53	1	0
	TOTAL:	**96**	**14**	**35**	**18**	**67**	**311**	**54**	**276**	**28**	**358**	**65**	**17**	**10**	**21**	**48**	**527**	**27**	**492**	**7**	**526**				
16:00-17:00	CAR	142	14	58	43	115	641	69	561	11	641	98	37	44	85	166	535	43	436	15	494	N	180	0	0
	TRK	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	2	0	2	0	2	S	41	0	0
PM PEAK	BUS	0	0	0	0	0	18	0	18	0	18	0	0	0	0	0	13	0	13	0	13	E	63	0	0
																						W	50	0	0
	TOTAL:	**142**	**14**	**58**	**43**	**115**	**660**	**69**	**580**	**11**	**660**	**98**	**37**	**44**	**85**	**166**	**550**	**43**	**451**	**15**	**509**				
OFF HR AVG	CAR	181	18	57	41	116	450	114	377	14	505	87	32	41	72	145	465	32	375	10	417	N	179	1	0
	TRK	0	0	0	0	0	3	0	3	0	3	1	0	1	0	1	2	0	2	0	2	S	66	2	0
	BUS	0	0	0	0	0	14	0	14	0	14	0	0	0	2	2	14	0	12	0	12	E	101	1	0
																						W	80	3	0
	TOTAL:	**181**	**18**	**57**	**41**	**116**	**467**	**114**	**394**	**14**	**522**	**88**	**32**	**42**	**74**	**148**	**481**	**32**	**389**	**10**	**431**				
07:30-09:30	CAR	159	30	58	33	121	496	92	441	30	563	97	22	23	34	79	951	44	887	9	940	N	115	0	0
	TRK	2	0	1	0	1	5	1	4	0	5	1	1	0	2	3	6	1	4	0	5	S	77	2	0
2 HR AM	BUS	2	0	1	1	2	41	1	40	2	43	3	0	1	1	2	26	0	25	0	25	E	100	6	0
																						W	75	3	0
	TOTAL:	**163**	**30**	**60**	**34**	**124**	**542**	**94**	**485**	**32**	**611**	**101**	**23**	**24**	**37**	**84**	**983**	**45**	**916**	**9**	**970**				
16:00-18:00	CAR	275	25	109	68	202	1,284	137	1,159	25	1,321	189	57	89	149	295	1,007	75	833	29	937	N	325	0	0
	TRK	0	0	0	0	0	4	0	4	0	4	0	0	0	0	0	5	0	5	0	5	S	77	0	0
2 HR PM	BUS	1	0	0	2	2	39	0	37	0	37	1	0	1	1	2	28	0	27	1	28	E	114	0	0
																						W	92	0	0
	TOTAL:	**276**	**25**	**109**	**70**	**204**	**1,327**	**137**	**1,200**	**25**	**1,362**	**190**	**57**	**90**	**150**	**297**	**1,040**	**75**	**865**	**30**	**970**				
07:30-18:00	CAR	1,155	128	393	264	785	3,581	684	3,109	109	3,902	628	208	274	472	954	3,819	245	3,219	78	3,542	N	1,155	4	0
	TRK	2	0	1	1	2	20	1	18	1	20	5	1	2	2	5	18	2	16	0	18	S	417	10	0
8 HR SUM	BUS	3	0	1	4	5	138	1	133	2	136	4	1	2	9	12	109	0	100	1	101	E	619	10	0
																						W	486	14	0
	TOTAL:	**1,160**	**128**	**395**	**269**	**792**	**3,739**	**686**	**3,260**	**112**	**4,058**	**637**	**210**	**278**	**483**	**971**	**3,946**	**247**	**3,335**	**79**	**3,661**				

Total 8 Hour Vehicle Volume: 9,482

Total 8 Hour Bicycle Volume: 38

Total 8 Hour Intersection Volume: 9,520

Comment:

Printed On: 25 Feb, 2020 12:48:17PM

Survey Date:
Gerrard Street/Logan Avenue: 2015-07-30
Dundas Street/Carlaw Avenue: 2015-04-13
Dundas Street/Logan Avenue: 2015-04-07

Source:https://open.toronto.ca/dataset/traffic-volumes-at-intersections-for-all-modes/

Intersection	Time Period	Start Time	End Time	Vehicle Type	Northbound				Total	Eastbound				Total	Southbound				Total	Westbound				Total	Pedestrians				Bikes			
					Exit	L	T	R		Exit	L	T	R		Exit	L	T	R		Exit	L	T	R		North	South	East	West	North	South	East	West
gerrard At logan	AM	8:15 AM	9:15 AM	Car	123	57	74	38	169	247	19	209	80	308	203	0	0	0	0	613	123	556	30	709	45	91	44	34	21	22	65	25
				Truck	11	0	5	5	10	12	6	7	5	18	10	0	0	0	0	8	5	8	0	13								
				Bus	0	0	0	0	0	15	0	15	0	15	0	0	0	0	0	18	0	18	0	18								
				Total	134	57	79	43		274	25	231	85		213	0	0	0		639	128	582	30									
	PM	4:45 PM	5:45 PM	Car	191	84	67	164	315	792	80	628	53	761	93	0	0	0	0	358	40	274	44	358	73	225	52	83	5	32	23	59
				Truck	4	3	2	2	7	11	1	9	3	13	5	0	0	0	0	12	2	9	1	12								
				Bus	0	0	0	0	0	17	0	17	0	17	0	0	0	0	0	17	0	17	0	17								
				Total	195	87	69	166		820	81	654	56		98	0	0	0		387	42	300	45									
dundas At carlaw	AM	8:15 AM	9:15 AM	Car	197	36	148	57	241	296	31	188	32	251	583	51	418	82	551	690	133	572	18	723	16	54	25	45	8	14	249	12
				Truck	10	2	8	3	13	6	1	2	0	3	7	1	3	1	5	6	4	3	1	8								
				Bus	7	0	6	0	6	0	1	0	0	1	9	0	9	0	9	0	0	0	0	0								
				Total	214	38	162	60		302	33	190	32		599	52	430	83		696	137	575	19									
	PM	5:00 PM	6:00 PM	Car	411	52	319	107	478	853	69	679	57	805	378	67	249	77	393	459	72	330	23	425	56	40	58	71	15	7	26	226
				Truck	0	2	0	1	3	6	0	5	0	5	5	0	5	0	5	5	0	3	0	3								
				Bus	6	0	6	0	6	3	0	3	0	3	9	0	9	0	9	2	0	2	0	2								
				Total	417	54	325	108		862	69	687	57		392	67	263	77		466	72	335	23									
dundas At logan	AM	8:00 AM	9:00 AM	Car	196	57	124	17	198	284	33	248	45	326	304	19	181	36	236	638	78	545	39	662	18	11	26	23	13	28	206	16
				Truck	3	0	2	0	2	3	1	2	0	3	0	1	0	0	1	6	0	6	0	6								
				Bus	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0								
				Total	199	58	126	17		287	34	250	45		304	20	181	36		645	78	551	39									
	PM	5:00 PM	6:00 PM	Car	284	38	185	97	320	635	62	510	36	608	192	28	103	19	150	400	53	343	37	433	24	18	47	37	17	33	26	104
				Truck	1	0	1	1	2	4	0	1	0	1	0	2	0	1	3	3	0	2	0	2								
				Bus	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0								
				Total	285	38	186	98		639	62	511	36		192	30	103	21		404	53	345	37									

AECOM Imagine it. Delivered.

Appendix B

Signal Timing Plans

LOCATION:	**Gerrard St E & Logan Ave**		*DISTRICT:*	**Scarborough**	N	
MODE/COMMENT:	**SAP with PR & TSP***		*COMPUTER SYSTEM:*	**TransSuite**	↑	
TCS:	**373**		*CONTROLLER/CABINET TYPE:*	**Peek ATC 1000 / TS2 T1**		
PREPARED BY / DATE:	***Ameneh Dialameh / February 6, 2019***		*CONFLICT FLASH:*	**Red & Red**		
CHECKED BY / DATE:	**Carmen Lam / February 6, 2019**		*DESIGN WALK SPEED:*	**1.0 m/s (FDW based on full crossing at 1.2 m/s)**		
IMPLEMENTATION DATE:	**February 7, 2019**		*CHANNEL/DROP:*	**4022/ 20**		
			CONTROLLER FIRMWARE:	**3.018.1.2976**		

NEMA Phase		OFF	AM	PM	NGHT	WKND	Phase Mode (Fixed/Demanded or Callable)	Remarks
		All Other Times	06:30-09:30 M-F	15:45-18:30 M-F	23:00-06:30 Daily	10:00-19:00 Sat & Sun		
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5		
	Split Table	Split 1	Split 2	Split 3	Split 4	Split 5		
1 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							Pedestrian Minimums: EWWK = 7 sec, EWFD = 14 sec NSWK = 7 sec, NSFD = 13 sec NS phase is callable by vehicle or pedestrian actuation. If a vehicle call and/or a pedestrian call is received, the pedestrian minimum will be served. The NSWK and NSFD are only display on the pedestrian signal heads if a vehicle and/or pedestrian call is received. *See back for TSP Instructions. EB & WB TSP enabled on September 12, 2018.
2 Gerrard St E	WLK 7 FDW 14 MIN 21 MAX1 28 AMB 3 ALR 3 SPLIT	33	43	43	33	43	Fixed POZ activated by Request Loop (max extension of 30 secs in Green/Walk)	
3 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
4 Logan Ave	WLK 7 FDW 13 MIN 20 MAX1 20 AMB 4 ALR 2 SPLIT	27	27	27	27	27	Callable by Wavetronix and/or Pushbutton;	
5 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
6 Gerrard St E	WLK 7 FDW 14 MIN 21 MAX1 28 AMB 3 ALR 3 SPLIT	33	43	43	33	43	Fixed POZ activated by Request Loop (max extension of 30 secs in Green/Walk)	
7 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
8 Logan Ave	WLK 7 FDW 13 MIN 20 MAX1 20 AMB 4 ALR 2 SPLIT	27	27	27	27	27	Callable by Pushbutton	
	CL OF	60 2	70 60	70 59	60 1	70 8		

Notes: North leg is One-Way Northbound

LOC: Gerrard St E & Logan Ave

MODE: SAP with PR & TSP*

TCS: 373 **PREPARATION DATE (TIMING CARD):** February 6, 2019

OFFSET CORRECTION PARAMETERS

2.3.4 O.C. Extend / Reduce

(Max. time added & subtracted in sec.)

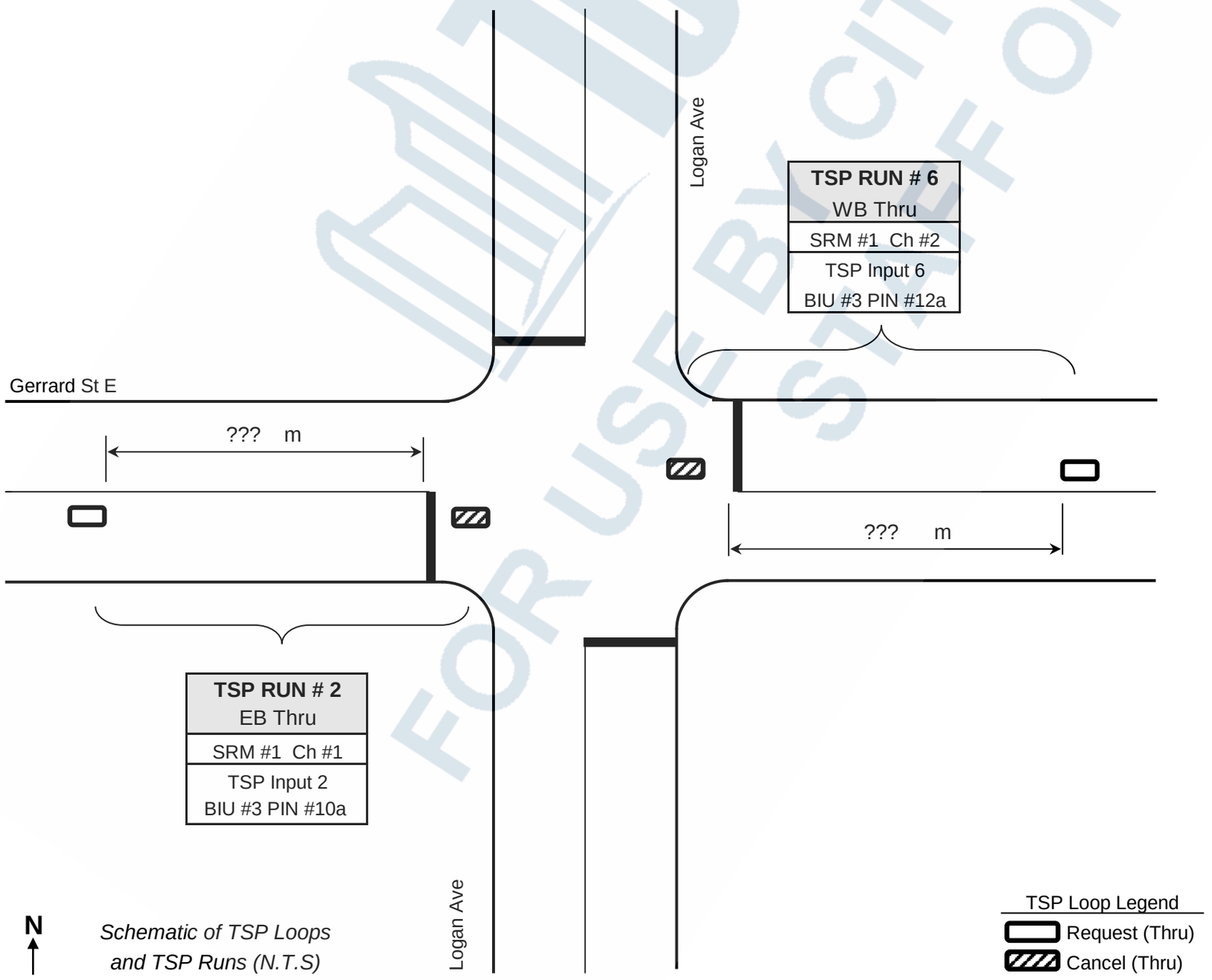
		Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	From page 1 [Cycle]	From page 1 [Slop]	2.3.2.x O.C. Thres.
OFF												Pattern 1
Split 1	Ext.	--	23	--	--	--	23	--		60	7	**15** s
	Rdc.	--	6	--	1	--	6	--	1			[25 %]
AM												Pattern 2
Split 2	Ext.	--	26	--	--	--	26	--	--	70	17	**18** s
	Rdc.	--	16	--	1	--	16	--	1			[26 %]
PM												Pattern 3
Split 3	Ext.	--	26	--	--	--	26	--	--	70	17	**18** s
	Rdc.	--	16	--	1	--	16	--	1			[26 %]
NGHT												Pattern 4
Split 4	Ext.	--	26	--	--	--	26	--	--	60	17	**15** s
	Rdc.	--	16	--	1	--	16	--	1			[25 %]
WKND												Pattern 5
Split 5	Ext.	--	26	--	--	--	26	--	--	70	17	**18** s
	Rdc.	--	16	--	1	--	16	--	1			[26 %]

T.S.P. PARAMETERS

PREPARED: AD / CL

	TSP RUN # 2 EB Thru	TSP RUN # 6 WB Thru
2.8.2 Transit Run Parameters		
ATC Green Extend Mode (Equivalent TTC Algorithm)	Mode 2 A	Mode 2 A
2.8.3 Transit Action Plan 1 (Used for all Patterns)		
Run Enable (X = Yes)	X	X
Run Config = **1**	Recovery = 2 (O.C. with delay)	
2.8.4 Transit Run Configuration 1		
Delay / Extend / Fail	-- / -- / 235	-- / -- / 235
CALLS (and Extends)	**Ø 2/6**	**Ø 2/6**
Skips	--	--
Reduces (Truncates)	**Ø 4/8**	**Ø 4/8**

2.8.6 TSP Split Tables: 1, 2, 3, 4 & 5	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8
GRN EXT (SDW Extension)	--	--	--	--	--	--	--	--
GRN RDC (Reduction)	--	--	--	-1	--	--	--	-1
WLK EXT (Walk Extension)	--	30	--	--	--	30	--	--



Notes:

Screen 2.1.9.2 Script #2 TSP Filter A used to block TSP calls during PH 4/8 AMB and ALR, and during PH 2/6 in unused time late in the cycle. The script is a workaround with firmware 3.18.2976. TSP calls can be checked on screen 1.2.4 at all times.

ATC Mode	0	2	3	4
TTC Algor'm	**B-2**	**A**	**C**	**D**
Extensions	SDW	Walk	W/SDW	W/SDW

TSP SUMMARY

Maximum Green Extensions:

EWG/EWWK: 30 s Green/Walk

Truncation of phase 4 and 8

LOCATION:	**Gerrard St E & Carlaw Ave**	*DISTRICT:*	**Toronto & East York**
MODE/COMMENT:	**FXT with Firehall Pre-emption (EBLA) & TSP***	*COMPUTER SYSTEM:*	**TransSuite**
TCS:	**372**	*CONTROLLER/CABINET TYPE:*	**Peek ATC 1000 / TS2 T1**
PREPARED/CHECKED BY:	***CIMA+***	*CONFLICT FLASH:*	**Red & Red**
PREPARATION DATE:	**July 31, 2018**	*DESIGN WALK SPEED:*	**1.0 m/s (FDW based on full crossing at 1.2 m/s)**
IMPLEMENTATION DATE:	**August 8, 2018**	*CHANNEL/DROP:*	**4022/16**
		CONTROLLER FIRMWARE:	**3.018.1.2976**

N

NEMA Phase		OFF All Other Times	AM 06:30-09:30 M-F	PM 15:00-19:00 M-F	NGHT 23:00-06:30 Daily	WKND 09:00-21:00 Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5		
	Split Table	Split 1	Split 2	Split 3	Split 4	Split 5		
1 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							Pedestrian Minimums: EWWK = 7 secs; EWFD = 15 secs NSWK = 7 secs; NSFD = 15 secs
2 Gerrard St E	WLK 7 FDW 15 MIN 22 MAX1 25 AMB 3 ALR 3 SPLIT	31	38	30	31	35	Fixed POZ activated by Request Loop (max extension of 30 secs in Green/Walk)	Firehall Preemption Instructions: • If preemption is received in phase 2/6: Time to Preemption Sequence = 0 - 28 secs • If preemption is received in phase 4/7/8: Time to Preemption Sequence = 0 - 28 secs • Signals go to All Red display before going into preemption sequence Preemption Sequence: Serve 60.0 seconds EBLA/EBG/EWDW Serve 4.0 seconds EBY/EWDW Serve 2.0 second of ALLR Return to normal operation in EWG/EWWK. *See back for TSP Instructions.
3 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							TSP disabled - TSP activation pending new firmware testing & field validation.
4 Carlaw Ave	WLK 7 FDW 15 MIN 22 MAX1 23 AMB 4 ALR 2 SPLIT	29	32	40	29	35	Fixed (truncations allowable to pedestrian minimum)	
5	WLK FDW MIN MAX1 AMB ALR SPLIT						Only Displayed during Firehall Preemption	
6 Gerrard St E	WLK 7 FDW 15 MIN 22 MAX1 25 AMB 3 ALR 3 SPLIT	31	38	30	31	35	Fixed POZ activated by Request Loop (max extension of 30 secs in Green/Walk)	
7	WLK FDW MIN 6 MAX1 6 AMB 3 ALR 1 SPLIT			11			Demanded	
8 Carlaw Ave	WLK 7 FDW 15 MIN 22 MAX1 23 AMB 4 ALR 2 SPLIT	29	32	29	29	35	Fixed (truncations allowable to pedestrian minimum)	
	CL OF	60 20	70 43	70 7	60 38	70 60		

NOTES:

LOC: Gerrard St E & Carlaw Ave
MODE: FXT with Firehall Pre-emption (EBLA) & TSP
TCS: 372 **PREPARATION DATE (TIMING CARD):** July 31, 2018

OFFSET CORRECTION PARAMETERS

2.3.4 O.C. Extend / Reduce (Max. time added & subtracted in sec.)

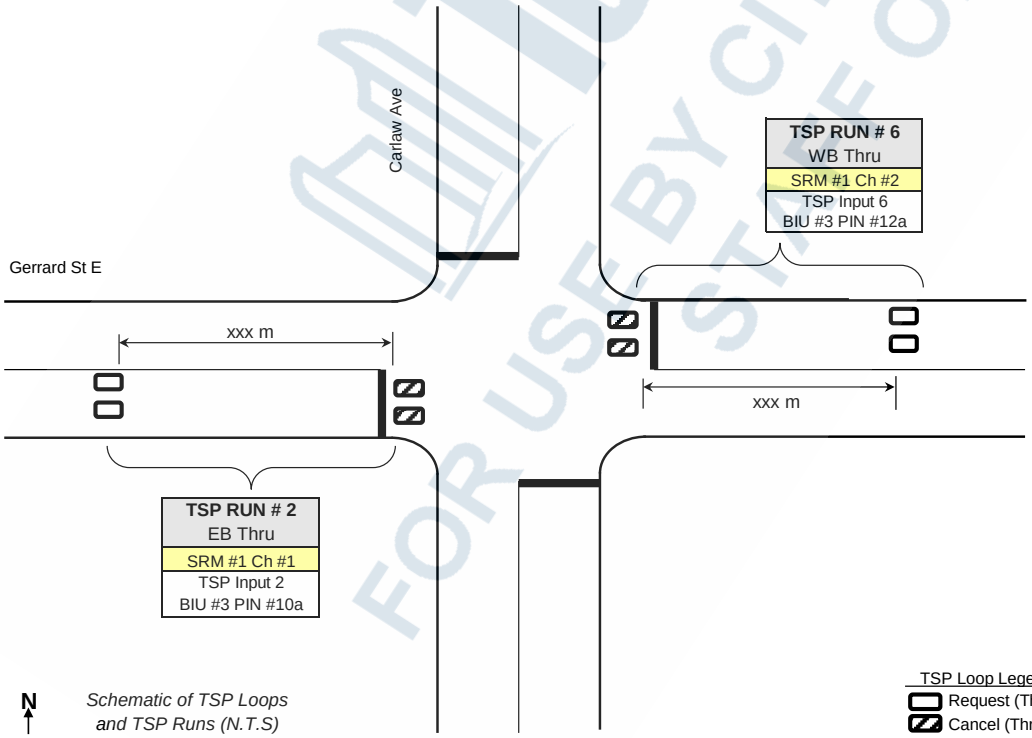
		Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	From page 1 [Cycle]	From page 1 [Slop]	2.3.2.x O.C. Thres.
OFF												Pattern 1
Split 1	Ext.	--	11	--	11	--	11	--	11	60	4	15 s
	Rdc.	--	3	--	1	--	3	--	1			[25 %]
AM												Pattern 2
Split 2	Ext.	--	13	--	13	--	13	--	13	70	14	18 s
	Rdc.	--	10	--	4	--	10	--	4			[25 %]
PM												Pattern 3
Split 3	Ext.	--	13	--	13	--	13	--	13	70	3	18 s
	Rdc.	--	2	--	1	--	2	--	1			[25 %]
NGHT												Pattern 4
Split 4	Ext.	--	11	--	11	--	11	--	11	60	4	15 s
	Rdc.	--	3	--	1	--	3	--	1			[25 %]
WKEND												Pattern 5
Split 5	Ext.	--	13	--	13	--	13	--	13	70	14	18 s
	Rdc.	--	7	--	7	--	7	--	7			[25 %]

T.S.P. PARAMETERS

PREPARED: CIMA+

	TSP RUN # 2 EB Thru	TSP RUN # 6 WB Thru
2.8.2 Transit Run Parameters		
ATC Green Extend Mode (Equivalent TTC Algorithm)	Mode 2 A	Mode 2 A
2.8.3 Transit Action Plan 1 (Used for all Patterns)		
Run Enable (X = Yes)	X	X
Run Config = **1** Recovery = 2 (O.C. with delay)		
2.8.4 Transit Run Configuration 1		
Delay / Extend / Fail	-- / -- / 235	-- / -- / 235
CALLS (and Extends)	**Ø 2/6**	**Ø 2/6**
Skips	--	--
Reduces (Truncates)	**Ø 4/8**	**Ø 4/8**

	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
2.8.6 TSP Split Tables: 1 & 4								
GRN EXT (SDW Extension)	--	--	--	--	--	--	--	--
GRN RDC (Reduction)	--	--	--	-1	--	--	--	-1
WLK EXT (Walk Extension)	--	30	--	--	--	30	--	--
2.8.6 TSP Split Tables: 2								
GRN EXT (SDW Extension)	--	--	--	--	--	--	--	--
GRN RDC (Reduction)	--	--	--	-4	--	--	--	-4
WLK EXT (Walk Extension)	--	30	--	--	--	30	--	--
2.8.6 TSP Split Tables: 3								
GRN EXT (SDW Extension)	--	--	--	--	--	--	--	--
GRN RDC (Reduction)	--	--	--	-2	--	--	--	-2
WLK EXT (Walk Extension)	--	30	--	--	--	30	--	--
2.8.6 TSP Split Tables: 5								
GRN EXT (SDW Extension)	--	--	--	--	--	--	--	--
GRN RDC (Reduction)	--	--	--	-3	--	--	--	-3
WLK EXT (Walk Extension)	--	30	--	--	--	30	--	--



Schematic of TSP Loops and TSP Runs (N.T.S)

Notes:

ATC Mode	0	2	3	4
TTC Algor'm	**B-2**	**A**	**C**	**D**
Extensions	SDW	Walk	W/SDW	W/SDW

TSP SUMMARY

EW: 30 secs EWG/EWWK Max Extensions
NS: Truncate to pedestrian minimum

LOCATION:	**Gerrard St E & Pape Ave**				***DISTRICT:***	**Toronto & East York**		
MODE/COMMENT:	**FXT with TSP***				***COMPUTER SYSTEM:***	**TransSuite**		N
TCS:	**371**				***CONTROLLER/CABINET TYPE:***	**Peek ATC 1000 / TS2 T1**		↑
PREPARED BY / DATE:	***Alvin Luk / December 17, 2019***				***CONFLICT FLASH:***	**Red & Red**		
CHECKED BY / DATE:	**Ameneh Dialameh / January 21, 2020**				***DESIGN WALK SPEED:***	**0.9 m/s (FDW based on full crossing at 1.1 m/s)**		
IMPLEMENTATION DATE:	**February 19, 2020**				***CHANNEL/DROP:***	**4022/15**		
					CONTROLLER FIRMWARE:	**3.018.1.2976**		

NEMA Phase		**OFF**	**AM**	**PM**	**NGHT**	**WKND**	**Phase Mode**	**Remarks**
		All Other Times	**06:30-09:30 M-F**	**15:45-18:30 M-F**	**23:00-06:30 Daily**	**10:00-19:00 Sat & Sun**	**(Fixed/Demanded or Callable)**	
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5		
	Split Table	Split 1	Split 2	Split 3	Split 4	Split 5		
1 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							Pedestrian Minimums: EWWK = 8 sec, EWFD = 13 sec NSWK = 8 sec, NSFD = 15 sec *See back for TSP Instructions. EB & WB TSP enabled on September 12, 2018.
2 Gerrard St E →	WLK 8 FDW 13 MIN 21 MAX1 24 AMB 3.0 ALR 2.5 SPLIT	30	40	40	30	40	Fixed POZ activated by Request Loop (max extension of 30 secs in Green/Walk)	
3 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
4 Pape Ave ↑↕	WLK 8 FDW 15 MIN 23 MAX1 23 AMB 3.0 ALR 3.9 SPLIT	30	30	30	30	30	Fixed	
5 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
6 Gerrard St E ↔	WLK 8 FDW 13 MIN 21 MAX1 24 AMB 3.0 ALR 2.5 SPLIT	30	40	40	30	40	Fixed POZ activated by Request Loop (max extension of 30 secs in Green/Walk)	
7 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
8 Pape Ave ↕↓	WLK 8 FDW 15 MIN 23 MAX1 23 AMB 3.0 ALR 3.9 SPLIT	30	30	30	30	30	Fixed	
	CL OF	60 38	70 25	70 25	60 18	70 42		

Notes:

LOC: Gerrard St & Pape Ave
MODE: FXT with TSP
TCS: 371 **PREPARATION DATE (TIMING CARD):** December 17, 2019

OFFSET CORRECTION PARAMETERS

2.3.4 O.C. Extend / Reduce *(Max. time added & subtracted in sec.)*

		Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	From page 1 [Cycle]	[Slop]	2.3.2.x O.C. Thres.
OFF												Pattern 1
Split 1	Ext.	--	12	--	11	--	12	--	11	60	3	**12** s [20 %]
	Rdc.	--	3	--	--	--	3	--	--			
AM												Pattern 2
Split 2	Ext.	--	13	--	13	--	13	--	13	70	9	**18** s [26 %]
	Rdc.	--	9	--	--	--	9	--	--			
PM												Pattern 3
Split 3	Ext.	--	13	--	13	--	13	--	13	70	9	**18** s [26 %]
	Rdc.	--	9	--	--	--	9	--	--			
NIGHT												Pattern 1
Split 4	Ext.	--	12	--	11	--	12	--	11	60	3	**12** s [20 %]
	Rdc.	--	3	--	--	--	3	--	--			
WKND												Pattern 5
Split 5	Ext.	--	13	--	13	--	13	--	13	70	9	**18** s [26 %]
	Rdc.	--	9	--	--	--	9	--	--			

Pattern 1 and 4 OC Thres set to 3x OC Rdc due to limited slop. Controller could take up to 3 cycles to get back in sync from -TSP Recovery.

OC Parameters modified to emulate MTSS with FXT operation.

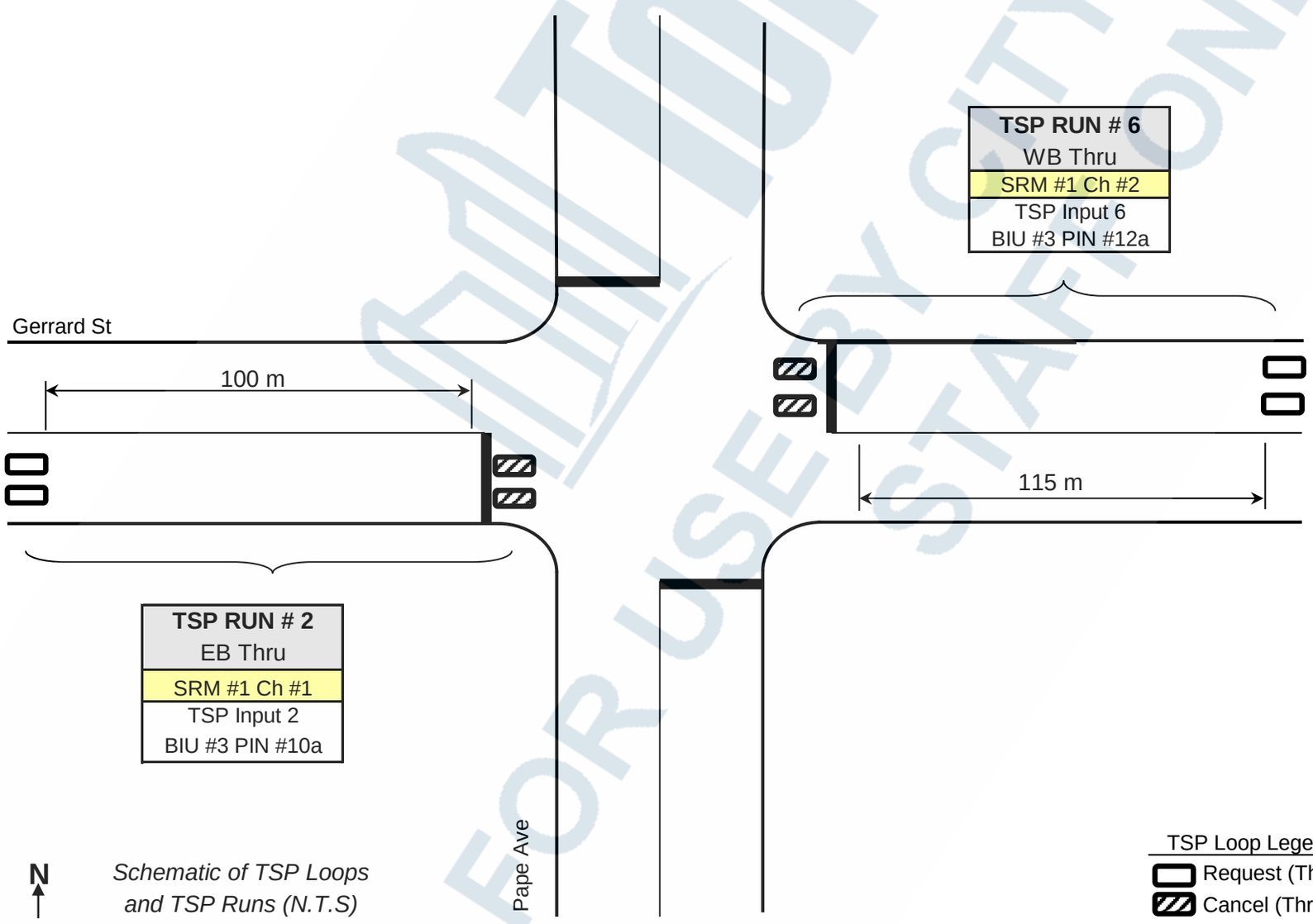
T.S.P. PARAMETERS

PREPARED: AL / AD

	TSP RUN # 2 EB Thru	**TSP RUN # 6** WB Thru
2.8.2 Transit Run Parameters		
ATC Green Extend Mode (Equivalent TTC Algorithm)	Mode 2 A	Mode 2 A
2.8.3 Transit Action Plan 1 (Used for all Patterns)		
Run Enable (X = Yes)	X	X
Run Config = **1**	Recovery = 2 (O.C. with delay)	
2.8.4 Transit Run Configuration 1		
Delay / Extend / Fail	-- / -- / 235	-- / -- / 235
CALLS (and Extends)	**Ø 2/6**	**Ø 2/6**
Skips	--	--
Reduces (Truncates)	--	--

2.8.6 TSP Split Tables: 1,2,3,4 & 5

	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8
GRN EXT (SDW Extension)	--	--	--	--	--	--	--	--
GRN RDC (Reduction)	--	--	--	--	--	--	--	--
WLK EXT (Walk Extension)	--	30	--	--	--	30	--	--



Schematic of TSP Loops and TSP Runs (N.T.S)

Notes:
Truncation of Phases 4 and 8 permitted to the pedestrian minimum, but there is currently no slop available.

ATC Mode	0	2	3	4
TTC Algor'm	**B-2**	**A**	**C**	**D**
Extensions	SDW	Walk	W/SDW	W/SDW

TSP SUMMARY

Maximum Green Extensions:
EWG: 30 s Green/Walk
Truncation of phases 4 and 8

LOCATION:	**Dundas St & Logan Ave**			*DISTRICT:*	**Toronto & East York**	N ↑
MODE / COMMENT:	**SAP (FXT by TOD) with PR**			*COMPUTER SYSTEM:*	**TransSuite**	
TCS:	**290**			*CONTROLLER / CABINET TYPE:*	**Peek ATC-1000 / TS2T1**	
PREPARED / CHECKED BY:	***SP/DS***			*CONFLICT FLASH:*	**Red & Red**	
PREPARATION DATE:	**October 20, 2017**			*DESIGN WALK SPEED:*	**1.0 m/s (FDW based on full crossing at 1.2 m/s)**	
IMPLEMENTATION DATE:	**November 16, 2017**			*CHANNEL / DROP:*	**4076/14**	
				CONTROLLER FIRMWARE:	**3.018.1.2976**	

NEMA Phase		OFF All Other Times	AM 06:30-09:30 M-F	PM 15:00-19:00 M-F	NIGHT 23:00-06:30 Daily	WKND 10:00-19:00 Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5		
	Split Table	Split 1	Split 2	Split 3	Split 4	Split 5		
1 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							Pedestrian Minimums: EWWK = 7 sec, EWFD = 16 sec NSWK = 7 sec, NSFD = 15 sec NS phase is callable by vehicle or pedestrian actuation. If a vehicle and/or pedestrian call is received, the maximum NSG is served. The NSWK & NSFD are displayed on the pedestrian signal heads if a vehicle and/or pedestrian call is received.
2 Dundas St	WLK 7 FDW 16 MIN 23 MAX1 36 AMB 3 ALR 3 SPLIT	41	47	47	31	51	Fixed	Side Street Passage Time = 3 sec Pattern 2 (AM peak period) provides FXT operation during 06:30-09:30, M-F. WALK and FDW are displayed for side street during FXT operation.
3 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
4 Logan Ave	WLK 7 FDW 15 MIN 22 MAX1 22 AMB 3 ALR 3 SPLIT	29	29	29	29	29	Callable by Stopbar Loop and/or Push Button	
5 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
6 Dundas St	WLK 7 FDW 16 MIN 23 MAX1 36 AMB 3 ALR 3 SPLIT	41	47	47	31	51	Fixed	
7 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT							
8 Logan Ave	WLK 7 FDW 15 MIN 22 MAX1 22 AMB 3 ALR 3 SPLIT	29	29	29	29	29	Callable by Stopbar Loop and/or Push Button	
	CL OF	70 67	76 4	76 64	60 31	80 37		

Notes: TransSuite

LOCATION:	**Dundas St E & Carlaw Ave**
MODE/COMMENT:	**FXT**
TCS:	**289**
PREPARED/CHECKED BY:	***SQ/HL***
PREPARATION DATE:	**October 20, 2017**
IMPLEMENTATION DATE:	**November 16, 2017**
DISTRICT:	**Toronto & East York**
COMPUTER SYSTEM:	**TransSuite**
CONTROLLER/CABINET TYPE:	**Peek ATC-1000 / TS2T1**
CONFLICT FLASH:	**Red & Red**
DESIGN WALK SPEED:	**1.0 m/s (FDW based on full crossing at 1.2 m/s)**
CHANNEL/DROP:	**4076/38**
CONTROLLER FIRMWARE:	**3.018.1.2976**

N

NEMA Phase		OFF All Other Times	AM 06:30-09:30 M-F	PM 15:00-19:00 M-F	NIGHT 23:00-06:30 Daily	WKND 10:00-19:00 Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5		
	Split Table	Split 1	Split 2	Split 3	Split 4	Split 5		
1 NOT USED	WLK							Pedestrian Minimums: EWWK = 7 sec, EWFD = 13 sec NSWK = 7 sec, NSFD = 18 sec
	FDW							
	MIN							
	MAX1							
	AMB							
	ALR							
	SPLIT							
2 Dundas St E	WLK 7						Fixed	
	FDW 13							
	MIN 20							
	MAX1 31							
	AMB 3							
	ALR 3							
	SPLIT	37	44	44	28	47		
3 NOT USED	WLK							
	FDW							
	MIN							
	MAX1							
	AMB							
	ALR							
	SPLIT							
4 Carlaw Ave	WLK 7						Fixed	
	FDW 18							
	MIN 25							
	MAX1 27							
	AMB 3							
	ALR 3							
	SPLIT	33	32	32	32	33		
5 NOT USED	WLK							
	FDW							
	MIN							
	MAX1							
	AMB							
	ALR							
	SPLIT							
6 Dundas St E	WLK 7						Fixed	
	FDW 13							
	MIN 20							
	MAX1 31							
	AMB 3							
	ALR 3							
	SPLIT	37	44	44	28	47		
7 NOT USED	WLK							
	FDW							
	MIN							
	MAX1							
	AMB							
	ALR							
	SPLIT							
8 Carlaw Ave	WLK 7						Fixed	
	FDW 18							
	MIN 25							
	MAX1 27							
	AMB 3							
	ALR 3							
	SPLIT	33	32	32	32	33		
	CL	70	76	76	60	80		
	OF	49	64	10	11	38		

NOTES: Picked up under TransSuite system control on Jun 4, 2014 at approximately 10:32.

AECOM Imagine it. Delivered.

Appendix C

Multi-Modal Level of Service Criteria

Automobile Level of Service

Highway Capacity Manual 2010

Table 1 summarizes the LOS criteria for signalized intersections, as described in the ***Highway Capacity Manual 2010*** (Transportation Research Board,2010).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: ***Highway Capacity Manual 2010***, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Pedestrian Level of Service

Exhibit 4 – PLOS Segment Evaluation Table

Sidewalk Width (m)	Boulevard Width (m)	Motor Vehicle Traffic Volume (AADT)	Presence of On-street Parking	Segment PLOS			
				Operating Speed (km/h)			
				≤30	>30 or 50	>50 or 60	>60 [1]
2.0 or more	> 2	≤ 3000	N/A	A	A	A	B
		> 3000	Yes	A	B	B	N/A
			No	A	B	C	D
	0.5 to 2	≤ 3000	N/A	A	A	A	B
		> 3000	Yes	A	B	C	N/A
			No	A	C	D	E
	0	≤ 3000	NA	A	B	C	D
		> 3000	Yes	B	B	D	N/A
			No	B	C	E	F
1.8	> 2	≤ 3000	N/A	A	A	A	B
		> 3000	Yes	A	B	C	N/A
			No	A	C	D	E
	0.5 to 2	≤ 3000	N/A	A	B	B	D
		> 3000	Yes	A	C	C	N/A
			No	B	C	E	E
	0	≤ 3000	N/A	A	B	C	D
		> 3000	Yes	B	C	D	N/A
			No	C	D	F	F
1.5	> 2	≤ 3000	N/A	C	C	C	C
		> 3000	Yes	C	C	D	N/A
			No	C	D	E	E
	0.5 to 2	≤ 3000	N/A	C	C	C	D
		> 3000	Yes	C	C	D	N/A
			No	D	E	E	E
	0	N/A		D	E	F [2]	F [2]
<1.5	N/A			F [3]	F [3]	F [3]	F [3]
No sidewalk	N/A			C [4]	F [3]	F [3]	F [3]

Notes:

1. On-street parking not provided on roadways with posted speed of 70 km/h or more
2. Sidewalk must be 1.8 m wide if no separation is provided (curb-face sidewalk) where speeds are high
3. Sidewalk must be 1.5 m wide to meet Provincial accessiblity standards
4. Ottawa Pedestrian Plan, 2014: “all new and reconstructed urban local roads where pedestrian facilities are required in accordance with these policies but no dedicated pedestrian facility is provided, require that roads be designed for a speed of 30 km/h or lower (pending development of a new 30 km/h roadway design standard).” Where a roadway is specifically designed as 'shared space', with appropriate design controls and features, it can achieve LOS A.
5. Where a multi-use path is provided in lieu of sidewalks, the MUP can be evaluated using the same methodology.

Exhibit 5 – PETSI Point Tables

5.1 Crossing Distance & Conditions		
Total travel lanes crossed	**No median**	**With Median (>2.4m)**
2	120	120
3	105	105
4	88	90
5	72	75
6	55	60
7	39	45
8	23	30
9	6	15
10	-10	0

5.2 Signal Phasing & Timing Features	
Left turn conflict ("Left_turns")	**Points**
Permissive	-8
Protected/permissive	-8
Protected	0
No left turn/prohibited	0
Right turn conflict ("Right_turns")	**Points**
Permissive or yield control	-5
Protected/permissive	-5
Protected	0
No right turn	0
Right turns on red ("RTOR")	**Points**
RTOR allowed	-3
RTOR prohibited	0
Leading ped interval? ("LPI")	**Points**
No	-2
Yes	0

5.3a Corner Radius	
Corner radius	**Points**
Greater than 25m	-9
> 15m to 25m	-8
> 10m to 15m	-6
> 5m to 10m	-5
>3m to 5m	-4
Less than/equal to 3m	-3
No right turn	0

5.3b Right Turn Channel	
Right turn channel	**Points**
Conventional right turn channel with receiving lane[1]	-3
Conventional right turn channel without receiving lane[1]	0
Right turn “smart channel” [1]	2
No right turn channel	-4
No right turn	0

[1] Right turn channels are counted as an additional “travel lane crossed” and so note that despite the points shown above overall they score lower than “No right turn channel”.

5.4 Crosswalk Treatment	
Crosswalk treatment ("Crosswalk")	Points
Standard transverse markings	-7
Textured/coloured pavement	-4
Zebra stripe hi-vis markings	-4
Raised crosswalk	0

Exhibit 6 – PETSI Evaluation Table

Pedestrian Exposure to Traffic LOS	
Points threshold	LOS
≥90	A
≥75	B
≥60	C
≥45	D
≥30	E
<30	F

Exhibit 7 – Pedestrian Delay Evaluation Table

Average Pedestrian Crossing Delay Component	
$\text{Delay} = 0.5 \times \frac{(\text{Cycle Length} - \text{Pedestrian Effective Walk Time})^2}{\text{Cycle Length}}$	
< 10 s per intersection leg	LOS A
≥10 to 20 sec	LOS B
>20 to 30 sec	LOS C
>30 to 40 sec	LOS D
>40 to 60 sec	LOS E
> 60 sec	LOS F

Bicycle Level of Service

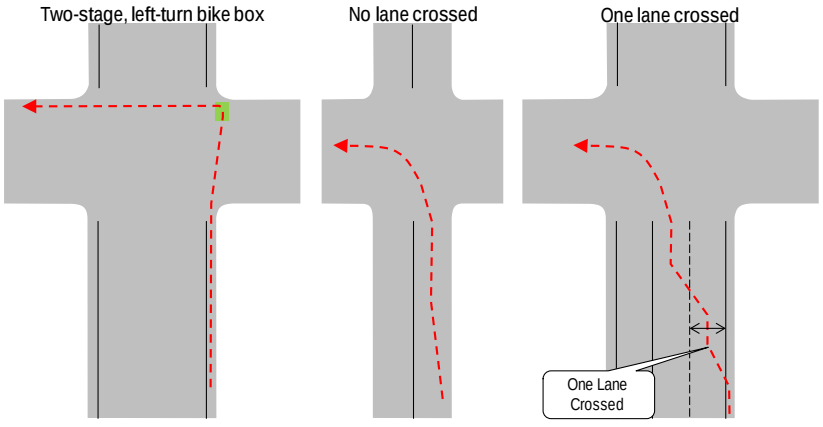
Exhibit 11 – BLOS Segment Evaluation Table

Type of Bikeway		LOS
Physically Separated Bikeway (cycle tracks, protected bike lanes and multi-use paths). Physical separation refers to, but is not limited to, curbs, raised medians, bollards and parking lanes (adjacent to the bike lane along the travelled way i.e. not curbside).		A
Bike Lanes Not Adjacent Parking Lane - Select Worst Scoring Criteria		
No. of Travel Lanes	1 travel lane in each direction	A
	2 travel lanes in each direction separated by a raised median	B
	2 travel lanes in each direction without a separating median	C
	More than 2 travel lanes in each direction	D
Bike Lane Width	≥ 1.8 m wide bike lane (includes marked buffer and paved gutter width)	A
	≥1.5 m to <1.8 m wide bike lane (includes marked buffer and paved gutter width)	B
	≥1.2 m to <1.5 m wide bike lane (includes marked buffer and paved gutter width)	C
Operating Speed	≤ 50 km/h operating speed	A
	60 km/h operating speed	C
	≥ 70 km/h operating speed	E
Bike lane blockage (commercial areas)	Rare	A
	Frequent	C
Bike Lanes Adjacent to curbside Parking Lane - Select Worst Scoring Criteria		
No. of Travel Lanes	1 travel lane in each direction	A
	2 or more travel lanes in each direction	C
Bike Lane and Parking Lane Width	4.5 m wide bike lane plus parking lane (includes marked buffer and paved gutter width)	A
	4.25 m wide bike lane plus parking lane (includes marked buffer and paved gutter width)	B
	≤ 4.0 m wide bike lane plus parking lane (includes marked buffer and paved gutter width)	C
Operating Speed	≤ 40 km/h operating speed	A
	50 km/h operating speed	B
	60 km/h operating speed	D
	≥ 70 km/h operating speed	F
Bike lane blockage (commercial areas)	Rare	A
	Frequent	C
Mixed Traffic		
No. of Travel Lanes and Operating Speed	2 travel lanes; ≤ 40 km/h; no marked centerline or classified as residential	A
	2 to 3 travel lanes; ≤ 40 km/h	B
	2 travel lanes; 50 km/h; no marked centerline or classified as residential	B
	2 to 3 travel lanes; 50 km/h	D
	4 to 5 travel lanes; ≤ 40 km/h	D
	4 to 5 travel lanes; ≥ 50 km/h	E
	6 or more travel lanes; ≤ 40 km/h	E
	≥ 60 km/h	F
Unsignalized Crossing along Route: no median refuge		
No. of Travel Lanes on Side Street and Operating Speed	3 or less lanes being crossed; ≤ 40 km/h	A
	4 to 5 lanes being crossed; ≤ 40 km/h	B
	3 or less lanes being crossed; 50 km/h	B
	4 to 5 lanes being crossed; 50 km/h	C
	3 or less lanes being crossed; 60 km/h	C
	4 to 5 lanes being crossed; 60 km/h	D
	6 or more lanes being crossed; ≤ 40 km/h	E
	3 or less lanes being crossed; ≥ 65 km/h	E
	6 or more lanes being crossed; ≥ 50 km/h	F
	4 to 5 lanes being crossed; ≥ 65 km/h	F
Unsignalized Crossing along Route: with median refuge (≥ 1.8 m wide)		
No. of Travel Lanes on Side Street and Operating Speed	5 or less lanes being crossed; ≤ 40 km/h	A
	3 or less lanes being crossed; 50 km/h	A
	6 or more lanes being crossed; ≤ 40 km/h	B
	4 to 5 lanes being crossed; 50 km/h	B
	3 or less lanes being crossed; 60 km/h	B
	6 or more lanes being crossed; 50 km/h	C
	4 to 5 lanes being crossed; 60 km/h	C
	3 or less lanes being crossed; ≥ 65 km/h	D
	6 or more lanes being crossed; 60 km/h	E
	4 to 5 lanes being crossed; ≥ 65 km/h	E
	6 or more lanes being crossed; ≥ 65 km/h	F

Exhibit 12 – BLOS Signalized Intersection Evaluation Table

Bikeway and Intersection Type		LOS
Bike Lanes or higher order facility on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	No impact on LTS (as long as cycling facility remains to the right of any turn lane - otherwise see pocket bike lanes below)	
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Pocket Bike Lanes on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane introduced to the right of the bike lane and ≤ 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	B
	Right-turn lane introduced to the right of the bike lane and > 50 m long, turning speed ≤ 30 km/h (based on curb radii and angle of intersection)	D
	Bike lane shifts to the left of the right-turn lane, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane with any other configurations	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	C
	1 lane crossed, 50 km/h	C
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	E
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F
Mixed Traffic on a Signalized Intersection Approach		
Right-turn Lane and Turning Speed of Motorists	Right-turn lane 25 to 50 m long, turning speed ≤ 25 km/h (based on curb radii and angle of intersection)	D
	Right-turn lane 25 to 50 m long, turning speed > 25 km/h (based on curb radii and angle of intersection)	E
	Right-turn lane longer than 50 m	F
	Dual right-turn lanes (shared or exclusive)	F
Cyclist Making a Left-turn and Operating Speed of Motorists (refer to figure)	Two-stage, left-turn bike box; ≤ 50 km/h	A
	No lane crossed, ≤ 50 km/h	B
	1 lane crossed, ≤ 40 km/h	B
	No lane crossed, ≥ 60 km/h	D
	1 lane crossed, 50 km/h	D
	2 or more lanes crossed, ≤ 40 km/h	D
	1 lane crossed, ≥ 60 km/h	F
	2 or more lanes crossed, ≥ 50 km/h	F
	All other single left-turn lane configurations	F
	Dual left-turn lanes (shared or exclusive)	F

Left-turn Configurations



Notes:

1. Pocket bike lanes are defined as bike lanes that develop near intersections between vehicular right turn lanes on the right side and vehicular through or left lanes on the left side. All other configurations of bike lanes or separated facility that remain against the edge of the curb/parking lane and require right turning vehicles to yield to through cyclists will not impact the level of traffic stress (i.e. are considered to be LOS A).

Transit Level of Service

Exhibit 15 - TLOS Segment Evaluation Table

Facility Type		Level/exposure to congestion delay, friction and incidents			Quantitative Measurement	LOS
		Congestion	Friction	Incident Potential		
Segregated ROW		No	No	No	N/A	A
Bus lane	No/limited parking/driveway friction	No	Low	Low	$C_f \leq 60$	B
	Frequent parking/driveway friction	No	Medium	Medium	$C_f > 60$	C
Mixed Traffic	Limited parking/driveway friction	Yes	Low	Medium	$Vt/Vp \geq 0.8$	D
	Moderate parking/driveway friction	Yes	Medium	Medium	$Vt/Vp \leq 0.6$	E
	Frequent parking/driveway friction	Yes	High	High	$Vt/Vp < 0.4$	F

Notes:

Cf, Conflict Factor = = (Number of driveways x crossing volume) / 1 km

Vt/Vp is the ratio of average transit travel speed to posted speed limit

Exhibit 16 – TLOS Signalized Intersection Evaluation Table

Delay	Typical Location	LOS
0	Grade Separation	A
≤10 sec	High Level TSP	B
≤20 sec		C
≤30 sec		D
≤40 sec	TSP & long cycle length	E
>40 sec	No TSP & long cycle length	F

Note: Delay includes travel time from end of queue to entering the intersection

Level of Service Targets

Exhibit 22 – Minimum Desirable MMLOS Targets by Official Plan Policy/Designation & Road Class

OP Designation / Policy Area	Road Class	PLOS	Bicycle - BLOS				Transit - TLOS [3]			Truck - TrLOS		Auto - LOS [4]
			Cross-town Bikeway	Spine Route	Local Route	Elsewhere	Rapid Transit Corridor	TP - Continuous Lanes	TP - Isolated Measures	Truck Route	Other	
Land-Use Designation												
Central Area	Arterial	A	A	C	B	D	A	C	D	D	E	E
	Collector	A	A	B	B	D	A	C	D	D	No target	E
	Local	A	A	B	B	D	A	C	D	E	No target	E
Developing Community	Arterial	C	B	C	B	D	B	C	D	D	No target	D
	Collector	C	B	C	B	D	B	C	D	D	No target	D
	Local	C	B	C	B	D	B	C	D	N/A	No target	D
Employment Area	Arterial	C	B	C	C	E	B	C	D	B	D	D
	Collector	C	B	C	C	E	B	C	D	B	D	D
	Local	C	B	D	C	No target	B	C	D	D	E	D
Entreprise Area	Arterial	C	B	C	B	D	B	C	D	B	E	D
	Collector	C	B	C	B	D	B	C	D	B	E	D
	Local	C	B	C	B	No target	B	C	D	D	No target	D
General Rural Area	Arterial	No target	N/A	D	D	No target	N/A	N/A	N/A	C	E	D
	Collector	No target	N/A	D	D	No target	N/A	N/A	N/A	C	No target	D
	Local	No target	N/A	D	D	No target	N/A	N/A	N/A	No target	No target	D
General Urban Area	Arterial	C	B	C	B	D	B	C	D	D	E	D
	Collector	C	B	C	B	D	B	C	D	D	No target	D
	Local	C	B	C	B	D	B	C	D	N/A	No target	D
Mixed Use Centre	Arterial	C	A	C	B	D	B	C	D	D	E	D
	Collector	C	A	B	B	D	B	C	D	D	No target	D
	Local	C	A	B	B	D	B	C	D	N/A	No target	D
Village	Arterial	C	B	C	B	D	N/A	N/A	N/A	D	No target	D
	Collector	C	B	C	B	D	N/A	N/A	N/A	D	No target	D
	Local	C	B		B	D	N/A	N/A	N/A	N/A	No target	D
Traditional Main Street	Arterial	B	A	C	C	D	B	C	D	D	E	D
	Collector	B	A	C	C	D	B	C	D	D	No target	D
Arterial Main Street	Arterial	C	B	C	D	D	B	C	D	D	E	D
All Other Designations	Arterial	D	B	C	C	D	B	C	D	D	No target	D
	Collector	D	B	C	C	D	B	C	D	D	No target	D
	Local	D	B	C	C	D	B	C	D	N/A	No target	D
Policy Area [2]												
Within 600m of a rapid transit station	Arterial	A	A	C	B	D	A	C	D	D	E	E
	Collector	A	A	B	B	D	A	C	D	D	No target	E
	Local	A	A	B	B	D	A	C	D	N/A	No target	E
Within 300m of a school	Arterial	A	A	C	B	D	A	C	D	D	E	E
	Collector	A	A	B	B	D	A	C	D	D	No target	E
	Local	A	A	B	B	D	A	C	D	N/A	No target	E

1. This table indicates the minimum desirable target. Efforts should be made to exceed these minimum targets whenever possible, without negatively impacting the ability to achieve the minimum targets for other modes .
2. Where a policy area applies to a project or area, the modal targets should reflect the policy area targets regardless of the land use designation.
3. Transit targets are intended to be applied only for streets with a proposed or existing transit route.
4. Auto LOS is based on the two and a half hour peak period.
5. Minimum guidelines as dictated by City policy must be maintained, regardless of MMLOS targets.

N/A - Not applicable

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Appendix D

Synchro Modelling Assumptions and Parameters

Synchro Modelling Parameters and Assumptions

The key assumptions and modifications made to the default values of the Synchro parameters in the traffic modelling exercise are as follows:

- The existing turning movement volumes at the Study Area intersections, developed from the raw Turning Movement Count data after applying a conservative annual growth rate of 1%, were used in the Existing Conditions model for all Turning Movement Counts collected before 2020.
- The Heavy Vehicle Percentages were calculated at the movement level based on the raw Turning Movement Count data.
- The Peak Hour Factors for each individual intersection was calculated based on the raw Turning Movement Count data.
- Conflicting pedestrian and bicycle volumes were input for the left-turn and right-turn movements based on the raw Turning Movement Count data.
- Bus Blockages were input into the model to represent delays to vehicular traffic due to passenger boarding and alighting at the bus / streetcar stops. Buses stopping at the nearside of an intersection were reflected in Synchro as bus blockages for the shared right-turn and through movements. Streetcars stopping at the nearside of an intersection were reflected in Synchro as bus blockages for the whole approach. Bus blockages were estimated as per the Toronto Transit Commission schedule available online for the Toronto Transit Commission bus and streetcar routes that have stops within the Study Area. It should be noted that Synchro assumes that Bus Blockages cause an average blockage of 14.4 seconds during each occurrence and reduces the Saturation Flow Rate of the respective blocked movements accordingly. Hence, any existing streetcar stop locations with a passenger servicing time exceeding 14.4 seconds could have its impacts on traffic operations underestimated, as a result.
- The Lost Time Adjust values for all the movements were set to -1 second as per the City's Guidelines for Using Synchro 9.
- The Synchro default values were used for all other parameters.

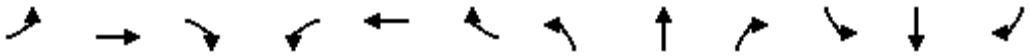
AECOM Imagine it. Delivered.

Appendix E

Synchro Reports

Lane Group	EBT	WBT	NBT	NBR
Lane Group Flow (vph)	394	856	157	49
v/c Ratio	0.23	0.51	0.37	0.14
Control Delay	5.5	3.8	23.5	7.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.5	3.8	23.5	7.0
Queue Length 50th (m)	9.2	10.3	15.6	0.0
Queue Length 95th (m)	15.6	13.3	29.5	6.7
Internal Link Dist (m)	107.1	185.5	89.1	
Turn Bay Length (m)				20.0
Base Capacity (vph)	1714	1682	562	446
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.23	0.51	0.28	0.11

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	243	89	135	612	32	60	83	45	0	0	0
Future Volume (vph)	26	243	89	135	612	32	60	83	45	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0	5.0			
Lane Util. Factor		0.95			0.95			1.00	1.00			
Frpb, ped/bikes		0.96			1.00			1.00	0.89			
Flpb, ped/bikes		1.00			0.98			0.98	1.00			
Frt		0.96			0.99			1.00	0.85			
Flt Protected		1.00			0.99			0.98	1.00			
Satd. Flow (prot)		3095			3392			1791	1292			
Flt Permitted		0.87			0.79			0.98	1.00			
Satd. Flow (perm)		2701			2703			1791	1292			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	29	267	98	148	673	35	66	91	49	0	0	0
RTOR Reduction (vph)	0	37	0	0	3	0	0	0	37	0	0	0
Lane Group Flow (vph)	0	357	0	0	853	0	0	157	12	0	0	0
Confl. Peds. (#/hr)	45		91	91		45	34		44	44		34
Confl. Bikes (#/hr)	21		22	22		21	25		65	65		25
Heavy Vehicles (%)	24%	3%	6%	4%	1%	0%	0%	6%	12%	0%	0%	0%
Bus Blockages (#/hr)	12	12	12	12	12	12	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm			
Protected Phases		2			6			4				
Permitted Phases	2			6			4		4			
Actuated Green, G (s)		42.5			42.5			15.5	15.5			
Effective Green, g (s)		43.5			43.5			16.5	16.5			
Actuated g/C Ratio		0.62			0.62			0.24	0.24			
Clearance Time (s)		6.0			6.0			6.0	6.0			
Vehicle Extension (s)		3.0			3.0			3.0	3.0			
Lane Grp Cap (vph)		1678			1679			422	304			
v/s Ratio Prot												
v/s Ratio Perm		0.13			c0.32			0.09	0.01			
v/c Ratio		0.21			0.51			0.37	0.04			
Uniform Delay, d1		5.8			7.3			22.4	20.6			
Progression Factor		1.00			0.36			1.00	1.00			
Incremental Delay, d2		0.3			0.7			0.6	0.1			
Delay (s)		6.1			3.3			23.0	20.7			
Level of Service		A			A			C	C			
Approach Delay (s)		6.1			3.3			22.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	287	1027	295	609
v/c Ratio	0.22	0.77	0.28	0.54
Control Delay	16.4	14.9	12.3	17.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.4	14.9	12.3	17.6
Queue Length 50th (m)	14.7	56.4	10.5	29.3
Queue Length 95th (m)	24.7	80.1	18.5	43.7
Internal Link Dist (m)	185.5	183.2	89.2	52.7
Turn Bay Length (m)				
Base Capacity (vph)	1288	1327	1069	1138
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.22	0.77	0.28	0.54

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	185	62	152	730	105	44	176	63	79	408	98
Future Volume (vph)	28	185	62	152	730	105	44	176	63	79	408	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.97			0.98			0.97			0.98	
Flpb, ped/bikes		1.00			0.99			0.99			0.99	
Frt		0.97			0.98			0.97			0.97	
Flt Protected		0.99			0.99			0.99			0.99	
Satd. Flow (prot)		3216			3345			3283			3360	
Flt Permitted		0.82			0.83			0.81			0.85	
Satd. Flow (perm)		2659			2788			2675			2889	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	29	193	65	158	760	109	46	183	66	82	425	102
RTOR Reduction (vph)	0	34	0	0	13	0	0	38	0	0	24	0
Lane Group Flow (vph)	0	253	0	0	1014	0	0	257	0	0	585	0
Confl. Peds. (#/hr)	181		93	93		181	90		134	134		90
Confl. Bikes (#/hr)			63			23			40			11
Heavy Vehicles (%)	0%	3%	5%	1%	1%	1%	7%	1%	3%	0%	0%	1%
Bus Blockages (#/hr)	12	12	12	12	12	12	0	0	0	0	10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		32.0			32.0			26.0			26.0	
Effective Green, g (s)		33.0			33.0			27.0			27.0	
Actuated g/C Ratio		0.47			0.47			0.39			0.39	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Lane Grp Cap (vph)		1253			1314			1031			1114	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.36			0.10			c0.20	
v/c Ratio		0.20			0.77			0.25			0.53	
Uniform Delay, d1		10.8			15.4			14.6			16.6	
Progression Factor		1.89			0.68			1.00			1.00	
Incremental Delay, d2		0.4			4.4			0.6			1.8	
Delay (s)		20.8			14.8			15.2			18.3	
Level of Service		C			B			B			B	
Approach Delay (s)		20.8			14.8			15.2			18.3	
Approach LOS		C			B			B			B	

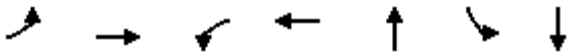
Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	393	578	73	52
v/c Ratio	0.27	0.35	0.12	0.10
Control Delay	14.3	5.0	13.1	10.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.3	5.0	13.1	10.8
Queue Length 50th (m)	15.1	3.2	4.7	2.5
Queue Length 95th (m)	23.1	4.4	12.7	9.0
Internal Link Dist (m)	183.2	212.4	62.4	59.6
Turn Bay Length (m)				
Base Capacity (vph)	1442	1652	592	543
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.27	0.35	0.12	0.10

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	282	29	28	502	7	14	36	18	17	10	21
Future Volume (vph)	55	282	29	28	502	7	14	36	18	17	10	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			5.9			5.9	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			0.98			0.97	
Flpb, ped/bikes		0.99			1.00			0.99			0.98	
Frt		0.99			1.00			0.96			0.94	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3448			3525			1758			1661	
Flt Permitted		0.81			0.92			0.95			0.91	
Satd. Flow (perm)		2828			3256			1685			1536	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	59	303	31	30	540	8	15	39	19	18	11	23
RTOR Reduction (vph)	0	9	0	0	1	0	0	12	0	0	15	0
Lane Group Flow (vph)	0	384	0	0	577	0	0	61	0	0	37	0
Confl. Peds. (#/hr)	56		43	43		56	53		61	61		53
Confl. Bikes (#/hr)			4			1						2
Heavy Vehicles (%)	0%	0%	0%	4%	0%	0%	0%	3%	0%	0%	0%	5%
Bus Blockages (#/hr)	12	12	12	12	12	12	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		34.5			34.5			23.1			23.1	
Effective Green, g (s)		35.5			35.5			24.1			24.1	
Actuated g/C Ratio		0.51			0.51			0.34			0.34	
Clearance Time (s)		5.5			5.5			6.9			6.9	
Lane Grp Cap (vph)		1434			1651			580			528	
v/s Ratio Prot												
v/s Ratio Perm		0.14			c0.18			c0.04			0.02	
v/c Ratio		0.27			0.35			0.10			0.07	
Uniform Delay, d1		9.8			10.3			15.6			15.4	
Progression Factor		1.45			0.42			1.00			1.00	
Incremental Delay, d2		0.4			0.6			0.4			0.3	
Delay (s)		14.7			4.9			16.0			15.7	
Level of Service		B			A			B			B	
Approach Delay (s)		14.7			4.9			16.0			15.7	
Approach LOS		B			A			B			B	

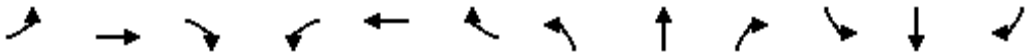
Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	38	326	86	652	222	22	240
v/c Ratio	0.14	0.32	0.15	0.63	0.46	0.07	0.40
Control Delay	9.8	9.7	4.1	6.5	23.9	19.0	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.8	9.7	4.1	6.5	23.9	19.0	21.7
Queue Length 50th (m)	2.4	21.8	2.2	16.9	24.5	2.2	25.0
Queue Length 95th (m)	7.1	36.3	m3.4	22.4	43.6	7.1	43.6
Internal Link Dist (m)		160.9		174.8	126.5		85.2
Turn Bay Length (m)	20.0		15.0			20.0	
Base Capacity (vph)	281	1028	556	1040	486	326	593
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.32	0.15	0.63	0.46	0.07	0.40

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	263	47	82	579	41	61	132	18	21	190	38
Future Volume (vph)	36	263	47	82	579	41	61	132	18	21	190	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			0.99		0.97	1.00	
Frt	1.00	0.98		1.00	0.99			0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1757	1846		1805	1877			1788		1688	1849	
Flt Permitted	0.28	1.00		0.53	1.00			0.84		0.58	1.00	
Satd. Flow (perm)	509	1846		1006	1877			1528		1035	1849	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	38	277	49	86	609	43	64	139	19	22	200	40
RTOR Reduction (vph)	0	9	0	0	3	0	0	4	0	0	10	0
Lane Group Flow (vph)	38	318	0	86	649	0	0	218	0	22	230	0
Confl. Peds. (#/hr)	18		11	11		18	23		26	26		23
Confl. Bikes (#/hr)	13		28	28		13	16		206	206		16
Heavy Vehicles (%)	3%	1%	0%	0%	1%	0%	0%	2%	0%	5%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	41.0	41.0		41.0	41.0			23.0		23.0	23.0	
Effective Green, g (s)	42.0	42.0		42.0	42.0			24.0		24.0	24.0	
Actuated g/C Ratio	0.55	0.55		0.55	0.55			0.32		0.32	0.32	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Lane Grp Cap (vph)	281	1020		555	1037			482		326	583	
v/s Ratio Prot		0.17			c0.35						0.12	
v/s Ratio Perm	0.07			0.09				c0.14		0.02		
v/c Ratio	0.14	0.31		0.15	0.63			0.45		0.07	0.40	
Uniform Delay, d1	8.2	9.2		8.3	11.6			20.8		18.2	20.3	
Progression Factor	1.00	1.00		0.42	0.36			1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.8		0.4	2.1			3.0		0.4	2.0	
Delay (s)	9.2	10.0		3.9	6.3			23.8		18.6	22.3	
Level of Service	A	A		A	A			C		B	C	
Approach Delay (s)		9.9			6.0			23.8			22.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	38	254	157	679	296	646
v/c Ratio	0.18	0.27	0.29	0.70	0.32	0.59
Control Delay	17.5	14.1	12.5	18.8	15.4	21.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	14.1	12.5	18.8	15.4	21.8
Queue Length 50th (m)	2.9	19.4	12.1	69.1	12.6	37.3
Queue Length 95th (m)	m9.9	38.5	23.7	106.9	21.9	53.6
Internal Link Dist (m)		174.8		141.2	116.8	107.1
Turn Bay Length (m)	40.0		25.0			
Base Capacity (vph)	214	953	536	970	911	1089
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.27	0.29	0.70	0.32	0.59

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	200	34	144	604	20	40	170	63	55	452	87
Future Volume (vph)	35	200	34	144	604	20	40	170	63	55	452	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			0.93			0.99	
Flpb, ped/bikes	1.00	1.00		0.96	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	1.00			0.97			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1765	1842		1697	1888			3025			3386	
Flt Permitted	0.23	1.00		0.59	1.00			0.81			0.89	
Satd. Flow (perm)	418	1842		1045	1888			2461			3014	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	217	37	157	657	22	43	185	68	60	491	95
RTOR Reduction (vph)	0	8	0	0	1	0	0	37	0	0	18	0
Lane Group Flow (vph)	38	246	0	157	678	0	0	259	0	0	628	0
Confl. Peds. (#/hr)	16		54	54		16	45		25	25		45
Confl. Bikes (#/hr)	8		14	14		8	12		249	249		12
Heavy Vehicles (%)	3%	1%	0%	3%	1%	5%	5%	5%	5%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	10	10	0	10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	38.0	38.0		38.0	38.0			26.0			26.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0			27.0			27.0	
Actuated g/C Ratio	0.51	0.51		0.51	0.51			0.36			0.36	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lane Grp Cap (vph)	214	945		536	968			874			1070	
v/s Ratio Prot		0.13			c0.36							
v/s Ratio Perm	0.09			0.15				0.11			c0.21	
v/c Ratio	0.18	0.26		0.29	0.70			0.30			0.59	
Uniform Delay, d1	9.9	10.4		10.6	14.1			17.7			20.0	
Progression Factor	1.46	1.35		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.7	0.6		1.4	4.2			0.9			2.4	
Delay (s)	16.3	14.7		12.0	18.3			18.5			22.3	
Level of Service	B	B		B	B			B			C	
Approach Delay (s)		14.9			17.1			18.5			22.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBT	NBR
Lane Group Flow (vph)	874	427	173	183
v/c Ratio	0.51	0.27	0.38	0.42
Control Delay	10.2	14.7	22.5	16.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.2	14.7	22.5	16.3
Queue Length 50th (m)	34.0	19.1	17.4	12.3
Queue Length 95th (m)	48.5	30.3	32.3	27.7
Internal Link Dist (m)	95.4	182.7	96.8	
Turn Bay Length (m)				20.0
Base Capacity (vph)	1709	1611	542	507
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.51	0.27	0.32	0.36

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	687	59	44	315	47	91	73	174	0	0	0
Future Volume (vph)	85	687	59	44	315	47	91	73	174	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0	5.0			
Lane Util. Factor		0.95			0.95			1.00	1.00			
Frpb, ped/bikes		0.97			0.98			1.00	0.92			
Flpb, ped/bikes		0.99			0.99			0.95	1.00			
Frt		0.99			0.98			1.00	0.85			
Flt Protected		0.99			0.99			0.97	1.00			
Satd. Flow (prot)		3355			3301			1727	1483			
Flt Permitted		0.85			0.81			0.97	1.00			
Satd. Flow (perm)		2878			2700			1727	1483			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	723	62	46	332	49	96	77	183	0	0	0
RTOR Reduction (vph)	0	7	0	0	13	0	0	0	43	0	0	0
Lane Group Flow (vph)	0	867	0	0	414	0	0	173	140	0	0	0
Confl. Peds. (#/hr)	73		225	225		73	83		52	52		83
Confl. Bikes (#/hr)	5		32	32		5	59		23	23		59
Heavy Vehicles (%)	1%	1%	5%	5%	3%	2%	3%	3%	1%	0%	0%	0%
Bus Blockages (#/hr)	10	10	10	10	10	10	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm			
Protected Phases		2			6			4				
Permitted Phases	2			6			4		4			
Actuated Green, G (s)		40.4			40.4			17.6	17.6			
Effective Green, g (s)		41.4			41.4			18.6	18.6			
Actuated g/C Ratio		0.59			0.59			0.27	0.27			
Clearance Time (s)		6.0			6.0			6.0	6.0			
Vehicle Extension (s)		3.0			3.0			3.0	3.0			
Lane Grp Cap (vph)		1702			1596			458	394			
v/s Ratio Prot												
v/s Ratio Perm		c0.30			0.15			0.10	0.09			
v/c Ratio		0.51			0.26			0.38	0.35			
Uniform Delay, d1		8.4			6.9			21.0	20.8			
Progression Factor		1.00			2.00			1.00	1.00			
Incremental Delay, d2		1.1			0.3			0.5	0.6			
Delay (s)		9.5			14.1			21.5	21.4			
Level of Service		A			B			C	C			
Approach Delay (s)		9.5			14.1			21.4			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	768	533	555	517
v/c Ratio	0.77	0.60	0.39	0.62
Control Delay	19.4	28.2	10.6	22.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.4	28.2	10.6	22.0
Queue Length 50th (m)	26.9	32.6	19.5	27.4
Queue Length 95th (m)	49.6	49.6	28.9	42.6
Internal Link Dist (m)	182.7	183.2	89.2	52.7
Turn Bay Length (m)				
Base Capacity (vph)	998	895	1416	828
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	0.60	0.39	0.62

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	610	64	57	324	141	88	368	87	119	313	75
Future Volume (vph)	79	610	64	57	324	141	88	368	87	119	313	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.99			0.93			0.98			0.98	
Flpb, ped/bikes		0.99			1.00			0.99			0.99	
Frt		0.99			0.96			0.98			0.98	
Flt Protected		0.99			0.99			0.99			0.99	
Satd. Flow (prot)		3419			3146			3413			3278	
Flt Permitted		0.81			0.75			0.77			0.71	
Satd. Flow (perm)		2769			2357			2662			2356	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	622	65	58	331	144	90	376	89	121	319	77
RTOR Reduction (vph)	0	10	0	0	54	0	0	21	0	0	20	0
Lane Group Flow (vph)	0	758	0	0	479	0	0	535	0	0	497	0
Confl. Peds. (#/hr)	239		120	120		239	129		145	145		129
Confl. Bikes (#/hr)			28			66			22			23
Heavy Vehicles (%)	3%	0%	2%	2%	0%	1%	0%	0%	2%	0%	2%	4%
Bus Blockages (#/hr)	10	10	10	10	10	10	0	0	0	0	9	9
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		24.0			24.0			34.0			23.0	
Effective Green, g (s)		25.0			25.0			35.0			24.0	
Actuated g/C Ratio		0.36			0.36			0.50			0.34	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Lane Grp Cap (vph)		988			841			1416			807	
v/s Ratio Prot								c0.04				
v/s Ratio Perm		c0.27			0.20			0.15			c0.21	
v/c Ratio		0.77			0.57			0.38			0.62	
Uniform Delay, d1		19.9			18.2			10.8			19.2	
Progression Factor		0.70			1.62			1.00			1.00	
Incremental Delay, d2		5.1			2.7			0.8			3.5	
Delay (s)		19.1			32.1			11.6			22.7	
Level of Service		B			C			B			C	
Approach Delay (s)		19.1			32.1			11.6			22.7	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

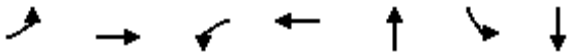
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	701	541	122	178
v/c Ratio	0.47	0.35	0.20	0.30
Control Delay	5.8	16.7	11.6	10.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.8	16.7	11.6	10.9
Queue Length 50th (m)	11.0	30.4	6.7	8.6
Queue Length 95th (m)	15.4	44.2	17.1	21.7
Internal Link Dist (m)	183.2	212.4	62.4	59.6
Turn Bay Length (m)				
Base Capacity (vph)	1499	1530	611	592
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.47	0.35	0.20	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	592	11	44	460	15	14	59	44	38	45	87
Future Volume (vph)	70	592	11	44	460	15	14	59	44	38	45	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			5.9			5.9	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.97			0.97	
Flpb, ped/bikes		0.99			1.00			1.00			0.99	
Frt		1.00			1.00			0.95			0.93	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3496			3506			1758			1699	
Flt Permitted		0.84			0.85			0.95			0.91	
Satd. Flow (perm)		2953			3009			1689			1566	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	73	617	11	46	479	16	15	61	46	40	47	91
RTOR Reduction (vph)	0	1	0	0	3	0	0	30	0	0	54	0
Lane Group Flow (vph)	0	700	0	0	538	0	0	92	0	0	124	0
Confl. Peds. (#/hr)	180		41	41		180	50		63	63		50
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	10	10	10	10	10	10	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		34.5			34.5			23.1			23.1	
Effective Green, g (s)		35.5			35.5			24.1			24.1	
Actuated g/C Ratio		0.51			0.51			0.34			0.34	
Clearance Time (s)		5.5			5.5			6.9			6.9	
Lane Grp Cap (vph)		1497			1525			581			539	
v/s Ratio Prot												
v/s Ratio Perm		c0.24			0.18			0.05			c0.08	
v/c Ratio		0.47			0.35			0.16			0.23	
Uniform Delay, d1		11.1			10.4			15.9			16.3	
Progression Factor		0.45			1.54			1.00			1.00	
Incremental Delay, d2		0.7			0.6			0.6			1.0	
Delay (s)		5.7			16.6			16.5			17.3	
Level of Service		A			B			B			B	
Approach Delay (s)		5.7			16.6			16.5			17.3	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	73	646	63	452	380	36	146
v/c Ratio	0.15	0.58	0.18	0.41	0.80	0.21	0.29
Control Delay	9.1	12.8	17.1	17.4	36.3	23.2	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.1	12.8	17.1	17.4	36.3	23.2	20.1
Queue Length 50th (m)	4.6	55.0	5.9	44.9	44.7	3.8	14.1
Queue Length 95th (m)	10.9	86.7	m14.1	70.0	72.1	10.7	26.7
Internal Link Dist (m)		172.8		175.7	92.0		75.5
Turn Bay Length (m)	20.0		15.0			20.0	
Base Capacity (vph)	493	1123	342	1107	540	193	575
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.58	0.18	0.41	0.70	0.19	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	537	38	56	363	39	40	195	103	32	108	22
Future Volume (vph)	65	537	38	56	363	39	40	195	103	32	108	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.96		1.00	0.96	
Flpb, ped/bikes	0.98	1.00		0.99	1.00			0.99		0.97	1.00	
Frt	1.00	0.99		1.00	0.99			0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1791	1893		1809	1864			1731		1647	1788	
Flt Permitted	0.44	1.00		0.30	1.00			0.94		0.35	1.00	
Satd. Flow (perm)	833	1893		579	1864			1646		614	1788	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	73	603	43	63	408	44	45	219	116	36	121	25
RTOR Reduction (vph)	0	3	0	0	4	0	0	22	0	0	10	0
Lane Group Flow (vph)	73	643	0	63	448	0	0	358	0	36	136	0
Confl. Peds. (#/hr)	24		18	18		24	37		47	47		37
Confl. Bikes (#/hr)	17		33	33		17	104		26	26		104
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	1%	1%	7%	0%	5%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	44.0	44.0		44.0	44.0			20.0		20.0	20.0	
Effective Green, g (s)	45.0	45.0		45.0	45.0			21.0		21.0	21.0	
Actuated g/C Ratio	0.59	0.59		0.59	0.59			0.28		0.28	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	493	1120		342	1103			454		169	494	
v/s Ratio Prot		c0.34			0.24						0.08	
v/s Ratio Perm	0.09			0.11				c0.22		0.06		
v/c Ratio	0.15	0.57		0.18	0.41			0.79		0.21	0.28	
Uniform Delay, d1	6.9	9.6		7.1	8.3			25.5		21.1	21.5	
Progression Factor	1.00	1.00		1.80	1.80			1.00		1.00	1.00	
Incremental Delay, d2	0.6	2.1		1.1	1.0			8.9		0.6	0.3	
Delay (s)	7.6	11.7		13.9	16.0			34.3		21.8	21.8	
Level of Service	A	B		B	B			C		C	C	
Approach Delay (s)		11.3			15.7			34.3			21.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	74	798	78	387	523	436
v/c Ratio	0.17	0.83	0.59	0.40	0.50	0.48
Control Delay	7.2	21.3	35.6	12.7	19.1	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	21.3	35.6	12.7	19.1	19.2
Queue Length 50th (m)	3.0	101.5	7.3	31.2	27.0	22.4
Queue Length 95th (m)	m5.2	#162.2	#28.3	50.0	40.8	35.2
Internal Link Dist (m)		175.7		157.1	118.9	144.5
Turn Bay Length (m)	40.0		25.0			
Base Capacity (vph)	441	965	133	964	1040	910
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.83	0.59	0.40	0.50	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	722	60	76	352	27	57	342	114	70	276	81
Future Volume (vph)	73	722	60	76	352	27	57	342	114	70	276	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.97			0.94	
Flpb, ped/bikes	0.97	1.00		1.00	1.00			0.99			0.99	
Frt	1.00	0.99		1.00	0.99			0.97			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1766	1873		1825	1872			3303			3171	
Flt Permitted	0.46	1.00		0.14	1.00			0.85			0.78	
Satd. Flow (perm)	860	1873		261	1872			2830			2488	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	74	737	61	78	359	28	58	349	116	71	282	83
RTOR Reduction (vph)	0	4	0	0	4	0	0	35	0	0	27	0
Lane Group Flow (vph)	74	794	0	78	383	0	0	488	0	0	409	0
Confl. Peds. (#/hr)	56		40	40		56	71		58	58		71
Confl. Bikes (#/hr)	15		7	7		15	226		26	26		226
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	4%	0%	1%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	9	9	0	9	9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	38.0	38.0		38.0	38.0			26.0			26.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0			27.0			27.0	
Actuated g/C Ratio	0.51	0.51		0.51	0.51			0.36			0.36	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lane Grp Cap (vph)	441	961		133	960			1005			883	
v/s Ratio Prot		c0.42			0.20							
v/s Ratio Perm	0.09			0.30				c0.17			0.16	
v/c Ratio	0.17	0.83		0.59	0.40			0.49			0.46	
Uniform Delay, d1	9.9	15.6		12.9	11.3			19.1			18.9	
Progression Factor	0.62	0.83		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.7	7.2		17.5	1.2			1.7			1.7	
Delay (s)	6.9	20.2		30.4	12.6			20.8			20.7	
Level of Service	A	C		C	B			C			C	
Approach Delay (s)		19.0			15.6			20.8			20.7	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	106.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

AECOM Imagine it. Delivered.

Appendix F

Multi-Modal Level of Service Results

Multi-Modal Level of Service - Intersections Form

Consultant	AECOM	**Project**	OL Early Works - LSEJC
Scenario	MMLOS Assessment - Existing Conditions (2020) - AM Peak	**Date**	22/06/2020

INTERSECTIONS		Gerrard Street / Logan Avenue				Gerrard Street / Carlaw Avenue				Gerrard Street / Pape Avenue				Dundas Street / Logan Avenue				Dundas Street / Carlaw Avenue			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	3	4	4	4	4	4	4	0 - 2	0 - 2	4	4	3	0 - 2	3	3	4	4	3	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	No left turn / Prohib.	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	**85**	**73**	**64**	**64**	**56**	**56**	**56**	**56**	**88**	**88**	**56**	**56**	**73**	**88**	**73**	**73**	**56**	**56**	**73**	**73**
	Ped. Exposure to Traffic LoS	**B**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**B**	**B**	**D**	**D**	**C**	**B**	**C**	**C**	**D**	**D**	**C**	**C**
	Cycle Length	70	70	70	70	70	70	70	70	70	70	70	70	76	76	76	76	76	76	76	76
	Effective Walk Time	23	23	8	8	17	17	11	11	21	21	8	8	25	25	8	8	25	25	8	8
	Average Pedestrian Delay	**16**	**16**	**27**	**27**	**20**	**20**	**25**	**25**	**17**	**17**	**27**	**27**	**17**	**17**	**30**	**30**	**17**	**17**	**30**	**30**
	Pedestrian Delay LoS	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**B**	**B**	**C**	**C**	**B**	**B**	**D**	**D**	**B**	**B**	**D**	**D**
	Level of Service	**B**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**B**	**B**	**D**	**D**	**C**	**B**	**D**	**D**	**D**	**D**	**D**	**D**
		C				**D**				**D**				**D**				**D**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach		Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>		≤ 50 m Introduced right turn lane																		
	Dedicated Right Turning Speed		≤ 25 km/h																		
	Cyclist Through Movement	**-**	**B**											**Not Applicable**		**Not Applicable**	**Not Applicable**			**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**-**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**
	Left Turn Approach		No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	1 lane crossed	No lane crossed	No lane crossed	2-stage, LT box	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed		≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≤ 40 km/h	≤ 40 km/h
	Left Turning Cyclist	**-**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**A**	**B**	**B**	**B**	**B**
	Level of Service	**-**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**A**	**B**	**B**	**B**	**B**
		B				**B**				**B**				**B**				**B**			
Transit	Average Signal Delay			≤ 10 sec	≤ 10 sec	≤ 20 sec	≤ 20 sec	≤ 20 sec	≤ 20 sec			≤ 10 sec	≤ 20 sec					≤ 30 sec	≤ 20 sec		
	Level of Service	**-**	**-**	**B**	**B**	**C**	**C**	**C**	**C**	**-**	**-**	**B**	**C**	**-**	**-**	**-**	**-**	**D**	**C**	**-**	**-**
		B				**C**				**C**				**-**				**D**			

Multi-Modal Level of Service - Intersections Form

Consultant	AECOM	**Project**	OL Early Works - LSEJC
Scenario	MMLOS Assessment - Existing Conditions (2020) - PM Peak	**Date**	22/06/2020

	INTERSECTIONS	Gerrard Street / Logan Avenue				Gerrard Street / Carlaw Avenue				Gerrard Street / Pape Avenue				Dundas Street / Logan Avenue				Dundas Street / Carlaw Avenue			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	3	4	4	4	4	4	4	0 - 2	0 - 2	4	4	3	0 - 2	3	3	4	4	3	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	No left turn / Prohib.	Permissive	Permissive	Permissive	Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	**85**	**73**	**64**	**64**	**56**	**56**	**56**	**56**	**88**	**88**	**56**	**56**	**73**	**88**	**73**	**73**	**56**	**56**	**73**	**73**
	Ped. Exposure to Traffic LoS	**B**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**B**	**B**	**D**	**D**	**C**	**B**	**C**	**C**	**D**	**D**	**C**	**C**
	Cycle Length	70	70	70	70	70	70	70	70	70	70	70	70	76	76	76	76	76	76	76	76
	Effective Walk Time	23	23	8	8	9	9	19	8	21	21	8	8	25	25	8	8	25	25	8	8
	Average Pedestrian Delay	**16**	**16**	**27**	**27**	**27**	**27**	**19**	**27**	**17**	**17**	**27**	**27**	**17**	**17**	**30**	**30**	**17**	**17**	**30**	**30**
	Pedestrian Delay LoS	**B**	**B**	**C**	**C**	**C**	**C**	**B**	**C**	**B**	**B**	**C**	**C**	**B**	**B**	**D**	**D**	**B**	**B**	**D**	**D**
	Level of Service	**B**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**B**	**B**	**D**	**D**	**C**	**B**	**D**	**D**	**D**	**D**	**D**	**D**
		C				**D**				**D**				**D**				**D**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach		Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>		≤ 50 m Introduced right turn lane																		
	Dedicated Right Turning Speed		≤ 25 km/h																		
	Cyclist Through Movement	-	B											Not Applicable		Not Applicable	Not Applicable			Not Applicable	Not Applicable
	Separated or Mixed Traffic	-	Separated	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated	Mixed Traffic	Separated	Separated	Mixed Traffic	Mixed Traffic	Separated	Separated
	Left Turn Approach		No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	1 lane crossed	No lane crossed	No lane crossed	2-stage, LT box	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed		≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≤ 40 km/h	≤ 40 km/h
	Left Turning Cyclist	-	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
	Level of Service	-	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B
		B				**B**				**B**				**B**				**B**			
Transit	Average Signal Delay			≤ 20 sec	≤ 10 sec	≤ 30 sec	≤ 20 sec	≤ 40 sec	≤ 20 sec			≤ 20 sec	≤ 10 sec					≤ 30 sec	≤ 30 sec		
	Level of Service	-	-	C	B	D	C	E	C	-	-	C	B	-	-	-	-	D	D	-	-
		C				**E**				**C**				**-**				**D**			

Multi-Modal Level of Service - Segments Form

Consultant	**AECOM**
Scenario	**MMLOS Assessment - Existing Conditions (2020)**

SEGMENTS		**Gerrard St**	Section Logan Ave to Pape Ave
Pedestrian	Sidewalk Width	**E**	1.5 m
	Boulevard Width		< 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000
	Operating Speed		> 30 to 50 km/h
	On-Street Parking		no
	Exposure to Traffic PLoS		**E**
	Level of Service		**E**
Bicycle	Type of Cycling Facility	**D**	Mixed Traffic
	Number of Travel Lanes		4-5 lanes total
	Operating Speed		≤ 40 km/h
	# of Lanes & Operating Speed LoS		**D**
	Bike Lane (+ Parking Lane) Width		
	Bike Lane Width LoS		-
	Bike Lane Blockages		
	Blockage LoS		-
	Median Refuge Width (no median = < 1.8 m)		
	No. of Lanes at Unsignalized Crossing		
	Sidestreet Operating Speed		
	Unsignalized Crossing - Lowest LoS		-
	Level of Service		**-**
Transit	Facility Type	**D**	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8
	Level of Service		**D**

Multi-Modal Level of Service - Segments Form

Consultant	**AECOM**
Scenario	**MMLOS Assessment - Existing Conditions (2020)**

SEGMENTS		**Dundas St**	Section Logan Ave to Carlaw Ave
Pedestrian	Sidewalk Width	**E**	1.5 m
	Boulevard Width		< 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000
	Operating Speed		> 30 to 50 km/h
	On-Street Parking		no
	Exposure to Traffic PLoS		**E**
	Level of Service		**E**
Bicycle	Type of Cycling Facility	**B**	Curbside Bike Lane
	Number of Travel Lanes		≤ 1 each direction
	Operating Speed		≤ 50 km/h
	# of Lanes & Operating Speed LoS		**A**
	Bike Lane (+ Parking Lane) Width		≥1.5 to <1.8 m
	Bike Lane Width LoS		**B**
	Bike Lane Blockages		Rare
	Blockage LoS		**A**
	Median Refuge Width (no median = < 1.8 m)		
	No. of Lanes at Unsignalized Crossing		
	Sidestreet Operating Speed		
	Unsignalized Crossing - Lowest LoS		**-**
	Level of Service		**-**
Transit	Facility Type	**-**	
	Friction or Ratio Transit:Posted Speed		
	Level of Service		**-**

Multi-Modal Level of Service - Segments Form

Consultant	**AECOM**
Scenario	**MMLOS Assessment - Existing Conditions (2020)**

SEGMENTS		Queen St	Section Boulton Ave to Empire Ave
Pedestrian	Sidewalk Width	B	1.8 m
	Boulevard Width		0.5 - 2 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000
	Operating Speed		> 30 to 50 km/h
	On-Street Parking		yes
	Exposure to Traffic PLoS		**B**
	Level of Service		**B**
Bicycle	Type of Cycling Facility	D	Mixed Traffic
	Number of Travel Lanes		4-5 lanes total
	Operating Speed		≤ 40 km/h
	# of Lanes & Operating Speed LoS		**D**
	Bike Lane (+ Parking Lane) Width		
	Bike Lane Width LoS		-
	Bike Lane Blockages		
	Blockage LoS		-
	Median Refuge Width (no median = < 1.8 m)		
	No. of Lanes at Unsignalized Crossing		
	Sidestreet Operating Speed		
	Unsignalized Crossing - Lowest LoS		-
	Level of Service		-
Transit	Facility Type	D	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8
	Level of Service		**D**

Multi-Modal Level of Service - Segments Form

Consultant	**AECOM**
Scenario	**MMLOS Assessment - Existing Conditions (2020)**

SEGMENTS		**Eastern Ave**	Section Lewis St to Dibble St
Pedestrian	Sidewalk Width	**D**	1.5 m
	Boulevard Width		< 0.5 m
	Avg Daily Curb Lane Traffic Volume		> 3000
	Operating Speed		≤ 30 km/h
	On-Street Parking		no
	Exposure to Traffic PLoS		**D**
	Level of Service		**D**
Bicycle	Type of Cycling Facility	**D**	Mixed Traffic
	Number of Travel Lanes		4-5 lanes total
	Operating Speed		≤ 40 km/h
	# of Lanes & Operating Speed LoS		**D**
	Bike Lane (+ Parking Lane) Width		
	Bike Lane Width LoS		-
	Bike Lane Blockages		
	Blockage LoS		-
	Median Refuge Width (no median = < 1.8 m)		
	No. of Lanes at Unsignalized Crossing		
	Sidestreet Operating Speed		
	Unsignalized Crossing - Lowest LoS		-
	Level of Service		**-**
Transit	Facility Type	**D**	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8
	Level of Service		**D**

Multi-Modal Level of Service - Segments Form

Consultant	**AECOM**
Scenario	**MMLOS Assessment - Existing Conditions (2020)**

SEGMENTS		**Logan Ave**	Section Gerrard St to Dundas St
Pedestrian	Sidewalk Width	**E**	1.5 m
	Boulevard Width		< 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000
	Operating Speed		> 30 to 50 km/h
	On-Street Parking		yes
	Exposure to Traffic PLoS		**E**
	Level of Service		**E**
Bicycle	Type of Cycling Facility	**B**	Parking beside Bike Lane
	Number of Travel Lanes		1 each direction
	Operating Speed		≤ 40 km/h
	# of Lanes & Operating Speed LoS		**A**
	Bike Lane (+ Parking Lane) Width		4.25 m biking + parking width
	Bike Lane Width LoS		**B**
	Bike Lane Blockages		Rare
	Blockage LoS		**A**
	Median Refuge Width (no median = < 1.8 m)		
	No. of Lanes at Unsignalized Crossing		
	Sidestreet Operating Speed		
	Unsignalized Crossing - Lowest LoS		**-**
	Level of Service		**-**
Transit	Facility Type	**-**	
	Friction or Ratio Transit:Posted Speed		
	Level of Service		**-**

Multi-Modal Level of Service - Segments Form

Consultant	**AECOM**
Scenario	**MMLOS Assessment - Existing Conditions (2020)**

SEGMENTS		**Carlaw Ave**	Section Gerrard St to Dundas St
Pedestrian	Sidewalk Width	**E**	1.5 m
	Boulevard Width		< 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000
	Operating Speed		> 30 to 50 km/h
	On-Street Parking		no
	Exposure to Traffic PLoS		**E**
	Level of Service		**E**
Bicycle	Type of Cycling Facility	**E**	Mixed Traffic
	Number of Travel Lanes		4-5 lanes total
	Operating Speed		>40 to <50 km/h
	# of Lanes & Operating Speed LoS		**E**
	Bike Lane (+ Parking Lane) Width		
	Bike Lane Width LoS		-
	Bike Lane Blockages		
	Blockage LoS		-
	Median Refuge Width (no median = < 1.8 m)		
	No. of Lanes at Unsignalized Crossing		
	Sidestreet Operating Speed		
	Unsignalized Crossing - Lowest LoS		-
	Level of Service		**-**
Transit	Facility Type	**D**	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8
	Level of Service		**D**