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37 Years

East LeBreton Flats
301 Lett Street

Transportation Impact Study

Engineering excellence. Planning precision. Inspired landscapes.

East LeBreton Flats – Phase 1
301 Lett Street

Transportation Impact Study

Prepared for:

Claridge Homes

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

October 2017
Revised January 2020
Revised June 2020

Novatech File: 116042
Ref No. R-2016-054

June 5th, 2020

City of Ottawa
Planning and Growth Management Branch
110 Laurier Ave. W., 4th Floor,
Ottawa, Ontario K1P 1J1

Attention: Wally Dubyk
Project Manager, Infrastructure Approvals

Dear Sir:

Reference: East LeBreton Flats Development – Phase 1
Transportation Impact Study
Our File No. : 116042

A TIS dated October 2017 was prepared in support of Zoning By-law Amendment and Official Plan Amendment applications for the East LeBreton Flats lands. A supplementary addendum dated May 2018 was prepared to review the impact of Phase 1 only. Following approval, Claridge has altered its Phase 1 to Buildings C and D located between Lett Street and Lloyd Street. A revised TIS was prepared, dated January 2020, in support of a Zoning By-law Amendment application for the revisions to Phase 1.

This revised TIS has been prepared in support of a Site Plan Control application for the revised Phase 1 of the East LeBreton Flats lands. This TIS provides supplementary detail on the proposed development, compared to the TIS prepared in January 2020 in support of Zoning By-law Amendment.

A PDF version of this report and copies of the electronic software files are provided on the enclosed disk. Please call if you have any questions as you complete your review.

Yours truly,

NOVATECH

B. Byvelds

Brad Byvelds, P. Eng.
Project Coordinator | Transportation/Traffic

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering ☑ or transportation planning ☐.

[1,2] License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

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Planning and Growth Management
110 Laurier Avenue West, 4th fl.
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Dated at Ottawa (City) this 5th day of June, 2020 .

Name: Brad Byvelds
(Please Print)

Professional Title: P. Eng. - Project Coordinator

B. Byvelds

Signature of Individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)	
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EXECUTIVE SUMMARY

A Transportation Impact Study (TIS) dated October 2017 was prepared in support of Zoning By-law Amendment and Official Plan Amendment applications for the East LeBreton Flats lands. A supplementary addendum dated May 2018 was prepared to review the impacts of Phase 1 only. Following approval, Claridge has altered its Phase 1 to the Buildings C and D located between Lett Street and Lloyd Street. A revised TIS was prepared, dated January 2020, in support of a Zoning By-law Amendment application for the revisions to Phase 1.

This revised TIS has been prepared in support of a Site Plan Control application for the revised Phase 1 of the East LeBreton Flats lands. The overall East LeBreton Flats lands will be accessed through the Booth Street/Fleet Street and Wellington Street/Lett Street intersections

The previously approved Phase 1 of the development consisted of 350 residential units, a 21,500ft^2 food store and 43,000ft^2 of institutional development. The new Phase 1 development consists of 276 condominium units and a 4,100ft^2 daycare in Building C and 319 rental apartments and a 3,875ft^2 ground floor commercial unit in Building D. The estimated completion date of the proposed development is 2023.

The study area for this report includes the following intersections:

- Wellington Street/Sir John A MacDonald Parkway/Booth Street;
- Wellington Street/Lett Street;
- Wellington Street/Portage Bridge;
- Booth Street/Fleet Street;
- Booth Street/Albert Street.

The time periods for the analysis are the weekday AM and PM peak hours, as they represent the 'worst case' combination of site generated traffic and adjacent street traffic. Existing traffic conditions within the study area have been examined, along with background and total traffic conditions for the 2023 build-out and 2028 horizon years.

The main conclusions and recommendations of this report are:

Development Design and Parking

- The overall East LeBreton Flats lands will be accessed through the Booth Street/Fleet Street and Wellington Street/Lett Street intersections. Parking for the development will be underground with access to Lloyd Street. The recently completed Confederation Line construction has developed a median along Booth Street, restricting the Fleet Street intersection to right-in right-out. The Wellington Street/Lett Street intersection will remain signalized.
- Pedestrian and cycling facilities will be provided between the main building entrances and the sidewalks and cycling facilities along the adjacent roadways. Bicycle parking will be provided in accordance with the City's Zoning By-Law.
- Phase 1 of the proposed development is within a walking distance of approximately 400m of the Pimisi LRT station. This LRT station provides comprehensive transit coverage across the City of Ottawa.
- All required TDM-supportive design and infrastructure measures in the TDM checklist are met.

- The proposed development will provide a total of 340 vehicle parking spaces, adhering to the requirements of the City's ZBL.
- The proposed development will provide a total of 330 bicycle parking spaces, adhering to the requirements of the ZBL.

Boundary Street MMLOS

- PLOS (Target 'A'):
  - Fleet Street and Lett Street (North-South) achieve the target PLOS 'A'.
  - With no existing sidewalk, Lloyd Street and Lett Street (East-West) are PLOS 'F'.
- BLOS (Target 'D'):
  - Each boundary roadway achieves a BLOS 'B', surpassing the target.
- TLOS and TkLOS
  - Not applicable as Boundary streets are not bus or truck routes.
- AutoLOS (Target 'E')
  - Each boundary roadway achieves an Auto LOS 'A', surpassing the target.
- The approved design for the boundary roadways will provide new pedestrian facilities along the boundary roadways, achieving the target PLOS 'A'.

Access Intersections Design, TDM, Neighbourhood Traffic Management, and Transit

- The width and location of the proposed underground parking ramp adhere to the requirements of the City's Zoning By-law and Private Approach By-law.
- A maximum grade of 6% is provided for a distance of 8.4m from the back of sidewalk, and vehicles exiting the ramp will have appropriate sight lines to the sidewalk and roadway. A waiver to the City's Private Approach By-law is recommended.
- The proposed development conforms to the City's Transportation Demand Management initiatives by providing easy access to the local pedestrian, bicycle and transit systems. To encourage travel by sustainable modes, the proponent agrees to unbundle parking cost from the purchase price/monthly rent.
- As the only accesses to the subject lands are provided on Booth Street and Wellington Street, which are classified as arterial roadways in the City's 2013 TMP, the proposed development is not anticipated to have any measurable impact on the residential communities in the site's vicinity.
- Traffic volumes along Lett Street and Lloyd Street, south of Fleet Street are not anticipated to exceed Area Traffic Management thresholds for local roadways. However, it is noted that the previously approved design for these roadways include roadway narrowings at the Fleet Street intersections.
- With the Confederation LRT Line and several bus routes (#61, 63, 65, 75, and 85) within 400m of the site, the additional transit trips generated by the site are not anticipated to have a significant impact on the operations of OC Transpo.

Intersection MMLOS Analysis

- None of the signalized intersections within the study area meet the target PLOS and BLOS.
- All of the study area intersections are not located along a Transit Priority Corridor and do not have a target TLOS in the MMLOS Guidelines.
- All intersections within the study area meet the target TkLOS.
- The Sir John A Macdonald Parkway/Wellington Street/Booth Street and Albert Street/Booth Street intersections do not meet the target Auto LOS.
- Wellington Street/Portage Bridge intersection: This is not a standard configuration and the results of the PLOS and BLOS analysis should be treated with caution. The pedestrian and cycling facilities are anticipated to have a higher PLOS and BLOS than represented by the

analysis. Critical movements at this intersection are currently operating with a vehicle LOS E during the PM peak hour.

- Wellington Street/Sir John A MacDonald Parkway/Booth Street intersection: The City could consider providing either textured or zebra striped crosswalks to improve the pedestrian level of comfort crossing each approach. Consideration could also be given to implementing a two stage, left-turn bike box to facilitate the southbound left turn movement for cyclists at this intersection. Critical movements at this intersection are currently operating with a vehicle LOS F during the PM peak hour.
- Wellington Street/Lett Street intersection: The City could consider implementing leading pedestrian intervals and a jug handle to facilitate the westbound left turn movement for cyclists.
- Albert Street/Booth Street intersection: The PLOS is highly influenced by the number of lanes crossed (7 lanes) along Albert Street. A further reduction in east-west travel lanes (beyond the repurposed transit lanes) is anticipated to have a significant impact on the vehicle operations at this intersection and is not recommended. Leading pedestrian intervals and zebra striped crosswalks are already in place and provide a higher level of comfort and safety for pedestrians crossing Albert Street. Critical movements at this intersection are currently operating with a vehicle LOS F during the PM peak hour.

Future Intersection Operations

- Under the 2023 and 2028 background and total traffic conditions, critical movements at the Wellington Street/Sir John A MacDonald Parkway/Booth Street and Albert Street/Booth Street intersections are anticipated to operate with LOS F during the AM and PM peak hours.
- Continued support of transportation solutions that maximize the transit, bike and pedestrian modes of travel will be critical in this area. Options to displace traffic along the study area roads include increased use of non-auto modes of transportation to/from the downtown core, alternate time of travel for drivers using the corridor to make use of off-peak capacity and alternate routes for travel to/from the downtown core.
- Acceptable operating conditions are anticipated at the Albert Street / Booth Street intersection in the AM and PM peak hours if dual eastbound left turn lanes are implemented by the City, post LRT.

1.0 INTRODUCTION

A Transportation Impact Study (TIS) dated October 2017 was prepared in support of Zoning By-law Amendment and Official Plan Amendment applications for the East LeBreton Flats lands. A supplementary addendum dated May 2018 was prepared to review the impacts of Phase 1 only. Following approval, Claridge has altered its Phase 1 to the Buildings C and D located between Lett Street and Lloyd Street. A revised TIS was prepared, dated January 2020, in support of a Zoning By-law Amendment application for the revisions to Phase 1.

This revised TIS has been prepared in support of a Site Plan Control application for the revised Phase 1 of the East LeBreton Flats lands. The overall East LeBreton Flats lands will be accessed through the Booth Street/Fleet Street and Wellington Street/Lett Street intersections, consistent with the Block Subdivision Plan, which can be found in **Appendix A**. An aerial photo of the East LeBreton Flats lands is shown in **Figure 1**.

Figure 1: Aerial Photo of the East LeBreton Flats Lands

Phase 1 of East LeBreton Flats lands are currently zoned MD[2504] S386-h and are currently vacant. The subject site is bounded by the following:

- To the north, Fleet Street and parkland;
- To the south, Lett Street and future residential development;
- To the east, Lett Street and existing residential development;
- To the west, Lloyd Street and future mixed-use development.

1.1 Proposed Development

The previously approved Phase 1 of the development consisted of 350 residential units, a 21,500ft^2 food store and 43,000ft^2 of institutional development. The new Phase 1 development consists of 276 condominium units and a 4,100ft^2 daycare in Building C and 319 rental apartments and a 3,875ft^2

ground floor commercial unit in Building D. A copy of the proposed site plan is included in **Appendix B**. The estimated completion date of the proposed development is 2023.

2.0 EXISTING CONDITIONS

2.1 Roadway Facilities

Wellington Street
Wellington Street is an arterial roadway that runs on an east-west alignment between Booth Street and Elgin Street. Map 7 in the City of Ottawa's 2013 TMP identifies Wellington Street in the vicinity of the Portage Bridge a "Federally Owned Roadway". It has a four-lane divided urban cross section, transitioning to a six-lane divided urban cross section near the Portage Bridge, and a regulatory speed limit of 50km/hr within the study area.

Sir John A MacDonald Parkway
The Sir John A MacDonald Parkway is a federally owned roadway that runs on an east-west alignment between Carling Avenue and Booth Street. It is classified as an arterial roadway between Vimy Place and Booth Street. It has a four-lane divided urban cross section and a regulatory speed limit of 50km/hr within the study area.

Albert Street
Albert Street is an arterial roadway that runs on an east-west alignment between Bayview Road and the Mackenzie King Bridge. Albert Street has a five-lane undivided urban cross-section and a regulatory speed limit of 50km/hr within the study area. It contains one transit lane in each direction, two westbound lanes for general traffic and one eastbound lane for general traffic. Albert Street is a truck route allowing full-loads.

Booth Street
Booth Street runs on a north-south alignment and is classified as an arterial roadway between the Chaudière Bridge and Albert Street. Booth Street south of Albert Street is classified as a major collector and has a two-lane undivided urban cross section with a regulatory speed limit of 50km/hr. Traffic calming measures (on-street parking, curb extensions and speed humps) have been implemented along Booth Street south of Albert Street. Booth Street between Albert Street and Wellington Street has two travel lanes in either direction, with raised concrete medians on the intersection approaches. Booth Street north of Albert Street is a truck route with load restrictions.

Portage Bridge
The Portage Bridge is a federally owned bridge connecting the provinces of Ontario and Quebec. The Portage Bridge runs on a north south alignment between Wellington Street (Ontario) and Rue Laurier (Quebec). It has a six-lane divided urban cross section and a regulatory speed limit of 50km/hr.

Lett Street and Fleet Street
Lett Street and Fleet Street are local roadways providing access to the overall East LeBreton Flats lands. Lett Street and Fleet Street have two lane undivided urban cross sections and a regulatory speed limit of 50km/hr.

2.2 Study Area Intersections

The existing lane configurations at the study area intersections are described below.

Wellington Street/Sir John A MacDonald Parkway/Booth Street

- Northbound one through lane, one shared through/right turn lane, and a buses only left turn lane
- Southbound – two through lanes, a left turn lane and a right turn lane
- Eastbound – two through lanes
- Westbound – one through lane and one shared through/right turn lane
- The eastbound left/right turn movements as well as the northbound and westbound left turn movements are restricted

Wellington Street/Lett Street

- Eastbound (Wellington Street) – one through lane and one shared through/right turn lane
- Westbound – two through lanes and a left turn lane
- Northbound – one shared left/right turn lane

Wellington Street/Portage Bridge

- Eastbound – three through/right turn lanes and dual left turn lanes
- Westbound – two through/left turn lanes and three right turn lanes
- Southbound – three left turn lanes and one right turn lane with smart channel

Booth Street/Fleet Street

- Northbound – one through lane and one shared through/right turn lane
- Southbound – two through lanes
- Westbound – One right turn lane

Albert Street/Booth Street

- Northbound – one shared through/left turn lane and one shared through/right turn lane
- Southbound – one through lane, one left turn lane and one right turn lane
- Eastbound – one through lane, one transit lane and one left turn lane. The transit lane functions as a right turn lane on this approach
- Westbound – two through lanes, one transit lane, one left turn lane and one right turn lane
- Right turn on red prohibitions are in place on the westbound and southbound approaches from 7:00AM to 9:00PM on weekdays
- The westbound left turn movement is prohibited between 7:00AM to 9:00AM and 3:30PM to 5:30PM on weekdays
- The southbound through movement is prohibited between 11:00PM to 6:00AM

2.3 Driveways

There are three existing driveways accessing the boundary streets that surround the site:

1. One driveway at Lloyd Street for a surface parking lot; and,
2, 3. Two driveways at Lett Street accessing underground parking for 300 Lett Street.

2.4 Pedestrian and Cycling Facilities

Sidewalks are currently provided on both sides of Wellington Street, Sir John A MacDonald Parkway, Booth Street, the south side of Albert Street, the east side of Lett Street, and the north side of Fleet Street. Fleet Street, east of Lett Street, connects to Pooley's Bridge/Commissioner Street. A multi-use pathway is also provided on the north side of Albert Street.

A multi-use pathway network is currently provided just east of the existing residential development east of Lett Street. This multi-use pathway network provides connections from Fleet Street/Pooley's Bridge to Wellington Street and the Trans Canada Trail.

Booth Street, Sir John A MacDonald Parkway, Wellington Street and Albert Street are classified as Spine Cycling Routes in the City's Ultimate Cycling Network. A physically separated bike lane (westbound) and a standard bicycle lane (eastbound) are currently provided along Wellington Street east of the Portage Bridge. A segregated two-way cycle track is provided along the east side of Portage Bridge. A multi-use pathway is provided on the north side of Albert Street. Cycle tracks are provided along Booth Street between Wellington Street and Albert Street.

2.5 Area Traffic Management

Currently, there are no existing Area Traffic Management (ATM) measures within the study area.

2.6 Transit Facilities

An excerpt from OC Transpo's system map for the study area is included in **Appendix C**. This report describes all existing transit facilities within a five-minute walk of the subject site, which equates to a walking distance of approximately 400m.

The Pimisi Light Rail Transit (LRT) station is located a walking distance of approximately 300m from the subject site. The Pimisi LRT station serves O-Train Route 1, which runs on an east-west alignment between the Tunneys Pasture LRT Station and the Blair LRT Station. O-Train Route 1 runs on three-minute headways during peak periods.

OC Transpo bus stops #1877 and #1876 are located along Booth Street, south of Wellington Street/Sir John A MacDonald Parkway. These bus stops provide service to the OC Transpo routes 61, 63, 66, 75, and 85, which provide interprovincial transit service.

OC Transpo Routes 61, 63, and 75 travel between the Gatineau and the Goulbourn Recreation Complex (Stittsville), Briarbrook (Kanata North), and the Minto Recreation Complex (Nepean South) respectively. These routes are classified as 'Rapid' routes that provide station to station bus service seven days a week during all time periods.

OC Transpo Route 66 travels between Solandt Road (Kanata North) and Gatineau. This route is classified as a 'Local' route and provides peak period service on weekdays.

OC Transpo Route 85 travels between the Bayshore Transit and Gatineau. This route is classified as a 'Frequent' route and provides all day service, seven days a week. On weekdays, this route operates every 15 minutes or less.

2.7 Traffic Volumes

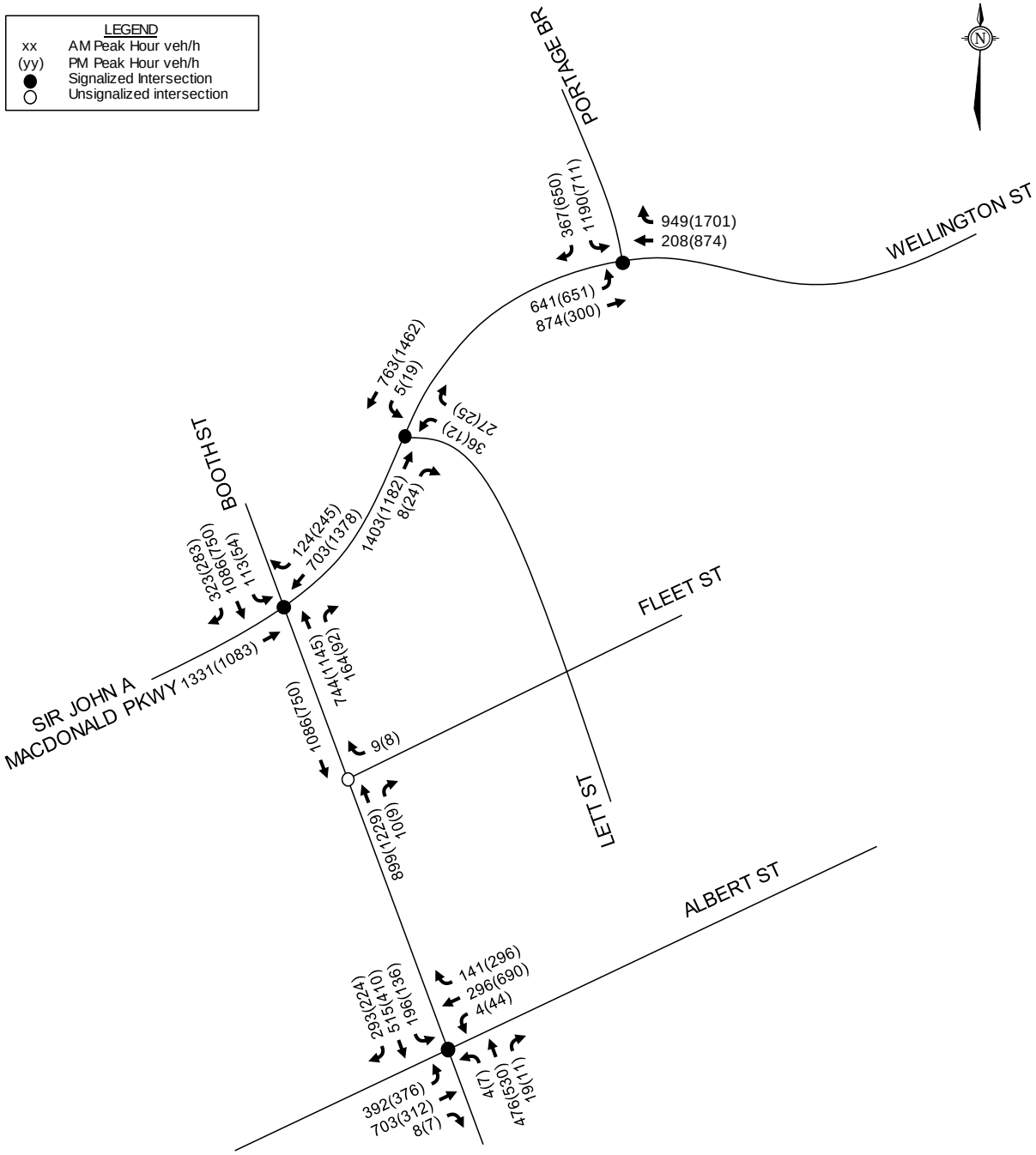
Weekday traffic counts completed by the City of Ottawa were used to determine the existing vehicle, pedestrian, and cyclist traffic volumes at the following study area intersections:

- Wellington Street /Sir John A MacDonald Parkway/Booth Street – June 8, 2017
- Wellington Street/Lett Street – August 31, 2016
- Wellington Street/Portage Bridge – March 23, 2016
- Booth Street/Albert Street – June 8, 2017

The traffic volumes using the Booth Street/Fleet Street intersection have been estimated using the traffic volumes presented in the 300 Lett Street Transportation Brief (dated April 2011).

Peak hour summary sheets for the above traffic counts and an excerpt from the 300 Lett Street Transportation Brief are included in **Appendix D**. Existing weekday AM and PM peak hour traffic volumes at the study area intersections are shown in **Figure 2**.

Figure 2: Existing Traffic Volumes



2.8 Collision Records

Historical collision data for the last five years was obtained from the City's Public Works and Service Department for all study area intersections and roadways. Copies of the collision summary reports are included in **Appendix E**.

Table 1 summarizes the number of collisions reported at each intersection and roadway segment from January 1st, 2014 to December 31st, 2018.

Table 1: Reported Collisions

Intersection / Street Segment	Number of Reported Collisions
Wellington Street / Sir John A MacDonald Parkway / Booth Street	60
Booth Street / Albert Street	51
Wellington Street / Portage Bridge	29
Wellington Street / Lett Street	9
Booth Street / Fleet Street	2

Wellington Street/Sir John A MacDonald Parkway/Booth Street
A total of 60 collisions were reported at the Wellington Street/Sir John A MacDonald Parkway/Booth Street intersection over the last five years. Twenty-five of the collisions were rear-end impacts, 14 were sideswipe impacts, 12 were turning movement impacts, five were angle impacts, and four were single vehicle/other impacts. Ten of the collisions resulted in personal injuries, but none were fatal. One of the collisions involved a pedestrian and one involved a cyclist.

Ten of the rear-end impacts involved eastbound vehicles, seven involved westbound vehicles, six involved northbound vehicles, and two involved southbound vehicles. Eight of the rear-end impacts occurred under poor surface/environmental conditions.

Five of the sideswipe impacts involved southbound vehicles, four involved eastbound vehicles, three involved westbound vehicles, and two involved northbound vehicles. Three of the sideswipe impacts occurred under poor surface conditions.

Three of the turning movement impacts involved eastbound left turning vehicles, two involved northbound left turning vehicles, two involved northbound right turning vehicles, two involved southbound left turning vehicles, two involved westbound right turning vehicles, and one involved a westbound left turning vehicle. Three of the turning movement impacts occurred under poor surface conditions.

It is noteworthy that a detour was in place from 2014 to 2016 to accommodate the closure of Booth Street for Confederation Line Light Rail Transit (LRT) construction. This detour reconfigured the intersection to include eastbound dual left turn lanes and converted the southbound lanes into dual right turn lanes. This detour significantly changed the traffic flow at this intersection and may have had an impact on the collision history.

Booth Street/Albert Street

A total of 51 collisions were reported at the Booth Street/Albert Street intersection over the last five years. Eighteen of the collisions were rear-end impacts, 14 were turning movement impacts, 10 were angle impacts, six were sideswipe impacts, and three were single vehicle/other impacts. Twelve of the collisions caused personal injuries, but none were fatal. Four of the collisions involved cyclists, but none involved pedestrians.

Eight of the rear-end impacts involved westbound vehicles, five involved southbound vehicles, three involved eastbound vehicles, and two involved northbound vehicles. Six of the rear-end impacts occurred under poor surface conditions.

Five of the turning movement impacts involved eastbound left turning vehicles, four involved southbound left turning vehicles, two involved eastbound right turning vehicles, two involved westbound right turning vehicles, and one involved a northbound right turning vehicle. Three of the turning movement impacts occurred under poor surface conditions.

Four of the angle impacts involved southbound and westbound vehicles, three involved northbound and westbound vehicles, two involved northbound and eastbound vehicles, and one involved a southbound and eastbound vehicle. Four of the angle impacts occurred under poor surface conditions.

It is noteworthy that the northern leg of this intersection was closed from 2014 to 2016 for the construction of the Confederation Line. The changes implemented as part of the Confederation Line construction are expected to have a positive effect on the safety of this intersection, and by extension, the number and types of collisions that will be observed in years to come. As such, Novatech have not identified any potential mitigation measures at this intersection, since the conditions that may have warranted mitigation measures will be addressed by the reconstruction.

Wellington Street/Portage Bridge

A total of 29 collisions were reported at the Wellington Street/Portage Bridge intersection over the last five years. Fourteen of the collisions were rear-end impacts, seven were single vehicle/other impacts, six were sideswipe impacts, and two were angle impacts. Five of the collisions caused personal injuries, but none were fatal. One of the collisions involved a cyclist, but none involved pedestrians.

Six of the rear-end impacts involved southbound vehicles, five involved westbound vehicles, and two involved eastbound vehicles. Nine of the rear-end impacts occurred under poor surface conditions.

Wellington Street/Lett Street

A total of nine collisions were reported at the Wellington Street/Lett Street intersection over the last five years. Seven of the collisions were rear-end impacts and two were angle impacts. One of the collisions caused personal injuries, but none were fatal. None of the collisions involved pedestrians or cyclists.

Five of the rear-end impacts involved eastbound vehicles and two involved westbound vehicles. All the collisions occurred under dry surface conditions.

Booth Street/Fleet Street

A total of two collisions were reported at the Booth Street/Fleet Street intersection over the past five years. One of the collisions was a turning movement impact between a northbound right turning vehicle and a cyclist. The other collision was an “other” impact between a vehicle reversing into a westbound vehicle. Both of the collisions occurred under dry surface conditions and caused property damage only.

2.9 Study Area and Time Periods

The study area for this report includes the following intersections:

- Wellington Street/Sir John A MacDonald Parkway/Booth Street;
- Wellington Street/Lett Street;
- Wellington Street/Portage Bridge;
- Booth Street/Fleet Street;
- Booth Street/Albert Street.

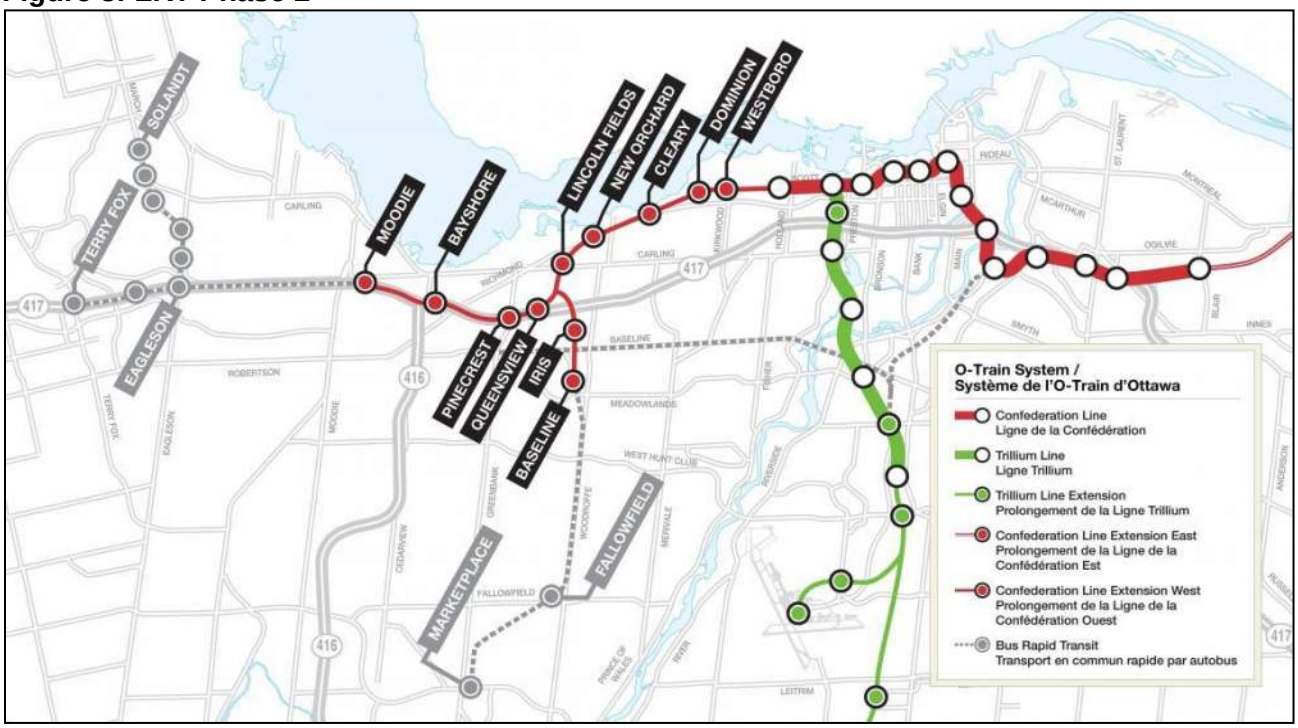
The time periods for the analysis are the weekday AM and PM peak hours, as they represent the 'worst case' combination of site generated traffic and adjacent street traffic. Existing traffic conditions within the study area have been examined, along with background and total traffic conditions for the 2023 build-out and 2028 horizon year of Phase 1 of the subject lands.

3.0 PLANNED CONDITIONS

3.1 Planned Transportation Projects

OC Transpo has recently converted the east-west transitway between Tunney's Pasture and Blair stations to LRT, known as the Confederation Line. Construction of Phase 2 of the Ottawa LRT has begun, which will extend the LRT further east, west and south (See **Figure 3**).

Figure 3: LRT Phase 2



With the opening of the Confederation LRT Line, The City of Ottawa is planning the removal of the bus lanes along Albert Street and repurposing this space to accommodate pedestrian and cycling modes as well as two through lanes in each direction. These plans include:

- The City of Ottawa will be reconstructing the street right-of-way along Albert Street running East from Empress in accordance with the Council Approved Albert and Slater Streets Post

Light Rail Transit (LRT) Repurposing Functional Design Study (See **Figure 4**). These plans also include the realignment of Slater Street.

- The design of the *Albert Street Cycling Facilities – Bayview Road to City Centre Avenue* was completed (See **Figure 5**).

Figure 4: Recommended Plan Albert Street & Slater Street Corridor (Parsons 2018)

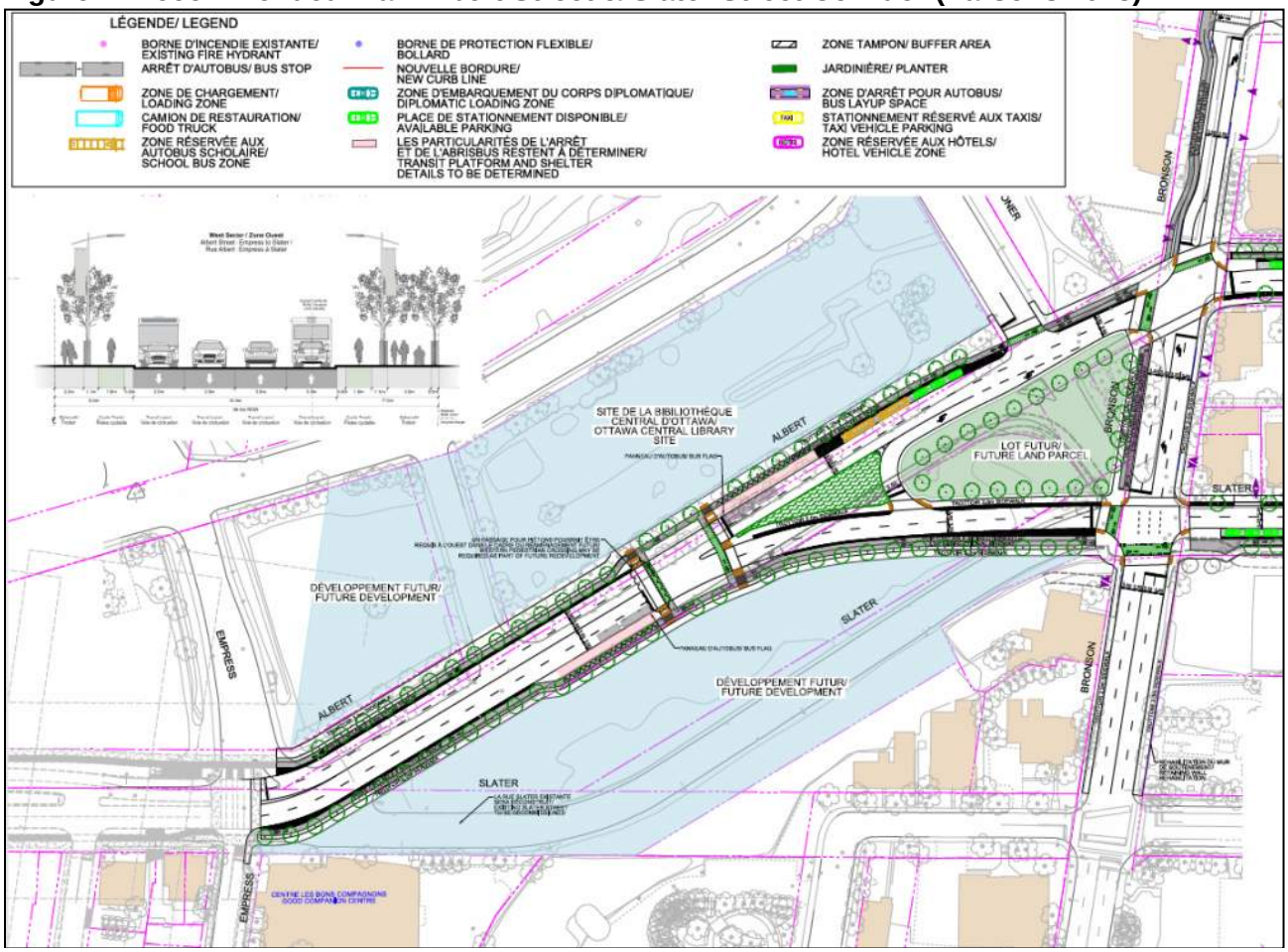
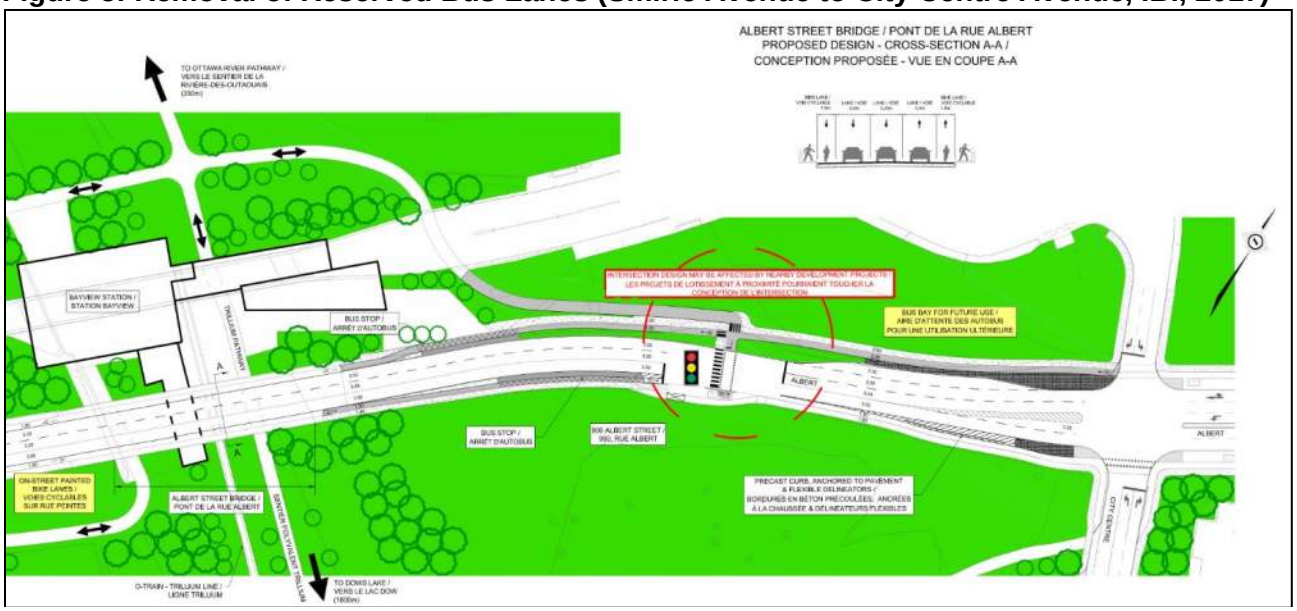


Figure 5: Removal of Reserved Bus Lanes (Smirle Avenue to City Centre Avenue, IBI, 2017)



The City of Ottawa's *2013 Transportation Master Plan (TMP)* identifies the extension of Preston Street from Albert Street to Sir John A MacDonald Parkway at Vimy Place as a Phase 3 Project (2026-2031) in its list of 2031 Affordable Road Network Projects. It describes this project as a two-lane extension of Preston Street through LeBreton Flats including a structure crossing of the new Confederation Line LRT and existing aqueduct.

The City of Ottawa's *Ottawa Cycling Plan (OCP)* Ultimate Cycling Network identifies the construction of bicycle lanes along Albert Street (Phase One – 2014 to 2019 implementation) and either bicycle lanes or a multi-use pathway along Booth Street between Sir John A MacDonald Parkway and the Ottawa River Pathway (Phase 2 – 2020 to 2025 implementation).

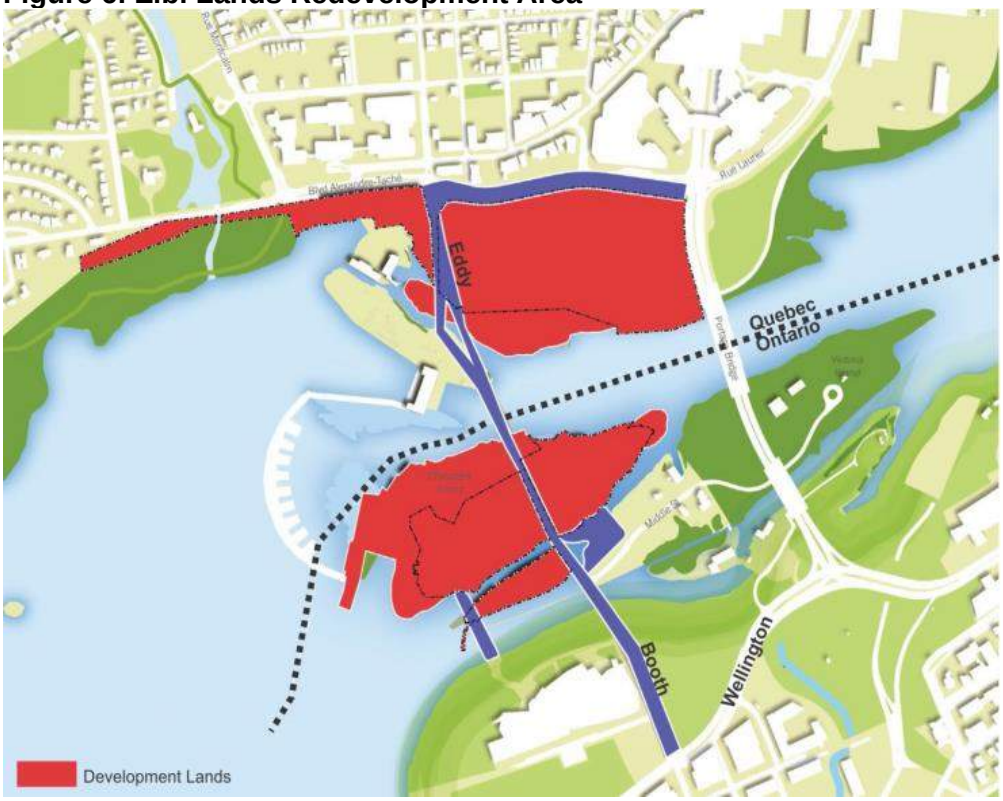
The previous Albert Street reconstruction project re-implemented a multi-use pathway on the north side of Albert Street however, it is anticipated that cycle tracks will be implemented along Albert Street once bus lanes are removed.

3.2 Other Area Developments

A Transportation Study was prepared in April 2018 for the Ottawa Central Library development located at 557 Wellington Street, 584/587 Wellington Street and 550 Albert Street. For the purposes of this analysis, it has been assumed that this development will be fully built-out by 2023. Vehicular traffic generated by this site is based on the traffic projections in the April 2018 report. Relevant excerpts are included in **Appendix F**.

Windmill Development is proposing to redevelop the former Domtar lands (now called Zibi) shown in **Figure 6**.

Figure 6: Zibi Lands Redevelopment Area



The Zibi lands will contain approximately 1M square feet of mixed-use development on the Ontario side of the provincial border and 2M square feet of mixed-use development on the Quebec side. A Transportation Impact Study (TIS) was prepared by Parsons in September 2015 in support of Phase 1 of the Zibi development. The TIS included a review of the ultimate Zibi development to assess the impacts at the site's signalized intersection to Booth Street. Two Addenda (June and July 2019) addressed changes associated with Block 211 and changes to Phase 1 of Zibi. Based on the TIS and its Addenda, Phase 1 of the Zibi development will consist of 315 condominium units, 72,500ft^2 of office space, 28,300ft^2 of retail, a 9,153ft^2 restaurant, and a 7,000ft^2 community centre. Relevant excerpts from the TIS and Addenda are included in **Appendix F**.

Trinity Group are proposing a development at 900 Albert Street, consisting of 1,632 residential units, 10,905m^2 of retail space, and 16,818m^2 of office space. A TIS (Parsons 2016) was prepared in support of the development. Addendum #3 (Parsons March 2018) to the TIS considered the impact of the proposed revisions to the concept, including a reduction of the residential units, additional office space, and a hotel. Relevant excerpts from the March 2018 addendum and November 2016 TIS are included in **Appendix F**.

4.0 TRAVEL DEMAND FORECASTING

4.1 Development Generated Travel Demand

4.1.1 Trip Generation

Trips generated by the residential development have been estimated based on the High-rise Condominiums (Land Use 232) and High-rise Apartments (Land Use 222) in the 2009 TRANS Trip Generation Study. Trips generated by the residential portion have been converted to person trips using the auto volume modal shares presented in Table 3.13 of the TRANS Trip Generation Manual.

Trips generated by the commercial space and day care have been estimated based on the Shopping Center (Land Use 820) and Day Care Center (Land Use 565) in *Trip Generation Manual, 10th Edition* (Institute of Transportation Engineers, Washington, 2017). Trips generated by the commercial/day care development have been converted to person trips using a 1.28 factor, consistent with the City's TIA Guidelines. Person trips generated by the site are summarized in **Table 2**.

Table 2: Person Trip Generation

Land Use	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
High Rise Condominium (3+ Floors)	75	192	267	139	100	239
High Rise Apartments (10+ Floors)	48	152	200	138	84	222
Shopping Center	3	2	5	30	33	63
Day Care Center	31	27	58	28	31	59
TOTAL	**157**	**373**	**530**	**335**	**248**	**583**

The modal shares for the development are based on the modal shares for TOD zones, as requested by the City. The projected person trips by modal share are summarized in **Table 3**.

Table 3: Site Generated Trips by Modal Share

Travel Mode	Modal Share	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Residential Person Trips							
Auto Driver	15%	18	52	70	40	28	68
Auto Passenger	5%	6	17	23	14	9	23
Transit	65%	81	223	304	181	119	300
Bike/Walk	15%	18	52	70	42	28	70
Retail / Day Care Person Trips							
Auto Driver	15%	5	5	10	9	8	17
Auto Passenger	5%	2	1	3	3	3	6
Transit	65%	22	19	41	37	44	81
Bike/Walk	15%	5	4	9	9	9	18
Auto Driver (Total)		**23**	**57**	**80**	**49**	**36**	**85**
Auto Passenger (Total)		**8**	**18**	**26**	**17**	**12**	**29**
Transit (Total)		**103**	**242**	**345**	**218**	**163**	**381**
Bike/Walk (Total)		**23**	**56**	**79**	**51**	**37**	**88**

The shopping center land use is expected to generate two types of external peak hour trips: primary and pass-by trips. Primary trips are made for the specific purpose of visiting the site and pass-by trips are made as intermediate stops on the way to another destination. *Trip Generation Handbook, 3rd Edition* (Institute of Transportation Engineers, Washington, 2017) identifies 34% as the average pass-by rate for the Shopping Center land use and the peak hour pass-by trips have been estimated based on a pass-by rate of 34%. The pass-by trips generated by the commercial development are part of the observed background traffic and do not constitute 'new' trips on the adjacent road network. The primary and pass-by trip generation for the commercial land use is summarized in **Table 4**.

Table 4: Pass-by Retail Trips

Trip Type	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Shopping Center Vehicle Trips	*0*	*1*	*1*	*5*	*4*	*9*
Pass-by	0	0	0	2	2	4
Primary	0	1	1	3	2	5

4.1.2 Trip Distribution

The distribution of vehicular trips generated by the proposed development has been projected with appropriate consideration given to several key factors, including:

- The size and nature of the proposed development;
- Existing traffic patterns;
- The location of the site accesses with respect to the adjacent roadway system; and,
- The principles of logical trip routing.

Trips generated by the proposed development will be assigned differently based on arrival and departure due to the traffic restrictions at the Wellington Street/Sir John A MacDonald Parkway/Booth Street intersection. Trips generated by the proposed development have been distributed and assigned to the adjacent road network as follows:

Arrival

- 60% to/from the east via Wellington Street;
- 25% to/from the south via Booth Street;
- 10% to/from the west via Wellington Street/Sir John A MacDonald Parkway; and,
- 5% to/from the north via the Portage Bridge.

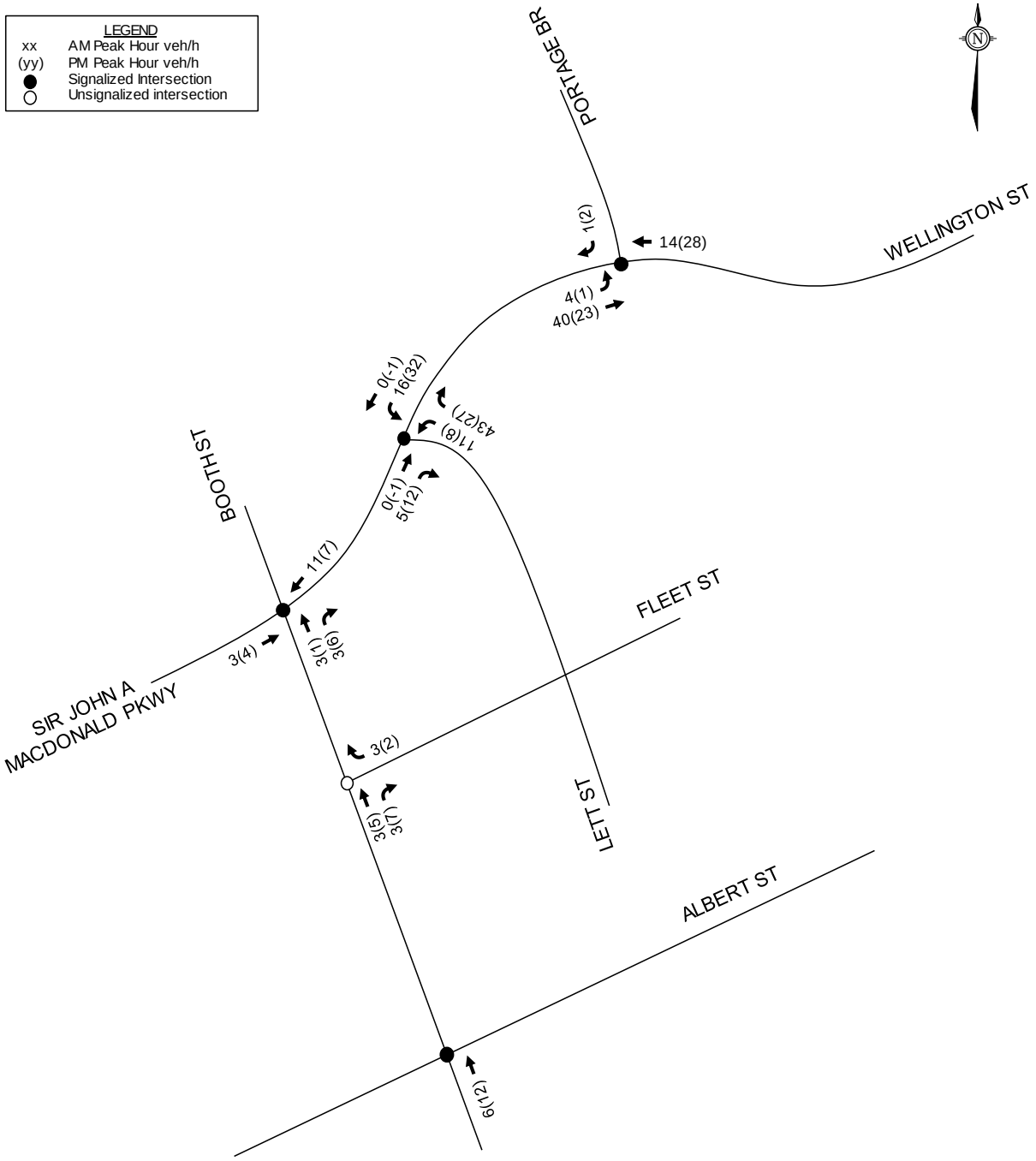
Departure

- 70% to/from the east via Wellington Street;
- 20% to/from the west via Wellington Street/Sir John A MacDonald Parkway;
- 5% to/from the north via Booth Street/Chaudiere Bridge; and,
- 5% to/from the north via the Portage Bridge.

Pass-by trips generated by the proposed development have been distributed based on existing traffic conditions.

AM and PM peak hour traffic volumes estimated to be generated by the subject site were assigned to the study intersections (See **Figure 7**).

Figure 7: Site Generated Traffic



4.2 Background Traffic

4.2.1 General Background Traffic Growth

The City of Ottawa's TMP identifies that the overall transit modal share (TMS) in the Ottawa Inner Area is anticipated to increase by 2% prior to the 2031 horizon year. The implementation of the Confederation Line in 2019 is anticipated to help achieve this increased TMS sooner than 2031. The projected traffic volumes at the study area intersections have been reduced to reflect the future TMS in the area.

Background traffic projections are based on 2011 and 2031 snapshots from the City of Ottawa's Strategic Long-Range Model and traffic generated by other planned developments in the area. The City's long-range model suggests a growth rate of approximately 0.5% per year along Wellington Street and Booth Street (north of Wellington Street). The long-range model suggests a -0.5% growth rate along Booth Street (south of Wellington Street). In order to provide a conservative and robust analysis, a 0.5% annual growth rate has been applied to the traffic volumes along Wellington Street, Booth Street and Albert Street.

4.2.2 Other Area Development Traffic

Other developments in the vicinity of the subject site are summarized in **Section 3.2**. Traffic generated by the following other developments have been accounted for in the background traffic:

- Ottawa Central Library development;
- Zibi development – Phase 1 and Block 211; and,
- 900 Albert Street.

Background traffic volumes at the study area intersections for the 2023 (build-out) and 2028 (horizon) years that include other area development trips are shown in **Figures 8** and **9**, respectively. Total traffic volumes that include site generated trips for the 2023 build-out year and 2028 horizon year are shown in **Figures 10** and **11**, respectively.

Figure 8: 2023 Background Traffic Volumes

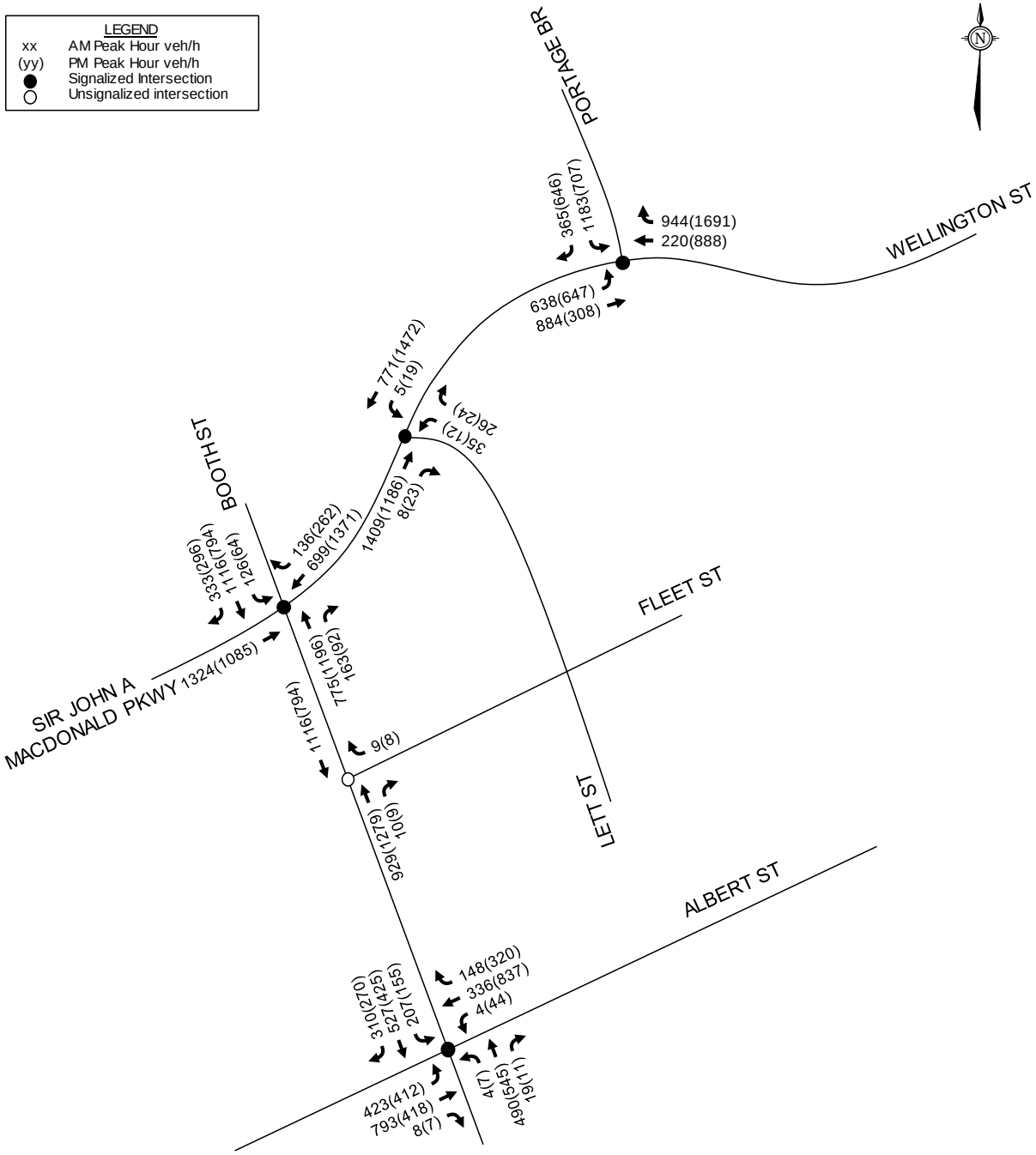


Figure 9: 2028 Background Traffic Volumes

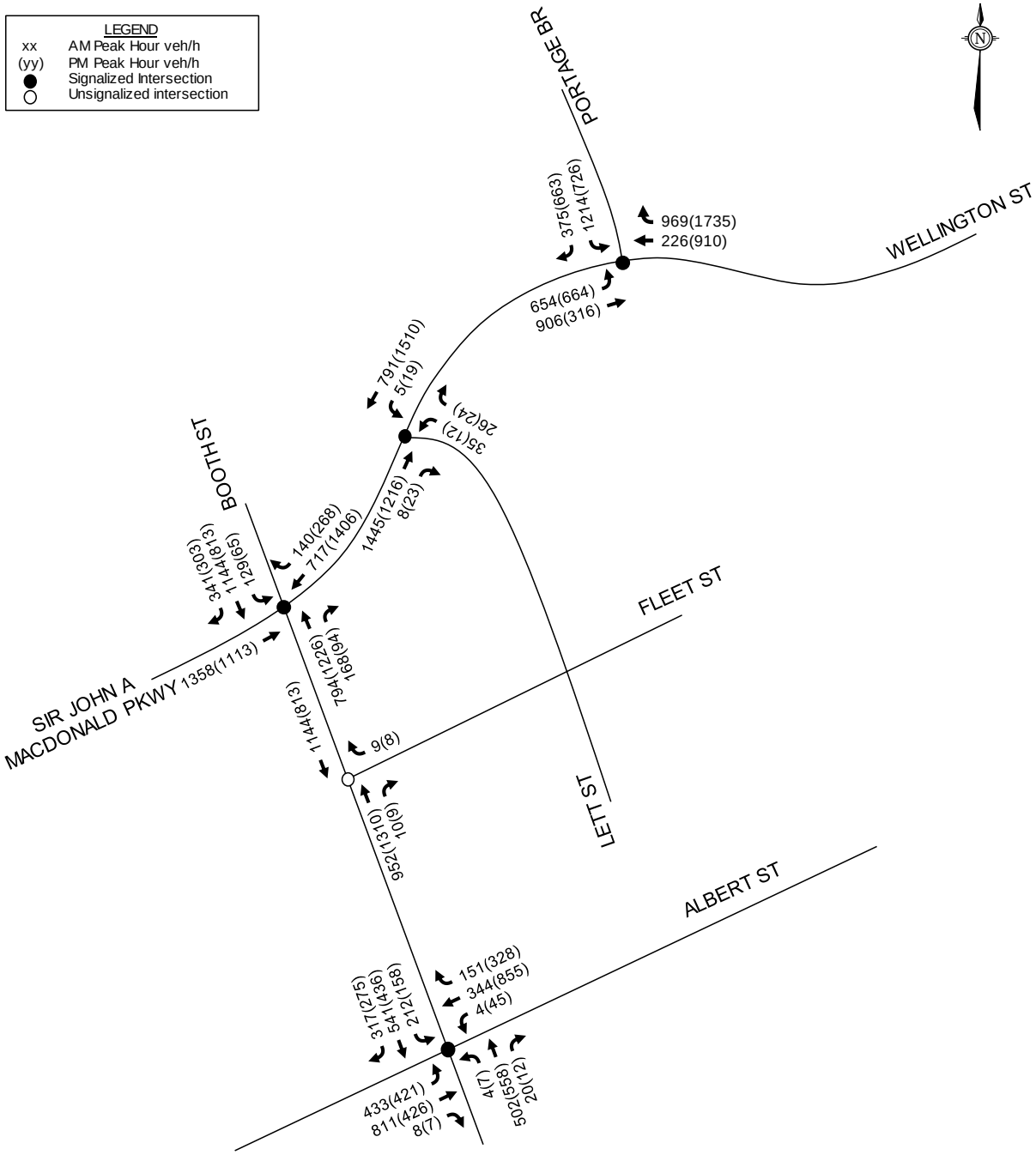


Figure 10: 2023 Total Traffic Volumes

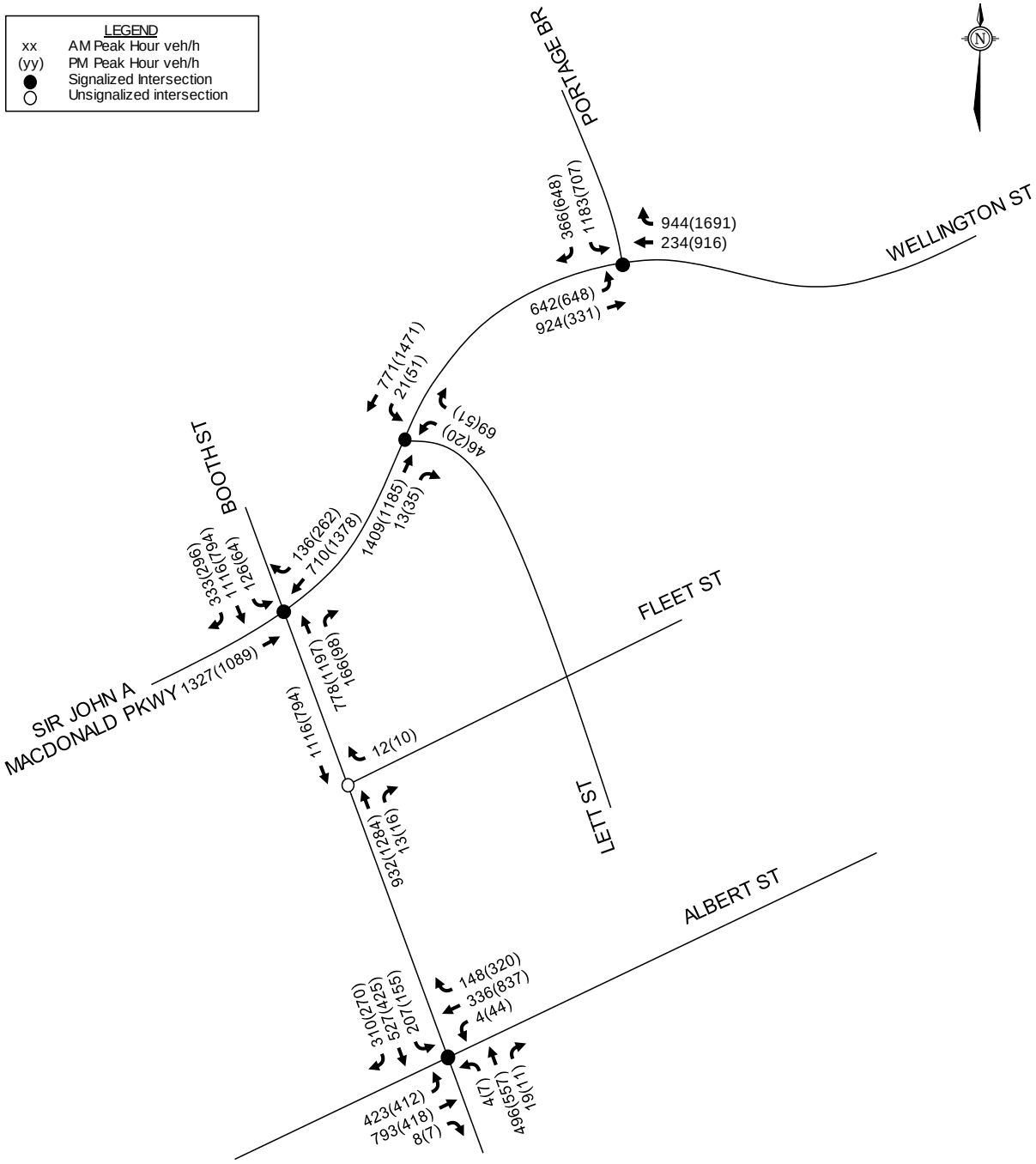
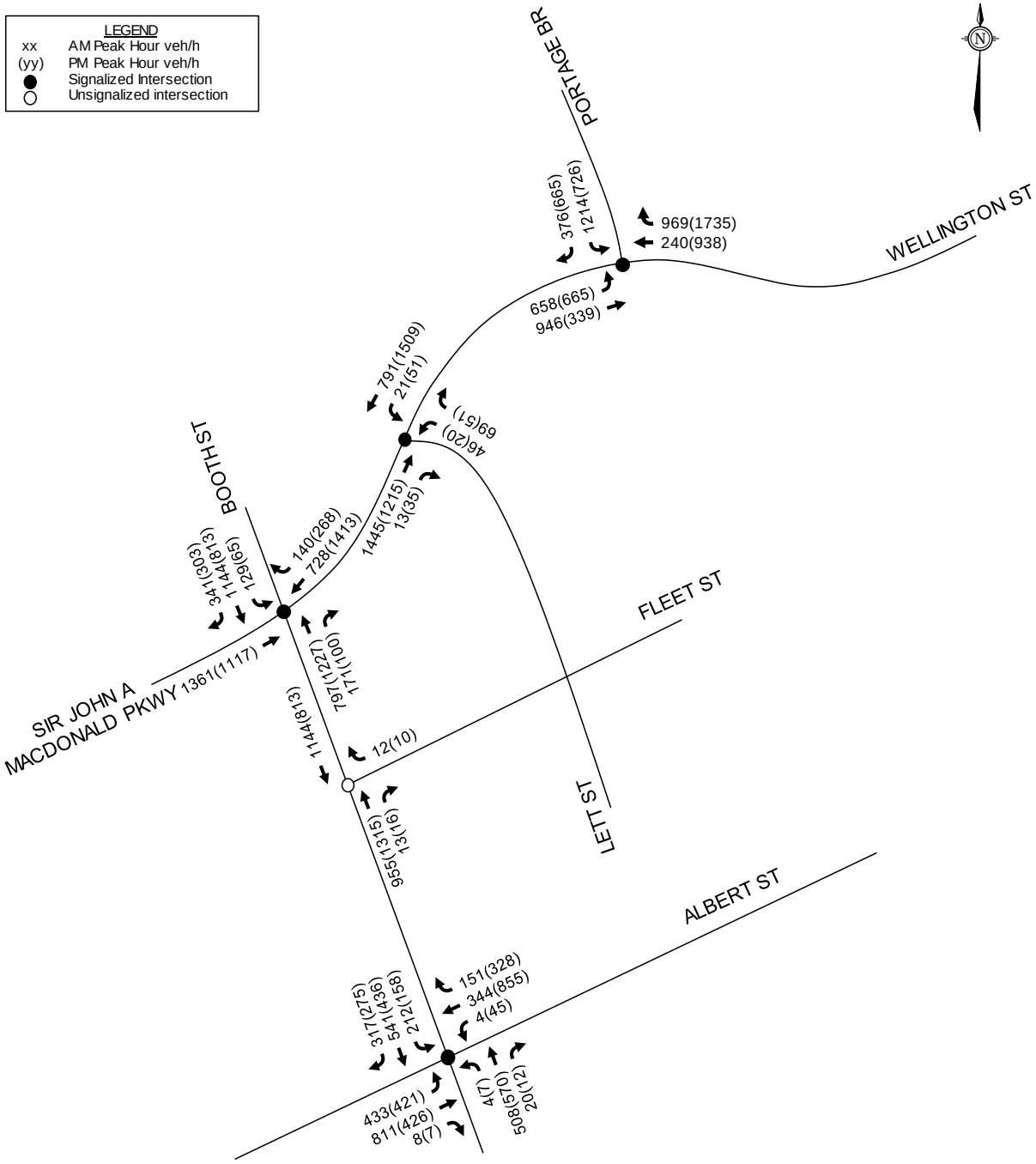


Figure 11: 2028 Total Traffic Volumes



5.0 ANALYSIS

5.1 Development Design

The overall East LeBreton Flats lands will be accessed through the Booth Street/Fleet Street and Wellington Street/Lett Street intersections. This is consistent with the Block Subdivision Plan, which can be found in **Appendix A**. Parking for the development will be underground with access to Lloyd Street. The recently completed Confederation Line construction has developed a median along Booth Street, restricting the Fleet Street intersection to right-in right-out. The Wellington Street/Lett Street intersection will remain signalized.

Pedestrian and cycling facilities will be provided between the main building entrances and the sidewalks and cycling facilities along the adjacent roadways. Bicycle parking will be provided in accordance with the City's Zoning By-Law.

A loading area will be provided adjacent to the proposed underground parking ramp. This loading area will generally be used by moving trucks for resident move-in or move-out.

Phase 1 of the proposed development is within a walking distance of approximately 400m of the Pimisi LRT station. This LRT station provides comprehensive transit coverage across the City of Ottawa.

A review of the City's Transportation Demand Management (TDM) – Supportive Development Design and Infrastructure Checklist has been conducted. A copy of the TDM checklist is included in **Appendix G**. All required TDM-supportive design and infrastructure measures in the TDM checklist are met.

5.2 Parking

The proposed development is located within Area A of Schedule 1 and Area Z of Schedule 1A to the City's Zoning By-law (ZBL). The ZBL identifies that no off-street motor vehicle parking is required for developments within Area Z. However, the ZBL identifies a requirement of 0.1 visitor parking spaces per unit in excess of 12 units, not exceeding a total of 30 visitor parking spaces.

As the proposed development is within a 600m walking distance of the Pimisi LRT station, the ZBL also identifies the following maximum parking space rates for the proposed development:

- 1.5 spaces per dwelling unit (combined resident and visitor parking); and,
- 1.0 per 100m^2 of GFA for a retail store

Based on the foregoing, the City's ZBL identifies a requirement to provide a minimum of 30 parking spaces for visitors, and a maximum of 903 total parking spaces. The proposed development will provide a total of 340 vehicle parking spaces, adhering to the requirements of the City's ZBL.

The City's ZBL requires minimum bicycle parking to be provided at the following rates:

- 0.5 bicycle parking spaces per dwelling unit; and
- 1 bicycle parking space per 250m^2 of retail store and day care.

Based on the foregoing, the City's ZBL identifies a requirement to provide a minimum of 301 bicycle parking spaces. The proposed development will provide a total of 330 bicycle parking spaces, adhering to the requirements of the ZBL.

5.3 Boundary Streets

This section provides a review of the boundary streets using complete streets principles. The Multi-Modal Level of Service (MMLOS) guidelines produced by IBI Group in 2015 were used to evaluate the LOS of the boundary roadways for each mode of transportation. Schedule B of the City of Ottawa's Official Plan indicates that all boundary streets are in the Central Policy Area. All boundary streets are also located within 600m of the Pimisi LRT station.

The existing and target PLOS, BLOS, and Auto LOS for the boundary street segments are summarized in **Table 5**. As none of the boundary streets serve transit and none are classified as truck routes, the TLOS and TkLOS has not been reviewed. Detailed segment MMLOS analysis is included in **Appendix H**.

Table 5: Segment MMLOS Summary

Segment	PLOS	BLOS	TLOS	TkLOS	Auto LOS
Lett Street (North-South)	A	B	-	-	A
Target	**A**	**D**	**-**	**-**	**E**
Lett Street (East-West)	F	B	-	-	A
Target	**A**	**D**	**-**	**-**	**E**
Lloyd Street	F	B	-	-	A
Target	**A**	**D**	**-**	**-**	**E**
Fleet Street	A	B	-	-	A
Target	**A**	**D**	**-**	**-**	**E**

With no sidewalk currently provided along Lloyd Street and Lett Street (East-West) the PLOS for these roadways is deemed 'F'. Both Fleet Street and Lett Street (North-South) achieve the target PLOS 'A'. The approved design for the Lett Street and Lloyd Street are provided in **Appendix I**, and will include the following new pedestrian facilities:

- 2.0m concrete sidewalk adjacent to the curb along west and north side of Lett Street,
- 2.0m concrete sidewalk adjacent to the curb along both sides of Lloyd Street, and
- 4.6m concrete sidewalk adjacent to the curb on the south side of Fleet Street.

The aforementioned pedestrian facilities will achieve the target PLOS 'A' streets and along all boundary will be constructed as part of this development.

With mixed traffic and two lanes along each roadway, each roadway achieves a BLOS 'B', surpassing the target 'D'.

Each boundary roadway is expected to operate with traffic volumes well below the 400 vehicle per hour per lane capacity identified for local streets in the City's guidelines for the TRANS Long-Range Transportation Model and the AutoLOS for each boundary roadway is expected to be 'A'.

5.4 Access Intersections Design

The proposed underground parking garage will be accessed along Lloyd Street. The proposed underground parking ramp will be 6.0m in width, and will be located 26m from the Lett Street right-of-way (ROW) limit and 60m from the Fleet Street ROW limit. The underground parking ramp will have a 6% grade for a distance of 6m within the property, where it transitions to a 16% grade for 14m, before transitioning back to a 7.5% grade at the base of the ramp.

Section 107 of the City's ZBL identifies a minimum width of 6.0m for a double traffic lane leading to a parking garage. Section 25(c) of the City's Private Approach By-law (PABL) identifies a maximum width of 9m for a two-way driveway.

Section 25(o) of the City's PABL identifies a minimum distance of 6m between a driveway and the nearest intersecting streetline.

Section 25(u) of the City's PABL identifies a maximum grade of 6% for a distance of 9m within the property, for driveways leading to 50 parking spaces or more.

The width and location of the proposed underground parking ramp adhere to the requirements of the City's ZBL and PABL.

A grade of 6% for a distance of 9m within the property is unachievable due to the lay-out of the underground parking garage, a maximum recommended transition grade differential of 10%, and headroom requirements at the base of the ramp. As such a waiver to the City's PABL is required for the grade of the underground parking ramp. A distance of 2.4m with a grade of 2% sloping towards the roadway will be provided between the back of sidewalk and the property line. The proposed underground parking ramp accommodates the maximum permitted 6% grade for a distance of 6m within the property, where it transitions to a 16% grade. As such a maximum grade of 6% is provided for a distance of 8.4m from the back of sidewalk, and vehicles exiting the ramp will have appropriate sight lines to the sidewalk and roadway. A waiver to the City's PABL is recommended.

5.5 Transportation Demand Management

The proposed development conforms to the City's TDM initiatives by providing easy access to the local pedestrian, bicycle and transit systems as outlined in **Section 5.1**. A review of the TDM – Measures checklist was conducted and can be found in **Appendix G**. To encourage travel by sustainable modes, the proponent agrees to unbundle parking cost from the purchase price/monthly rent.

5.6 Neighbourhood Traffic Management

The overall East LeBreton Flats lands are to be accessed through the Booth Street/Fleet Street and Wellington Street/Lett Street intersections. This is consistent with the Block Subdivision Plan, which can be found in **Appendix A**. As the only accesses to the subject lands are provided on Booth Street and Wellington Street, which are classified as arterial roadways in the City's 2013 TMP, the proposed development is not anticipated to have any measurable impact on the residential communities in the site's vicinity.

Community concerns have been raised regarding cut-through traffic along Fleet Street and Lett Street during peak hours when queueing occurs on the northbound approach to the Booth Street/Wellington Street/Sir John A MacDonald Parkway intersection. The travelled distance for vehicles entering Fleet Street to Lett Street and turning right onto Wellington Street is approximately 270m. The travelled distance for a vehicle continuing north, turning right on Wellington Street and travelling eastbound to Lett Street is approximately 200m. It is acknowledged that although this is a longer route, some motorists may choose to travel through Fleet Street/Lett Street to Wellington Street. As development progresses within the east LeBreton Flats lands, higher friction is anticipated along these roads due to the increased vehicular, pedestrian and cyclist activity within the east LeBreton Flats lands. The increased friction is anticipated to make this route less enticing for motorists to 'short-cut' through the development. If a high volume of vehicles continues to short-cut and warrant an area traffic management study, hard traffic measures could be considered by the City to limit short-cutting.

Traffic volumes along Lett Street and Lloyd Street, south of Fleet Street are not anticipated to exceed ATM thresholds for local roadways. However, it is noted that the previously approved design for these roadways include roadway narrowings at the Fleet Street intersections.

5.7 Transit

Based on the modal share presented in **Table 3**, the proposed development is anticipated to generate an additional 345 transit trips (103 in, 242 out) during the weekday AM peak hour and 381 transit trips (218 in, 163 out) during the weekday PM peak hour.

With the Confederation LRT Line and several bus routes (#61, 63, 65, 75, and 85) within 400m of the site, the additional transit trips generated by the site are not anticipated to have a significant impact on the operations of OC Transpo.

5.8 Network Intersections

5.8.1 Existing MMLOS Analysis

The MMLOS guidelines produced by IBI Group in 2015 were used to evaluate the LOS of all study area signalized intersection for each mode of transportation. Schedule B of the City of Ottawa's Official Plan indicates that all study area intersections are in the Central Policy Area. All intersections are also located within 600m of a rapid transit station. MMLOS targets are from Exhibit 22 of the MMLOS guidelines for the Central Area.

The existing and target PLOS, BLOS, TkLOS and Auto LOS for the study area intersections are summarized in **Table 6**. As none of the area intersections are along a transit priority corridor, the TLOS has not been reviewed. The Wellington Street westbound approach at Booth Street has been modelled with two through lanes and a right turn taper to account for the wide curb lane and the stopping restriction about 35m in advance of the intersection. Detailed MMLOS calculations are included in **Appendix H**.

Table 6: Intersection MMLOS Summary

Intersection	PLOS	BLOS	TLOS	TkLOS	Auto LOS
Sir John A Macdonald Pkwy/ Wellington St/ Booth St	F	F	-	D	F
Target	**A**	**C**	**-**	**D**	**E**
Wellington St/ Lett St	F	F	-	F	A
Target	**A**	**C**	**-**	**E**	**E**
Wellington St/ Portage Bridge	F	F	-	B	E
Target	**A**	**C**	**-**	**E**	**E**
Booth St/ Albert St	F	D	-	F	F
Target	**A**	**B**	**-**	**E**	**E**

Sir John A MacDonald Parkway/Wellington Street/Booth Street

The Sir John A MacDonald Parkway/Wellington Street/Booth Street intersection does not meet the target PLOS, BLOS or Auto LOS.

As all approaches to this intersection have a minimum of four-lanes with a divided cross-section, and the intersection is currently operating with an Auto LOS F, there is limited opportunity to improve the overall PLOS. Left turn movements are prohibited on the northbound, eastbound and westbound approaches of this intersection, and the right turn movement is prohibited on the eastbound approach. These turn restrictions reduce the potential for pedestrian/vehicle conflicts. Consideration could be given to providing zebra striped crosswalks to further improve the pedestrian level of comfort crossing each approach. It is noteworthy that zebra striped crosswalks are warranted on the north, east and west legs of this intersection based on the vehicle/pedestrian conflict warrants (>400,000 vehicle/pedestrian conflicts over an eight-hour period).

The southbound left turn movement is currently operating with a BLOS F. The implementation of a southbound left turn bike box would achieve the target BLOS C for this area. The City of Ottawa's *OCP* Ultimate Cycling Network identifies the implementation of either bicycle lanes or a multi-use pathway along Booth Street between Sir John A MacDonald Parkway and the Ottawa River Pathway (Phase 2 – 2020 to 2025 implementation). The City should consider implementing a two-stage left turn bike box for the southbound left turn movement at this intersection as part of the future cycling facility.

This intersection is currently operating with an Auto LOS F. A review of the number of vehicles that need to be removed from the study area roadway to achieve the target Auto LOS E is provided in **Section 5.8.6**.

Wellington Street/Lett Street
The Wellington Street/Lett Street intersection does not meet the target PLOS, BLOS or TkLOS.

As the east and west approaches to this intersection have a minimum four-lane divided cross-section, there is limited opportunity to improve the overall PLOS. Consideration could be given to providing zebra striped crosswalks, leading pedestrian intervals, and no right-turn on red to improve the pedestrian level of comfort crossing each approach to the Wellington Street/Lett Street intersection. Zebra striped crosswalks are currently warranted on the east and west approaches based on the vehicle/pedestrian conflict warrants (>400,000 vehicle/pedestrian conflicts over an eight-hour period).

To achieve the BLOS target for the central area, the City could consider implementing a two stage, left-turn box (jug handle) to facilitate the westbound left turn movement for cyclists at the Wellington Street/Lett Street intersection. As this is an existing conditions analysis, the mitigation measure is identified for the City's consideration.

Wellington Street/Portage Bridge
The Wellington Street/Portage Bridge intersection does not meet the target PLOS or BLOS.

The Wellington Street/Portage Bridge intersection is not a standard configuration and the results of the PLOS and BLOS analysis should be treated with caution. The east and west approaches to the intersection have two stage pedestrian crossings, with a channelized island refuge area. All vehicular movements are fully protected, excluding southbound right turn smart channel, limiting the potential for vehicle/pedestrian conflict and the pedestrian level of comfort crossing this intersection is anticipated to be higher than represented by the PLOS analysis. There is limited opportunity to improve the delay score for each pedestrian crossing, as the intersection is a major link to/from the downtown core and is currently operating with a vehicle LOS E.

The cyclist eastbound and westbound left turn accommodation at the Wellington Street/Portage Bridge intersection governs the BLOS analysis. The on-road cycling facilities require cyclists to cross three lanes of traffic into a pocket bike lane to perform an eastbound or westbound left turn. As this

intersection has a two-stage pedestrian crossing on the east and west approaches, cyclists may alternatively choose to dismount adjacent to the curb to cross to the channelized island refuge area using the pedestrian crossing. Cyclists can then mount their bike and enter the pocket bike lane to perform the left turn movement. This approach reduces the level of traffic stress experienced by the cyclist. As this approach is not reflected in the MMLOS guidelines, it is reasonable to assume that the level of service at this intersection is higher than BLOS F.

Booth Street/Albert Street
The Booth Street/Albert Street intersection does not meet the target PLOS, BLOS, TkLOS or Auto LOS.

The east and west approaches to the Albert Street/Booth Street intersection are currently operating with a PLOS F. The PLOS on these approaches is highly influenced by the number of lanes crossed (7 to 8 lanes of 3.5m in width) along Albert Street. It is noteworthy that leading pedestrian intervals and zebra striped crosswalks are currently implemented at this intersection to provide a higher level of comfort and safety for pedestrians crossing Albert Street.

With a bi-directional multi-use pathway on the north side of Albert Street, cyclists performing left turn movements are required to dismount and cross as pedestrians and the BLOS for left turn movements are not reflected in the MMLOS Guidelines. The northbound left turn movement is currently operating with a BLOS D. To achieve the target BLOS B, either a reduction in the operating speed or a higher order facility is required.

With Light Rail Transit in place, it is anticipated that the City will repurpose the existing transit lanes along the Albert Street corridor, consistent with the Albert Street/Slater Street repurposing project east of Empress Avenue. Opportunities to improve the PLOS and BLOS at this intersection should be explored through the future Albert Street repurposing project.

This intersection is currently operating with an Auto LOS F. A review of the number of vehicles that need to be removed from the study area roadway to achieve the target Auto LOS E is provided in **Section 5.8.6**.

5.8.2 2023 Background Traffic

Intersection capacity analysis has been completed for the AM and PM peak hours in the 2023 background traffic condition. For the purposes of this analysis, it has been assumed that the existing eastbound/westbound bus lanes at the Booth Street/Albert Street intersection will be repurposed post LRT, consistent with the approach presented in the 557 Wellington Street, 584/587 Wellington Street and 550 Albert Street Traffic Study. The eastbound and westbound bus lanes have been assumed to be repurposed as follows:

- Eastbound bus lane will be repurposed to a through/right turn lane; and
- Westbound bus lane will be removed.

The MMLOS analysis suggested the City consider providing leading pedestrian intervals at the Wellington Street/Lett Street intersection to improve the PLOS. For the purposes of this analysis, north-south leading pedestrian intervals are assumed to be in place at this intersection.

The results of the analysis are summarized in **Table 7** and detailed synchro reports are included in **Appendix J**.

Table 7: 2023 Background Intersection Operations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Sir John A Macdonald Pkwy / Wellington St/ Booth St	AM	0.99	E	NBT/R	36 sec	0.95	E
		0.96	E	EBT			
	PM	0.98	E	WBT	40 sec	0.97	E
		0.98	E	NBT/R			
Wellington St/ Lett St	AM	0.57	A	EBT/R	4 sec	0.56	A
	PM	0.54	A	WBT	6 sec	0.53	A
Wellington St/ Portage Bridge	AM	0.81	D	EBL	26 sec	0.72	C
	PM	0.89	D	SBR	32 sec	0.80	C
Booth St/ Fleet St	AM	10 sec	A	WB	0 sec	0.36	A
	PM	11 sec	B	WB	0 sec	0.50	A
Booth St/ Albert St	AM	1.07	F	SBL	49 sec	0.75	C
		0.95	E	SBR			
	PM	1.19	F	SBL	59 sec	0.95	E
		1.04	F	EBL			
		1.03	F	WBT			

Sir John A MacDonald Parkway/Wellington Street/Booth Street

All movements are expected to operate with a LOS 'E' or better during both the AM and PM peak hours. The 95th percentile queue length on the northbound approach is anticipated to be approximately 140m and 205m during the AM and PM peak hours respectively, and extending through the Booth Street/Fleet Street intersection. The 95th percentile queue length on the westbound approach is expected to be approximately 230m, extending through the Wellington Street/Lett Street intersection during the PM peak hour.

Wellington Street/Lett Street

With the implementation of north-south leading pedestrian intervals critical movements at the intersection are expected to operate with a LOS 'A' during both the weekday AM and PM peak hours. The 95th percentile queue length on the northbound approach is anticipated to be about 15m during the AM peak and PM peak. The delay on the northbound approach is anticipated to be 27 seconds during the AM peak and 26 seconds during the PM peak.

A review of the impacts of a right-turn on red restriction on the northbound approach, and a jug handle on the westbound approach to the Wellington Street/Lett Street intersection has been conducted (See **Table 8**). These modifications are not anticipated to have a significant impact on the overall operations of the intersection, however they are anticipated to increase the delay and queueing on the northbound approach.

Wellington Street/Portage Bridge

All traffic movements at this intersection are expected to operate with a LOS 'E' or better during both the AM and PM peak hours.

Booth Street/Albert Street

Critical movements at this intersection are anticipated to operate with a LOS F, however the overall intersection is anticipated to operate with a LOS E during the PM peak hour. The 95th percentile queue length for the eastbound left turn movement is anticipated to be approximately 165m during the PM peak hour, exceeding the existing storage length and blocking the adjacent through traffic lane. With more than 410 vehicles projected to be turning left during each of the AM and PM peak hours, the City should consider implementing dual eastbound left turn lanes when the bus lanes are

repurposed along Albert Street. Improved overall intersection operations and a reduced eastbound left turn 95th percentile queue length (80m) are anticipated during the PM peak hour if dual eastbound left turn lanes are implemented by the City. The effects of dual eastbound left turn lanes at this intersection are shown in **Table 8**.

Table 8: 2023 Background Intersection with Mitigations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Northbound Right Turn on Red Restriction							
Wellington Street/ Lett St	AM	0.57	A	EBT/R	5 sec	0.56	A
	PM	0.54	A	WBT	6 sec	0.53	A
Westbound Left Cyclist Jug Handle							
Wellington Street/ Lett St	AM	0.63	B	EBT/R	14 sec	0.62	B
	PM	0.57	A	WBT	17 sec	0.56	A
Dual Eastbound Left Turn Lanes							
Booth St/ Albert St	AM	0.87	D	SBR, EBL	47 sec	0.74	C
	PM	0.94	E	WBT	46 sec	0.87	D

5.8.3 2028 Background Traffic

Intersection capacity analysis has been completed for the AM and PM peak hours in the 2028 background traffic condition. The lane configurations and signal timing plans are consistent with the analysis presented in **Section 5.8.2**. The results of the analysis are summarized in **Table 9** and detailed synchro reports are included in **Appendix J**.

Table 9: 2028 Background Intersection Operations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Sir John A Macdonald Pkwy / Wellington St/ Booth St	AM	1.01	F	NBT/R	39 sec	0.97	E
		0.99	E	EBT			
	PM	1.01	F	WBT	44 sec	0.99	E
		1.00	E	NBT/R			
Wellington St/ Lett St	AM	0.58	A	EBT/R	4 sec	0.57	A
	PM	0.55	A	WBT	6 sec	0.54	A
Wellington St/ Portage Bridge	AM	0.82	D	EBL	27 sec	0.73	C
	PM	0.91	E	SBR	33 sec	0.82	D
Booth St/ Fleet St	AM	10 sec	B	WB	0 sec	0.37	A
	PM	11 sec	B	WB	0 sec	0.51	A
Booth St/ Albert St	AM	1.10	F	SBL	51 sec	0.78	C
		0.96	E	SBR			
	PM	1.22	F	SBL	63 sec	0.98	E
		1.09	F	EBL			
		1.05	F	WBT			

Sir John A Macdonald Parkway/Wellington Street/Booth Street

The northbound and eastbound movements are anticipated to operate with a v/c ratio of 1.01 and 0.99 respectively during the AM peak hour. The 95th percentile queue length on the northbound

approach is anticipated to be approximately 145m, extending through the Booth Street/Fleet Street intersection during the AM peak hour.

The westbound through and northbound through/right turn movements are expected to operate with v/c ratios of 1.01 and 1.00, respectively. The 95th percentile queue length on the westbound approach is expected to be approximately 235m, extending through the Wellington Street/Lett Street intersection during the PM peak hour. The 95th percentile queue length on the northbound approach is anticipated to be approximately 210m, extending through the Booth Street/Fleet Street intersection during the PM peak hour.

Wellington Street/Lett Street
With the implementation of north-south leading pedestrian intervals critical movements at the intersection are expected to operate with a LOS 'A' during both the weekday AM and PM peak hours. The 95th percentile queue length on the northbound approach is anticipated to be 15m during the AM peak and PM peak. The delay on the northbound approach is anticipated to be 27 seconds during the AM peak and 26 seconds during the PM peak.

A review of the impacts of a right-turn on red restriction on the northbound approach, and a jug handle on the westbound approach to the Wellington Street/Lett Street intersection has been conducted (See **Table 10**). These modifications are not anticipated to have a significant impact on the overall operations of the intersection, however they are anticipated to increase the delay and queueing on the northbound approach.

Wellington Street/Portage Bridge
All traffic movements at this intersection are expected to operate with a LOS 'E' or better during both the AM and PM peak hours.

Booth Street/Albert Street
Critical movements at this intersection are anticipated to operate with a LOS F, however the overall intersection is anticipated to operate with a LOS E during the PM peak hour. The 95th percentile queue length for the eastbound left turn movement is anticipated to increase to approximately 170m during the PM peak hour, exceeding the existing storage length and blocking the adjacent through traffic lane. With more than 420 vehicles projected to be turning left during each of the AM and PM peak hours, the City should consider implementing dual eastbound left turn lanes when the bus lanes are repurposed along Albert Street. Improved overall intersection operations and a reduced eastbound left turn 95th percentile queue length (85m) are anticipated during the PM peak hour if dual eastbound left turn lanes are implemented by the City. The effects of dual eastbound left turn lanes at this intersection are shown in **Table 10**.

Table 10: 2028 Background Intersection with Mitigations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Northbound Right Turn on Red Restriction							
Wellington St/ Lett St	AM	0.59	A	EBT/R	5 sec	0.58	A
	PM	0.55	A	WBT	7 sec	0.54	A
Westbound Left Cyclist Jug Handle							
Wellington St/ Lett St	AM	0.64	B	EBT/R	15 sec	0.63	B
	PM	0.59	A	WBT	18 sec	0.58	A
Dual Eastbound Left Turn Lanes							
Booth St/ Albert St	AM	0.89	D	EBL	48 sec	0.76	C
	PM	0.96	E	WBT	48 sec	0.88	D

5.8.4 2023 Total Traffic

Intersection capacity analysis has been completed for the AM and PM peak hours in the 2023 total traffic condition. The lane configurations and signal timing plans are consistent with the analysis presented in Section 5.8.2. The results of the analysis are summarized in **Table 11** with detailed reports included in **Appendix J**.

Table 11: 2023 Total Traffic Intersection Operations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Booth St/ Wellington St/ Sir John A. Macdonald Pkwy	AM	0.99	E	NBT/R	36 sec	0.96	E
		0.97	E	EBT			
	PM	0.98	E	WBT	40 sec	0.97	E
		0.98	E	NBT/R			
Wellington St/ Lett St	AM	0.59	A	EBT/R	5 sec	0.58	A
	PM	0.56	A	WBT	7 sec	0.55	A
Wellington St/ Portage Bridge	AM	0.81	D	EBL	26 sec	0.72	C
	PM	0.89	D	SBR	32 sec	0.81	D
Booth St/ Fleet St	AM	10 sec	A	WB	0 sec	0.37	A
	PM	11 sec	B	WB	0 sec	0.50	A
Booth St/ Albert St	AM	1.07	F	SBL	49 sec	0.76	C
		0.95	E	SBR			
	PM	1.20	F	SBL	59 sec	0.96	E
		1.05	F	EBL			
		1.03	F	WBT			

The addition of site generated traffic is not anticipated to have a significant impact on the overall intersection operations within the study area.

With the addition of site generated trips, the critical movements at the Wellington Street/Lett Street intersection are expected to continue to operate with a LOS 'A' during both the weekday AM and PM peak hours. The 95th percentile queue length associated with the westbound left turn movement at this intersection is anticipated to be 10m during the AM and PM peak hours, respectively. The 95th percentile queue length on the northbound approach is anticipated to be 20 and 15m during the weekday AM and PM peak hours, respectively. The existing intersection geometry and storage lengths accommodate traffic generated by Phase 1 of the development. The impacts of a right-turn on red restriction on the northbound approach and a jug handle on the westbound approach this intersection are shown in **Table 12**. These modifications are not anticipated to have a significant impact on the overall operations of the intersection, however they are anticipated to increase the delay and queueing on the northbound approach.

The eastbound left turn movement at the Booth Street/Albert Street intersection is anticipated to increase to a v/c ratio of 1.05 (from 1.04 in 2023 background scenario). The addition of site generated traffic is not anticipated to increase the 95th percentile queue length for the eastbound left turn movement during the PM peak hour; however, as was noted in the future background scenario, the 95th percentile queue length is anticipated to exceed the existing storage length and block the adjacent through traffic lane. If dual eastbound left turn lanes are implemented by the City, the 95th percentile queue length is anticipated to decrease to 80m during the PM peak hour, consistent with the 2023 background traffic analysis. The effects of providing dual eastbound left turn lanes at this intersection are shown in **Table 12**.

Table 12: 2023 Total Traffic Intersection with Mitigations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Northbound Right Turn on Red Restriction							
Wellington Street/ Lett St	AM	0.62	A	EBT/R	6 sec	0.61	B
	PM	0.59	A	WBT, NB	13 sec	0.56	A
Westbound Left Cyclist Jug Handle							
Wellington Street/ Lett St	AM	0.68	B	EBT/R	16 sec	0.66	B
	PM	0.60	A	WBT	25 sec	0.59	A
Dual Eastbound Left Turn Lanes							
Booth St/ Albert St	AM	0.87	D	SBR, EBL	47 sec	0.75	C
	PM	0.94	E	WBT	47 sec	0.87	D

5.8.5 2028 Total Traffic

Intersection capacity analysis has been completed for the AM and PM peak hours in the 2028 total traffic condition. The lane configurations and signal timing plans are consistent with the analysis presented in Section 0. The results of the analysis are summarized in **Table** 13 **13** with detailed reports included in **Appendix J**.

Table 13: 2028 Total Traffic Intersection Operations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Booth St/ Wellington St/ Sir John A. Macdonald Pkwy	AM	1.02	F	NBT/R	39 sec	0.98	E
		0.99	E	EBT			
	PM	1.01	F	WBT	44 sec	1.00	E
		1.01	F	NBT/R			
Wellington St/ Lett St	AM	0.61	A	EBT/R	5 sec	0.59	A
	PM	0.57	A	WBT	8 sec	0.56	A
Wellington St/ Portage Bridge	AM	0.82	D	EBL	27 sec	0.73	C
	PM	0.91	E	SBR	33 sec	0.83	D
Booth St/ Fleet St	AM	10 sec	B	WB	0 sec	0.37	A
	PM	11 sec	B	WB	0 sec	0.52	A
Booth St/ Albert St	AM	1.10	F	SBL	51 sec	0.78	C
		0.96	E	SBR			
	PM	1.25	F	SBL	64 sec	0.98	E
		1.10	F	EBL			
		1.05	F	WBT			

The addition of site generated traffic is not anticipated to have a significant impact on the overall intersection operations within the study area in the 2028 horizon year.

The Wellington Street/Lett Street intersection is anticipated to operate with a LOS ‘A’ during both the weekday AM and PM peak hours. The 95th percentile queue length associated with the westbound left turn movement at this intersection is anticipated to be 10m during the AM and PM peak hours respectively. The 95th percentile queue length on the northbound approach is anticipated to be 20 and 15m during the weekday AM and PM peak hours, respectively. The existing intersection

geometry and storage lengths accommodate traffic generated by Phase 1 of the development. The impacts of a right-turn on red restriction on the northbound approach and a jug handle on the westbound approach of this intersection are shown in **Table 14**. These modifications are not anticipated to have a significant impact on the overall operations of the intersection, however they are anticipated to increase the delay and queueing on the northbound approach.

The eastbound left turn movement during the PM peak hour at the Booth Street/Albert Street intersection is anticipated to increase to a v/c ratio of 1.10 (from 1.09 in 2028 background scenario). The addition of site generated traffic is not anticipated to increase the 95th percentile queue length for the eastbound left turn movement during the PM peak hour; however, as was noted in the future background scenario, the 95th percentile queue length is anticipated to exceed the existing storage length and block the adjacent through traffic lane.

If dual eastbound left turn lanes are implemented by the City, the 95th percentile queue length is anticipated to decrease to 85m during the PM peak hour, consistent with the 2028 background traffic analysis. The effects of providing dual eastbound left turn lanes at this intersection are shown in **Table 14**.

Table 14: 2028 Total Traffic Intersection with Mitigations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Northbound Right Turn on Red Restriction							
Wellington St/ Lett St	AM	0.63	B	EBT/R	6 sec	0.61	B
	PM	0.57	A	WBT	9 sec	0.56	A
Westbound Left Cyclist Jug Handle							
Wellington St/ Lett St	AM	0.69	B	EBT/R	16 sec	0.67	B
	PM	0.62	B	WBT	30 sec	0.61	B
Dual Eastbound Left Turn Lanes							
Booth St/ Albert St	AM	0.89	D	EBL	48 sec	0.76	C
	PM	0.97	E	WBT	49 sec	0.89	D

While there are some critical movements that were found to operate at LOS 'F' during peak periods both without and with the addition of site generated trips, all intersections in all scenarios are expected to operate with an overall LOS 'E' or better during the weekday AM and PM peak hours.

Based on the analysis, the eastbound left turn movement at the Booth Street/Albert Street intersection is anticipated to operate with a LOS 'F' during the PM peak period. The analysis suggests a 95th percentile queue length of 170m for the eastbound left turn during the PM peak period. As such, 95th percentile eastbound left turn queue is anticipated to exceed the existing storage length and spill over inter the adjacent through lane throughout the PM peak period. Based on the analysis, it is recommended the City consider implementing dual eastbound left turn lanes at the Booth Street/Albert Street intersection when the existing bus lanes along Albert Street are repurposed. Dual eastbound left turn lanes are expected to improve the overall intersection operations during both the AM and PM peak hours and reduce queueing. As dual eastbound left turn lanes will be a fully protected phase, it will provide additional safety/comfort for pedestrians crossing the north leg of the intersection, however it will increase the pedestrian crossing distance on the west leg. As the proposed development is not anticipated to add eastbound left turning vehicles to this intersection, this modification would be implemented by the City.

The City could consider implementing a jug handle at the Wellington Street/Lett Street intersection to improve the BLOS for the westbound left turn movement to address the existing cycling condition. The jug handle would increase the delay and queuing on the northbound approach. Some cyclists may arrive/depart the subject lands using the NCC multi-use pathways at Pooley's Bridge. These pathways connect to other off-road NCC pathways providing an alternative east-west cycling route, as well as a north-south cycling route along Portage Bridge.

As development of future phases within the east LeBreton Flats lands progress, the impacts of the right-turn on red restriction are anticipated to increase. Since the Wellington Street/Lett Street intersection is the only signalized access to the subject lands, a right turn on red restriction on the northbound approach is not recommended.

5.8.6 Demand Rationalization

The required traffic reductions to yield an acceptable LOS 'E' at the study area intersections are summarized in **Table 15**.

Table 15: Demand Rationalization – Vehicle Reductions

	Intersection	Movement	Scenario			
			2023 FB	2028 FB	2023 TT	2028 TT
AM Peak Hour	Booth St/ Wellington St/ Sir John A. Macdonald Pkwy	NBT/R	-	9	-	15
	Booth St/Albert St	SBL	13	19	14	20
PM Peak Hour	Booth St/ Wellington St/ Sir John A. Macdonald Pkwy	WBT	-	1	-	8
		NBT/R	-	-	-	2
	Booth St/Albert St	SBL	25	29	26	32
		EBL	12	23	14	26
		WBT	22	40	22	40

<u>John A Macdonald Parkway/Wellington Street/Booth Street</u>
The proposed development is anticipated to add the following traffic to critical movements:

- AM peak hour:
  - eleven westbound through vehicles;
  - three northbound through vehicles; and,
  - three northbound right turning vehicles.
- PM peak hour:
  - seven westbound through vehicles;
  - one northbound through vehicle; and,
  - six northbound right turning vehicles.

During periods of higher congestion, more traffic exiting the site toward the north on Booth Street may choose to use the signalized access at Lett Street and turn right from Wellington Street to avoid congestion on northbound Booth.

<u>Booth Street/Albert Street</u>

- The proposed development is not anticipated to add any traffic to the critical movements.
- Acceptable operating conditions are anticipated if dual eastbound left turn lanes are implemented by the City.

Options to displace background traffic at the Booth Street/Wellington Street/Sir John A. Macdonald Parkway and Booth Street/Albert Street intersections include:

- increased use of non-auto modes of transportation;
- alternate time of travel for drivers using the corridor to make use of off-peak capacity; or
- alternate routes for travel.

Alternate north-south interprovincial routes include the Portage Bridge, the Champlain Bridge, Alexandra Bridge and Macdonald-Cartier Bridge. The Chaudière Crossing narrows to a two-lane cross section prior to the Chaudière Bridge. As part of the Domtar lands development, Booth Street will narrow to a two-lane cross section from north of the Canadian War Museum access to the Chaudière Bridge to improve facilities for non-auto modes along this corridor. This is not anticipated to have a significant impact on the operations at the Booth Street/Wellington Street/Sir John A. Macdonald Parkway intersection but may increase non-auto modes.

Alternative east-west routes outside the study area include Somerset Street West and Gladstone Avenue. It is noteworthy that existing turn restrictions at the Booth Street/Wellington Street/Sir John A. Macdonald Parkway intersection limit the ability for trips from the development to depart south via Booth Street. Trips destined to the south are required to either exit the study area to the east to use north-south routes in the downtown core or exit the study area to the west to use north-south routes such as Parkdale Avenue or Island Park Drive.

Based on the foregoing, the site generated trips are expected to have minimal impact on the critical movements of the study are intersections. A review of the alternative north-south interprovincial routes, and north-south and east-west routs outside the study area are considered outside the scope of this study.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Development Design and Parking

- The overall East LeBreton Flats lands will be accessed through the Booth Street/Fleet Street and Wellington Street/Lett Street intersections. Parking for the development will be underground with access to Lloyd Street. The recently completed Confederation Line construction has developed a median along Booth Street, restricting the Fleet Street intersection to right-in right-out. The Wellington Street/Lett Street intersection will remain signalized.
- Pedestrian and cycling facilities will be provided between the main building entrances and the sidewalks and cycling facilities along the adjacent roadways. Bicycle parking will be provided in accordance with the City's Zoning By-Law.
- Phase 1 of the proposed development is within a walking distance of approximately 400m of the Pimisi LRT station. This LRT station provides comprehensive transit coverage across the City of Ottawa.
- All required TDM-supportive design and infrastructure measures in the TDM checklist are met.
- The proposed development will provide a total of 340 vehicle parking spaces, adhering to the requirements of the City's ZBL.
- The proposed development will provide a total of 330 bicycle parking spaces, adhering to the requirements of the ZBL.

Boundary Street MMLOS

- PLOS (Target 'A'):
    - Fleet Street and Lett Street (North-South) achieve the target PLOS 'A'.
    - With no existing sidewalk, Lloyd Street and Lett Street (East-West) are PLOS 'F'.
- BLOS (Target 'D'):
    - Each boundary roadway achieves a BLOS 'B', surpassing the target.

- TLOS and TkLOS
    - Not applicable as Boundary streets are not bus or truck routes.
- AutoLOS (Target 'E')
    - Each boundary roadway achieves an Auto LOS 'A', surpassing the target.
- The approved design for the boundary roadways will provide new pedestrian facilities along the boundary roadways, achieving the target PLOS 'A'.

Access Intersections Design, TDM, Neighbourhood Traffic Management, and Transit

- The width and location of the proposed underground parking ramp adhere to the requirements of the City's Zoning By-law and Private Approach By-law.
- A maximum grade of 6% is provided for a distance of 8.4m from the back of sidewalk, and vehicles exiting the ramp will have appropriate sight lines to the sidewalk and roadway. A waiver to the City's Private Approach By-law is recommended.
- The proposed development conforms to the City's Transportation Demand Management initiatives by providing easy access to the local pedestrian, bicycle and transit systems. To encourage travel by sustainable modes, the proponent agrees to unbundle parking cost from the purchase price/monthly rent.
- As the only accesses to the subject lands are provided on Booth Street and Wellington Street, which are classified as arterial roadways in the City's 2013 TMP, the proposed development is not anticipated to have any measurable impact on the residential communities in the site's vicinity.
- Traffic volumes along Lett Street and Lloyd Street, south of Fleet Street are not anticipated to exceed Area Traffic Management thresholds for local roadways. However, it is noted that the previously approved design for these roadways include roadway narrowings at the Fleet Street intersections.
- With the Confederation LRT Line and several bus routes (#61, 63, 65, 75, and 85) within 400m of the site, the additional transit trips generated by the site are not anticipated to have a significant impact on the operations of OC Transpo.

Intersection MMLOS Analysis

- None of the signalized intersections within the study area meet the target PLOS and BLOS.
- All of the study area intersections are not located along a Transit Priority Corridor and do not have a target TLOS in the MMLOS Guidelines.
- All intersections within the study area meet the target TkLOS.
- The Sir John A Macdonald Parkway/Wellington Street/Booth Street and Albert Street/Booth Street intersections do not meet the target Auto LOS.
- Wellington Street/Portage Bridge intersection: This is not a standard configuration and the results of the PLOS and BLOS analysis should be treated with caution. The pedestrian and cycling facilities are anticipated to have a higher PLOS and BLOS than represented by the analysis. Critical movements at this intersection are currently operating with a vehicle LOS E during the PM peak hour.
- Wellington Street/Sir John A MacDonald Parkway/Booth Street intersection: The City could consider providing either textured or zebra striped crosswalks to improve the pedestrian level of comfort crossing each approach. Consideration could also be given to implementing a two stage, left-turn bike box to facilitate the southbound left turn movement for cyclists at this intersection. Critical movements at this intersection are currently operating with a vehicle LOS F during the PM peak hour.
- Wellington Street/Lett Street intersection: The City could consider implementing leading pedestrian intervals and a jug handle to facilitate the westbound left turn movement for cyclists.
- Albert Street/Booth Street intersection: The PLOS is highly influenced by the number of lanes crossed (7 lanes) along Albert Street. A further reduction in east-west travel lanes (beyond

the repurposed transit lanes) is anticipated to have a significant impact on the vehicle operations at this intersection and is not recommended. Leading pedestrian intervals and zebra striped crosswalks are already in place and provide a higher level of comfort and safety for pedestrians crossing Albert Street. Critical movements at this intersection are currently operating with a vehicle LOS F during the PM peak hour.

Future Intersection Operations

- Under the 2023 and 2028 background and total traffic conditions, critical movements at the Wellington Street/Sir John A MacDonald Parkway/Booth Street and Albert Street/Booth Street intersections are anticipated to operate with LOS F during the AM and PM peak hours.
- Continued support of transportation solutions that maximize the transit, bike and pedestrian modes of travel will be critical in this area. Options to displace traffic along the study area roads include increased use of non-auto modes of transportation to/from the downtown core, alternate time of travel for drivers using the corridor to make use of off-peak capacity and alternate routes for travel to/from the downtown core.
- Acceptable operating conditions are anticipated at the Albert Street / Booth Street intersection in the AM and PM peak hours if dual eastbound left turn lanes are implemented by the City, post LRT.

NOVATECH

Prepared by:

Brad Byvelds, P. Eng.
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APPENDIX A

BLOCK SUBDIVISION PLAN

NOTE: PROJECTION NAD 83, MTM 3°; ZONE 9

Project

National Capital Commission

LeBreton Flats Infrastructure and Remediation Project

Title

BLOCK SUBDIVISION OF LEBRETON FLATS

DESSAU SOPRIN

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APPENDIX B

PROPOSED SITE PLAN

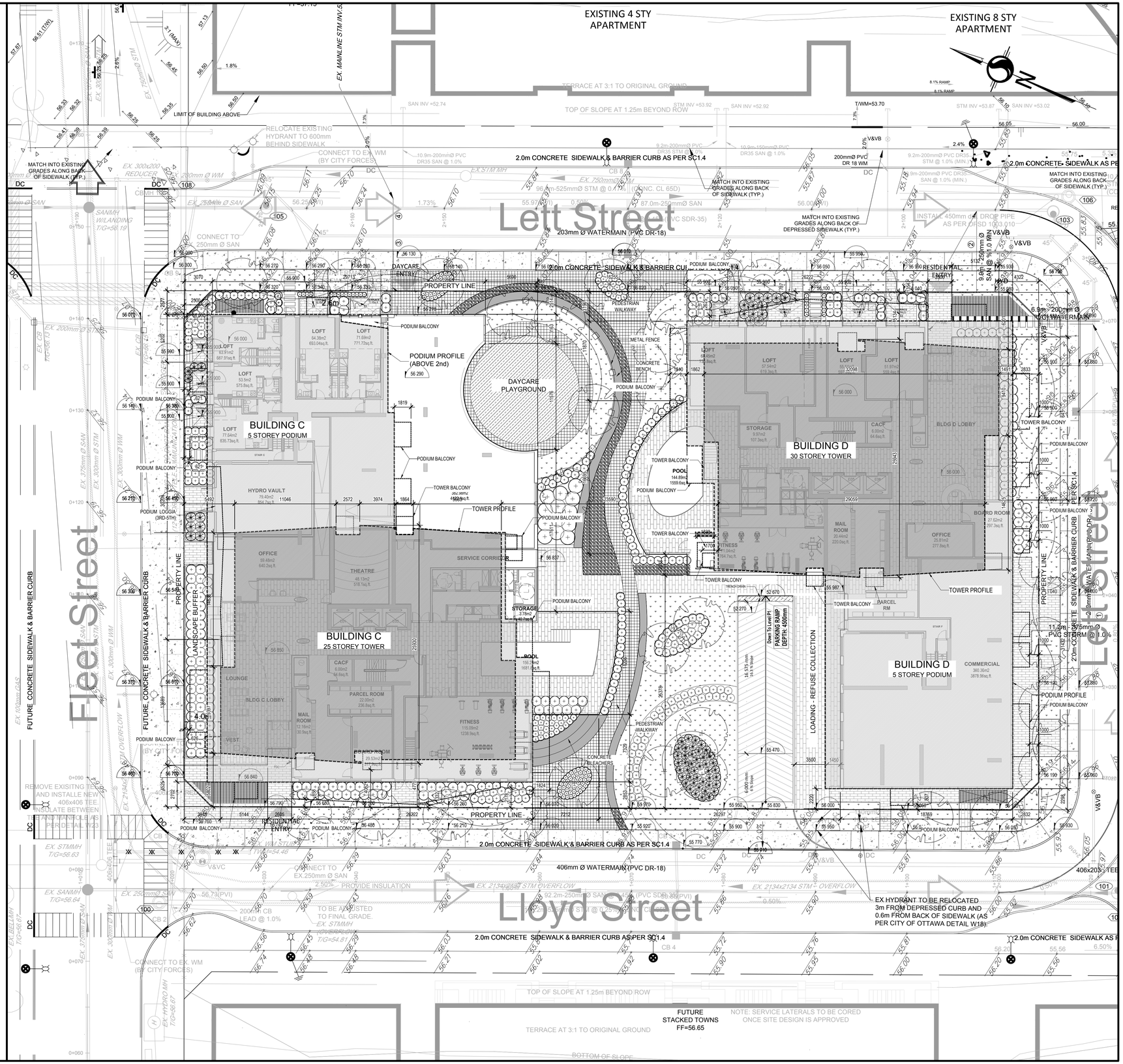
BUILDING C - 25 STOREYS										
	AREA (m²)		UNITS						AMENITIES (m²)	
Floor	GFA	BFA	Loft	Studio	1BR	2BR	3BR	TOT	Common	Total
G	579.0	1763.0	5	0	0	0	0	5	921.8	983.5
Mezz	174.1	174.1								
2	789.0	1341.0	0	3	9	3	0	15	234.2	481.7
3	1087.0	1407.8	0	4	10	4	0	18		137.8
4	1087.0	1407.8	0	4	10	4	0	18		137.8
5	1087.0	1407.8	0	4	10	4	0	18		137.8
6	421.0	719.2	0	1	2	2	1	6	657.7	788.2
7	584.7	719.2	0	1	4	3	1	9		38.2
8	608.2	749.8	0	2	6	3	0	11		38.2
9	608.2	749.8	0	2	6	3	0	11		38.2
10	608.2	749.8	0	2	6	3	0	11		38.2
11	608.2	749.8	0	2	6	3	0	11		38.2
12	608.2	749.8	0	2	6	3	0	11		38.2
13	608.2	749.8	0	2	6	3	0	11		38.2
14	608.2	749.8	0	2	6	3	0	11		38.2
15	608.2	749.8	0	2	6	3	0	11		38.2
16	584.7	719.2	0	1	4	3	1	9		33.0
17	608.2	749.8	0	1	6	2	1	10		38.2
18	608.2	749.8	0	1	6	2	1	10		38.2
19	608.2	749.8	0	1	6	2	1	10		38.2
20	608.2	749.8	0	1	6	2	1	10		38.2
21	608.2	749.8	0	1	6	2	1	10		38.2
22	608.2	749.8	0	1	6	2	1	10		38.2
23	608.2	749.8	0	1	6	2	1	10		38.2
24	608.2	749.8	0	1	6	2	1	10		38.2
25	608.2	749.8	0	1	6	2	1	10		38.2
26	608.2	749.8	0	1	6	2	1	10		38.2
27	608.2	749.8	0	1	6	2	1	10		38.2
28	608.2	749.8	0	1	6	2	1	10		38.2
29	608.2	749.8	0	1	6	2	1	10		38.2
30	608.2	749.8	0	1	6	2	1	10		38.2
MPH		262.2								
SUBTOTAL	16732.9	22672.9	5	34	160	74	3	276	1813.7	3387.4

BUILDING D - 30 STOREYS										
	AREA (m²)		UNITS						AMENITIES (m²)	
Floor	GFA	BFA	Loft	Studio	1BR	2BR	3BR	TOT	Common	Total
G	590.1	1440.9	4	0	0	0	0	4	919.1	1013.8
Mezz	187.0	187.0								
2	913.1	1341.0	0	2	5	2	0	9	178.2	245.1
3	1121.0	1407.8	0	4	10	4	0	18		126.0
4	1121.0	1407.8	0	4	10	4	0	18		126.0
5	1121.0	1407.8	0	4	10	4	0	18		126.0
6	421.0	719.2	0	1	2	2	1	6	657.7	788.2
7	584.7	719.2	0	1	4	3	1	9		38.2
8	608.2	749.8	0	2	6	3	0	11		38.2
9	608.2	749.8	0	2	6	3	0	11		38.2
10	608.2	749.8	0	2	6	3	0	11		38.2
11	608.2	749.8	0	2	6	3	0	11		38.2
12	608.2	749.8	0	2	6	3	0	11		38.2
13	608.2	749.8	0	2	6	3	0	11		38.2
14	608.2	749.8	0	2	6	3	0	11		38.2
15	608.2	749.8	0	2	6	3	0	11		38.2
16	584.7	719.2	0	1	4	3	1	9		33.0
17	608.2	749.8	0	1	6	2	1	10		38.2
18	608.2	749.8	0	1	6	2	1	10		38.2
19	608.2	749.8	0	1	6	2	1	10		38.2
20	608.2	749.8	0	1	6	2	1	10		38.2
21	608.2	749.8	0	1	6	2	1	10		38.2
22	608.2	749.8	0	1	6	2	1	10		38.2
23	608.2	749.8	0	1	6	2	1	10		38.2
24	608.2	749.8	0	1	6	2	1	10		38.2
25	608.2	749.8	0	1	6	2	1	10		38.2
26	608.2	749.8	0	1	6	2	1	10		38.2
27	608.2	749.8	0	1	6	2	1	10		38.2
28	608.2	749.8	0	1	6	2	1	10		38.2
29	608.2	749.8	0	1	6	2	1	10		38.2
30	608.2	749.8	0	1	6	2	1	10		38.2
MPH		262.2								
SUBTOTAL	20024.0	26107.7	4	47	177	74	17	319	1755.0	3145.40
TOTAL	36756.9	49102.7								

PARKING LEVELS									
	AREA (m²)		PARKING				Bicycle Storage		
Floor	GFA	BFA	Standard	Small	HC	Total	Horizontal	Vertical	Total
P1		5159.0	73	17	4	94	117	125	242
P2		5159.0	100	20	1	121	21	16	37
P3		5159.0	102	20	3	125	30	21	51
TOTAL		15762.0	275	57	8	340	168	162	330

PARKING BREAKDOWN			
	Minimum req'd by zoning	Maximum permitted by zoning	Provided
Residential	0	892	310
Daycare	0	inc	0
Commercial	0	inc	0
Guest	30	inc	30
TOTAL	30	892	340

PROJECT SUMMARY				
	BUILDING C	BUILDING D	TOTAL	REQUIRED
SITE AREA (m²)			5216.0	
BUILDING FOOTPRINT (PROJECTION) (m²)	1818.1	1538.2	3356.3	
BUILDING FOOTPRINT (GROUND FLOOR) (m²)	1763.7	1440.9	3204.6	
GROSS FLOOR AREA (m²)	20024.0	16732.9	36756.9	
GROSS LEASABLE FLOOR AREA (Daycare)	383.5		383.5	
GROSS LEASABLE FLOOR AREA (Commercial)		739.9	739.9	
DENSITY			7.04	
SITE OCCUPANCY (%)			64.0	
BUILDING HEIGHT (m)	80.51	95.95		
LANDSCAPED AREA (m²)			1813.8	
LANDSCAPED AREA (%)			34.8	30.0
RESIDENTIAL UNITS	275	318	593	
CARETAKER UNITS	1	1	2	
PARKING SPACES			340	30
BICYCLE STORAGE SPACES			330	304
COMMON AMENITIES (m²)(required)	1813 (828)	1755 (957.0)		
AMENITIES (m²)(required)	3387 (1656)	3145 (1914)		



CLIENT:
CLARIDGE HOMES
210 Gladstone Avenue
OTTAWA, ONTARIO K2P 0Y6
T: (613) 233-6030 F: (613) 233-8290

ARCHITECTS:
EVOQ
1435, RUE SAINT-ALEXANDRE, BUREAU 1000
MONTRÉAL (QUÉBEC) H3A 2G4
T. 514-393-9490 F. 514-393-9498
info@evoqarchitecture.com

LANDSCAPE ARCHITECTS:
James B. Lennox and Associates Inc.
Landscape Architects
361 Hinton Avenue South,
Ottawa, Ontario, K1Y 1A6 T : (613) 722 5168

STRUCTURAL ENGINEERS:
GOODEVE STRUCTURAL INC.
70 Rideau St., Suite 10, Ottawa ON K1N 1G1
tel. 613-226-4608 www.goodevestructural.ca

MECANICAL + ELECTRICAL ENGINEERS:
Smith + Andersen
1600 Carling Ave. Suite 530
Ottawa, ON K1Z 1G3
Tel : (613) 230-1186
smithandersen.com

TOPOGRAPHICAL SURVEYOR:
Stantec
1331 Clyde Ave Suite 400
Ottawa, ON K2C 3G4
Tel : (613) 722-4420
stantec.com

CIVIL ENGINEERS:
NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Dr.
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email novatech@novatech-eng.com

URBAN DESIGN CONSULTANTS:
URBAN STRATEGIES INC.
197 Spadina Avenue Suite 600
Toronto, ON. M5T 2C8
Tel : (416) 340-9004
urbanstrategies.com

01	SITE PLAN APPROVAL	NG	08-05-2019

REVISION:

THE GENERAL CONTRACTOR :

1. SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS ON SITE TO ENSURE COMPLIANCE WITH THE DIMENSIONS GIVEN ON THE DRAWINGS.
2. SHALL BE RESPONSIBLE TO IMMEDIATELY SUBMIT A REPORT TO THE ARCHITECT OR ENGINEER OUTLINING ANY INACCURACIES.
3. SHALL NOT TAKE SCALED MEASUREMENTS OFF THE DRAWINGS.
4. ANY INDIVIDUAL OR FIRM THAT HAVE RECEIVED ELECTRONIC DOCUMENT SHALL USE THEM AT THEIR OWN RISK. ONLY ORIGINAL DRAWINGS, STAMPED BY THE ARCHITECT, MAY BE USED FOR CONSTRUCTION.

SEAL

ONTARIO ASSOCIATION OF ARCHITECTS
ALAIN FOURNIER
LICENCE 6760

PROJECT:
LEBRETON - PHASE 4-5

DRAWING TITLE:
SITE PLAN

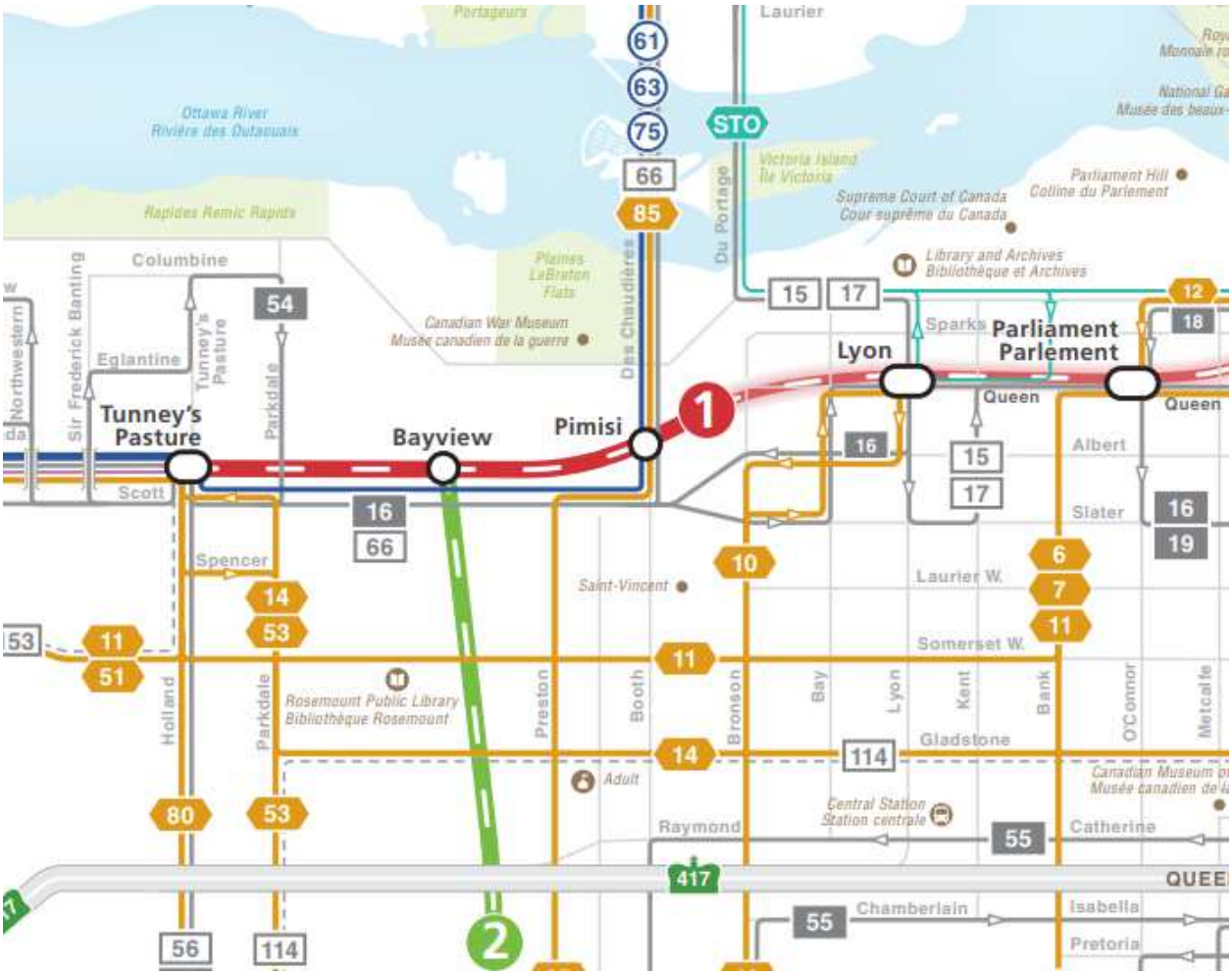
DESIGN:	NG	APPROVED:	NG
DRAWN:	NG.EF.PS	DATE:	2020-01-13
VERIFIED:	NG	SCALE:	1:200

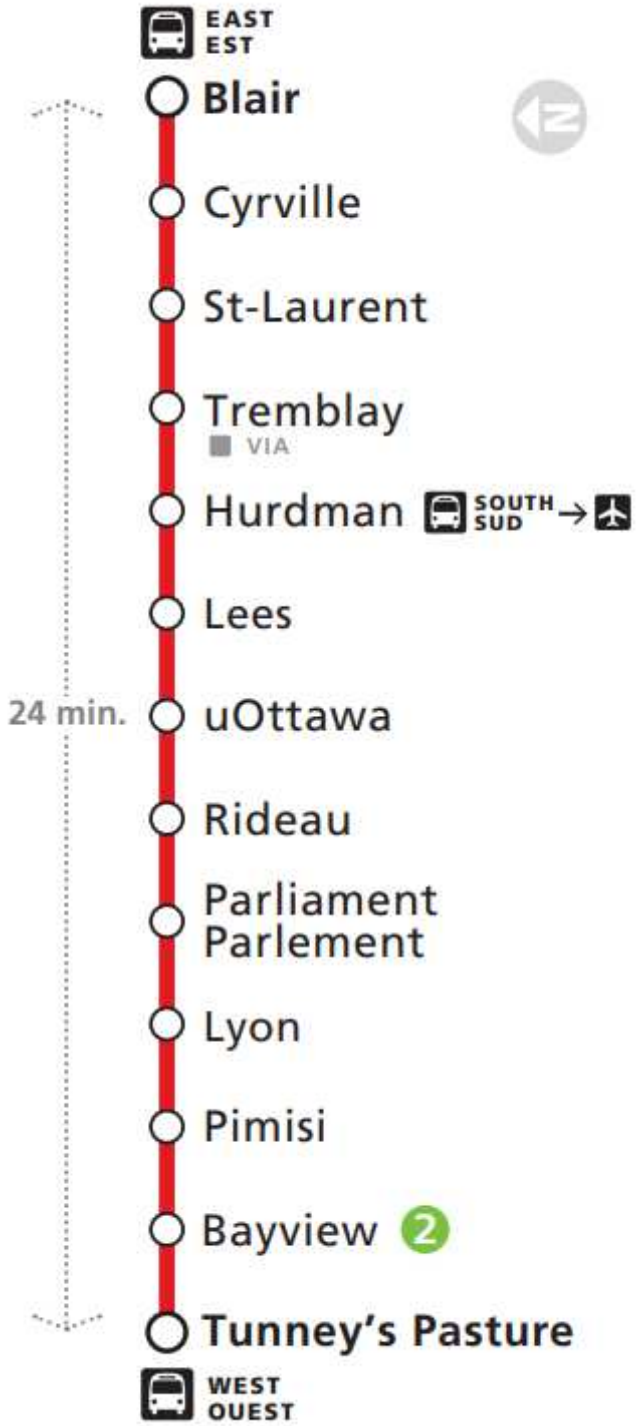
PROJECT N°: 9360-20

DRAWING N°: A-010

APPENDIX C

OC TRANSPO INFORMATION


Laurier
Portageurs
Ottawa River
Rivière des Outaouais
Rapides Remic Rapids
Plaines LeBreton Flats
Canadian War Museum
Musée canadien de la guerre
Des Chaudières
Du Portage
Victoria Island
Île Victoria
Supreme Court of Canada
Cour suprême du Canada
Parliament Hill
Colline du Parlement
Library and Archives
Bibliothèque et Archives
National Ga
Musée des beaux-
STO
61
63
75
66
85
Columbine
54
Northwestern
Sir Frederick Banting
Eglantine
Tunney's Pasture
Parkdale
Tunney's Pasture
Bayview
Pimisi
Lyon
Sparks
Parliament
Parlement
Queen
Queen
15
17
12
18
16
15
17
Albert
Slater
16
19
Scott
16
66
Spencer
14
53
10
Saint-Vincent
Laurier W.
6
7
11
Somerset W.
11
51
Holland
Parkdale
Rosemount Public Library
Bibliothèque Rosemount
Preston
Booth
Bronson
Bay
Lyon
Kent
Bank
O'Connor
Metcalfe
Gladstone
14
114
Adult
Canadian Museum
Musée canadien de l
80
53
Central Station
Station centrale
Raymond
55
Catherine
417
QUEE
55
Chamberlain
Isabella
Pretoria
56
114
1
2

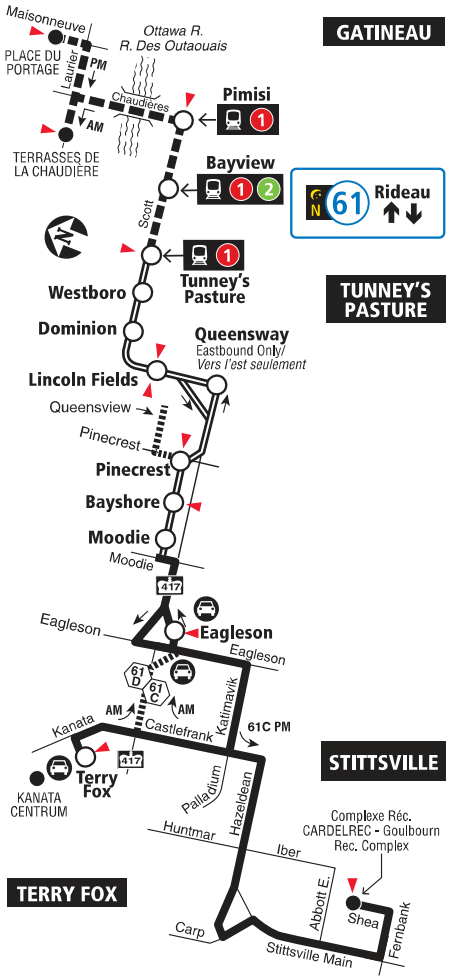

EAST
EST
Blair
Cyrville
St-Laurent
Tremblay
VIA
Hurdman
SOUTH
SUD
Lees
24 min.
uOttawa
Rideau
Parliament
Parlement
Lyon
Pimisi
Bayview
2
Tunney's Pasture
WEST
OUEST

61 Rapide

TERRY FOX STITTSVILLE
TUNNEY'S PASTURE GATINEAU

7 days a week / 7 jours par semaine

All day service and limited overnight
Service toute la journée et limité la nuit



Transitway & Station
Peak trips / Trajets de pointe
Selected time periods / Périodes sélectionnées
Park & Ride / Parc-o-bus
Timepoint / Heures de passage

When O-Train Line 1 is not running overnight, Route 61 will be extended downtown to Rideau Station. / Lorsque la ligne 1 de l'O-Train ne circule pas la nuit, le circuit 61 sera prolongée au centre-ville jusqu'à la station Rideau.

2019.07

Future route after O-Train Line 1 is open
Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

Lost and Found / Objets perdus..... **613-563-4011**
Security / Sécurité..... **613-741-2478**

OC Transpo **INFO 613-741-4390**
octranspo.com

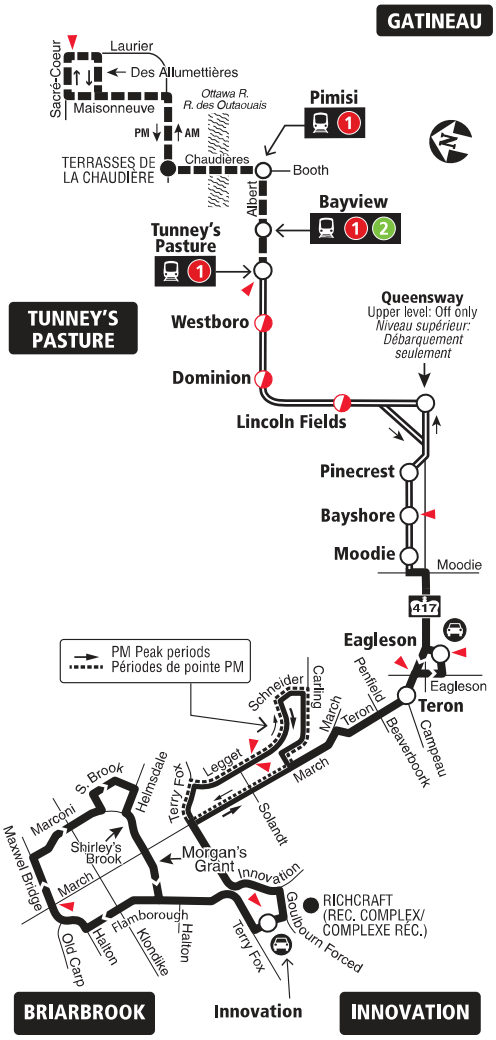
63 Rapide

INNOVATION BRIARBROOK TUNNEY'S PASTURE GATINEAU

7 days a week / 7 jours par semaine

All day service

Service toute la journée



2019.07

1

Starting July 14, 2019
À partir du 14 juillet 2019

Lost and Found / Objets perdus..... **613-563-4011**
Security / Sécurité..... **613-741-2478**

OC Transpo **INFO 613-741-4390**
octranspo.com

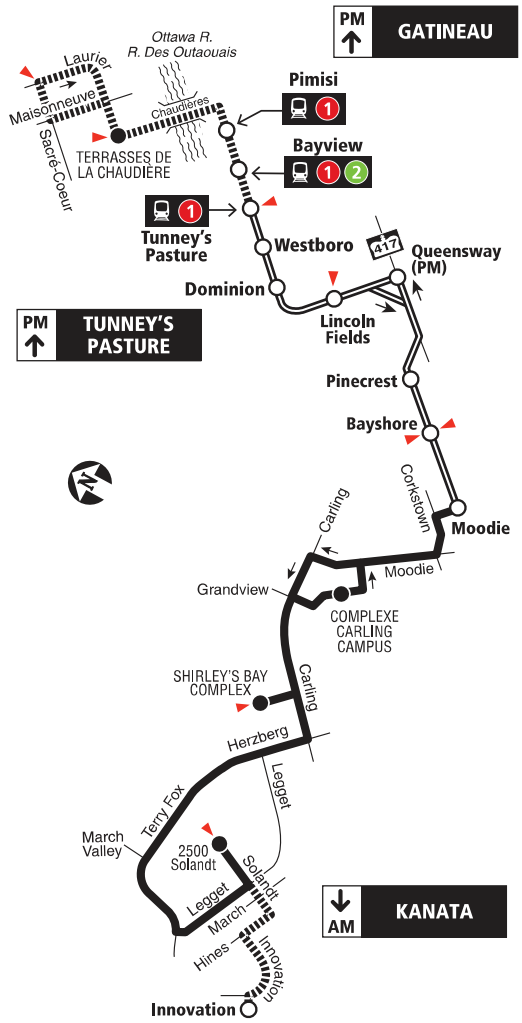
66 Local

KANATA
TUNNEY'S PASTURE
GATINEAU

Monday to Friday / Lundi au vendredi

Peak periods only

Périodes de pointe seulement



2019.07

Future route after O-Train Line 1 is open
Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité..... **613-741-2478**

OC Transpo **INFO 613-741-4390**
octranspo.com

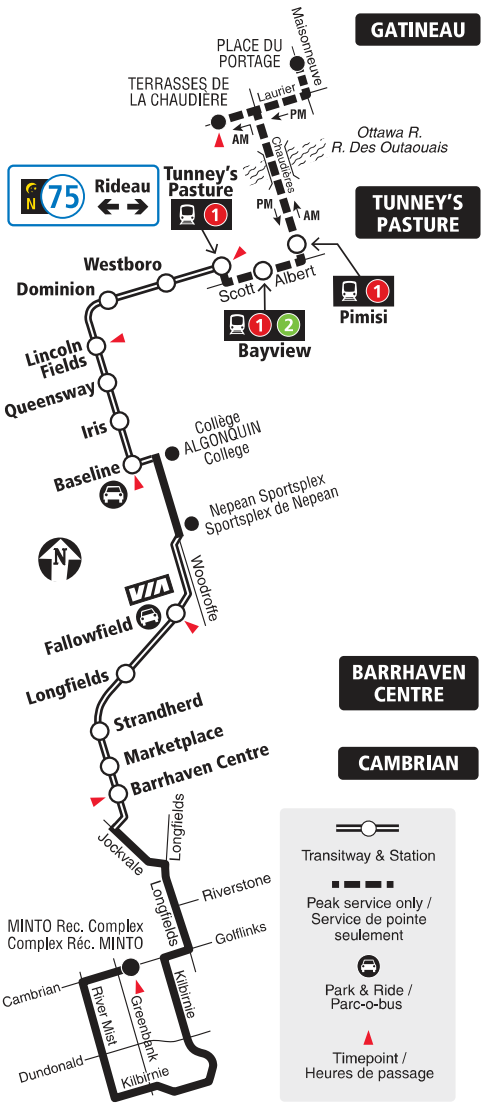
75 Rapide

CAMBRIAN BARRHAVEN C.
TUNNEY'S PASTURE GATINEAU

7 days a week / 7 jours par semaine

All day service and limited overnight

Service toute la journée et limité la nuit



When O-Train Line 1 is not running overnight, Route 75 will be extended downtown to Rideau Station. / Lorsque la ligne 1 de l'O-Train ne circule pas la nuit, le circuit 75 sera prolongée au centre-ville jusqu'à la station Rideau.

2019.07

Future route after O-Train Line 1 is open
Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité..... **613-741-2478**

OC Transpo **INFO 613-741-4390**
octranspo.com

85 GATINEAU / BAYSHORE

Fréquent

7 days a week / 7 jours par semaine

All day service

Service toute la journée

Station

Timepoint / Heures de passage

2019.07

Future route after O-Train Line 1 is open
Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité..... **613-741-2478**

OC Transpo **INFO 613-741-4390**
octranspo.com

APPENDIX D

TRAFFIC COUNT INFORMATION

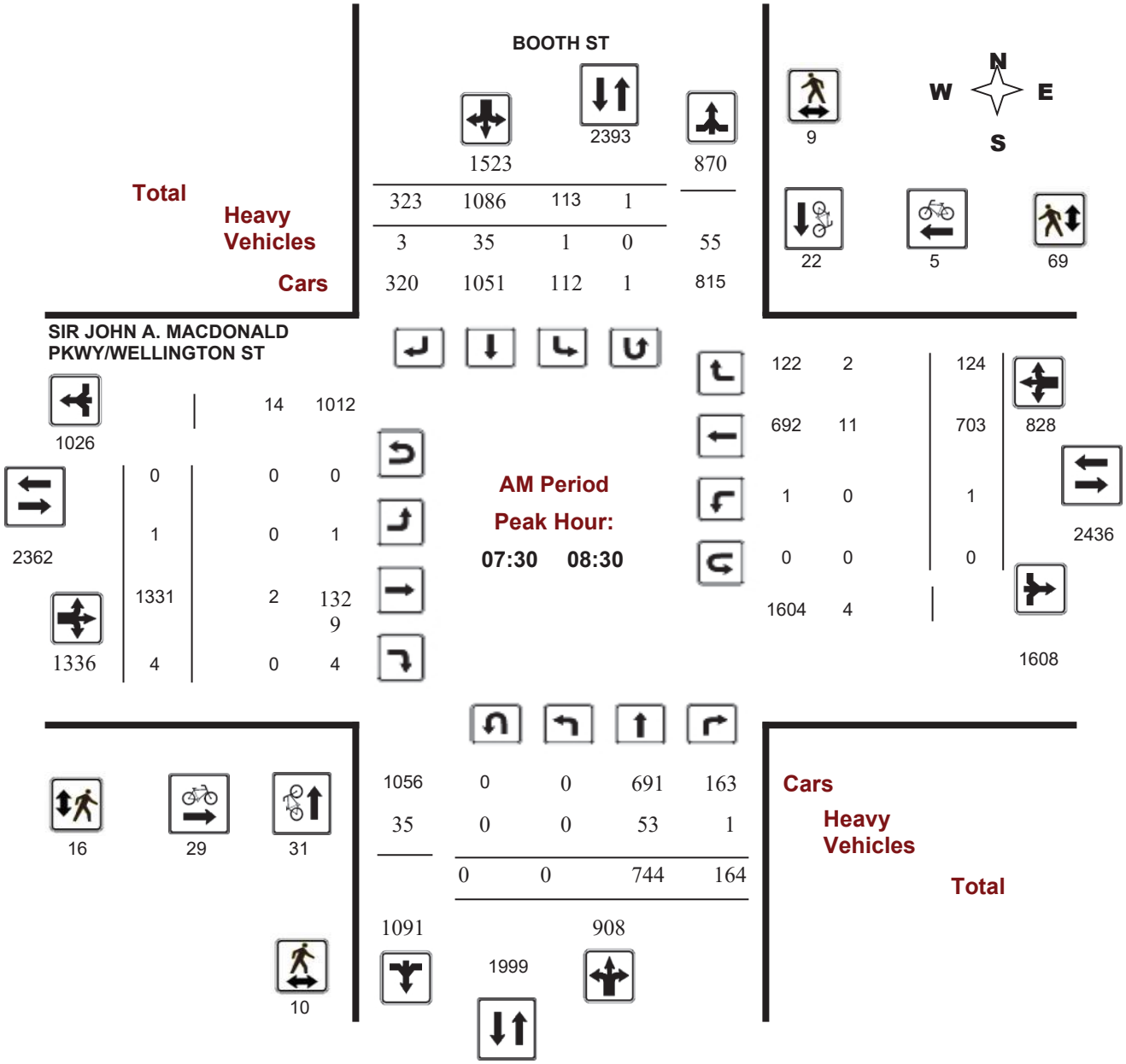
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

BOOTH ST @ SIR JOHN A. MACDONALD PKWY/WELLINGTON ST

Survey Date: Thursday, June 08, 2017 **WO No:** 37114

Start Time: 07:00 **Device:** Miovision



Comments

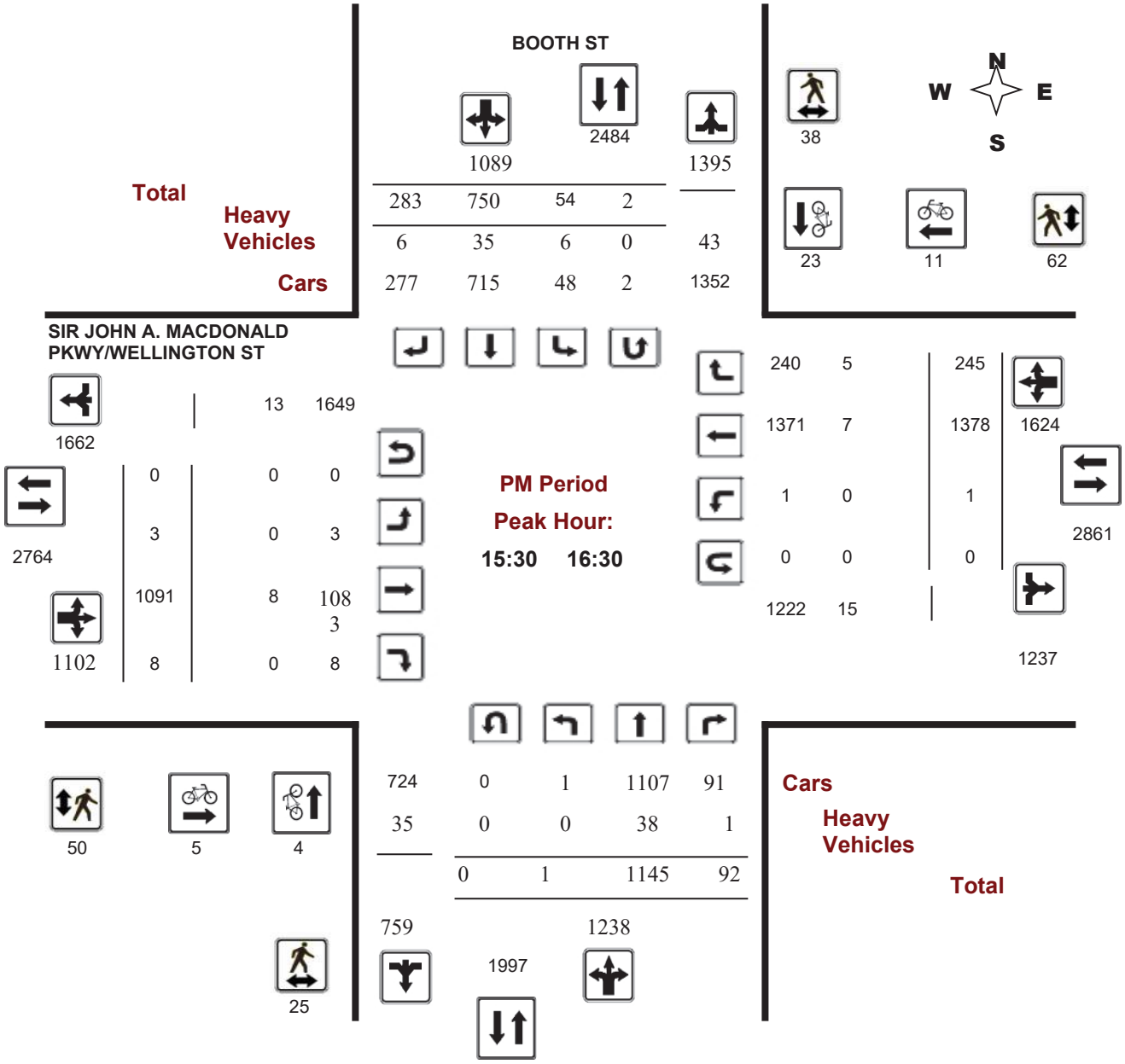
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

BOOTH ST @ SIR JOHN A. MACDONALD PKWY/WELLINGTON ST

Survey Date: Thursday, June 08, 2017 **WO No:** 37114

Start Time: 07:00 **Device:** Miovision



Comments

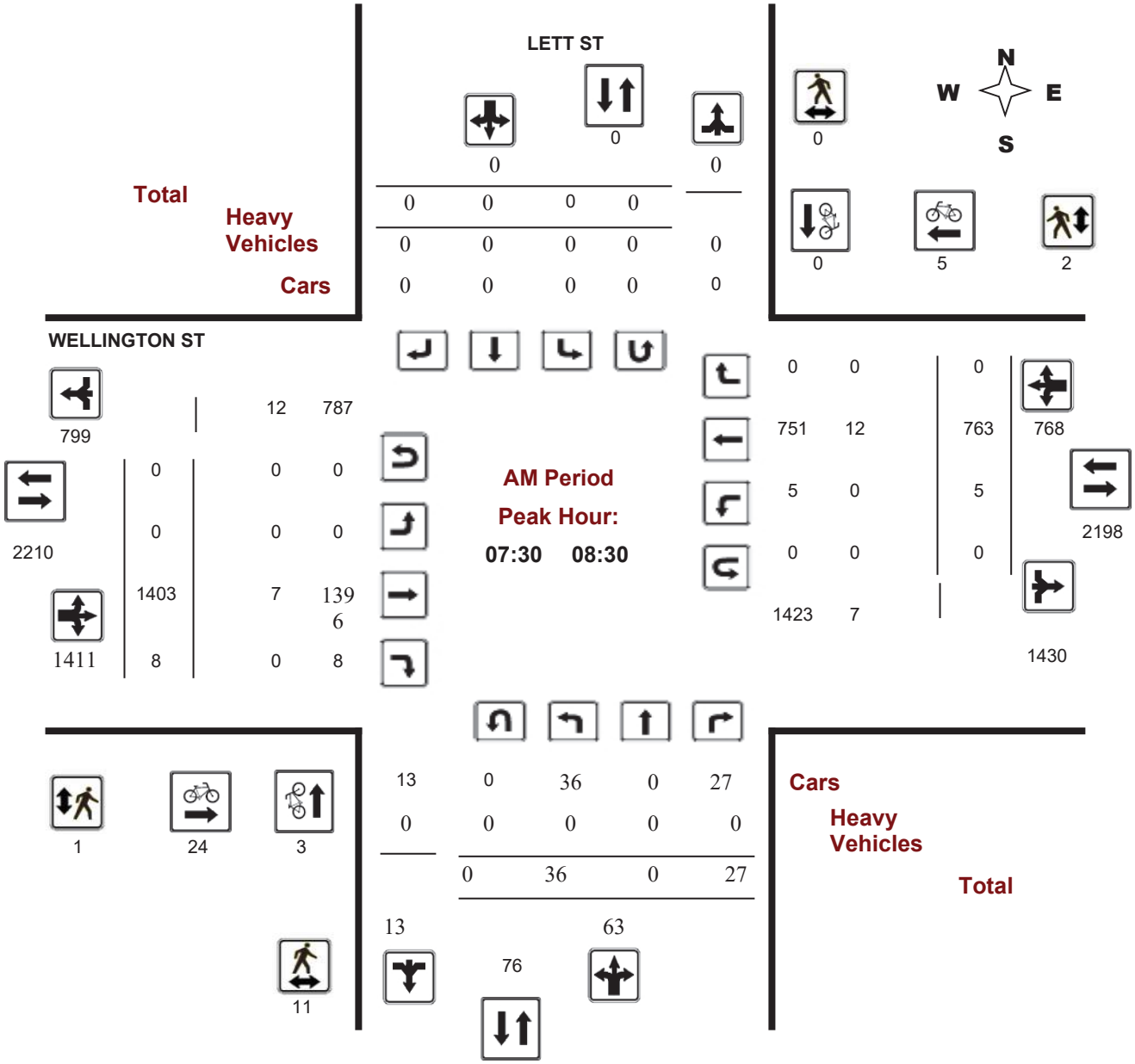
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

WELLINGTON ST @ LETT ST

Survey Date: Wednesday, August 31, 2016 **WO No:** 36259

Start Time: 07:00 **Device:** Miovision



Comments

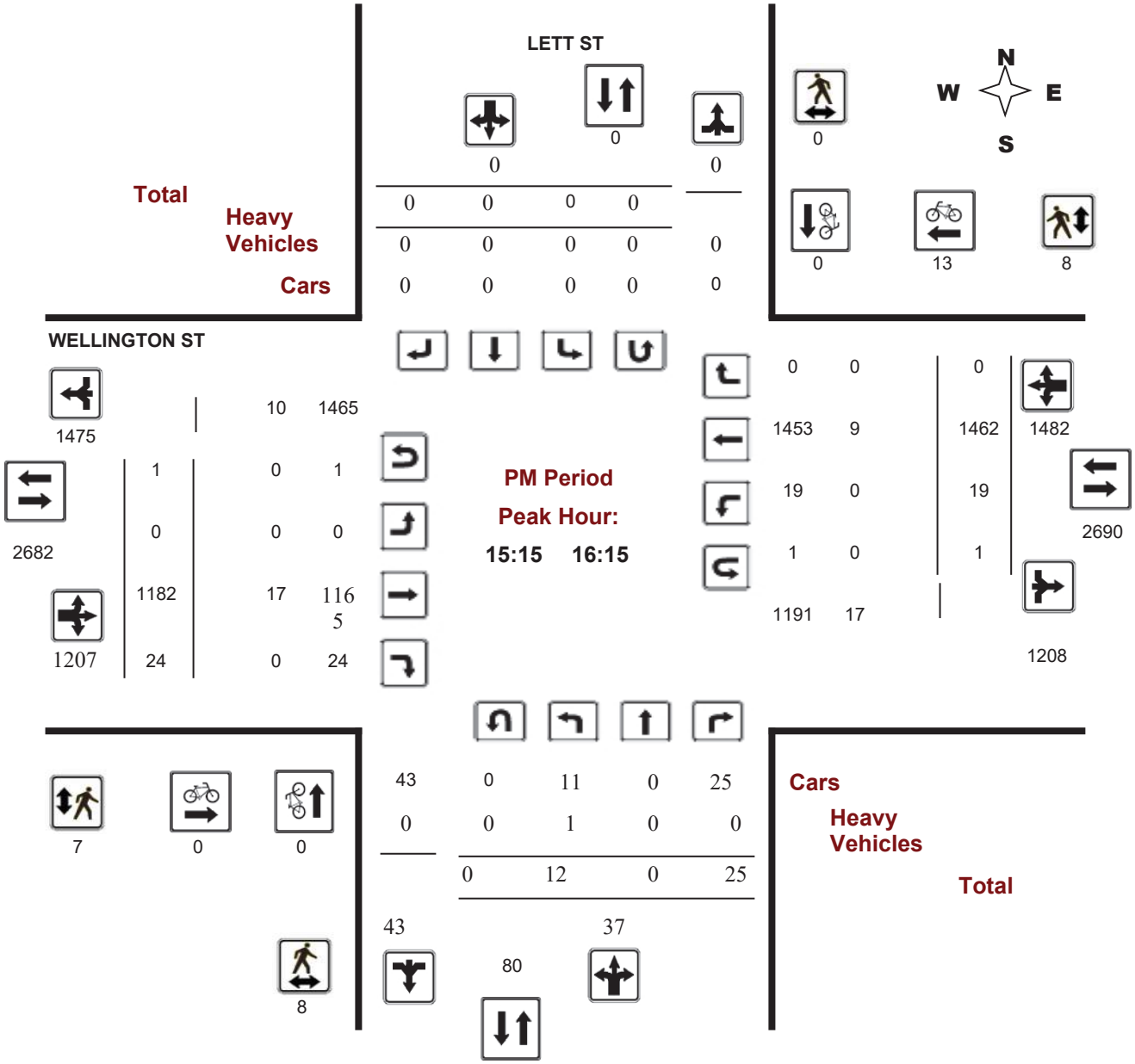
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

WELLINGTON ST @ LETT ST

Survey Date: Wednesday, August 31, 2016 **WO No:** 36259

Start Time: 07:00 **Device:** Miovision



Comments

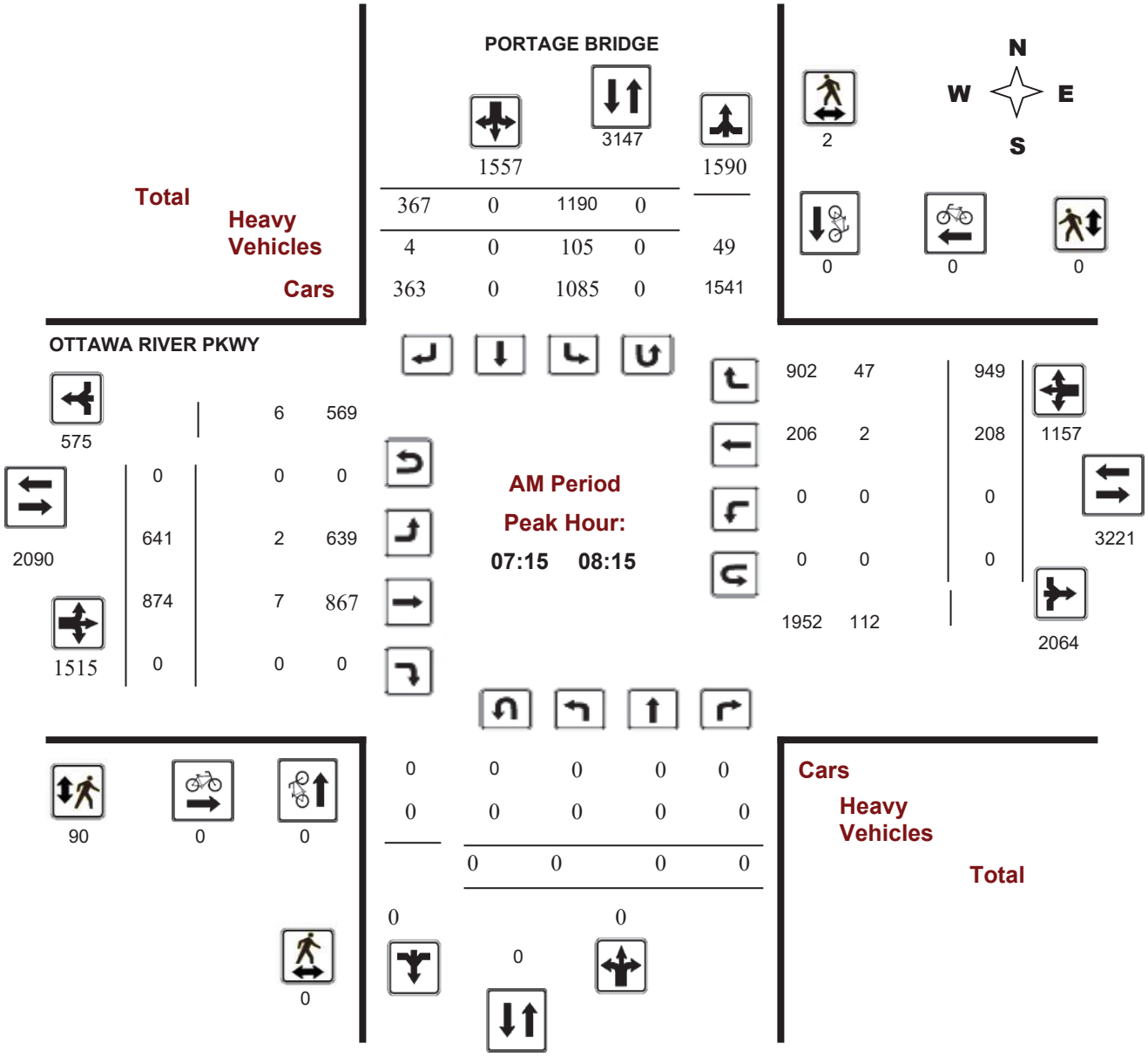
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

OTTAWA RIVER PKWY @ PORTAGE BRIDGE

Survey Date: Wednesday, March 23, 2016 **WO No:** 35813

Start Time: 07:00 **Device:** Miovision



Comments

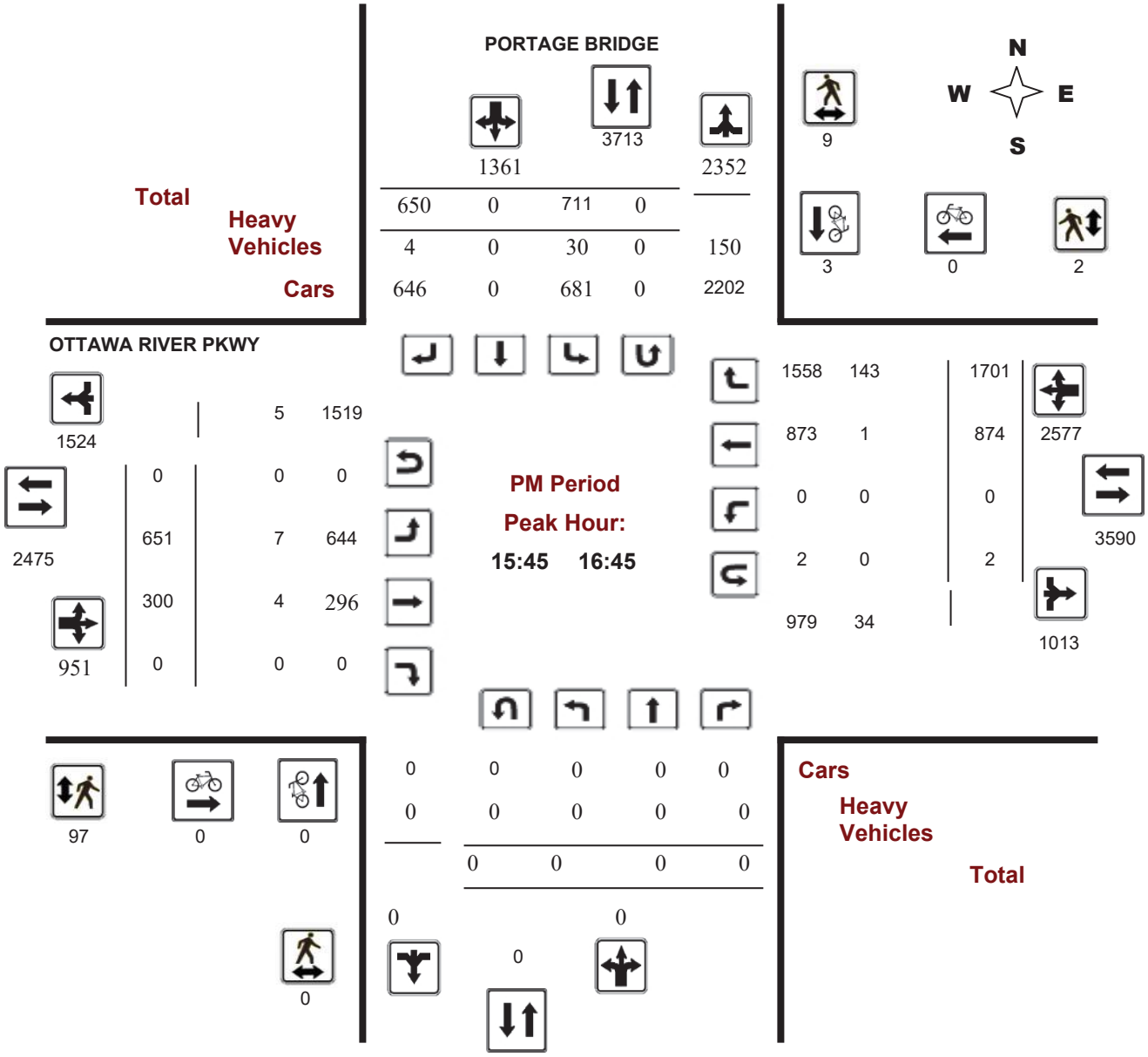
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

OTTAWA RIVER PKWY @ PORTAGE BRIDGE

Survey Date: Wednesday, March 23, 2016 **WO No:** 35813

Start Time: 07:00 **Device:** Miovision



Comments

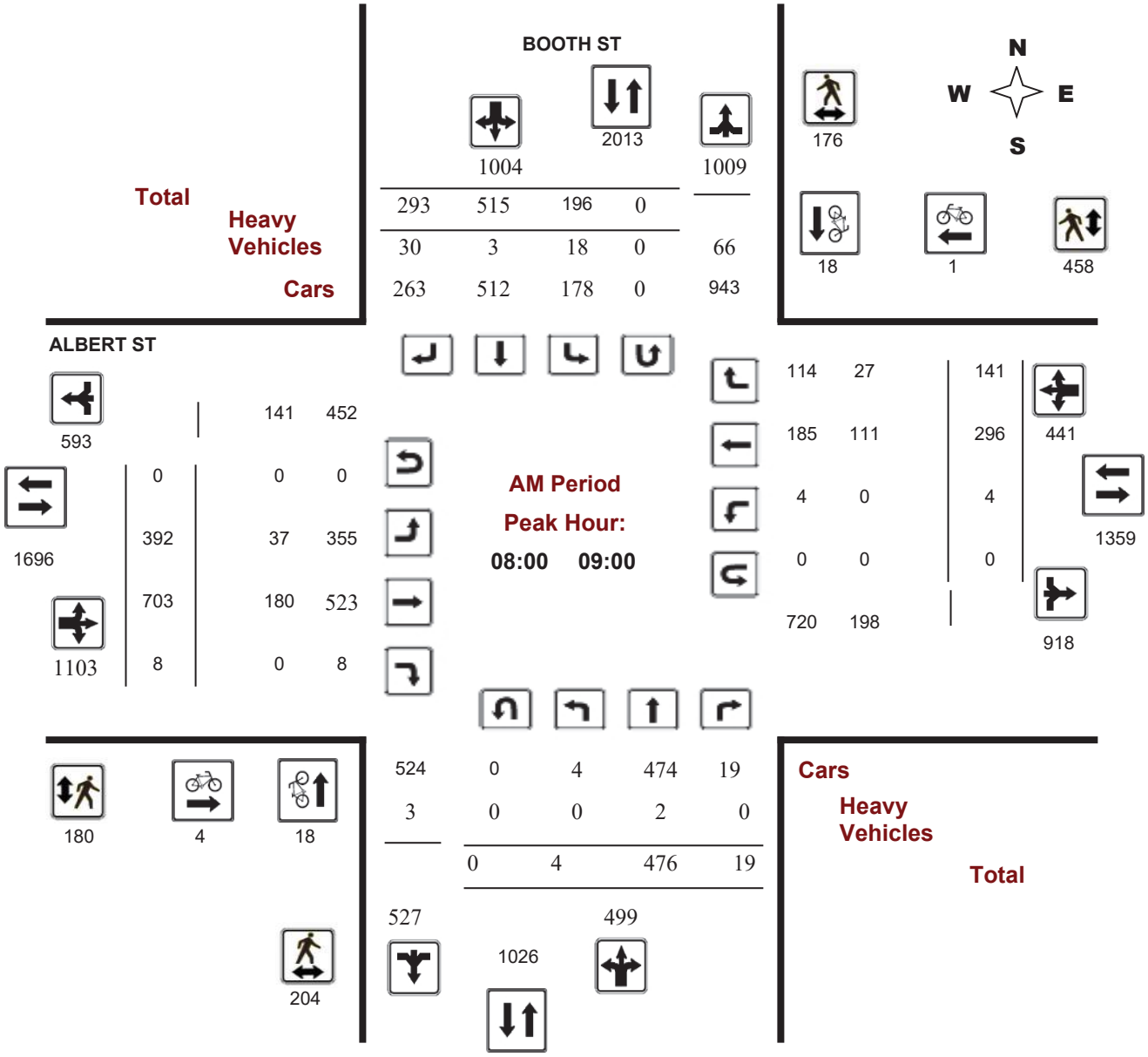
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

ALBERT ST @ BOOTH ST

Survey Date: Thursday, June 08, 2017 **WO No:** 37113

Start Time: 07:00 **Device:** Miovision



Comments

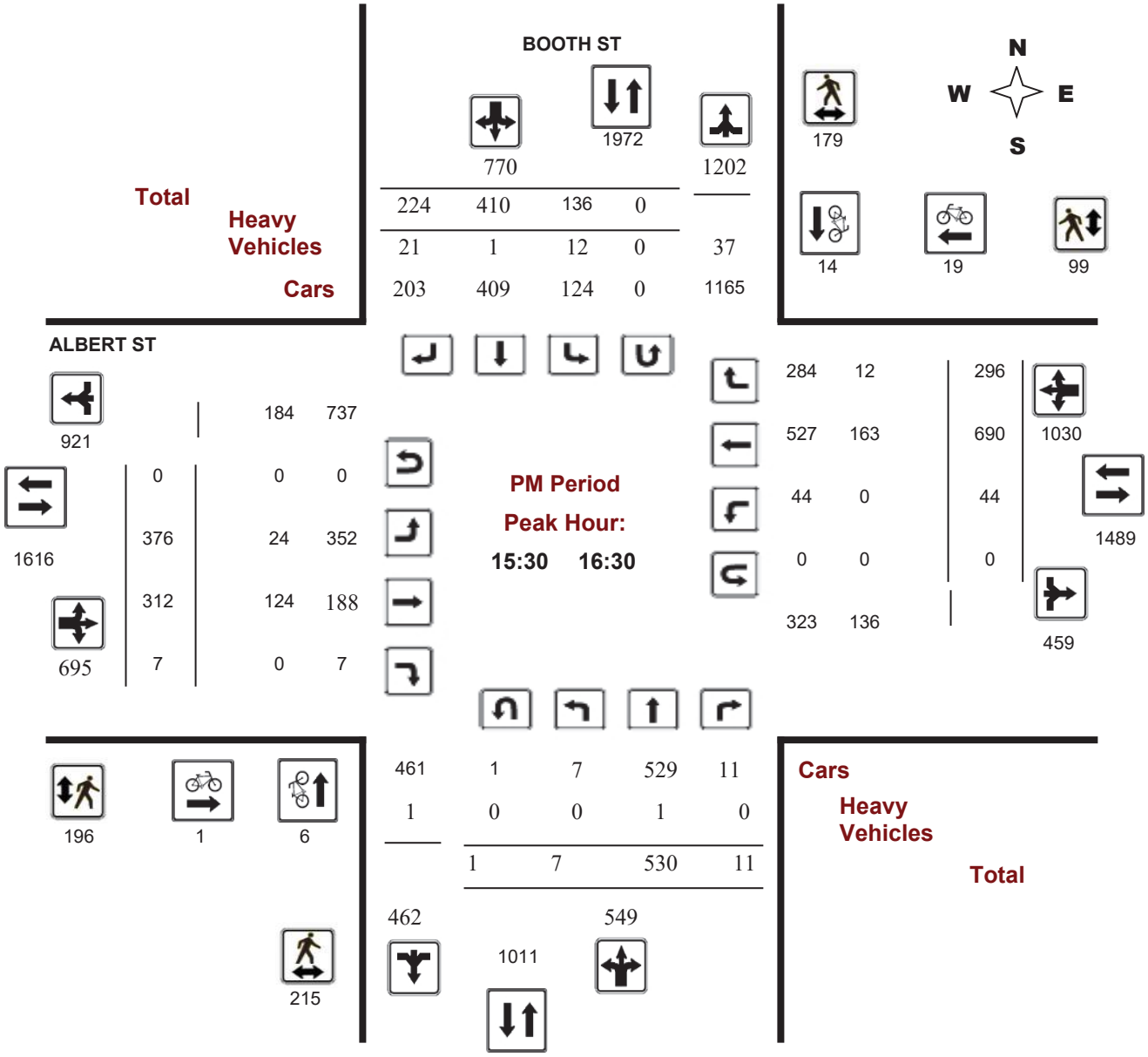
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

ALBERT ST @ BOOTH ST

Survey Date: Thursday, June 08, 2017 **WO No:** 37113

Start Time: 07:00 **Device:** Miovision



Comments

APPENDIX E

COLLISION RECORDS

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: ALBERT ST @ BOOTH ST

Traffic Control: Traffic signal **Total Collisions:** 51

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-11, Sat,07:26	Rain	Rear end	P.D. only	Ice	South	Turning left	Pick-up truck	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Feb-07, Fri,16:05	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Feb-14, Fri,07:30	Snow	Angle	P.D. only	Loose snow	West	Turning right	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	
2014-Feb-24, Mon,10:27	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Passenger van	Other motor vehicle	
2014-Mar-06, Thu,16:06	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	

2014-Mar-22, Sat,11:47	Snow	Other	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Curb
2014-May-05, Mon,18:05	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2014-May-10, Sat,13:44	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
2014-Aug-02, Sat,12:35	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2014-Sep-19, Fri,15:53	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Dec-07, Sun,21:11	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2014-Dec-12, Fri,14:06	Clear	Turning movement	P.D. only	Wet	North	Turning right	Passenger van	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle

2016-Jan-15, Fri,16:30	Clear	Rear end	P.D. only	Wet	East	Slowing or stopping	Pick-up truck	Skidding/sliding
					East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Unknown	Other motor vehicle
2016-Feb-17, Wed,19:31	Clear	Angle	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2016-Feb-25, Thu,19:28	Clear	Rear end	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2016-Jul-06, Wed,07:25	Clear	Turning movement	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Municipal transit bus	Other motor vehicle
2016-Jul-10, Sun,11:59	Clear	Sideswipe	Non-fatal injury	Dry	West	Going ahead	Bicycle	Other motor vehicle
					West	Stopped	Automobile, station wagon	Cyclist
2016-Jul-16, Sat,10:21	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Turning left	Truck - closed	Other motor vehicle
2016-Aug-17, Wed,01:56	Clear	SMV other	P.D. only	Dry	West	Unknown	Automobile, station wagon	Fence/noice barrier

2016-Sep-18, Sun,10:29	Clear	Turning movement	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2016-Nov-16, Wed,23:30	Clear	Angle	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Nov-29, Tue,06:39	Snow	Angle	P.D. only	Wet	North	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Municipal transit bus	Other motor vehicle
2016-Dec-17, Sat,12:20	Snow	Angle	P.D. only	Loose snow	North	Turning right	Passenger van	Other motor vehicle
					West	Stopped	Passenger van	Other motor vehicle
2017-Jan-20, Fri,08:59	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Truck - open	Other motor vehicle
					West	Going ahead	Municipal transit bus	Other motor vehicle
2017-Feb-03, Fri,15:41	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Delivery van	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2017-Feb-09, Thu,09:10	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle

2017-Feb-15, Wed,10:54	Clear	Rear end	P.D. only	Dry	East	Changing lanes	Delivery van	Other motor vehicle
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2017-Mar-14, Tue,13:45	Snow	Turning movement	P.D. only	Loose snow	East	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Municipal transit bus	Other motor vehicle
2017-Apr-03, Mon,13:13	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2017-May-11, Thu,09:18	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Truck and trailer	Other motor vehicle
					South	Going ahead	Truck and trailer	Other motor vehicle
2017-Jun-02, Fri,14:35	Clear	SMV other	P.D. only	Dry	North	Going ahead	Pick-up truck	Ran off road
2017-Jul-10, Mon,22:55	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Jul-11, Tue,16:40	Clear	Turning movement	Non-fatal injury	Wet	West	Turning right	Automobile, station wagon	Cyclist
					West	Going ahead	Bicycle	Other motor vehicle
2017-Jul-23, Sun,15:00	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle

					East	Stopped	Automobile, station wagon	Other motor vehicle
2017-Aug-27, Sun,22:59	Clear	Turning movement	P.D. only	Dry	West	Turning right	Municipal transit bus	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2017-Sep-14, Thu,07:50	Clear	Angle	P.D. only	Dry	South	Turning left	Pick-up truck	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2017-Oct-31, Tue,16:27	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Nov-17, Fri,22:04	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2017-Dec-07, Thu,20:51	Clear	Turning movement	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2017-Dec-12, Tue,09:21	Snow	Rear end	P.D. only	Packed snow	North	Going ahead	Passenger van	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2017-Dec-23, Sat,14:08	Snow	Rear end	P.D. only	Loose snow	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle

					West	Turning right	Automobile, station wagon	Other motor vehicle
2018-Mar-23, Fri,08:35	Clear	Sideswipe	P.D. only	Dry	South	Unknown	Unknown	Other motor vehicle
					South	Turning right	Municipal transit bus	Other motor vehicle
2018-Apr-10, Tue,07:21	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2018-May-17, Thu,21:51	Clear	Angle	Non-fatal injury	Dry	West	Going ahead	Bicycle	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Cyclist
2018-May-30, Wed,06:06	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Delivery van	Cyclist
					West	Going ahead	Bicycle	Other motor vehicle
2018-Jun-12, Tue,16:30	Clear	Rear end	P.D. only	Dry	West	Unknown	Unknown	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2018-Aug-10, Fri,17:52	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Truck - open	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Sep-14, Fri,14:58	Clear	Rear end	Non-fatal injury	Dry	South	Turning left	Truck - closed	Other motor vehicle

					South	Turning left	Automobile, station wagon	Other motor vehicle
2018-Sep-22, Sat,12:45	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Oct-20, Sat,17:00	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Nov-02, Fri,07:47	Rain	Rear end	Non-fatal injury	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle

Location: BOOTH ST @ FLEET ST

Traffic Control: Stop sign **Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Oct-22, Wed,13:10	Clear	Other	P.D. only	Dry	East	Reversing	Pick-up truck	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Sep-15, Thu,09:10	Clear	Turning movement	P.D. only	Dry	North	Going ahead	Bicycle	Other motor vehicle	
					North	Turning right	Automobile, station wagon	Cyclist	

Location: BOOTH ST @ SIR JOHN A. MACDONALD PKWY/WELLINGTON ST

Traffic Control: Traffic signal **Total Collisions:** 60

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped

2014-Feb-18, Tue,16:15	Snow	Rear end	P.D. only	Loose snow	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	
2014-Mar-20, Thu,08:19	Rain	Rear end	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Passenger van	Other motor vehicle	
2014-Apr-08, Tue,16:00	Rain	Rear end	Non-fatal injury	Wet	North	Going ahead	Municipal transit bus	Other motor vehicle	
					North	Turning right	Pick-up truck	Other motor vehicle	
2014-Jun-09, Mon,17:20	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Jun-15, Sun,09:15	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Aug-18, Mon,12:20	Clear	Turning movement	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Nov-10, Mon,09:00	Clear	SMV other	Non-fatal injury	Dry	North	Turning right	Municipal transit bus	Pedestrian	1
2014-Dec-13, Sat,16:50	Clear	Turning movement	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	

					North	Turning left	Passenger van	Other motor vehicle
2015-Jan-05, Mon,14:08	Clear	Rear end	P.D. only	Wet	South	Changing lanes	Unknown	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Jan-21, Wed,19:19	Clear	SMV other	P.D. only	Wet	East	Turning left	Automobile, station wagon	Ran off road
2015-Jan-28, Wed,10:07	Clear	Sideswipe	P.D. only	Dry	South	Turning right	Delivery van	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Feb-12, Thu,10:10	Clear	Rear end	P.D. only	Slush	East	Slowing or stopping	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2015-Feb-13, Fri,13:13	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Mar-22, Sun,08:52	Snow	Rear end	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-May-28, Thu,16:14	Clear	Turning movement	Non-fatal injury	Dry	West	Turning right	Automobile, station wagon	Cyclist
					West	Going ahead	Bicycle	Other motor vehicle

					South	Stopped	Automobile, station wagon	Cyclist
2015-Jul-20, Mon,16:15	Clear	Rear end	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
2015-Aug-01, Sat,01:38	Clear	Turning movement	P.D. only	Dry	East	Turning left	Truck and trailer	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Aug-18, Tue,08:20	Clear	Rear end	Non-fatal injury	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Sep-03, Thu,09:48	Clear	Sideswipe	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Nov-05, Thu,16:51	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Fire vehicle	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle
2015-Nov-17, Tue,20:00	Clear	Turning movement	P.D. only	Dry	West	Turning right	Truck - dump	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2015-Nov-26, Thu,23:43	Clear	Sideswipe	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle

					East	Turning left	Truck - dump	Other motor vehicle
2015-Dec-01, Tue,05:40	Clear	Sideswipe	P.D. only	Dry	West	Turning right	Delivery van	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2015-Oct-14, Wed,17:09	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
					East	Unknown	Automobile, station wagon	Other motor vehicle
2015-Oct-02, Fri,08:00	Clear	Rear end	P.D. only	Dry	East	Stopped	Pick-up truck	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Mar-25, Fri,22:21	Clear	Sideswipe	P.D. only	Dry	North	Turning right	Unknown	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2016-Apr-07, Thu,13:44	Snow	Rear end	P.D. only	Loose snow	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2016-May-13, Fri,18:03	Clear	Rear end	P.D. only	Dry	West	Turning right	Pick-up truck	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle

2016-Jun-24, Fri,13:42	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Pick-up truck	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Sep-04, Sun,13:30	Clear	Turning movement	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Oct-03, Mon,12:15	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-06, Tue,08:45	Clear	Sideswipe	P.D. only	Wet	South	Changing lanes	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Municipal transit bus	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Sep-04, Sun,13:30	Clear	Rear end	Non-fatal injury	Dry	South	Stopped	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Aug-19, Fri,17:11	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Unknown	Other motor vehicle
2016-Jan-15, Fri,18:43	Clear	Sideswipe	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle

2017-Jan-14, Sat,18:44	Clear	Angle	P.D. only	Dry	West	Unknown	Unknown	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Feb-20, Mon,08:05	Clear	Sideswipe	P.D. only	Wet	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2017-Mar-21, Tue,18:19	Clear	Sideswipe	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2017-May-02, Tue,14:53	Rain	Turning movement	Non-fatal injury	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Jun-18, Sun,13:23	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2017-Jul-04, Tue,15:22	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Pick-up truck	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Jul-13, Thu,19:30	Clear	Rear end	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle

2017-Oct-06, Fri,13:09	Clear	Turning movement	P.D. only	Dry	North	Going ahead	Delivery van	Other motor vehicle
					South	Turning left	Pick-up truck	Other motor vehicle
2017-Oct-16, Mon,17:54	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2017-Oct-22, Sun,07:13	Clear	SMV other	P.D. only	Dry	South	Going ahead	Pick-up truck	Pole (sign, parking meter)
2017-Nov-08, Wed,11:23	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2017-Nov-10, Fri,10:26	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Nov-19, Sun,11:03	Snow	Angle	Non-fatal injury	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Nov-23, Thu,18:28	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Dec-02, Sat,16:08	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle

					East	Stopped	Automobile, station wagon	Other motor vehicle
2017-Mar-24, Fri,10:45	Snow	Sideswipe	P.D. only	Packed snow	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Oct-20, Fri,16:00	Clear	Rear end	P.D. only	Dry	East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Jan-07, Sun,20:10	Snow	Angle	P.D. only	Packed snow	West	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Apr-09, Mon,17:57	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2018-Apr-23, Mon,18:20	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Unknown	Other motor vehicle
					North	Merging	Passenger van	Other motor vehicle
2018-Jul-04, Wed,11:43	Clear	Turning movement	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle

2018-Nov-16, Fri,06:39	Snow	Rear end	P.D. only	Loose snow	East	Slowing or stopping	Automobile, station wagon	Skidding/sliding
					East	Stopped	Pick-up truck	Other motor vehicle
2018-Dec-08, Sat,22:32	Snow	Turning movement	P.D. only	Packed snow	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Jan-13, Sat,03:02	Snow	SMV other	P.D. only	Slush	West	Going ahead	Automobile, station wagon	Skidding/sliding
2018-Dec-01, Sat,17:01	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle

Location: OTTAWA RIVER PKWY @ PORTAGE BRIDGE

Traffic Control: Traffic signal

Total Collisions: 29

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-08, Wed,16:30	Clear	Rear end	P.D. only	Ice	West	Changing lanes	Automobile, station wagon	Other motor vehicle	
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Jan-11, Sat,08:01	Freezing Rain	SMV other	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Skidding/sliding	
2014-Jan-11, Sat,08:13	Freezing Rain	SMV other	P.D. only	Ice	West	Turning right	Automobile, station wagon	Pole (sign, parking meter)	
2014-Apr-12, Sat,15:50	Clear	SMV other	Non-fatal injury	Dry	North	Going ahead	Motorcycle	Skidding/sliding	

2014-Apr-16, Wed,13:31	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Pole (utility, power)
2014-May-11, Sun,10:20	Clear	Angle	Non-fatal injury	Dry	West	Going ahead	Bicycle	Other motor vehicle
					North	Going ahead	Passenger van	Cyclist
2014-Jul-18, Fri,09:28	Clear	Rear end	Non-fatal injury	Dry	South	Turning left	Pick-up truck	Other motor vehicle
					South	Turning left	Pick-up truck	Other motor vehicle
2014-Aug-20, Wed,15:45	Clear	Rear end	P.D. only	Dry	West	Unknown	Unknown	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2014-Sep-10, Wed,09:11	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2014-Dec-24, Wed,05:33	Snow	SMV other	P.D. only	Wet	South	Turning left	Automobile, station wagon	Curb
2014-Dec-24, Wed,13:50	Clear	Rear end	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2014-Jan-09, Thu,09:25	Clear	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle

					South	Stopped	Automobile, station wagon	Other motor vehicle
2014-Feb-14, Fri,07:30	Snow	Rear end	P.D. only	Loose snow	East	Slowing or stopping	Pick-up truck	Skidding/sliding
					East	Stopped	Pick-up truck	Other motor vehicle
2014-Apr-30, Wed,06:15	Rain	Rear end	P.D. only	Wet	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Feb-04, Wed,15:16	Snow	Rear end	P.D. only	Loose snow	West	Slowing or stopping	Pick-up truck	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2015-Feb-25, Wed,14:29	Clear	Sideswipe	P.D. only	Dry	South	Overtaking	Unknown	Other motor vehicle
					South	Turning right	Bus (other)	Other motor vehicle
2015-Dec-30, Wed,22:06	Snow	Rear end	Non-fatal injury	Slush	West	Turning right	Automobile, station wagon	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2015-Jun-07, Sun,03:55	Clear	SMV other	P.D. only	Dry	West	Going ahead	Pick-up truck	Ran off road
2016-Jan-04, Mon,19:48	Snow	Sideswipe	P.D. only	Loose snow	East	Turning left	Pick-up truck	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle

2016-Jul-09, Sat,17:39	Rain	Rear end	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2016-Aug-25, Thu,12:10	Clear	Sideswipe	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle
					South	Changing lanes	Passenger van	Other motor vehicle
2017-Mar-22, Wed,10:12	Clear	Rear end	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2017-Apr-02, Sun,22:50	Clear	Sideswipe	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Passenger van	Other motor vehicle
2017-May-16, Tue,14:57	Clear	Other	P.D. only	Dry	North	Reversing	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2017-May-23, Tue,17:28	Clear	Angle	P.D. only	Dry	East	Turning left	Unknown	Other motor vehicle
					North	Turning right	Passenger van	Other motor vehicle
2017-Apr-03, Mon,18:00	Rain	Sideswipe	P.D. only	Wet	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle

2017-May-26, Fri,09:40	Clear	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Sep-29, Sat,13:02	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Jun-19, Tue,16:00	Clear	Sideswipe	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Merging	Automobile, station wagon	Other motor vehicle	

Location: WELLINGTON ST @ LETT ST

Traffic Control: Traffic signal

Total Collisions: 9

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Jan-14, Wed,15:28	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Jan-29, Thu,11:15	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Oct-05, Mon,08:50	Clear	Angle	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	
					North	Turning left	Automobile, station wagon	Other motor vehicle	

2016-Apr-04, Mon,12:24	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Turning right	Pick-up truck	Other motor vehicle
2016-Apr-06, Wed,17:37	Snow	Angle	P.D. only	Slush	East	Turning right	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2016-Aug-10, Wed,07:41	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2016-Sep-19, Mon,15:51	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2017-Jun-02, Fri,15:10	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2017-Aug-26, Sat,10:50	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Delivery van	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle

APPENDIX F

EXCERPTS FROM OTHER AREA DEVELOPMENTS

3.3 SITE TRAFFIC GENERATION

The projected site traffic was generated for both the As of Right zoning as well as the Proposed zoning, as outlined in the following subsections.

3.3.1 As of Right Zoning

The lands are currently zoned as R5O [951] H(20), GM7 [119] H(25), or GM7 [119] H(33). Based on this zoning, the highest and best land uses in terms of traffic generation potential were developed to simulate what could potentially be built on the subject property under the current zoning by-law. The assumed land uses include residential mid-rise and high-rise apartment buildings, retail space, and office space.

The *Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition)* was used to estimate traffic generated by the assumed land uses. The ITE land uses were 222 – High Rise Apartments, 223 – Mid-Rise Apartments, 710 – General Office Space, and 826 – Specialty Retail Centre.

Table 1 summarizes the trip generation forecasts under the As of Right zoning, with the ensuing sections describing each step of the calculation.

Table 1 Trips Generated by the As of Right Zoning

		1000'S GFA / # UNITS	MORNING PEAK HOUR			AFTERNOON PEAK HOUR		
			In	Out	Total	In	Out	Total
Step 1: ITE Trip Generation Rates								
223 – Mid-Rise Apartment		814	31%	69%	0.39	58%	42%	0.47
222 – High-Rise Apartment		115	25%	75%	0.31	61%	39%	0.43
826 – Specialty Retail Center		10	0%	0%	0.00	44%	56%	4.62
710 – General Office		51	88%	12%	1.10	17%	83%	1.49
Step 2: Auto Trips Generated								
223 – Mid-Rise Apartment		814	100	221	321	220	160	380
222 – High-Rise Apartment		115	9	26	35	30	19	49
826 – Specialty Retail Center		10	0	0	0	20	25	45
710 – General Office		51	49	7	56	13	64	77
Step 3: Conversion from Auto Trips to Person Trips								
Total Development	Trip Gen		158	254	412	283	268	551
	Transit Share	10%	16	26	42	28	27	55
	Auto Occupancy	1.1	16	26	42	28	27	55
	Total Person Trips		190	306	496	339	322	661
Step 4: Person Trips by Modal Share								
Total	Auto	15%	28	46	74	51	48	99

		1000'S GFA / # UNITS	MORNING PEAK HOUR			AFTERNOON PEAK HOUR		
			In	Out	Total	In	Out	Total
Development	Passenger	5%	10	15	25	17	16	33
	Transit	65%	124	199	323	220	210	430
	Walk / Bike	15%	28	46	74	51	48	99

3.3.2 Proposed Zoning

The *Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition)* was used to estimate traffic generated by the proposed zoning and conceptual plan shown in **Figure 2.** The ITE land use codes were 222 – High Rise Apartments, 710 – General Office Space, 826 – Specialty Retail Centre, and 590 - Library.

Table 2 summarizes the trip generation forecasts under the proposed zoning, with the ensuing sections describing each step of the calculation.

Table 2 Trips Generated by the Proposed Development

		1000'S GFA / # UNITS	MORNING PEAK HOUR			AFTERNOON PEAK HOUR		
			In	Out	Total	In	Out	Total
Step 1: ITE Trip Generation Rates								
222 – High-Rise Apartment		672	25%	75%	0.30	61%	39%	0.34
710 – General Office Building		183	88%	12%	1.70	17%	83%	1.55
826 – Specialty Retail Center		92	0%	0%	0.00	44%	56%	2.63
590 – Library		215	71%	29%	1.04	48%	52%	7.30
Step 2: Auto Trips Generated								
222 – High-Rise Apartment		672	50	151	201	138	89	227
710 – General Office Building		183	273	37	310	48	235	283
826 – Specialty Retail Center		92	0	0	0	106	136	242
590 – Library		215	159	65	224	754	816	1570
Step 3: Conversion From Auto Trips to Person Trips								
Total Development	Trip Gen		482	253	735	1046	1276	2322
	Transit Share	10%	48	25	73	105	127	232
	Auto Occupancy	1.1	48	25	73	105	127	232
	Total Person Trips		578	303	881	1256	1530	2786
Step 4: Person Trips by Modal Share								
Total Development	Auto	15%	87	45	132	188	229	417
	Passenger	5%	28	15	43	64	77	141
	Transit	65%	376	198	574	816	995	1811
	Walk / Bike	15%	87	45	132	188	229	417

3.3.3 Conversion of ITE Rates to Person Trips

The notion of quantifying the volume of "person" trips expected to be generated by a given development is becoming a commonly accepted practice. It is aimed at quantifying the expected demands across the primary modes of transportation.

To convert ITE rates to person trips, the rates obtained from the ITE Trip Generation Manual were adjusted to account for an inherent transit mode share and auto occupancy. An assumed transit share of 10% was thought to be inherent within the ITE rates and an auto occupancy rate of 1.1 persons per vehicle was also assumed to be inherent within the ITE rates.

Step 3 of **Table 1** and **Table 2** outlines the conversion from auto trips to person trips.

3.3.4 Net New Site Trips

The person trips were then assigned to the four primary mode shares (i.e. auto, passenger, transit, and active modes). As the subject site is located next to the future PIMISI LRT station, it is well within the area of influence of a Transit-Oriented Development. As outlined in the City of Ottawa's *Transit-Oriented Development (TOD) Plans (2014)*, the mode share targets include the following:

- Transit – 65%
- Active Modes – 15%
- Auto Passenger – 5%
- Auto Driver – 15%

Step 4 of **Table 1** and **Table 2** summarizes the expected person trips by mode share.

It is common to consider internal capture rates within mixed use developments as motorists from portions of the development can be destined to other portions of the development (i.e. motorists from a restaurant may also visit a bank on the same site). Due to the proximity to the future LRT station, the internal capture percentage would be negligible as the auto mode share of the proposed development is anticipated to be very low. To remain conservative, an internal capture rate - which would have reduced the volume of vehicle trips generated - was not applied.

The As of Right zoning is anticipated to generate approximately 496 and 661 person trips during the AM and PM peak hours, respectively. In terms of vehicle trips, the As of Right zoning is anticipated to generate 74 auto trips during the AM peak hour and 99 auto trips during the PM peak hour. In terms of transit trips, the As of Right zoning is also anticipated to generate 323 and 430 transit trips during the AM and PM peak hours, respectively.

The proposed zoning is anticipated to generate approximately 881 and 2786 person trips during the AM and PM peak hours, respectively. In terms of vehicle trips, the proposed zoning is anticipated to generate approximately 132 auto trips during the AM peak hour and 417 auto trips during the PM peak hour. In terms of transit trips, the proposed zoning is also anticipated to generate 574 and 1811 transit trips during the AM and PM peak hours, respectively.

3.3.5 Traffic Distribution and Assignment

The distribution of traffic to / from the study area was determined through examination of the TRANS Committee's 2011 Origin-Destination (O-D) Survey for the Ottawa Inner Area.

Table 3 provides a summary of the estimated distribution of traffic generated by the proposed development.

The anticipated site traffic generated by the proposed development was assigned to the boundary road network using a logical pattern of primary roads. It should be noted that certain traffic restrictions (i.e. westbound left turns are prohibited during the peak hours from Albert Street to Booth Street and eastbound right turns are prohibited from Slater street to Bronson Avenue) influenced the assignment of traffic as outlined below. The distribution and assignment assumptions were consistent for both the As of Right zoning and the Proposed zoning scenarios.

Figure 12 and **Figure 13** illustrate the assignment of site traffic generated by the As of Right zoning.

Figure 14 and **Figure 15** illustrate the assignment of site traffic generated by the Proposed zoning.

Table 3 Traffic Distribution to / from the Ottawa Inner Area District

CARDINAL DIRECTION	% DISTRIBUTION	VIA (TO / FROM)			
		Booth	Bronson	Slater	Albert
North	5%	5%			
East	30%		3%	27%	
South	10%		10%		
West	15%		15%		
Internal	40%	2%	24%	10%	4%
Total	**100%**	**7%**	**52%**	**37%**	**4%**

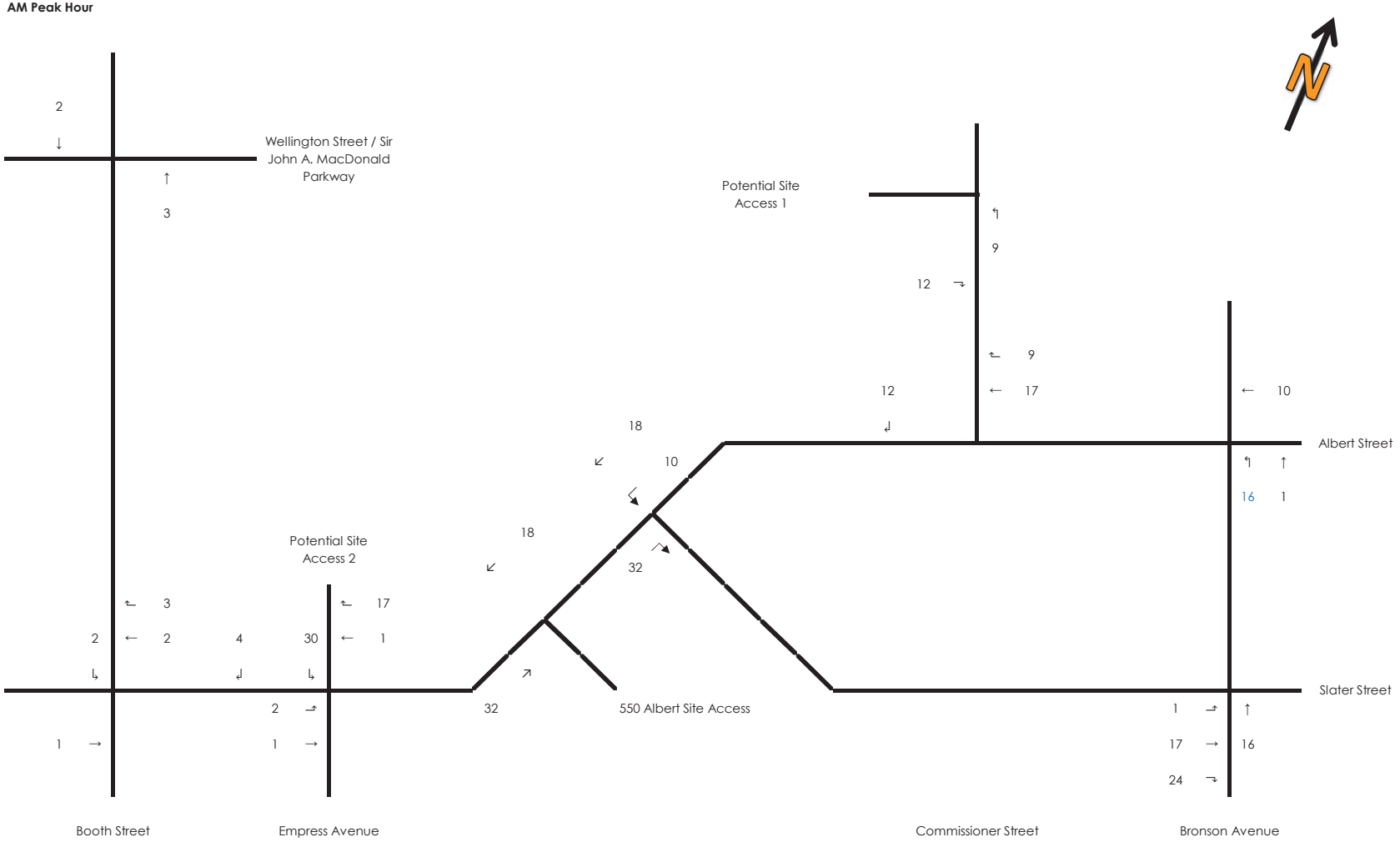


Figure 12: Site Traffic Volumes - As of Right Zoning

AM Peak Hour

PM Peak Hour

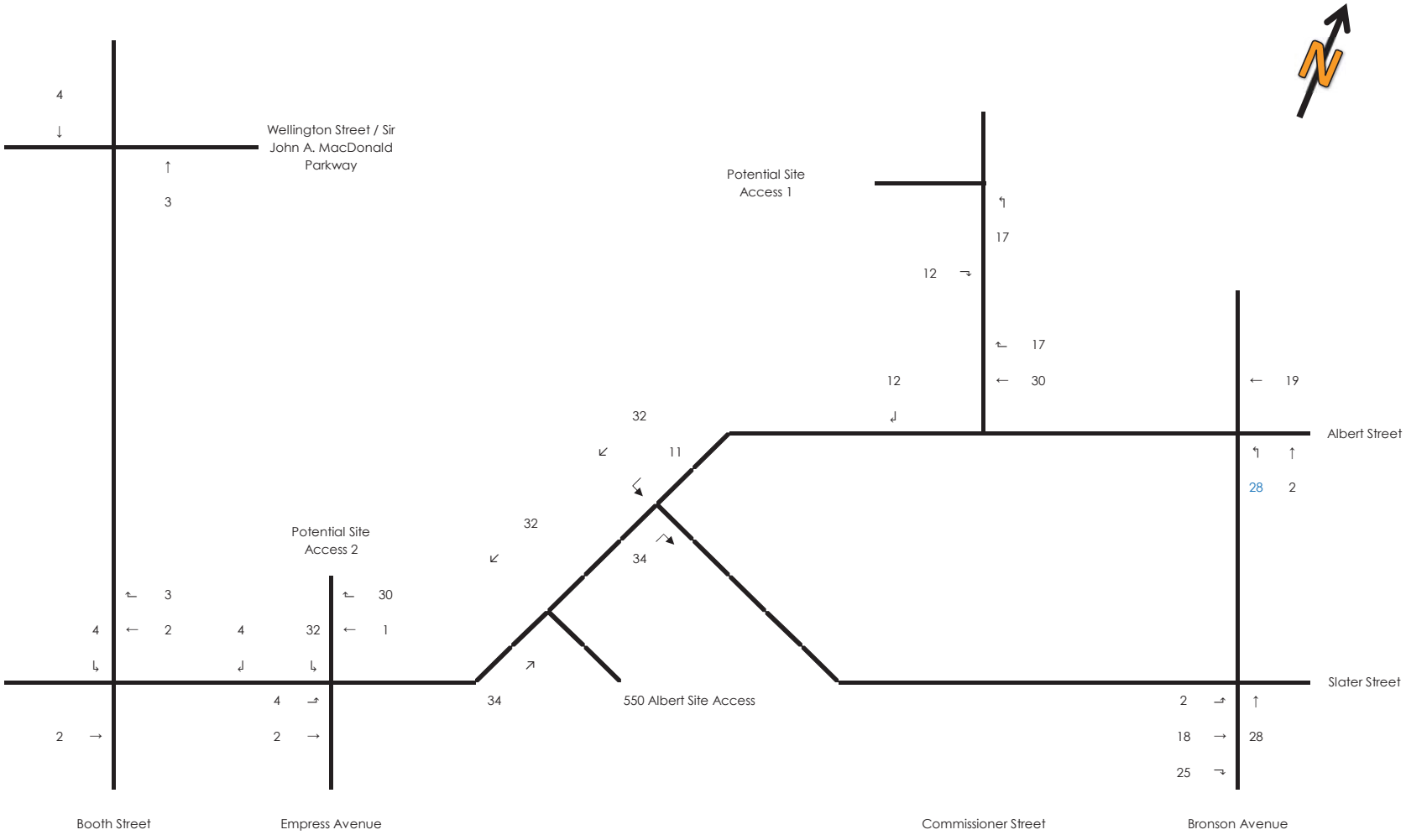
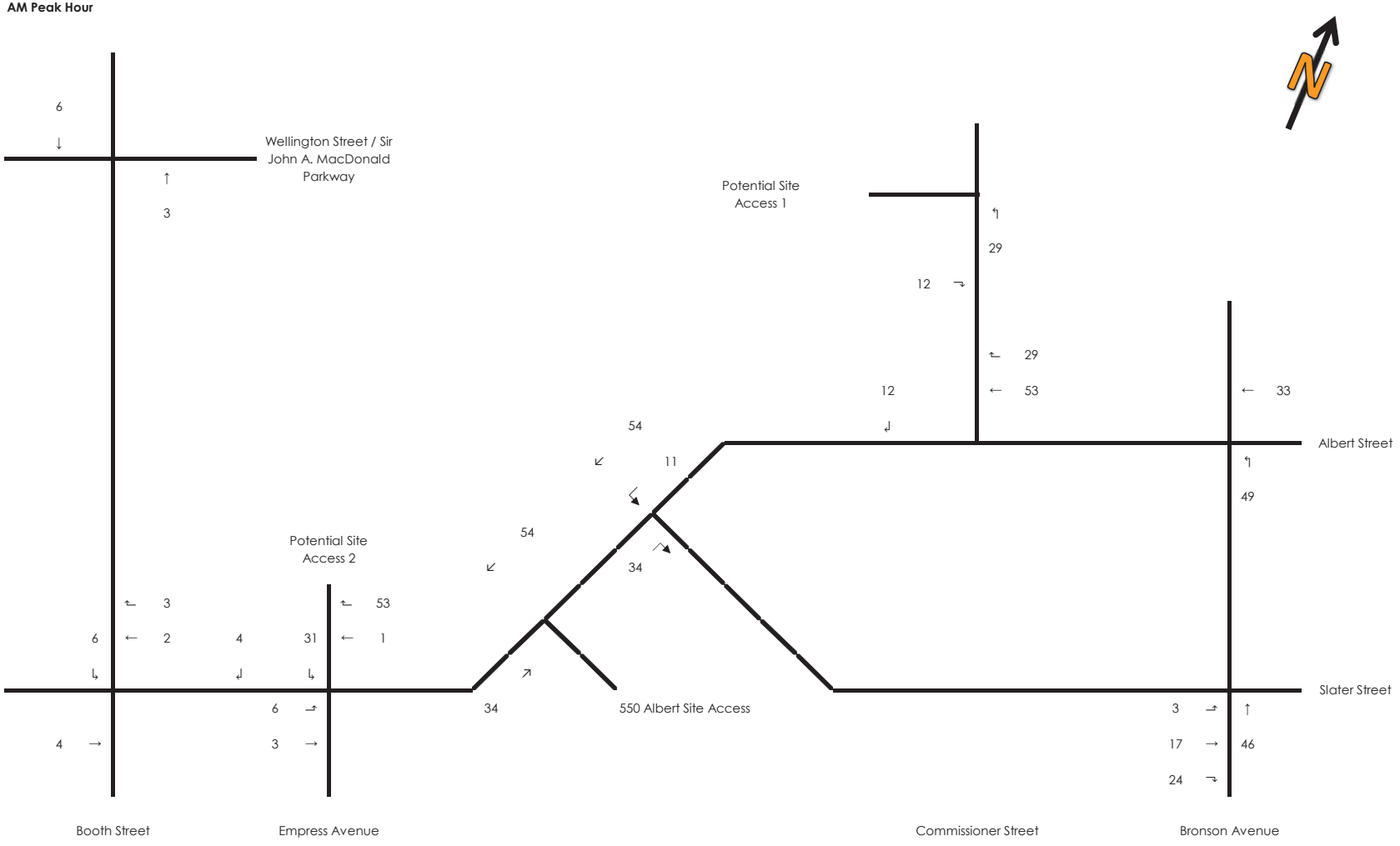


Figure 13: Site Traffic Volumes - As of Right Zoning

PM Peak Hour

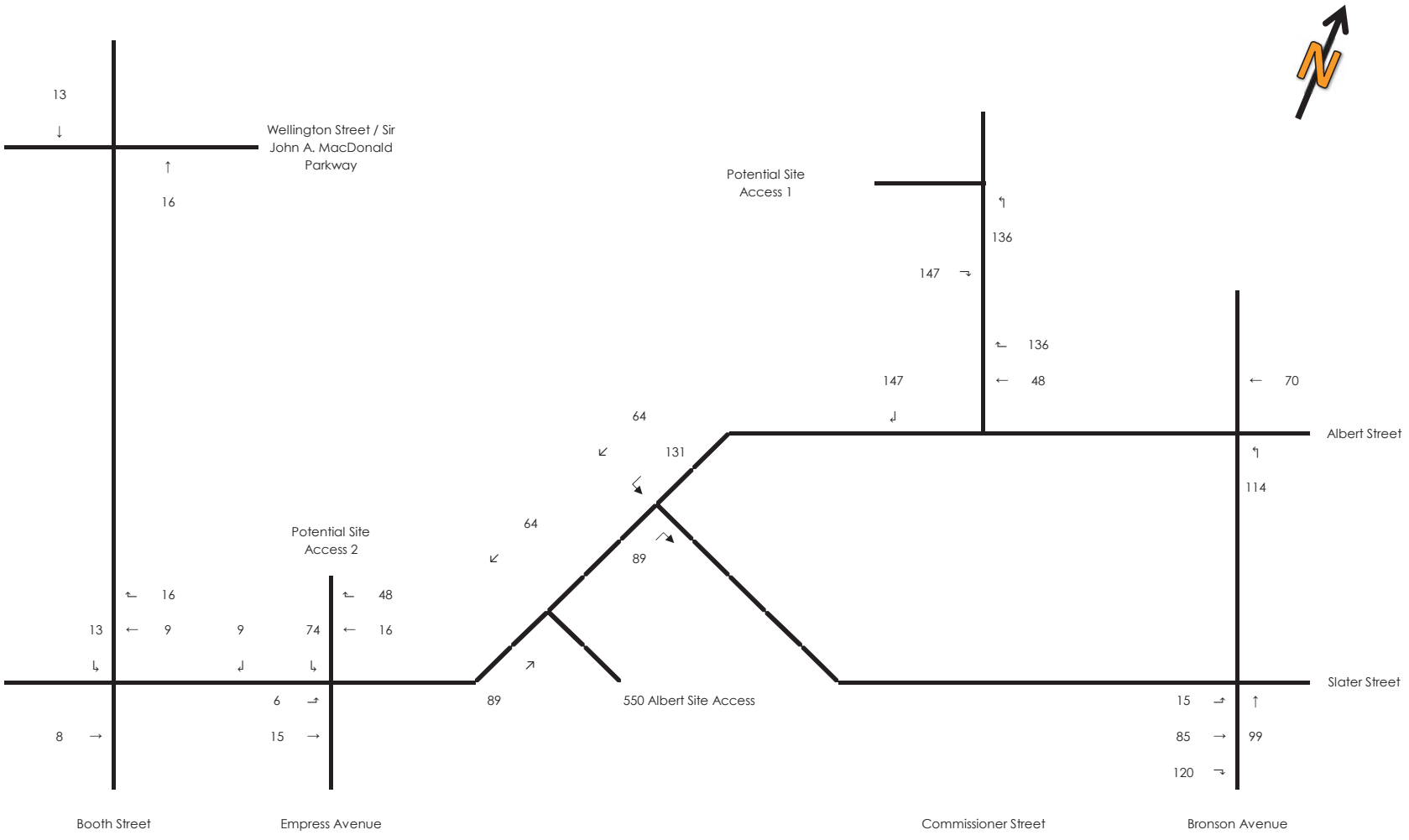


Stantec

Figure 14: Site Traffic Volumes - Proposed Zoning

AM Peak Hour

PM Peak Hour



Stantec

Figure 15: Site Traffic Volumes - Proposed Zoning

PM Peak Hour

geometry, assumed for the analysis herein, no peak hour vehicle volume reduction is required during the afternoon rush hour to achieve acceptable levels of service of LoS 'E' or better along the corridor.

As it was determined in the MMTIS that future vehicle volume reductions would be required to improve existing conditions as well as to accommodate the future traffic associated with the Zibi development, these revised volume reductions have been incorporated in the ensuing projected conditions analysis (Section 5).

4.3 Site Trip Generation

4.3.1 PHASE I

Appropriate trip generation rates for the proposed Phase I development consisting of approximate 50,000 ft^2 of retail, 38,000 ft^2 of office, a 7,000 ft^2 community centre, and 315 residential units[1] were obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, which are summarized in Table 4.

Table 4: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Condominiums	ITE 230	T = 0.44(du); ln(T) = 0.80 ln(du) + 0.26	T = 0.52(du); ln(T) = 0.82ln(du) + 0.32
Office	ITE 720	T = 2.39(X);	T = 2.74(X); ln(T) = 0.90ln(X) + 1.53
Specialty Retail Centre	ITE 826	T = 1.36(X); T = 1.20(X) + 10.74	T = 2.71(X); T = 2.40(X) + 21.48
Recreational Community Centre	ITE 495	T = 2.05(X);	T = 2.74(X);

Notes: T = Average Vehicle Trip Ends
X = 1000 ft^2 Gross Floor Area
du = dwelling units
Specialty Retail AM Peak is assumed to be 50% of the PM Peak

As ITE trip generation surveys only record vehicle trips and typically reflect highly suburban locations (with little to no access by travel modes other than private automobiles), adjustment factors appropriate to the more urban study area context were applied to attain estimates of person trips for the proposed development. This approach is considered appropriate within the industry for urban infill developments.

To convert ITE vehicle trip rates to person trips, an auto occupancy factor and a non-auto trip factor were applied to the ITE vehicle trip rates. Our review of available literature suggests that a combined factor of approximately 1.3 is considered reasonable to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. As such, the person trip generation for the proposed site is summarized in Table 5.

[1] The residential units were calculated based on the assumption of approximately 850 ft^2 per unit. The total GFA of the residential area proposed for Phase I is 267,784 ft^2, which equates to approximately 315 units.

Table 5: Modified Person Trip Generation

Land Use	Area	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Condominiums	315 du	28	140	168	134	66	200
Office	38,000 ft²	93	25	118	44	115	159
Specialty Retail Centre	49,908 ft²	51	41	92	80	104	184
Recreational Community Centre	7,000 ft²	12	7	19	12	13	25
Total Person Trips		**184**	**213**	**397**	**270**	**298**	**568**

Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%

The person trips shown in Table 5 for the proposed site were then reduced by modal share values (including a reduction for 'pass-by' trips) based on the site's mixed use, location, and proximity to adjacent communities, employment, other shopping uses, transit availability, and bicycle and pedestrian system connections. Modal share and 'pass-by' values for condominium, office, specialty retail, and community centre land uses within the proposed development are summarized in Tables 5, 6, 7, and 8, respectively.

Given the close proximity to Ottawa's/Hull's downtown, the implementation of Gatineau's RapiBus, the construction of Ottawa's Confederation LRT line, the limited interprovincial bridge capacity and the proposed development's pedestrian/bike-oriented design, the following modal share values are considered justifiable/appropriate.

Table 6: Condominium Site Trip Generation

Travel Mode	Mode Share	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Auto Driver	25%	7	35	42	34	17	51
Auto Passenger	5%	2	7	9	7	3	10
Transit	50%	14	70	84	67	33	100
Non-motorized	20%	5	28	33	26	13	39
Total Person Trips	100%	28	140	168	134	66	200
Total 'New' Auto Trips		**7**	**35**	**42**	**34**	**17**	**51**

Table 7: Office Site Trip Generation

Travel Mode	Mode Share	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Auto Driver	30%	28	8	36	14	35	49
Auto Passenger	5%	5	1	6	3	6	9
Transit	45%	42	11	53	19	51	70
Non-motorized	20%	18	5	23	8	23	31
Total Person Trips	100%	93	25	118	44	115	159
Total 'New' Auto Trips		**28**	**8**	**36**	**14**	**35**	**49**

Table 8: Specialty Retail Centre Site Trip Generation

Travel Mode	Mode Share	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Auto Driver	20%	11	9	20	16	21	37
Auto Passenger	5%	2	2	4	4	6	10
Transit	20%	10	8	18	16	20	36
Non-motorized	55%	28	22	50	44	57	101
Total Person Trips	100%	51	41	92	80	104	184
Less Retail 30% Pass-By		-3	-3	-6	-6	-6	-12
Total 'New' Auto Trips		**8**	**6**	**14**	**10**	**15**	**25**

Table 9: Recreational Community Centre Site Trip Generation

Travel Mode	Mode Share	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Auto Driver	20%	3	2	5	3	3	6
Auto Passenger	5%	1	1	2	1	1	2
Transit	20%	2	1	3	2	2	4
Non-motorized	55%	6	3	9	6	7	13
Total Person Trips	100%	12	7	19	12	13	25
Total 'New' Auto Trips		**3**	**2**	**5**	**3**	**3**	**6**

The following Table 10 provides a summary of potential two-way vehicle trips to/from the proposed development with a reduction of 10% for multi-purpose trips (i.e. drivers stopping at two destinations within one trip).

Table 10: Total Phase I Site Vehicle Trip Generation

Land Use	AM Peak (veh/h)			PM Peak (veh/h)		
	In	Out	Total	In	Out	Total
Condominiums	7	35	42	34	17	51
General Office Building	28	8	36	14	35	49
Specialty Retail Centre	11	9	20	16	21	37
Recreational Community Centre	3	2	5	3	3	6
Retail Pass-By (30%)	-3	-3	-6	-6	-6	-12
Multi-Purpose Trips (10%)	-5	-5	-10	-6	-7	-13
Total 'New' Auto Trips	**41**	**46**	**87**	**55**	**63**	**118**

As shown in Table 10, the resulting number of potential 'new' two-way vehicle trips for the proposed Phase I development is approximately 90 and 120 veh/h during the weekday morning and afternoon peak hours, respectively. With regard to site-generated transit ridership it is estimated to be 160 to 210 persons per hour two-way total.

4.3.2 PHASE 2 TO 8

Trip generation for Phases 2 to 8 for the proposed development are included herein to assess the traffic impact of full site development at the site's signalized intersection to Booth Street. This is necessary to ensure that the intersection is designed initially to its optimal/ultimate requirements and does not have to

be redone at a later date. The current phasing plan is included as Appendix K. Currently, the proposed Phases 3, 4 and 5 west of Booth Street will consist of approximately 760 dwelling units[2], 81,000 ft^2 of office and 45,300 ft^2 of retail. Phases 2, 6, 7 and 8 east of Booth Street currently proposed to have approximately 350 dwelling units, 4,000 ft^2 of retail and an approximate 100 room hotel. The trip generation method outlined for Phase 1 was also applied to all other phases, and the resultant projected new auto trips are summarized in Table 11.

Table 11: Phases 2 to 8 Site Trip Generation

Land Use	Area	AM Peak (veh/h)			PM Peak (veh/h)		
		In	Out	Total	In	Out	Total
Condominiums	1,106 du	23	109	132	106	52	158
Office	81,000 ft²	60	16	76	27	68	95
Specialty Retail Centre	49,300 ft²	13	10	23	19	24	43
Hotel	100 rooms	14	11	25	14	14	28
Retail Pass-By (30%)		-4	-4	-8	-6	-6	-12
Multi-Purpose Trips (10%)		-10	-14	-24	-15	-16	-31
Total 'New' Auto Trips		**96**	**128**	**224**	**145**	**136**	**281**

As shown in Table 11, the resulting number of potential 'new' two-way vehicle trips for the proposed Phases 2 to 8 of the development is approximately 225 and 280 veh/h during the weekday morning and afternoon peak hours, respectively. The total site trip-generation for all phases is approximately 315 and 400 veh/h two-way total. With regard to site-generated transit ridership for all three phases, it is estimated to be 420 to 525 persons per hour two-way total.

4.4 Vehicle Traffic Distribution and Assignment

Traffic distribution was based on the different types of land uses, existing volume splits at study area intersections, the MMTIS, and our knowledge of the surrounding area. The resultant distribution is outlined as follows:

Residential

- 75% to/from the south (Ottawa); and
- 25% to/from the north (Gatineau).

Office/Retail

- 50% to/from the south (Ottawa); and
- 50% to/from the north (Gatineau).

Based on these distributions, 'new' and 'pass-by' site-generated trips for Phase I are assigned to study area intersections, which are illustrated in Figure 7. 'New' and 'pass-by' site-generated trips for Phases 1 to 8 are illustrated in Figure 8.

[2] The residential units were calculated based on the assumption of approximately 850 ft^2 per unit. The total GFA of the residential area proposed for Phases II and III is 938,500 ft^2, which equates to approximately 1106 units.

Figure 7: Phase I Site-Generated Traffic Volumes (New and Pass-by)

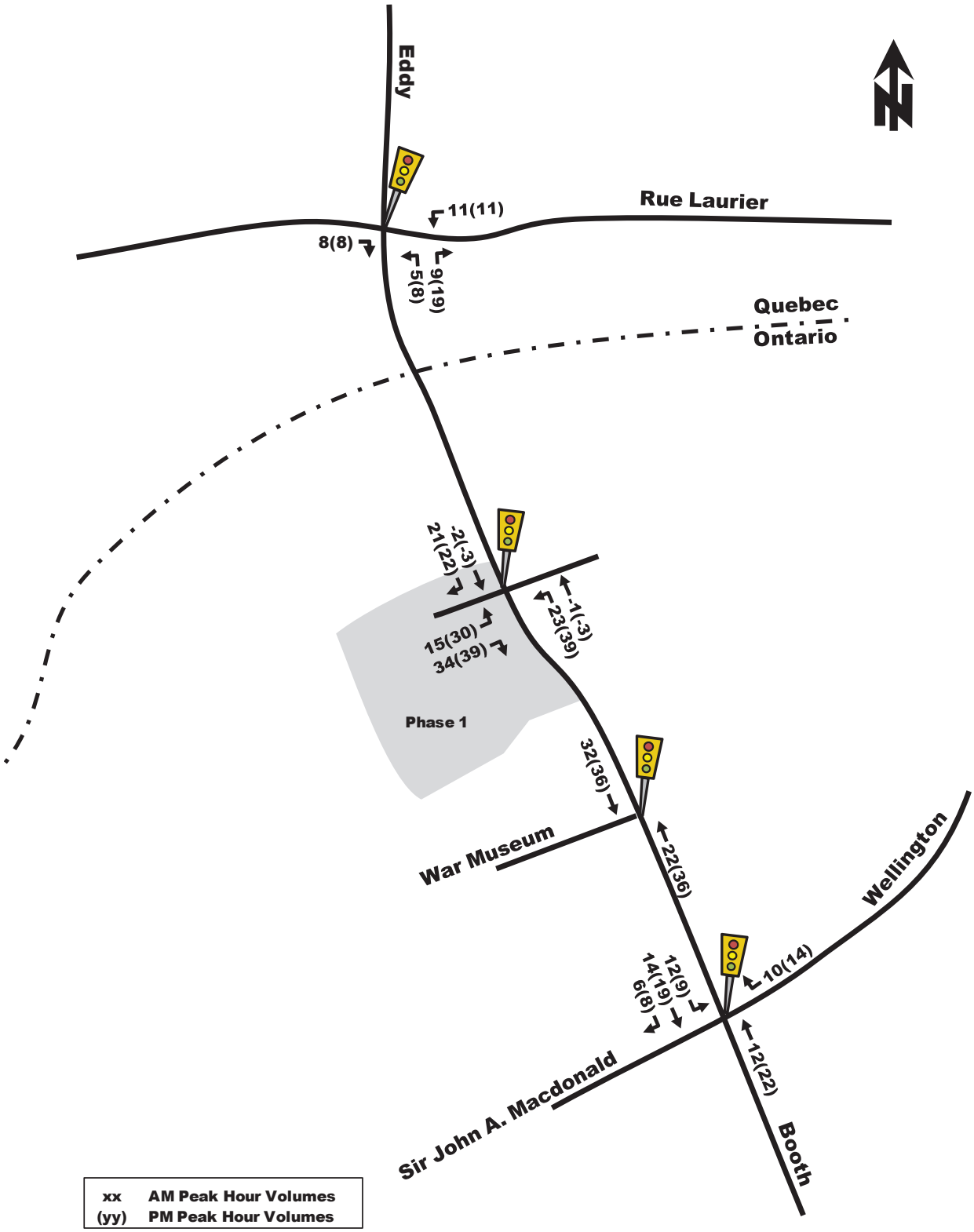
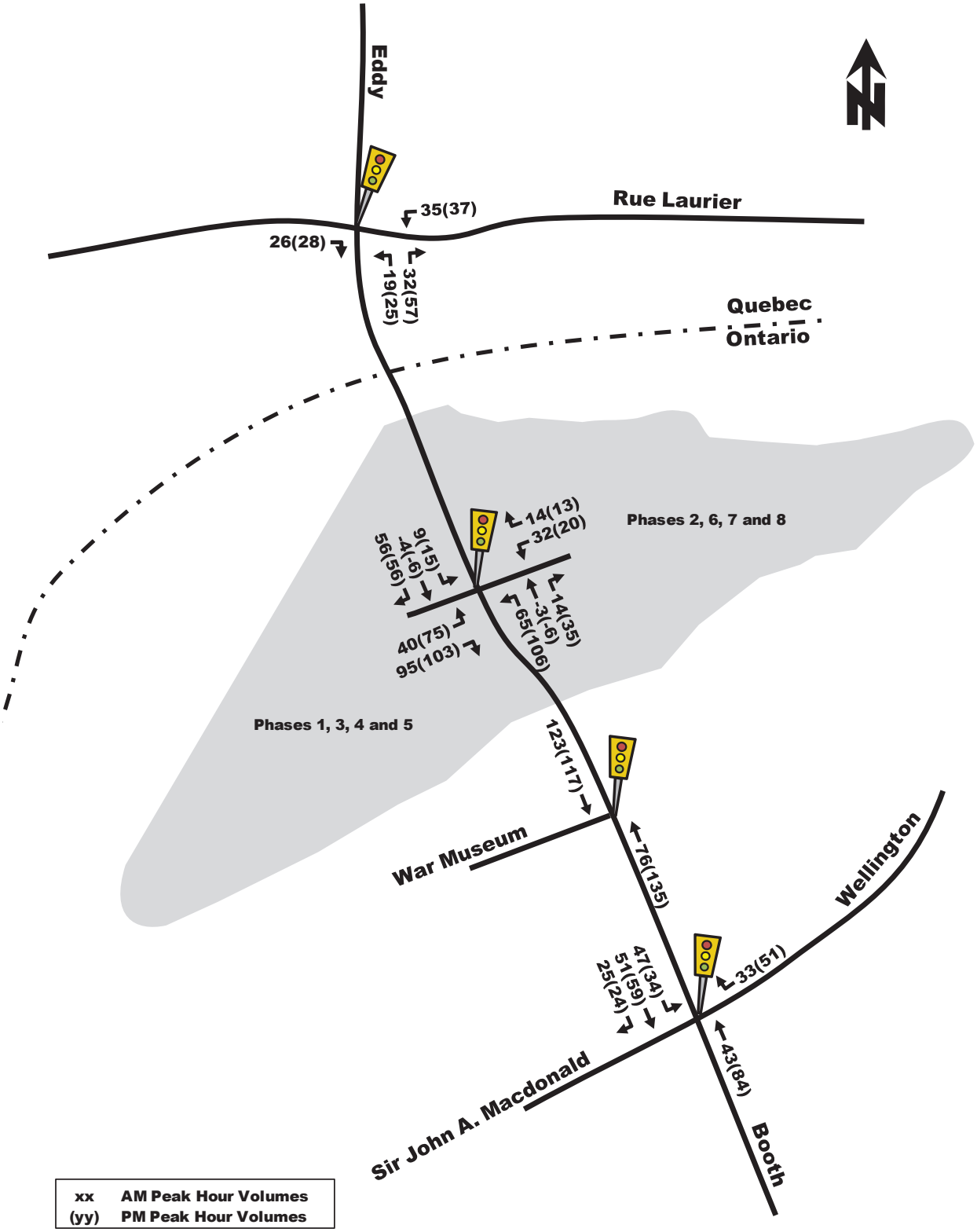


Figure 8: Phases 1 to 8 Site-Generated Traffic Volumes (New and Pass-by)



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Revised: 8 July 2019

OUR REF: 602835-03000

Windmill Green Fund LPV
1306 Wellington Street West
Suite 201
Ottawa, ON K1Y 3B2

Attention: Scott Bentley

Dear Scott:

Re: Zibi Ontario Phase 1
Transportation Impact Study (4 September 2015) Addendum No. 4.
Block 207

1. INTRODUCTION

This brief letter report has been prepared to satisfy the submission requirements of the City of Ottawa for the Site Plan Control application for **Block 207** of the Zibi Ontario Phase 1 Development.

Previous transportation planning documents prepared by Parsons for the proposed development include: *Domtar Lands Redevelopment - Multi-Modal Transportation Impact Study* dated 21 April 2014; *Zibi Ontario Phase 1A Transportation Impact Study* dated 4 September 2015; *Zibi Ontario Phase 1A Response to City of Ottawa Comments* dated 5 January 2016, 20 July 2017 and 16 November 2017 (Addendum No. 1, 2, and 3, respectively)

The most current version of the Phase 1 Plan is attached, which shows the subject Block 207 in the southwest quadrant of the Booth/Chaudière intersection.

2. PREVIOUS TIA SUBMISSION (4 SEPTEMBER 2015)

The original Transportation Impact Study prepared by Parsons included all development for Zibi Ontario Phase 1, including approximately 50,000ft^2 retail, 38,000ft^2 office, 315 residential units, and 7,000ft^2 community space comprised of two sub-phases, namely:

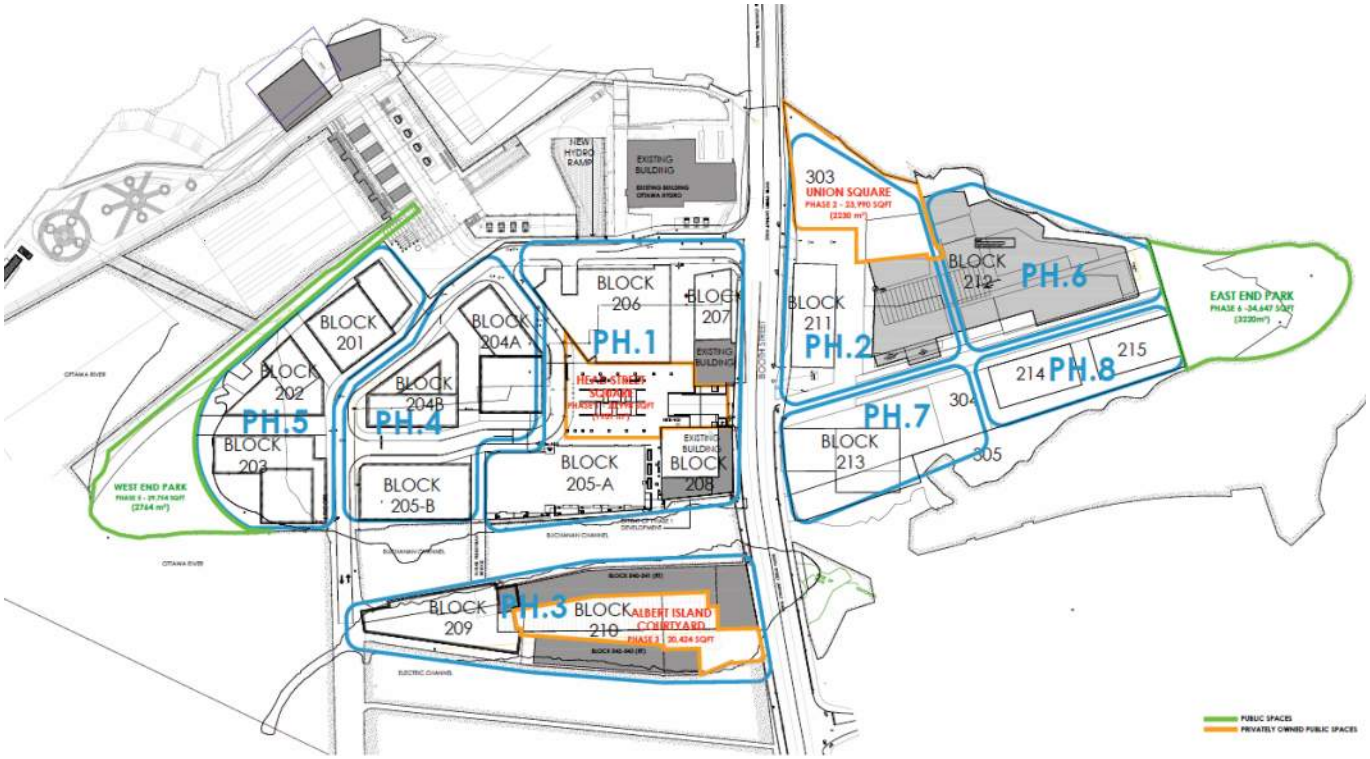
- Phase 1a - Blocks 301 (interim parking), 208 and 205A (25,000 ft^2 office, 25,000 ft^2 retail and 67 residential units),
- Phase 1b - Blocks 207 and 206.

At the time, Block 207 was envisioned to consist of 40,000 ft^2 office/retail, with an approximate equal split of office and retail space, while Block 206 would be predominantly a residential building.

Note that the title of the September 2015 TIA refers to Phase 1A, but it actually reflects the entire Phase 1 (i.e., A and B). The TIS indicated that the entire Phase 1 development was projected to generate approximately 90 and 120 veh/h during the weekday morning and afternoon peak hours, respectively.

Furthermore, the RMA for the Booth/Chaudière intersection was approved as part of the submission, and it is understood that these works, supporting the full development, will be completed by 2019.

Exhibit 1: ZIBI Ontario Master Development Plan



3. BLOCK 207 SUBMISSION

The attached Site Plan for the subject Block 207 indicates a GFA of 70,200 ft^2 office/retail, which is approximately 50% greater than the size of land use assumed in the original submission. However, it is understood that the proposed split is 54,119 ft^2 office (floors 2-6), 6,928 ft^2 retail and 9,153 ft^2 restaurant (ground floor), which results in additional office space and reduced retail space than assumed in the original TIS. The updated total office space associated with Phase 1 is approximately 72,500 ft^2 (versus 38,000 ft^2 previously assumed), updated total retail space is approximately 28,300 ft^2 (versus 50,000 ft^2 previously assumed) and newly proposed 9,153 ft^2 of restaurant space. The number of residential units remains unchanged at approximately 300 units.

The projected vehicle trip generation associated with the resulting increased office space (and reduced retail space) for Block 207 is 70 veh/h and 85 veh/h, during the weekday morning afternoon peak hours respectively. When also accounting for the previously approved Blocks 205A, 208 and 301, the combined total is 110 veh/h and 140 veh/h respectively. These totals are within 20 veh/h of the volume projections forecasted as part of the original TIA (namely 90 and 120 veh/h as indicated in Section 2), and therefore no further analysis is required.

With regard to vehicle parking, a total of 68 spaces are proposed, with 32 on P1 and 36 on P2. The By-Law requirement is for 56 spaces. Vehicle access for these spaces will be through Block 301 which is being constructed as part of Phase 1A. With regard to bicycle parking, the By-Law requirement is for 26 spaces, however, 32 are proposed with 18 in the garage and 14 outside adjacent to the west wall of the Block 207 building in the pedestrian alley.

Pedestrian access to Block 207 will be from both the east and west side of the building (Booth St and Ahearn Pedestrian St). In the short term, vehicles will enter the underground parking garage via a temporary ramp in Block 301. When Block 206 is eventually built, the temporary ramp into 301 will be replaced by a permanent ramp in Block 206.

When Block 206 is introduced (future application), resulting in an estimated 250 residential units and 7,000 ft^2 community space, the total projected vehicle trip generation using the standard approach is 140 and 170 veh/h during the weekday morning and afternoon peak hours, respectively. These totals are within 50 veh/h of the volume projections forecasted as part of the original TIA (namely 90 and 120 veh/h as indicated in Section 2), and therefore consideration could be given at that time for additional transportation study requirements. It should be noted, however, that the on-site parking supply will have a significant impact on the magnitude of peak hour site-generated traffic. If a reduced amount of parking is provided (even though By-Law requirement is met) than the estimated peak hour traffic volume based on floor area of proposed land use or number of residential units, will be much higher than the actual realized volume.

Based on the foregoing, the proposed Zibi Ontario Phase 1 development, and Block 207, continues to be recommended from a transportation perspective. If there are any questions, please contact the undersigned.

Sincerely,

Mark Baker, P.Eng.
Senior Transportation Engineer

attachment

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17 June 2019

OUR REF: 602835-03000

Windmill Green Fund LPV
1306 Wellington Street West
Suite 201
Ottawa, ON K1Y 3B2

scott.bentley@zibi.ca

Attention: Scott Bentley

Dear Scott:

Re: Zibi Ontario Phase 1: *Transportation Impact Study (4 September 2015) Addendum No. 5 for Block 211*

1. INTRODUCTION

This brief letter report has been prepared to satisfy the submission requirements of the City of Ottawa for the Site Plan Control application for **Block 211** of the Zibi Ontario development.

Previous transportation planning documents prepared by Parsons for the proposed development include: *Domtar Lands Redevelopment - Multi-Modal Transportation Impact Study* dated 21 April 2014; *Zibi Ontario Phase 1A Transportation Impact Study* dated 4 September 2015; *Zibi Ontario Phase 1A Response to City of Ottawa Comments* dated 5 January 2016, 20 July 2017 and 16 November 2017 (Addendum No. 1, 2, and 3, respectively), and Addendum #4 for Block 207 dated 4 March 2019.

The most current Zibi Ontario Context and Blocking Plan is provided in Figure 1, with the subject Block 211 located in the southeast quadrant of the Booth/Chaudière East intersection, highlighted in yellow.

2. PREVIOUS TIA SUBMISSION (4 SEPTEMBER 2015)

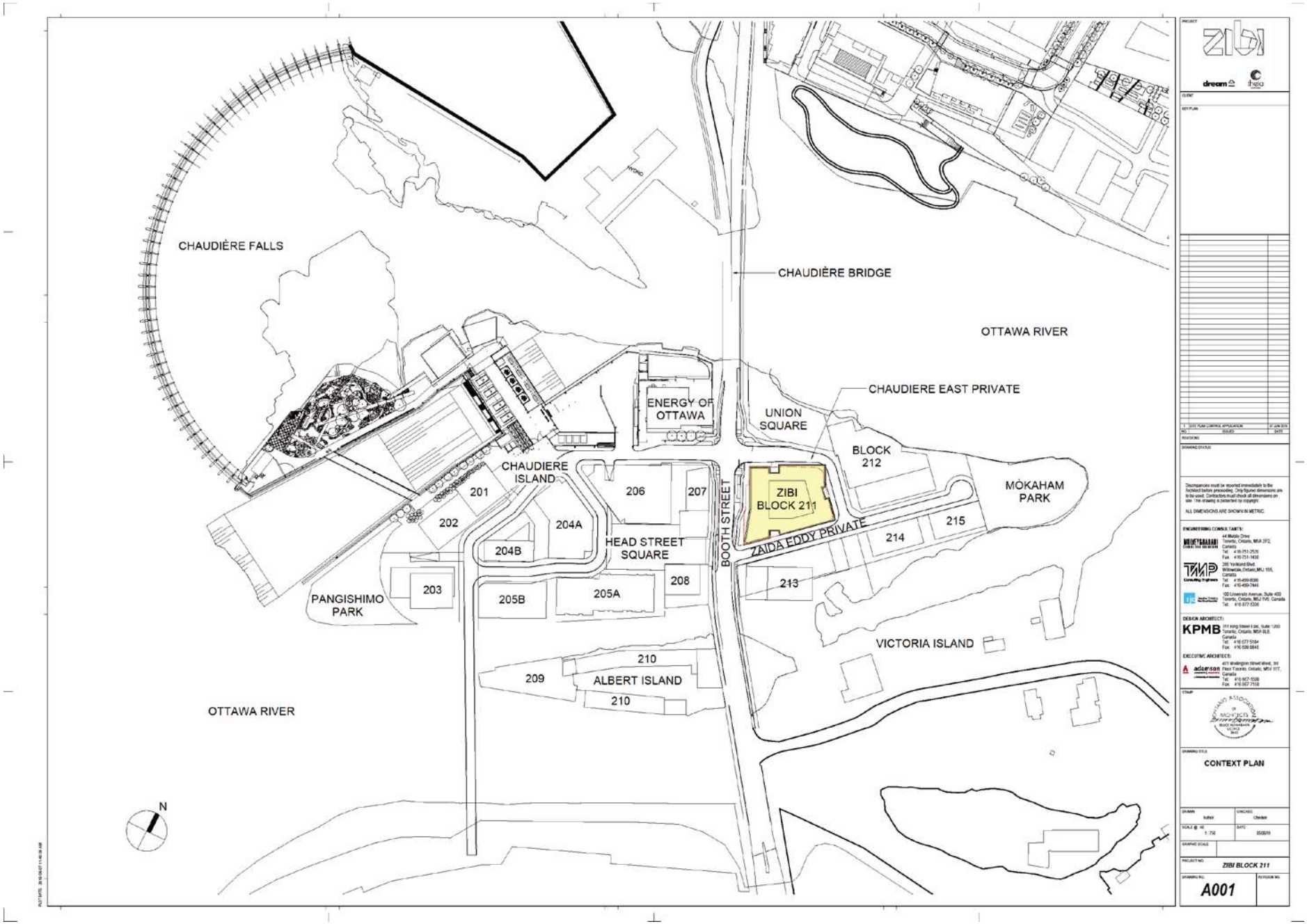
The original Transportation Impact Study prepared by Parsons included all development for Zibi Ontario Phase 1, including approximately 50,000 ft^2 retail, 38,000 ft^2 office, 315 residential units, and 7,000 ft^2 community space comprised of two sub-phases, namely:

- Phase 1a - Blocks 301 (interim parking), 208 and 205A (25,000 ft^2 office, 25,000 ft^2 retail and 67 residential units),
- Phase 1b - Blocks 207 and 206.

At the time, Block 207 was envisioned to consist of 40,000ft^2 office/retail, with an approximate equal split of office and retail space, while Block 206 would be predominantly a residential building.

As context, note that the title of the September 2015 TIA refers to Phase 1A, but it actually reflects the entire Phase 1 (i.e., A and B). The TIS indicated that the entire Phase 1 development was projected to generate approximately 90 and 120 veh/h during the weekday morning and afternoon peak hours, respectively. Furthermore, the RMA for the Booth/Chaudière intersection was approved as part of the submission, and it is understood that these road works, supporting the full development, will be completed by 2019. The contract drawings for the adjacent section of Booth Street, including the Booth/Chaudière East and Booth/Head/Zaida Eddy intersections are included as Attachment #1.

Figure 1: Context and Blocking Plan



The revised Site Plan for the subject Block 207 indicated a GFA of 70,209 ft^2 office/retail, which is approximately 50% greater than the size of land use assumed in the original submission. However, it is understood that the proposed split is 54,477 ft^2 office (floors 2-6), 6,928 ft^2 retail and 8,804 ft^2 restaurant (ground floor), which results in additional office space and reduced retail space than assumed in the original TIS. The updated total office space associated with Phase 1 is approximately 72,500 ft^2 (versus 38,000 ft^2 previously assumed), updated total retail space is approximately 28,300 ft^2 (versus 50,000 ft^2 previously assumed) and newly proposed 8,800 ft^2 of restaurant space. The number of residential units remains unchanged at approximately 300 units.

The projected vehicle trip generation associated with the increased office space (and reduced retail space) for Block 207, as well as the previously approved Blocks 205A, 208 and 301, was 110 veh/h and 140 veh/h during the weekday morning and afternoon peak hours, respectively. These totals are within 20 veh/h of the volume projections forecasted as part of the original TIA (namely 90 and 120 veh/h as indicated in Section 2), and therefore no further transportation-related analysis was required for the revised Block 207.

3. BLOCK 211 SITE PLAN SUBMISSION

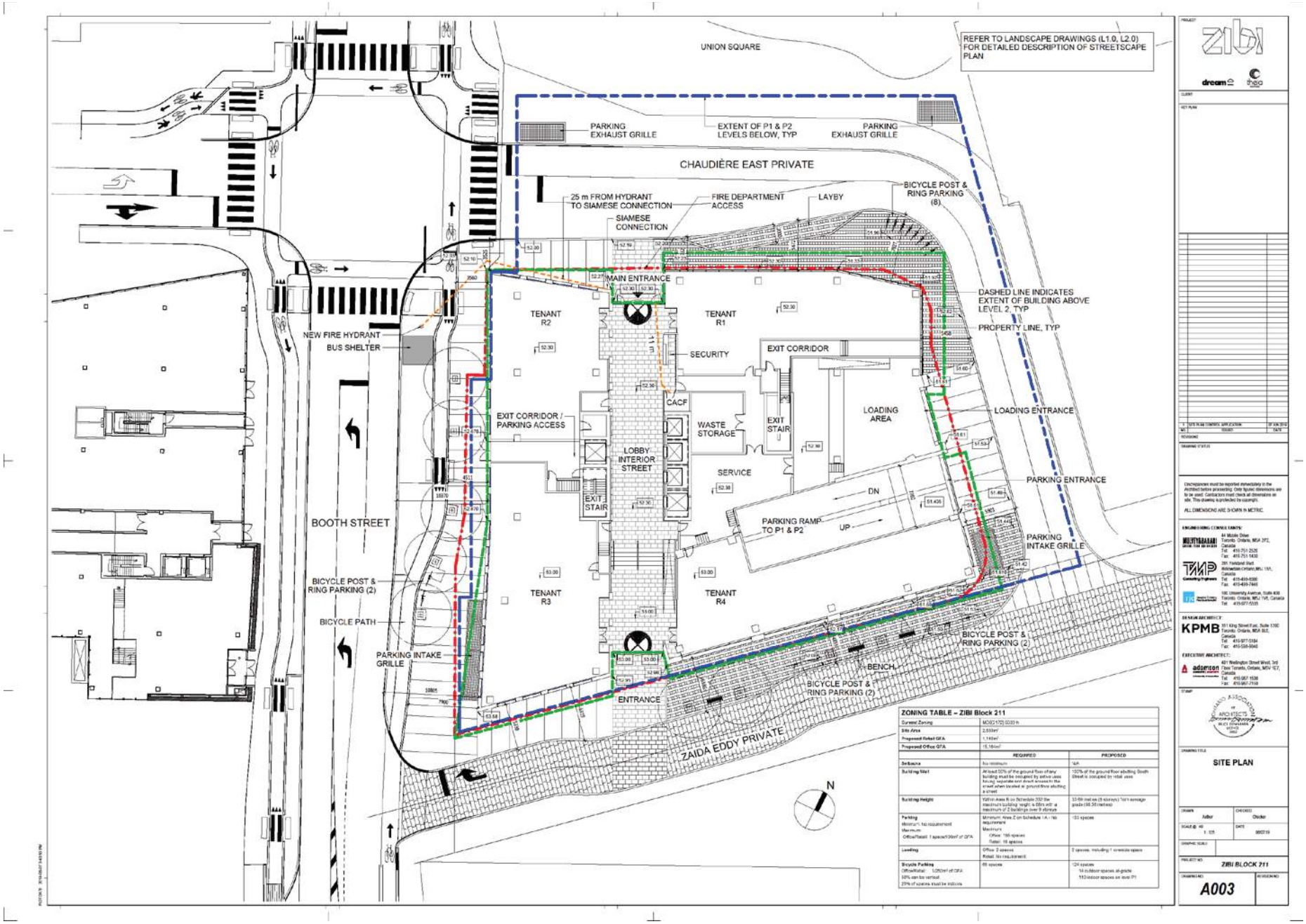
The current submission is for Block 211 which is located on the east side of Booth Street in the southeast quadrant of the Booth Street/Chaudière East intersection. In the previously approved plans, Block 211 was comprised of 60,166 ft^2 of residential condominium development (70 to 80 units). The current proposal/Site Plan for Block 211 as shown in Figure 2, is comprised of approximately 163,300 ft^2 (15,164 m^2) of office with 12,270 ft^2 (1140 m^2) of ground floor supporting retail accommodated in a 9 storey building with 2 levels of below grade parking. With regard to any projected change in block traffic generation, the approved residential use was projected to generate an approximate two-way total of 15 veh/h during the weekday morning and afternoon peak hours. As the proposed use is office with a negligible parking requirement, it's traffic generation will be different and needs to be quantified. It is assumed that the ground floor retail is service/support retail and not destination retail and as such will have no/negligible peak hour vehicle trips. It's trip generation will be predominately pedestrian oriented from the immediate neighborhood.

In doing peak hour traffic generation for Block 211, there are two approaches. The first would be to use the office trip generation rates used in the previous Zibi transportation studies which were based on modal share assumptions and an unconstrained parking supply. Under this approach the auto driver modal share would be 30% with the balance (70%) being transit (45%), bike/walk (20%) and auto passengers (5%). The result of using this approach would be a weekday commuter peak hour two-way vehicle trip generation of 155 veh/h to 180 veh/h during the morning and afternoon peak hours, respectively. This would be approximately 140 veh/h and 165 veh/hr greater than what the initially assumed residential condominium use would generate. As this net increase is considered significant, it would have an impact on the operation of site access intersections and on the adjacent section of Booth Street. This analysis approached, however, is based on a readily available supply of parking to accommodate 155 to 180 peak hour vehicle trips. Given the proposed office tenant, the parking supply will be extremely low (tenant requires only 2 parking spaces and City By-Law requires 0 parking spaces). As such, the traditional approach for site traffic generation is not appropriate in this instance, and an alternative approach giving consideration to the minimal parking supply will be used for assessing the traffic impacts/requirements of Block 211.

As noted, the approximately 175,500 ft^2 (16,305m^2) office/retail proposal for Block 211 is for a tenant with a related By-law requirement for 0 parking spaces and a tenant requirement for 2 parking spaces. This parking requirement would obviously have a negligible traffic impact; however, service vehicle and drop-off/pick-up traffic would have to be accounted for.

On the topic of parking supply, we are advised that Block 211 has the capacity to economically provide approximately 150 parking spaces, however, the significant majority of these would be to accommodate the parking requirements of adjacent development blocks on the east side of Booth Street, which in total cannot provide sufficient parking for their own respective requirements. As such, the Block 211 parking supply would be shared parking for use by adjacent projects and potentially by general public.

Figure 2: Site Plan



Included as Attachment #2 to this report is a table of the current anticipated parking supply/demand on a block by block basis for the Ontario component of Zibi. Specifically, with regard to the east side of Booth Street, the key parking data is summarized in Table 1.

Table 1: Chaudière East: Parking Supply/Demand Estimate

	Residential Units	Retail GFA (m^2)	Office GFA (m^2)	Anticipated Parking Provision	Anticipated Market Demand	By-law Requirement	Visitor Requirement
Block 211	-	-	16,314	150	122	0	0
Block 212	-	1,394	18,580	45	192	0	0
Block 213-214-215	245	372	-	221	136	0	23
Total Spaces	245	1,766	34,894	416	450	0	23

As can be seen from review of Table 1, the proposed office use for Block 211 has a 0 By-law parking requirement, and as the tenant has identified a requirement for only 2 assigned spaces, the balance of the parking supply (148 spaces) will be shared parking for use by Block 212 (which has a projected supply/demand deficiency of approximately 150 spaces (192-45) and is anticipated to have office and some retail uses on the ground and lower floors. With regard to non-auto parking, the Site plan identifies 6 motorcycle spaces and 110 level one bicycle parking spaces.

4. PROJECTED BLOCK 211 VEHICLE TRIP GENERATION

When initially constructed with its 150 parking spaces, Block 211 will be the first block developed on the east side of Booth Street. As such, there will be no shared parking with other development blocks in this sector. This will occur when the adjacent Block 212 is developed. Initially Block 211 parking will most likely be used as follows:

- By the 2 vehicles required by the Block 211 tenants;
- By small Block 211 service vehicles (van size);
- By visitors and retail patrons to Block 211;
- As overflow parking by tenants, residents, visitors to Zibi development on the west side of Booth Street; and
- By employees working in Block 211 who choose to drive and pay for daily, monthly, or annual parking.

So, the question is, what will be the peak hour traffic generation from the 150-space parking garage under this usage scenario. A simplistic approach is to use the following assumptions:

- The functional capacity of the garage is assumed to be 90% of capacity due to employee absenteeism and the challenge of finding the few remaining open parking spaces in a 90% full garage;
- Commuter peak hours have spread in the Ottawa-Gatineau area to be approximately 3 hours in both the morning and afternoon peak periods. As such, the peak hour of garage traffic generation could be assumed to be approximately 35% to 40% of the number of vehicles parking in the garage, and
- 3% to 5%, or 5 parking spaces, are reserved for service or equivalent type vehicles that travel to/from the site outside of the morning and afternoon peak hour.

Based on the foregoing, an estimate of the garage's peak hour vehicle trip generation is as follows:

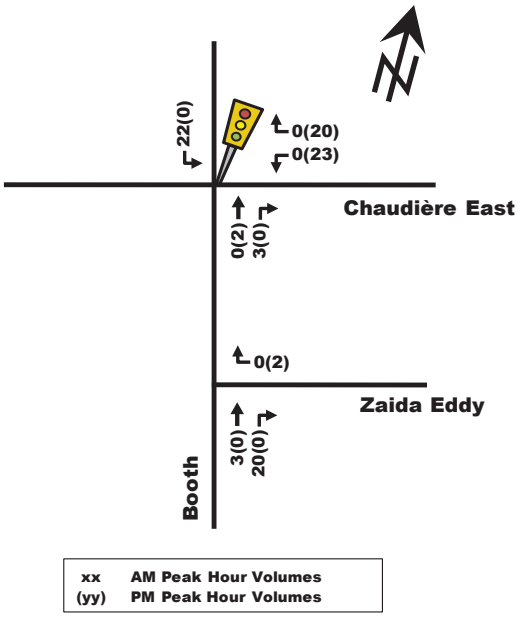
- 150 spaces x 90% functional capacity = 135 spaces.
- 135 spaces – 5 service vehicle spaces = 130 spaces
- 130 spaces x 0.35 peak hour factor = 45 veh/h inbound in the morning peak hour and outbound during the afternoon peak hour.
- The peak hour traffic generation in the opposite direction of peak flow is 10% of peak flow which equates to 5 veh/h outbound in the morning peak and inbound in the afternoon peak.

Based on the foregoing assumptions, Block 211's garage traffic generation is estimated to be 50 veh/h two-way total during peak hours.

In additional to the garage-generated traffic, there will also be peak hour drop-off/pick-up traffic due to the restricted parking provision, that should be accounted for. This is estimated to be 10 veh/h two-way total, or 20% of the garage traffic generation. In total, the Block 211 peak hour vehicle trip generation is estimated to be 60 veh/h two-way total (50 + 10).

As identified in Section 3. Block 211's previously proposed residential use was projected to generate 15 veh/h two-way total. As such, the net change as a result of the current office proposal is 45 veh/h two-way total (60 – 15). When accounting for the directional distribution of the 15 veh/h generation by the initial residential scenario and the 10 veh/h using the lay-by lane, the net result is only 45 veh/h in and 45 veh/h out during the morning and afternoon peak hour respectively as depicted in Figure 3. The distribution is based on 50/50 split between Ontario and Quebec as per the original TIA.

Figure 3:Assignment of Block 211's Net Increase in Peak Hour Traffic Generation



5. TRAFFIC IMPACT ANALYSIS

To determine the Impact/requirements of Block 211's net traffic increase, the Figure 3 volumes were added to the Figure 11 volumes contained in the Zibi Ontario TIA (Full Zibi Development Total Projected Volumes). The resultant volumes are depicted in Figure 4 and the related levels of service at the Booth/Chaudière intersection are presented in Table 2, Row 1. As noted in the TIA, because of the projected failed conditions along the Booth Street Corridor, up to 380 veh/h southbound in the morning peak hour would have to be removed/assigned elsewhere for the corridor to operate at LoS E or better. When this reduction is applied to the Figure 4 volumes, the resulting levels of services are included in Row 2 of Table 2. All related SYNCHRO analysis is included in Attachment 3.

As can be seen in reviewing the Table 2 content, there is no change in level of service at the Booth/Chaudière intersection due to the changes in Block 211 land use, and in fact the v/c ratios remain effectually the same (Row 1 versus Row 3). And as per the TIA scenario with 380 veh/h removed from the southbound through traffic, the subject intersection will be at an acceptable (E or better) for all time periods, except for the critical northbound through movement which is projected to have a LoS F and a v/c ratio of 1.01. To get this ratio below 1.0, approximately 30 veh/h of northbound through traffic would have to be removed during the afternoon peak hour.

No mitigation measures are considered since the previously discussed LOS do not exceed the City's permissible operational thresholds (i.e. v/c < 0.90). Note that the intersections are in separate coordinated signal control areas, and therefore the intersections are coordinated with neighbouring intersections west and east of the corridors, respectively.

SITE TRIP GENERATION

In order to estimate the impact of the subject development on the road network, it is necessary to estimate the traffic growth associated with the subject developments. Appropriate trip generation rates for the proposed development were obtained from the Ninth Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual. The trip generation rates and rate equations are summarized in Table 3.

Table 3: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates		
		AM Peak	PM Peak	SAT Peak
High-Rise Residential Condominium	ITE 230	T = 0.44 (du); Ln(T) = 0.80 Ln (du) + 0.26	T = 0.52 (du); Ln(T) = 0.82 Ln (du) + 0.32	T = 0.47 (du); T = 0.29 (du) + 42.63
General Office Building	ITE 710	T = 1.56(X); Ln(T) = 0.80 Ln(X) + 1.57	T = 1.49(X); T = 1.12(X) + 78.45	T = 0.43 (X); N/A
Shopping Center	ITE 820	T = 0.96(X); Ln(T) = 0.61 Ln(X) + 2.24	T = 3.71(X); Ln(T) = 0.67 Ln(X) + 3.31	T = 4.82; Ln (T) = 0.65 Ln(x) + 3.78

Notes: T = Average Vehicle Trip Ends
X = 1000 ft² Gross Floor Area
du = dwelling units

As ITE trip generation surveys only record vehicle trips and typically reflect highly suburban locations (with little to no access by travel modes other than private automobiles), adjustment factors appropriate to the more urban study area context were applied to attain estimates of person trips for the proposed development. This approach is considered appropriate within the industry for urban infill developments.

To convert ITE vehicle trip rates to person trips, an auto occupancy factor and a non-auto trip factor were applied to the ITE vehicle trip rates. Our review of available literature suggests that a combined factor of approximately 1.3 is considered reasonable to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. Using these factors, along with the rate equations in Table 3, the person trip generation for the proposed site was calculated. This is summarized in Table 4.

Table 4: Modified Person Trip Generation

Land Use	Area	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)			SAT Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total	In	Out	Total
High-Rise Condominium	1,632 du	106	521	627	517	255	772	362	309	671
General Office Building	181,027 ft²	352	48	400	62	304	366	54	47	101
Specialty Retail	117,380 ft²	138	85	223	416	451	867	655	606	1,261
Total Person Trips		**596**	**654**	**1,250**	**995**	**1,010**	**2,005**	**1,071**	**962**	**2,033**

Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%

The person trips shown in Table 4 for the proposed site were then reduced by modal share values, including a reduction for pass-by trips and multi-purpose trips for the retail land use based on the site's location and proximity to adjacent communities, employment, other shopping uses, and transit availability. In addition, future transit modal splits are likely to be even greater as the implementation of the City's LRT is completed. High transit mode shares were allocated to the land uses due to the close proximity of the future LRT station in addition to the ease in which it can be accessed. Transit mode shares as high as 65% can be assumed in trip-generation according to the Transit-Oriented Development (TOD) Plan, nonetheless lower values were used to output a worst-case scenario.

Modal share, pass-by, and multi-purpose values for condominium, office, and retail land uses within the proposed development for horizon years 2020 and 2025 are summarized in Tables 5 to 9 with the total site-generated vehicle traffic for both horizon years summarized in Tables 10 and 11. To account for a gradual shift towards transit use over time, a greater transit mode share was used for the 2025 horizon than the 2020 horizon. It has been assumed that the shopping centre land use would draw a higher vehicle mode share and is less likely to change over time. The shopping center trips were assumed to have the same mode splits in both horizon years.

Tables 5 and 6 summarize the forecasted trip generation for condominium and office land uses for horizon year 2020.

Table 5: Condominium Modal Site Trip Generation - 2020

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)			SAT Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	30%	32	157	189	156	77	233	109	93	202
Auto Passenger	10%	11	52	63	52	26	78	37	31	68
Transit	45%	48	234	282	232	114	346	162	139	301
Non-motorized	15%	15	78	93	77	38	115	54	46	100
Total Person Trips	100%	106	521	627	517	255	772	362	309	671
Auto Trips		AM Peak (Autos/hr)			PM Peak (Autos/hr)			SAT Peak (Autos/hr)		
Total New Residential Condos Auto Trips		32	157	189	156	77	233	109	93	202

Table 6: Office Modal Site Trip Generation - 2020

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)			SAT Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	30%	106	15	121	19	92	111	17	15	32
Auto Passenger	10%	36	5	41	7	31	38	5	4	9
Transit	45%	158	21	179	27	136	163	24	21	45
Non-motorized	15%	52	7	59	9	45	54	8	7	15
Total Person Trips	100%	352	48	400	62	304	366	54	47	101
Auto Trips		AM Peak (Autos/hr)			PM Peak (Autos/hr)			SAT Peak (Autos/hr)		
Total New Office Auto Trips		106	15	121	19	92	111	17	15	32

Tables 7 and 8 summarize the forecasted trip generation for condominium and office land uses for horizon year 2025.

Table 7: Condominium Modal Site Trip Generation - 2025

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)			SAT Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	25%	27	131	158	130	64	194	91	78	169
Auto Passenger	5%	6	26	32	26	13	39	18	16	34
Transit	55%	58	286	344	284	140	424	199	169	368
Non-motorized	15%	15	78	93	77	38	115	54	46	100
Total Person Trips	100%	106	521	627	517	255	772	362	309	671
Auto Trips		AM Peak (Autos/hr)			PM Peak (Autos/hr)			SAT Peak (Autos/hr)		
Total New Residential Condos Auto Trips		27	131	158	130	64	194	91	78	169

Table 8: Office Modal Site Trip Generation - 2025

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)			SAT Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	25%	88	12	100	16	76	92	14	12	26
Auto Passenger	5%	18	3	21	3	16	19	3	3	6
Transit	55%	194	26	220	34	167	201	29	25	54
Non-motorized	15%	52	7	59	9	45	54	8	7	15
Total Person Trips	100%	352	48	400	62	304	366	54	47	101
Auto Trips		AM Peak (Autos/hr)			PM Peak (Autos/hr)			SAT Peak (Autos/hr)		
Total New Office Auto Trips		88	12	100	16	76	92	14	12	26

Table 9 summarizes the forecasted trip generation for the shopping centre land uses for both horizon years, 2020 and 2025, given that the mode shares are assumed to remain constant.

Table 9: Shopping Centre Modal Site Trip Generation – 2020/2025

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)			SAT Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	60%	83	51	134	250	271	521	393	364	757
Auto Passenger	15%	21	13	34	63	68	131	99	91	190
Transit	20%	28	17	45	83	90	173	131	121	252
Non-motorized	5%	6	4	10	20	22	42	32	30	62
Total Person Trips	100%	138	85	223	416	451	867	655	606	1,261
Auto Trips		AM Peak (Autos/hr)			PM Peak (Autos/hr)			SAT Peak (Autos/hr)		
Autos (Mode Share - 60%)		83	51	134	250	271	521	393	364	757
Less Pass-by (35%)		-23	-23	-46	-91	-91	-182	-132	-132	-264
Total New Shopping Center Auto Trips		60	28	88	159	180	339	261	232	493

The following Tables 10 and 11 provides a summary of potential two-way vehicle trips to/from the proposed development for the two horizon years.

Table 10: Total Site Vehicle Trip Generation 2020

Travel Mode	AM Peak (veh/hr)			PM Peak (veh/hr)			SAT Peak (veh/hr)		
	In	Out	Total	In	Out	Total	In	Out	Total
Residential Condos	32	157	189	156	77	233	109	93	202
General Office Building	106	15	121	19	92	111	17	15	32
Shopping Center	83	51	134	250	271	521	393	364	757
Shopping Center Pass-by (35%)	-23	-23	-46	-91	-91	-182	-132	-132	-264
Office Multi-Purpose (10%)	-11	-2	-12	-2	-9	-11	-2	-2	-3
Shopping Center Multi-Purpose (10%)	-6	-2	-9	-16	-18	-34	-26	-23	-49
Total New Auto Trips	181	196	377	316	322	638	359	315	675

Table 11: Total Site Vehicle Trip Generation 2025

Travel Mode	AM Peak (veh/hr)			PM Peak (veh/hr)			SAT Peak (veh/hr)		
	In	Out	Total	In	Out	Total	In	Out	Total
Residential Condos	27	131	158	130	64	194	91	78	169
General Office Building	88	12	100	16	76	92	14	12	26
Shopping Center	83	51	134	250	271	521	393	364	757
Shopping Center Pass-by (35%)	-23	-23	-46	-91	-91	-182	-132	-132	-264
Office Multi-Purpose (10%)	-9	-1	-10	-1	-8	-9	-1	-1	-3
Shopping Center Multi-Purpose (10%)	-6	-3	-9	-16	-18	-34	-26	-23	-49
Total New Auto Trips	160	167	327	288	294	582	339	298	636

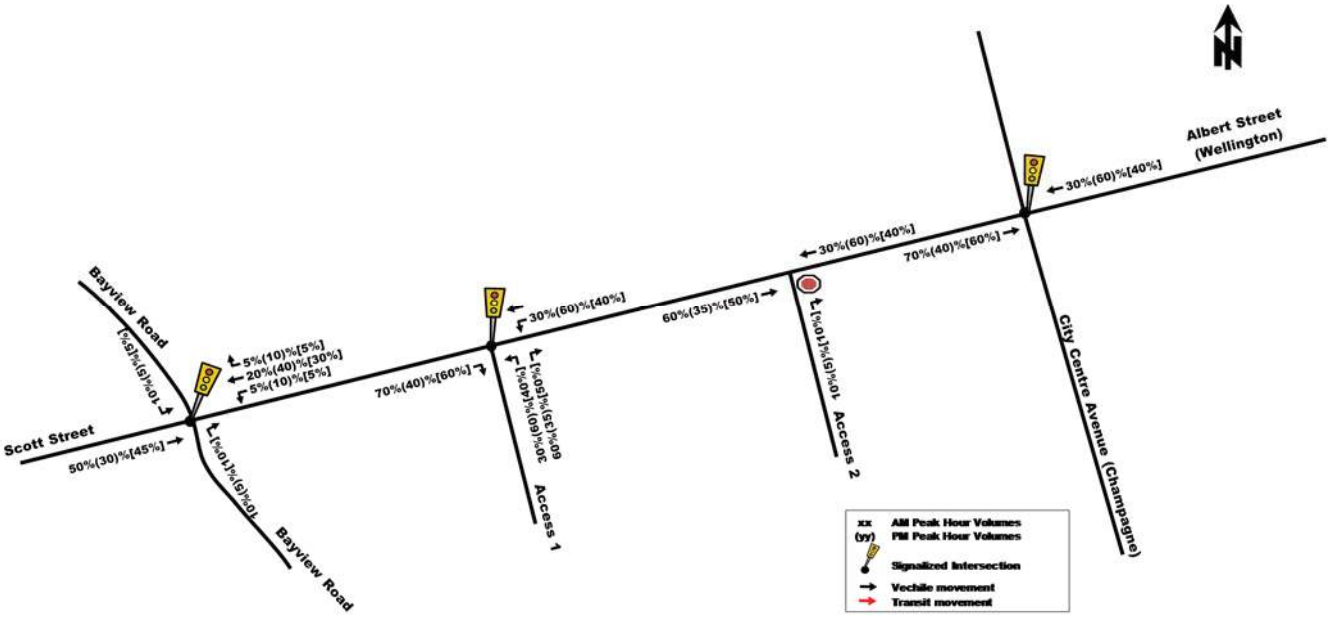
As shown in Table 10, the forecast 2020 new two-way vehicle trip generation for the proposed development is approximately 377, 638, and 675 veh/h during the weekday morning, afternoon peak hours, and Saturday peak hours, respectively.

As shown in Table 11, the forecast 2025 new two-way vehicle trips for the proposed development is approximately 327, 582, and 636 veh/h during the weekday morning, afternoon peak hours, and Saturday peak hours, respectively. These numbers have decreased, compared to the 2020 horizon, due to the projected changes to the mode share.

VEHICLE TRAFFIC DISTRIBUTION AND ASSIGNMENT

To determine how the projected traffic would access the site, a trip distribution and assignment exercise has been completed. Several resources were drawn upon to determine a suitable trip distribution for the proposed site, including the 2011 NCR Household Origin – Destination Survey, the existing east-west volume splits along Albert Street, and local knowledge of the surrounding area. It was determined that due to the mix of land uses and the location of the site, the existing on street volume split would be appropriate indicator of the potential site trip distribution. Figure 9 details the site trip distribution.

Figure 9: New Site-Generated Traffic – Percentage Distribution



Based on these distributions, new and pass-by site-generated trips were assigned to study area intersections, which are illustrated as Figures 10 and 11 for horizon years 2020 and 2025.

Figure 10: New and Pass-by Site-Generated Traffic Volumes – 2020

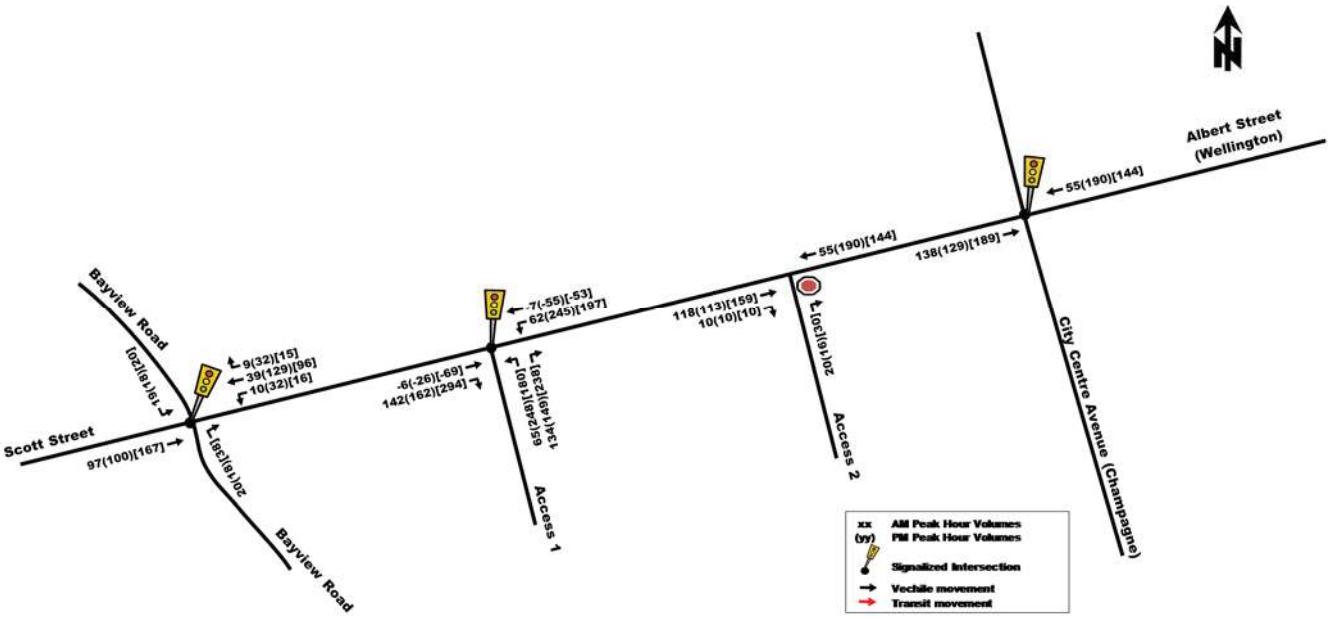
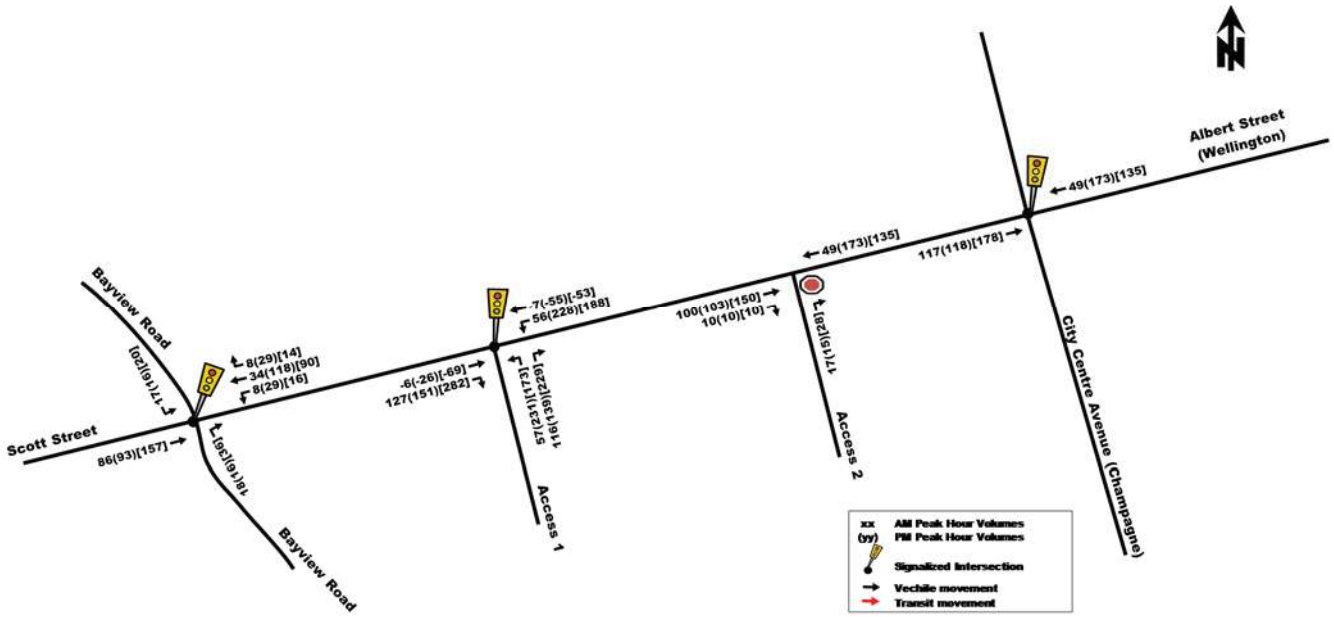


Figure 11: New and Pass-by Site-Generated Traffic Volumes – 2025

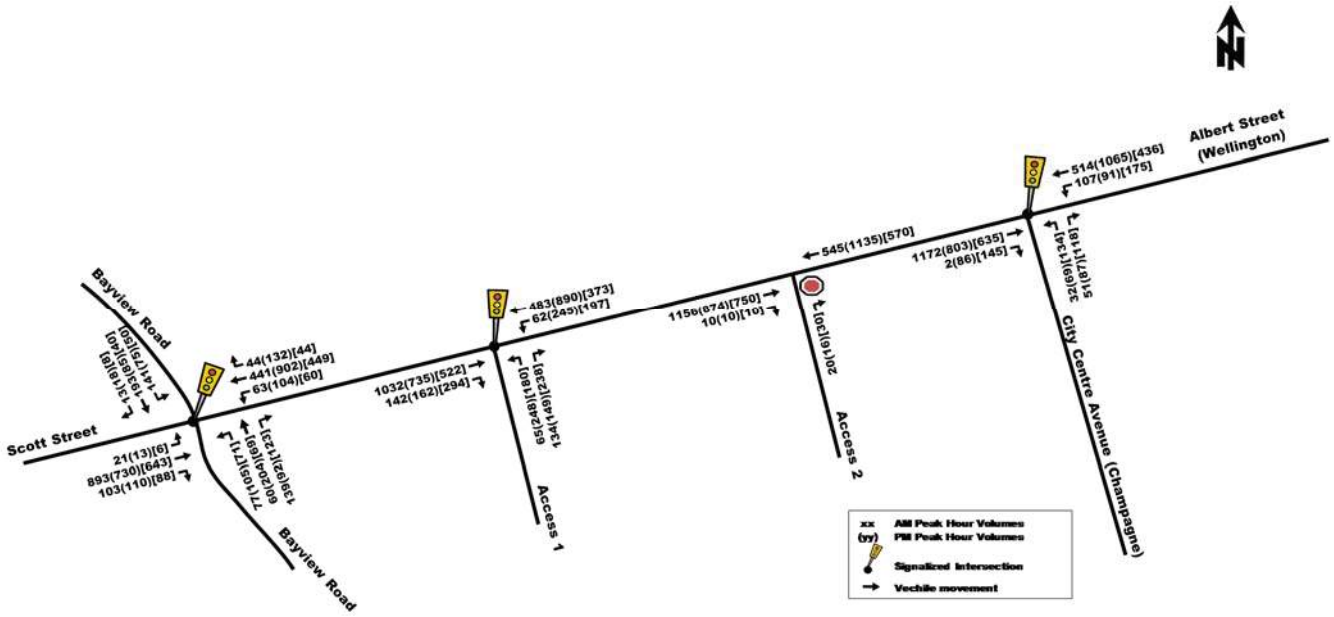


FUTURE TRAFFIC OPERATIONS

PROJECTED CONDITIONS AT FULL SITE DEVELOPMENT

The total projected volumes associated with the proposed development were derived by superimposing new and pass-by site-generated traffic volumes (Figure 10 and 11) onto projected background traffic volumes (Figure 7 and 8). The resulting total projected volumes for the horizon years 2020 and 2025 are illustrated as Figure 12 and 13, respectively.

Figure 12: Total Projected Peak Hour Traffic Volumes - 2020



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March 20, 2018

OUR REF: 476655-01000

Trinity Development Group Inc.
3250 Bloor Street West, Suite 1000
Toronto, ON
M8X 2X9

Attention: Mathew Laing
Vice President – Development and Planning

Dear Mr. Laing:

Re: 900 Albert OPA and ZBLA Resubmission – Transportation Impact Assessment Addendum #3

1. INTRODUCTION

1.1. CONTEXT

Trinity Development Group Inc. has put forward an application to develop 900 Albert Street, Ottawa. In support of this development application an Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBLA) have been prepared. Applications for both OPA and ZBLA have been submitted to the City previously. Subsequent to that application, an updated concept plan for the site has been prepared. The changes to the concept plan have triggered the need to update and revise the OPA and ZBLA applications.

In support of the original OPA and ZBLA Parsons prepared a TIA, using the City of Ottawa's 2006 TIA Guidelines, along with a Multi Modal Level of Service (MMLOS) analysis and report, and a Draft Roadway Modification Approval (RMA). To support the update this addendum has been prepared to examine the changes to the concept plan and review the transportation related conclusions that were previously put forward.

The updated concept plan has been included in Attachment 1.

2. LAND USE COMPARISON

The revised concept plan includes changes to the proposed land uses. This includes adding a hotel and reducing the number of residential units. Table 1 summarizes the updated land use statistics.

Table 1: Land Use Statistics Comparison

	New Concept Plan	Previous Concept Plan	Difference
Gross Building Area (m2)	233,270	197,678	35,592
Residential Units	1,232	1,634	-402
Hotel (Rooms)	150	0	150
Retail (m2)	11,926	15,958	-4,032
Office (m2)	18,331	7,483	10,849
Parking Stalls (Car)	1,198	1,108	90
Parking Stalls (Bike)	1,014	866	148

As shown above the total building area increases with the proposed changes, but the retail space and number of residential units has been decreased. The amount of parking, both for cars and bicycles has been increased to support the hotel and additional office space.

3. TRIP GENERATION COMPARISON

As discussed previously, the land use statistics have changed based on the latest concept plan. The projected trips generated by the site are determined using the land use statistics. Therefore, the trip generation has been updated to reflect the new concept plan. The new trip generation has been compared to the trip generation from the previous TIA and addendums for 900 Albert.

The first step in estimating the trip generation is determining the anticipated mode share assumptions. For this comparison the mode share assumptions from the previous TIA work will be carried forward. These are documented in Table 2 and Table 3. Table 2 includes mode shares for the residential and office space. Additionally, the updated concept plan includes a land use that was not previously considered, a hotel. It is assumed that visitors to the hotel would arrive at the site throughout the day via personal vehicles, but that once on the site, and for the duration of their stay, would utilize active modes and transit for peak hour trips and to get around the city. Therefore, it is assumed that the hotel mode share will be the same as the residential or office uses. As in the previous TIA's and addendums it is assumed that the mode share for the shopping centre land uses would be different from the residential, hotel, and office uses. The shopping centre land use mode shares are documented in Table 3.

Table 2: Residential, Hotel, Office Mode Share

Travel Mode	Mode Share
Auto Driver	25%
Auto Passenger	5%
Transit	55%
Non-motorized	15%
Total Person Trips	100%

Table 3: Shopping Centre Mode Share

Travel Mode	Mode Share
Auto Driver	60%
Auto Passenger	15%
Transit	20%
Non-motorized	5%
Total Person Trips	100%

Using the updated land use statistics and the mode shares summarized above, a trip generation comparison was undertaken. The trip generation comparison has been summarized by mode. Table 4 summarizes the transit trip generation. Table 5 summarizes the non-auto modes trip generation (e.g. walking, cycling). Table 6 summarizes the vehicle trip generation comparison.

Table 4:Transit Trip Generation Comparison

	New Concept Plan			Previous Concept Plan			Difference		
Land Use	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
Residential	274	336	286	344	424	368	-70	-88	-82
Office	217	199	54	114	120	24	122	93	37
Shopping Centre	50	196	284	55	223	323	-8	-39	-56
Hotel	50	61	77	0	0	0	50	61	77
Total	591	792	701	513	767	715	94	27	-24

As shown above the transit trips are expected to increase slightly over the previous concept plan in the AM and PM peak hours, and decrease slightly during the Saturday peak hour. This represents a negligible change and does not impact the overall conclusions and recommendations of the previous TIA and addendums.

Table 5:Non-Auto Trip Generation Comparison

	New Concept Plan			Previous Concept Plan			Difference		
Land Use	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
Residential	74	91	78	93	115	100	-19	-24	-22
Office	59	54	14	30	32	6	33	25	9
Shopping Centre	11	48	70	13	55	79	-2	-10	-13
Hotel	12	16	20	0	0	0	12	16	20
Total	156	209	182	136	202	185	24	7	-6

As shown above the non-auto trips will only vary slightly from the previous concept. This is, again, a negligible change and does not impact the overall conclusions and recommendations of the previous TIA and addendums.

Table 6:Vehicle Trip Generation Comparison

	New Concept Plan			Previous Concept Plan			Difference		
Land Use	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
Residential	126	154	130	158	194	169	-32	-40	-39
Office	90	83	23	48	50	11	48	38	14
Shopping Centre	88	344	500	99	393	567	-16	-69	-98
Hotel	24	29	36	-	-	-	24	29	36
Total	328	610	689	305	637	747	24	-42	-87

As shown in the table above the new concept plan represents a minor decrease in the projected vehicle trip generation during the PM and Saturday peak hours, and a very small increase in traffic during the AM peak hour. Therefore, the results and conclusions of the previous TIA and addendums for 900 Albert Street are valid and a new TIA is not required to support the OPA and ZBLA resubmission.

Additionally, the above changes to the trip generation and land use will not require changes to the intersection configuration that was agreed upon at the meeting on September 21, 2017. This included a westbound left-turn lane, far side transit stops in both directions, and the inclusion of higher order pedestrian and cycling facilities.

4. ACCESS AND PARKING

4.1. ACCESS

As shown on the attached concept plan the access location and configuration are proposed to remain the same. The on-street impacts of the new development concept will be reviewed as part of the ongoing RMA Process.

4.2. PARKING

The revised concept considers an additional 90 parking stalls, beyond what the previous concept included. These parking stalls would be spread across seven underground parking levels. The previous plan had both above ground and underground parking (spread across four underground and four above ground parking levels). The increase and amount of parking required for this site is driven by two factors.

The first is the need for parking to be provided for the residential units and the hotel rooms. While the proposed development is a TOD, there will still be a demand for vehicle storage. This does not translate into peak hour vehicle trips, as shown in the trip generation tables above. The residents and hotel guests may have the need to store their vehicles on site, but on a regular basis are unlikely to use them during the peak hour traffic periods. Given the access to transit, the multi-use nature of the site, and the adjacent road network capacity, the proposed site is not anticipated to produce a single car trip for every vehicle parking space. This does not preclude the need for parking for residents and hotel guests. While a resident of 900 Albert will likely commute using transit, they may wish to store their private vehicle in the parking garage for recreational activities in the evenings or weekends (i.e. during off-peak hours). Similarly, many hotel guests will arrive to 900 Albert by car and then store their car as they use transit and active modes to travel throughout the city.

The second is the need to meet retail and office tenant requirements for parking. Tenant agreements with certain retailers, particularly large format retailers, such as a grocery store, or gym (both uses have been considered for this site) have ideal parking requirements to build and sustain their client base. While it is anticipated that the number of internal site trips (i.e. resident walking to the grocery store, gym, etc.) will be very high, some patrons of the retailers may choose to drive their car, particularly if the goods purchased require private transportation (e.g. groceries).

As the site design continues, the parking will be programmed to optimize its use. As well, TDM initiatives, in particular, car-sharing programs, will be further explored. As a result, the parking requirements for this site, while greater than the minimum parking for a TOD, are required to support the proposed development of 900 Albert Street.

5. SUMMARY

The proposed plan has been updated to refine the development concept. The previous traffic work has been reviewed and it has been determined that there is no need to update the previous TIA's, the conclusions and recommendations of those TIA's remain valid and there is no need to revisit the proposed intersection configuration for the signalized site access based on the proposed changes in land use.

From a transportation perspective, the resubmission of the OPA and ZBLA should be approved.

If you have any questions about the foregoing, please do not hesitate to contact the undersigned.

Mark Crockford, P. Eng.
Transportation Engineer

APPENDIX G

TRANSPORTATION DEMAND MANAGEMENT CHECKLISTS

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	✓
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	✓
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	✓
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	✓
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	✓

TDM-supportive design & infrastructure measures: *Residential developments*			Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	✓
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	✓
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	✓
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	✓
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	N/A
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	N/A

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	✓ Indoor bicycle parking provided
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	✓
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	✓
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	✓ All bicycle parking spaces are indoors
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	No onsite transit stops
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	N/A
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	N/A

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	✓
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance
★	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☐
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☐
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☒
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☒

		TDM measures: *Residential developments*	Check if proposed & add descriptions
		6. TDM MARKETING & COMMUNICATIONS	
		6.1 Multimodal travel information	
BASIC	★	6.1.1 Provide a multimodal travel option information package to new residents	☐
		6.2 Personalized trip planning	
BETTER	★	6.2.1 Offer personalized trip planning to new residents	☐

APPENDIX H

DETAILED MMLOS ANALYSIS

Pedestrian Level of Service (PLOS)

Sidewalk Width	Boulevard Width	Avg. Daily Curb Lane Traffic Volume	Presence of On-Street Parking	Operating Speed	Segment PLOS
Lett Street (North-South)					
2.0m	None	<3,000 vpd	Yes	50 km/hr	A
Fleet Street					
2.0m	1.5m	<3,000 vpd	Yes	50 km/hr	A
Lett Street (East-West), and Lloyd Street					
0m	0m	<3,000 vpd	Yes	50 km/hr	F

Bicycle Level of Service (BLOS)

Road Class	Bike Route	Type of Bikeway	Travel Lanes[1]	Centerline Markings	Operating Speed	Segment BLOS
All Boundary Streets						
Local	N/A	Mixed Traffic	1	No	50 km/hr	B

1. Travel lanes in each direction

Auto LOS

Direction	Directional Capacity[1]	Traffic Volumes		V/C Ratio and LOS				Auto LOS
		AM Peak	PM Peak	AM Peak		PM Peak		
				v/c	LOS	v/c	LOS	
All Boundary Streets								
NB/EB	400vph	<240	<240	<0.60	A	<0.60	A	A
SB/WB	400vph	<240	<240	<0.60	A	<0.60	A	

1. Typical lane capacity based on the City's guidelines for the TRANS long-range transportation model

Pedestrian Level of Service

Criteria	North Approach		South Approach		East Approach		West Approach	
Sir John A MacDonald Parkway/Wellington Street/Booth Street								
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	23	No	39	No	23	No	23
Lanes Crossed (3.5m Lane Width)	8		7		8		8	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0	Perm + Prot	-8	No Left Turn/Prohibited	0
Right Turn Conflict	Permissive or Yield	-5	No Right Turn/Prohibited	0	Permissive or Yield	-5	Permissive or Yield	-5
Right Turn on Red	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3	N/A	0
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	> 5m to 10m	-5	No Right Turn	0	> 5m to 10m	-5	> 5m to 10m	-5
Parallel Right Turn Channel	No Right Turn Channel	-4	No Right Turn	0	No Right Turn Channel	-4	No Right Turn Channel	-4
Perpendicular Radius	N/A	0	N/A	0	N/A	0	N/A	0
Perpendicular Right Turn Channel	N/A	0	N/A	0	N/A	0	N/A	0
CROSSING TREATMENT								
Treatment	Standard	-7	Standard	-7	Standard	-7	Standard	-7
PETSI SCORE		**-3**		**27**		**-11**		**0**
LOS		**F**		**F**		**F**		**F**
DELAY SCORE								
Cycle Length		95		95		95		95
Pedestrian Walk Time		7.1		7.1		14.6		14.6
DELAY SCORE		**40.7**		**40.7**		**34**		**34**
LOS		**E**		**E**		**D**		**D**
OVERALL		**F**		**F**		**F**		**F**

Criteria	South Approach		East Approach		West Approach	
Wellington Street/Lett Street						
PETSI SCORE						
CROSSING DISTANCE CONDITIONS						
Median > 2.4m in Width	No	88	No	23	No	23
Lanes Crossed (3.5m Lane Width)	4		8		8	
SIGNAL PHASING AND TIMING						
Left Turn Conflict	Permissive	-8	No Left Turn/Prohibited	0	Permissive	-8
Right Turn Conflict	Permissive or Yield	-5	Permissive or Yield	-5	No Right Turn/Prohibited	0
Right Turn on Red	RTOR Allowed	-3	N/A	0	N/A	0
Leading Pedestrian Interval	No	-2	No	-2	No	-2
CORNER RADIUS						
Parallel Radius	> 5m to 10m	-5	> 5m to 10m	-5	No Right Turn	0
Parallel Right Turn Channel	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn	0
Perpendicular Radius	N/A	0	N/A	0	N/A	0
Perpendicular Right Turn Channel	N/A	0	N/A	0	N/A	0
CROSSING TREATMENT						
Treatment	Standard	-7	Standard	-7	Standard	-7
PETSI SCORE		**54**		**0**		**6**
LOS		**D**		**F**		**F**
DELAY SCORE						
Cycle Length		95		95		95
Pedestrian Walk Time		7.1		46.2		46.2
DELAY SCORE		**40.7**		**12.5**		**12.5**
LOS		**E**		**B**		**B**
OVERALL		**E**		**F**		**F**

East LeBreton Flats – Intersection MMLOS Analysis

Criteria	North Approach		East Approach		West Approach	
Wellington Street/Portage Bridge						
PETSI SCORE						
CROSSING DISTANCE CONDITIONS						
Median > 2.4m in Width	Yes	0	Yes	0	No	-10
Lanes Crossed (3.5m Lane Width)	10 +		10 +		10 +	
SIGNAL PHASING AND TIMING						
Left Turn Conflict	Protected	0	Protected	0	Protected	0
Right Turn Conflict	Protected	0	Protected	0	Permissive or Yield	-5
Right Turn on Red	N/A	0	N/A	0	N/A	0
Leading Pedestrian Interval	No	-2	No	-2	No	-2
CORNER RADIUS						
Parallel Radius	No Right Turn	0	No Right Turn	0	> 5m to 10m	-5
Parallel Right Turn Channel	No Right Turn	0	No Right Turn	0	Smart Channel	2
Perpendicular Radius	> 5m to 10m	-5	N/A	0	N/A	0
Perpendicular Right Turn Channel	Smart Channel	2	N/A	0	N/A	0
CROSSING TREATMENT						
Treatment	Textured	-4	Textured	-4	Textured	-4
PETSI SCORE		**-9**		**-6**		**-24**
LOS		**F**		**F**		**F**
DELAY SCORE						
Cycle Length		136		136		136
Pedestrian Walk Time		17		38		13
DELAY SCORE		**52.3**		**35.5**		**55.8**
LOS		**E**		**D**		**E**
OVERALL		**F**		**F**		**F**

Criteria	North Approach		South Approach		East Approach		West Approach	
Sir John A MacDonald Parkway/Wellington Street/Booth Street								
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	39	No	105	No	23	No	39
Lanes Crossed (3.5m Lane Width)	7		3		8		7	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	Perm + Prot	-8	Permissive	-8	Perm + Prot	-8	Permissive	-8
Right Turn Conflict	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5
Right Turn on Red	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3
Leading Pedestrian Interval	No	-2	No	-2	Yes	0	Yes	0
CORNER RADIUS								
Parallel Radius	> 5m to 10m	-5	> 5m to 10m	-5	> 3m to 5m	-4	> 15m to 25m	-8
Parallel Right Turn Channel	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4
Perpendicular Radius	N/A	0	N/A	0	N/A	0	N/A	0
Perpendicular Right Turn Channel	N/A	0	N/A	0	N/A	0	N/A	0
CROSSING TREATMENT								
Treatment	Zebra Stripe	-4	Zebra Stripe	-4	Zebra Stripe	-4	Zebra Stripe	-4
PETSI SCORE		**8**		**74**		**-5**		**7**
LOS		**F**		**C**		**F**		**F**
DELAY SCORE								
Cycle Length		120		120		120		120
Pedestrian Walk Time		12.5		41.5		10.5		21.5
DELAY SCORE		**48.2**		**25.7**		**50**		**40.4**
LOS		**E**		**C**		**E**		**E**
OVERALL		**F**		**C**		**F**		**F**

Bicycle Level of Service

Approach	Bikeway Facility Type	Criteria	Travel Lanes and/or Speed[1]	BLOS
Sir John A MacDonald Parkway/Wellington Street/Booth Street				
North Approach	Mixed Traffic Approach	Right turn lane characteristics	Right-turn lane 25 to 50m long; Turning speed ≤ 25km/hr	D
		Left turn accommodation	2 or more lanes crossed; ≥ 50km/hr	**F**
South Approach	Bike Lanes	Right turn lane characteristics	No impact to LTS	A
		Left turn accommodation	Left turns prohibited	-
East Approach	Mixed Traffic Approach	Right turn lane characteristics	No impact to LTS	A
		Left turn accommodation	Left turns prohibited	-
West Approach	Mixed Traffic Approach	Right turn lane characteristics	Right turns prohibited	-
		Left turn accommodation	Left turns prohibited	-
Wellington Street/Lett Street				
South Approach	Mixed Traffic Approach	Right turn lane characteristics	No impact to LTS	A
		Left turn accommodation	No lanes crossed; 50km/hr	B
East Approach	Mixed Traffic Approach	Left turn accommodation	2 or more lanes crossed; ≥ 50km/hr	**F**
West Approach	Mixed Traffic Approach	Right turn lane characteristics	No impact to LTS	A
Wellington Street/Portage Bridge				
North Approach	Pocket Bike Lane	Right turn lane characteristics	Right-turn lane ≤ 50m long; Turning speed ≤ 25km/hr	B
		Left turn accommodation	No lanes crossed	-
East Approach	Bike Lanes	Right turn lane characteristics	No right turn lane	-
		Left turn accommodation	3 lanes crossed; ≥ 50km/hr	**F**
West Approach	Bike Lanes	Right turn lane characteristics	No right turn lane	-
		Left turn accommodation	3 lanes crossed; ≥ 50km/hr	**F**

Approach	Bikeway Facility Type	Criteria	Travel Lanes and/or Speed[1]	BLOS
Booth Street/Albert Street				
North Approach	Pocket Bike Lane	Right turn lane characteristics	No impact to LTS	A
		Left turn accommodation	Not Applicable[1]	-
South Approach	Mixed Traffic Approach	Right turn lane characteristics	No Impact to LTS	A
		Left turn accommodation	One lane crossed; 50km/hr	D
East/West Approach	Separated Multi-Use Pathway	Right turn lane characteristics	No impact to LTS	A
		Left turn accommodation	Not Applicable[1]	-

1. Cyclists required to dismount and cross intersection

Truck Level of Service

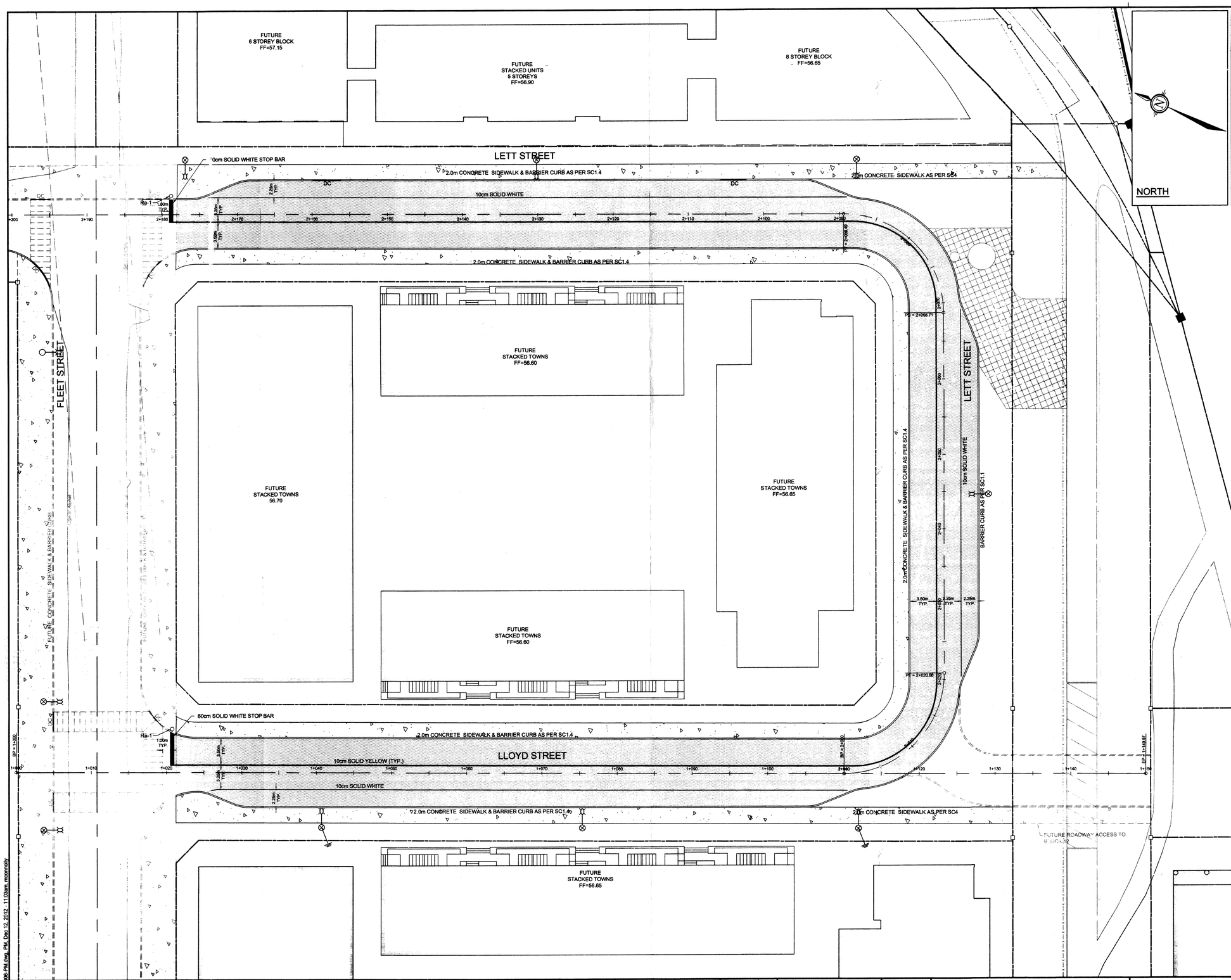
Approach	Effective Corner Radius (m)	Number of Receiving Lanes on Departure from Intersection	LOS
Sir John A MacDonald Parkway/Wellington Street/Booth Street			
North Approach	< 10m	2	D
South Approach	< 10m	2	D
East Approach	< 10m	2	D
West Approach	Not Applicable	Not Applicable	-
Wellington Street/Lett Street			
South Approach	< 10m	2	D
East Approach	Not Applicable	Not Applicable	-
West Approach	< 10m	1	F
Wellington Street/Portage Bridge			
North Approach	10m to 15m	2	B
East Approach	Not Applicable	Not Applicable	-
West Approach	Not Applicable	Not Applicable	-
Booth Street/Albert Street			
North Approach	> 15m	2	A
South Approach	< 10m	2	D
East Approach	10m to 15m	2	B
West Approach	< 10m	1	F

Auto LOS

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	LOS	V/C
Sir John A MacDonald Parkway/ Wellington Street/ Booth Street	AM	1.08	F	EBT	50 sec	F	1.05
		1.06	F	NBT/R			
	PM	1.09	F	WBT	53 sec	F	1.05
		1.04	F	NBT/R			
Wellington St/ Lett Street	AM	0.59	A	EBT/R	4 sec	A	0.58
	PM	0.58	A	WBT	7 sec	A	0.57
Wellington St/ Portage Bridge	AM	0.85	D	EBL	28 sec	D	0.77
	PM	0.98	E	SBR	39 sec	E	0.89
Booth St/ Fleet St	AM	10 sec	A	WBR	-	-	-
	PM	11 sec	B	WBR	-	-	-
Booth St/ Albert St	AM	1.10	F	SBL	68 sec	F	0.99
		1.07	F	EBT			
	PM	1.25	F	SBL	58 sec	F	0.97
		1.04	F	EBL			

APPENDIX I

DESIGN OF BOUNDARY ROADWAYS



SIGN LEGEND:

Ra - 1
(60x60)

NOTE:
SIGNAGE ASSOCIATED WITH ON-STREET PARKING AT LLOYD STREET AND LETT STREET TO BE ~~DESIGNED~~ BY CITY FORCES.
INSTALLED

Reviewed by Development Review Branch
Signed:
Date: MAY 24, 2012

Plan # 16258
A.M.

D07-16-02-0019-02-0019 LETT AND LLOYD ST.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

CLARIDGE HOMES

CLARIDGE HOMES
SUITE 2001,
210 GLADSTONE AVENUE,
OTTAWA , ONTARIO
K2P 0Y6.

CLARIDGE HOMES

No.	REVISION	DATE	BY
9	ISSUED FOR CONSTRUCTION	OCT 26/12	GJM
8	REVISED PER CITY COMMENTS	SEPT 14/12	GJM
7	ISSUED FOR MOE APPROVAL	AUG 03/12	GJM
6	REVISED PER CITY COMMENTS	JUL 26/12	GJM
5	REVISE & REISSUED FOR CITY REVIEW	MAR 12/12	GJM
4	ISSUED FOR TENDER	MAR 16/11	GJM
3	REISSUED TO CITY	FEB 01/11	GJM
2	REISSUED TO CITY	OCT 27/10	BHB
1	ISSUED FOR CITY REVIEW	OCT 21/10	BHB

SCALE
1:250
1:250
0 2 4 6 8 10

DESIGN	BHB
CHECKED	GJM
DRAWN	BHB
CHECKED	BHB
APPROVED	GJM

LICENSED PROFESSIONAL ENGINEER
B.H. BANIA
100154647
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
G.J. MacDONALD
PROVINCE OF ONTARIO

NOVATECH
ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novaintl@novatech-eng.com

LOCATION
CITY OF OTTAWA
LEBRETON FLATS - PHASE 2

DRAWING NAME
PAVEMENT MARKINGS & SIGNAGE

PROJECT No. 105006-2
REV REV # 09
DRAWING No. 105006-2-PM

R:\NAT.DWG - Bill\mmc\Bill.mm

M:\2005\105006\CAD\design\Street 2010\105006-PM.dwg, PM, Dec 12, 2012 - 11:03am, mcormolly

APPENDIX J

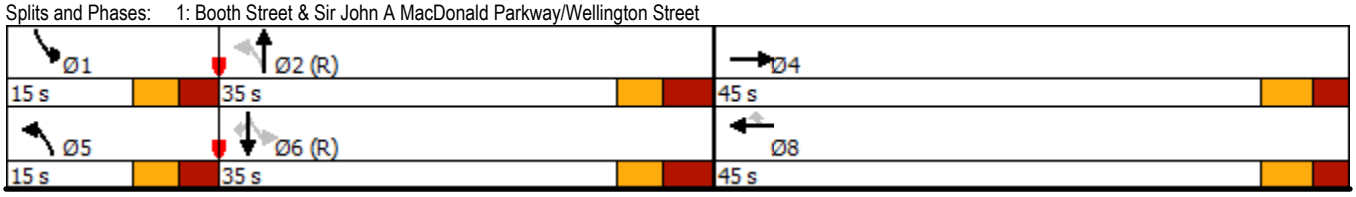
SYNCHRO ANALYSIS REPORTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1324	0	0	699	136	5	775	163	126	1116	333
Future Volume (vph)	0	1324	0	0	699	136	5	775	163	126	1116	333
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		35.0	10.0		0.0	135.0		50.0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	0	3386	0	0	3353	1500	1710	3088	0	1693	3320	1515
Flt Permitted							0.139			0.115		
Satd. Flow (perm)	0	3386	0	0	3353	1466	250	3088	0	202	3320	1448
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						127		26				221
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		115.0			144.3			74.7			217.9	
Travel Time (s)		8.3			10.4			5.4			15.7	
Lane Group Flow (vph)	0	1324	0	0	699	136	5	938	0	126	1116	333
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		45.0			45.0	45.0	15.0	35.0		15.0	35.0	35.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		38.6			38.6	38.6	35.2	28.7		43.2	40.7	40.7
Actuated g/C Ratio		0.41			0.41	0.41	0.37	0.30		0.45	0.43	0.43
v/c Ratio		0.96			0.51	0.20	0.03	0.99		0.57	0.79	0.45
Control Delay		45.3			17.9	2.7	14.6	59.8		26.8	29.6	9.3
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		45.3			17.9	2.7	14.6	59.8		26.8	29.6	9.3
LOS		D			B	A	B	E		C	C	A
Approach Delay		45.3			15.4			59.6			25.1	
Approach LOS		D			B			E			C	
Queue Length 50th (m)		128.3			52.8	6.9	0.5	~94.1		13.7	90.2	12.4
Queue Length 95th (m)		#177.8			25.4	3.4	2.5	#138.8		27.8	#163.7	42.3
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1375			1362	671	237	950		232	1421	746
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.96			0.51	0.20	0.02	0.99		0.54	0.79	0.45

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 31 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 36.1 Intersection LOS: D
Intersection Capacity Utilization 91.5% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street

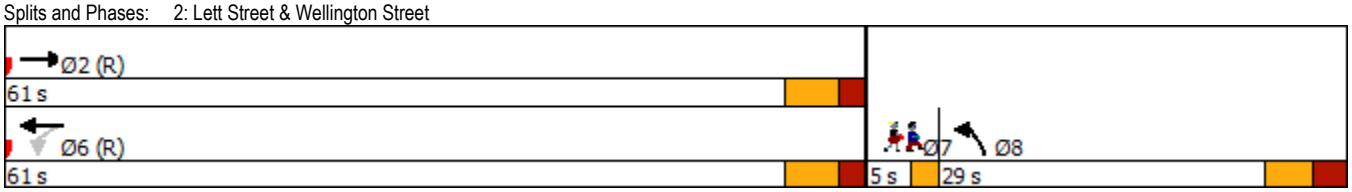


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1409	8	5	771	35	26	
Future Volume (vph)	1409	8	5	771	35	26	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3382	0	1710	3353	1636	0	
Flt Permitted			0.155		0.972		
Satd. Flow (perm)	3382	0	279	3353	1635	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	1				26		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1417	0	5	771	61	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	70.4		70.4	70.4	10.2		
Actuated g/C Ratio	0.74		0.74	0.74	0.11		
v/c Ratio	0.57		0.02	0.31	0.31		
Control Delay	1.9		6.8	5.9	27.2		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.0		6.8	5.9	27.2		
LOS	A		A	A	C		
Approach Delay	2.0			5.9	27.2		
Approach LOS	A			A	C		
Queue Length 50th (m)	8.5		0.2	21.3	6.5		
Queue Length 95th (m)	m22.0		2.1	52.1	15.6		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2506		206	2484	417		
Starvation Cap Reductn	153		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.60		0.02	0.31	0.15		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 4.0 — Intersection LOS: A
Intersection Capacity Utilization 56.3% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

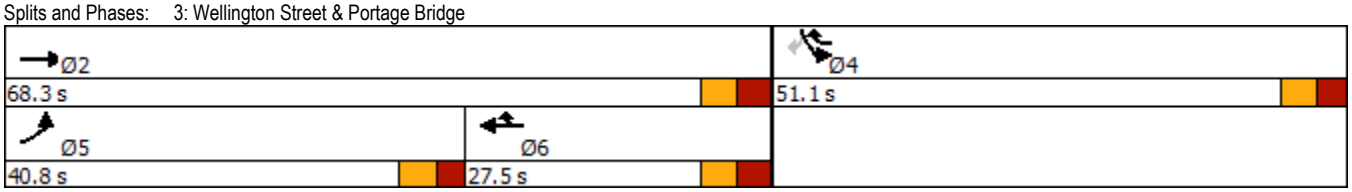
Splits and Phases: 2: Lett Street & Wellington Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	638	884	220	944	1183	365
Future Volume (vph)	638	884	220	944	1183	365
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0			115.0	0.0	35.0
Storage Lanes	2			3	3	1
Taper Length (m)	30.0				30.0	
Satd. Flow (prot)	3317	4865	3386	3322	4424	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3309	4865	3386	3322	4424	1371
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				135		226
Link Speed (k/h)		50	50		50	
Link Distance (m)		270.2	257.1		139.6	
Travel Time (s)		19.5	18.5		10.1	
Lane Group Flow (vph)	638	884	220	944	1183	365
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	40.8	68.3	27.5		51.1	51.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	27.3	61.9	28.8	75.4	40.4	40.4
Actuated g/C Ratio	0.24	0.54	0.25	0.66	0.35	0.35
v/c Ratio	0.81	0.34	0.26	0.42	0.76	0.58
Control Delay	50.1	15.9	38.4	9.1	36.5	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.1	15.9	38.4	9.1	36.5	14.7
LOS	D	B	D	A	D	B
Approach Delay		30.2	14.6		31.3	
Approach LOS		C	B		C	
Queue Length 50th (m)	76.0	44.0	23.0	36.6	87.0	24.7
Queue Length 95th (m)	91.5	55.4	38.0	56.7	104.2	56.1
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1011	2620	847	2351	1734	674
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	0.63	0.34	0.26	0.40	0.68	0.54

Intersection Summary	
Area Type:	Other
Cycle Length: 119.4	
Actuated Cycle Length: 115	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 26.4	Intersection LOS: C
Intersection Capacity Utilization 74.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Wellington Street & Portage Bridge



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	423	793	8	4	336	148	4	490	19	207	527	310
Future Volume (vph)	423	793	8	4	336	148	4	490	19	207	527	310
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	1569	2706	0	1710	2478	1286	0	3318	0	1569	1782	1391
Flt Permitted	0.418			0.349				0.950		0.186		
Satd. Flow (perm)	614	2706	0	544	2478	1001	0	3150	0	276	1782	982
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	423	801	0	4	336	148	0	513	0	207	527	310
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	30.0	67.0		37.0	37.0	37.0	33.0	33.0		15.0	48.0	48.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	62.1	62.1		33.0	33.0	33.0		24.9		44.9	39.9	39.9
Actuated g/C Ratio	0.52	0.52		0.28	0.28	0.28		0.21		0.37	0.33	0.33
v/c Ratio	0.85	0.57		0.03	0.49	0.54		0.78		1.07	0.89	0.95
Control Delay	38.1	22.3		34.5	40.4	46.9		53.7		113.6	56.2	78.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	38.1	22.3		34.5	40.4	46.9		53.7		113.6	56.2	78.4
LOS	D	C		C	D	D		D		F	E	E
Approach Delay		27.8			42.4			53.7			74.2	
Approach LOS		C			D			D			E	
Queue Length 50th (m)	68.9	71.1		0.8	38.0	32.3		62.3		~38.2	120.6	73.1
Queue Length 95th (m)	#118.6	91.5		3.9	53.8	56.1		82.6		#82.7	#182.0	#130.1
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	504	1400		149	682	275		697		194	616	339
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.84	0.57		0.03	0.49	0.54		0.74		1.07	0.86	0.91

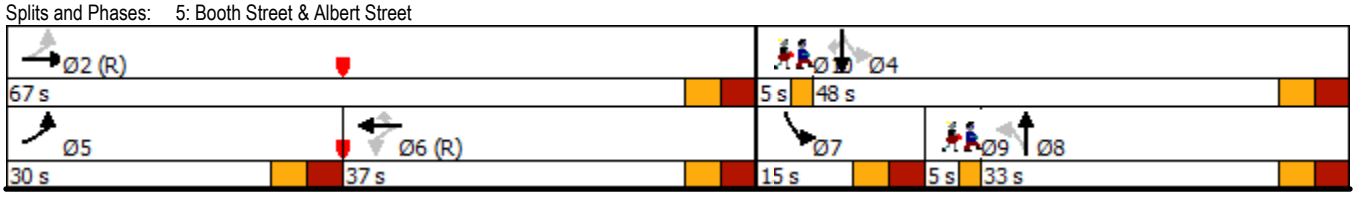
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 48.8 — Intersection LOS: D
Intersection Capacity Utilization 119.8% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	9	929	10	0	1116
Future Volume (Veh/h)	0	9	929	10	0	1116
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	9	929	10	0	1116
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.73	0.91			0.91	
vC, conflicting volume	1492	470			939	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	366	210			728	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	444	721			790	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	9	619	320	558	558
Volume Left	0	0	0	0	0
Volume Right	9	0	10	0	0
cSH	721	1700	1700	1700	1700
Volume to Capacity	0.01	0.36	0.19	0.33	0.33
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0
Control Delay (s)	10.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.1	0.0		0.0	
Approach LOS	B				

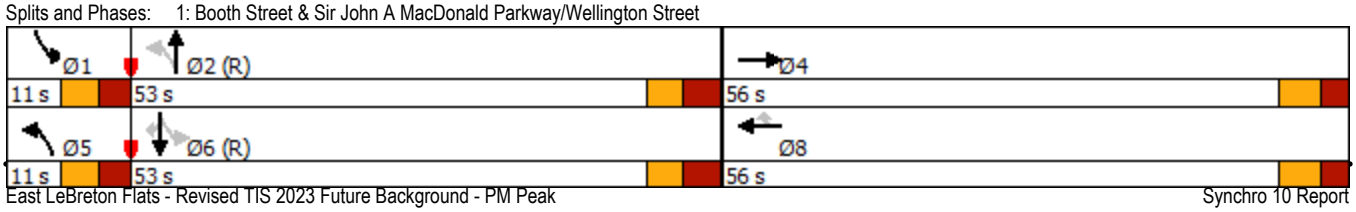
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1085	0	0	1371	262	5	1196	92	64	794	296
Future Volume (vph)	0	1085	0	0	1371	262	5	1196	92	64	794	296
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		35.0	10.0		0.0	135.0		50.0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	0	3386	0	0	3386	1500	1710	3267	0	1541	3257	1500
Flt Permitted							0.267			0.080		
Satd. Flow (perm)	0	3386	0	0	3386	1409	473	3267	0	130	3257	1370
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						100		8				102
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		115.0			144.3			74.7			217.9	
Travel Time (s)		8.3			10.4			5.4			15.7	
Lane Group Flow (vph)	0	1085	0	0	1371	262	5	1288	0	64	794	296
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		56.0			56.0	56.0	11.0	53.0		11.0	53.0	53.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		49.6			49.6	49.6	53.0	48.3		56.7	54.9	54.9
Actuated g/C Ratio		0.41			0.41	0.41	0.44	0.40		0.47	0.46	0.46
v/c Ratio		0.78			0.98	0.41	0.02	0.98		0.54	0.53	0.43
Control Delay		35.1			48.8	11.2	10.8	43.0		34.8	25.7	17.0
Queue Delay		0.0			10.2	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		35.1			59.0	11.2	10.8	43.0		34.8	25.7	17.0
LOS		D			E	B	B	D		C	C	B
Approach Delay		35.1			51.3			42.9			24.0	
Approach LOS		D			D			D			C	
Queue Length 50th (m)		120.2			173.7	27.0	0.5	~178.4		8.3	69.8	29.6
Queue Length 95th (m)		148.2			#227.5	32.0	m0.6	m#205.8		#19.9	105.4	63.3
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1399			1399	641	259	1319		119	1489	682
Starvation Cap Reductn		0			58	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.78			1.02	0.41	0.02	0.98		0.54	0.53	0.43

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 3 (3%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 39.7 Intersection LOS: D
Intersection Capacity Utilization 98.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
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.

Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street

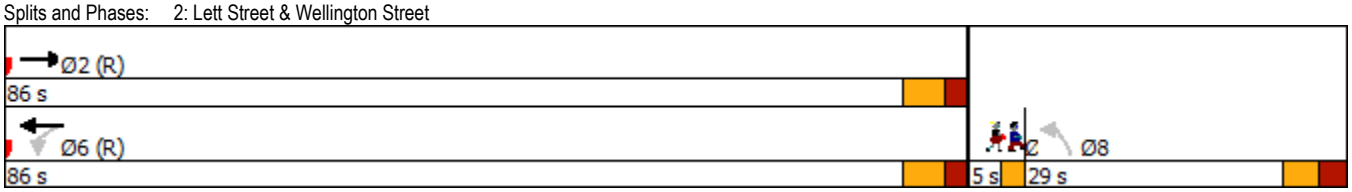


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1182	23	19	1472	12	24	
Future Volume (vph)	1182	23	19	1472	12	24	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3374	0	1710	3386	1545	0	
Flt Permitted			0.214		0.984		
Satd. Flow (perm)	3374	0	384	3386	1539	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	3				24		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1205	0	19	1472	36	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	97.1		97.1	97.1	12.6		
Actuated g/C Ratio	0.81		0.81	0.81	0.10		
v/c Ratio	0.44		0.06	0.54	0.20		
Control Delay	2.6		5.5	6.5	25.5		
Queue Delay	0.1		0.0	0.4	0.0		
Total Delay	2.7		5.5	6.9	25.5		
LOS	A		A	A	C		
Approach Delay	2.7			6.9	25.5		
Approach LOS	A			A	C		
Queue Length 50th (m)	16.0		0.9	63.2	2.8		
Queue Length 95th (m)	m32.3		4.5	124.8	12.0		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2729		310	2738	315		
Starvation Cap Reductn	459		0	389	0		
Spillback Cap Reductn	0		0	663	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.53		0.06	0.71	0.11		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 5.3 — Intersection LOS: A
Intersection Capacity Utilization 63.6% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

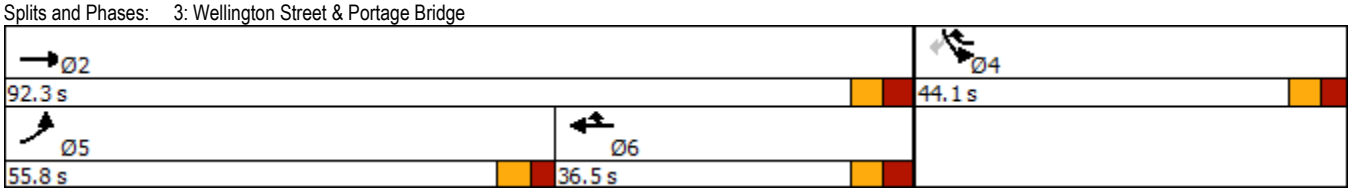


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	647	308	888	1691	707	646
Future Volume (vph)	647	308	888	1691	707	646
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0			115.0	0.0	35.0
Storage Lanes	2			3	3	1
Taper Length (m)	30.0				30.0	
Satd. Flow (prot)	3285	4865	3420	3230	4637	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3267	4865	3420	3230	4620	1342
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				240		506
Link Speed (k/h)		50	50		50	
Link Distance (m)		270.2	257.1		139.6	
Travel Time (s)		19.5	18.5		10.1	
Lane Group Flow (vph)	647	308	888	1691	707	646
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	55.8	92.3	36.5		44.1	44.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	32.6	85.9	47.5	88.7	35.1	35.1
Actuated g/C Ratio	0.24	0.64	0.36	0.66	0.26	0.26
v/c Ratio	0.81	0.10	0.73	0.76	0.58	0.89
Control Delay	55.9	9.6	43.3	16.3	44.8	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.9	9.6	43.3	16.3	44.8	26.2
LOS	E	A	D	B	D	C
Approach Delay		40.9	25.6		35.9	
Approach LOS		D	C		D	
Queue Length 50th (m)	90.1	11.9	116.6	113.1	60.7	42.5
Queue Length 95th (m)	104.6	16.2	#164.4	165.1	74.6	#128.4
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1230	3127	1215	2290	1319	743
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	0.53	0.10	0.73	0.74	0.54	0.87

Intersection Summary

Area Type: Other
Cycle Length: 136.4
Actuated Cycle Length: 133.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 31.5 — Intersection LOS: C
Intersection Capacity Utilization 91.7% — ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Wellington Street & Portage Bridge



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	412	418	7	44	837	320	7	545	11	155	425	270
Future Volume (vph)	412	418	7	44	837	320	7	545	11	155	425	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	1613	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.117			0.504				0.947		0.152		
Satd. Flow (perm)	191	2432	0	691	2758	1130	0	3214	0	242	1800	1006
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				165		1				270
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	412	425	0	44	837	320	0	563	0	155	425	270
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	29.0	71.0		42.0	42.0	42.0	33.0	33.0		11.0	44.0	44.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	66.4	66.4		35.5	35.5	35.5		24.6		40.1	35.6	35.6
Actuated g/C Ratio	0.55	0.55		0.30	0.30	0.30		0.20		0.33	0.30	0.30
v/c Ratio	1.04	0.32		0.22	1.03	0.71		0.85		1.19	0.80	0.55
Control Delay	90.7	15.6		35.3	80.4	27.6		59.2		160.9	39.1	20.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	90.7	15.6		35.3	80.4	27.6		59.2		160.9	39.1	20.9
LOS	F	B		D	F	C		E		F	D	C
Approach Delay		52.6			64.7			59.2			55.5	
Approach LOS		D			E			E			E	
Queue Length 50th (m)	~98.4	29.4		8.2	~116.4	34.7		70.0		~38.8	112.0	43.3
Queue Length 95th (m)	#164.9	41.0		19.0	#157.4	72.2		91.3		#87.3	146.2	82.6
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	395	1347		204	815	450		710		130	562	500
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	1.04	0.32		0.22	1.03	0.71		0.79		1.19	0.76	0.54

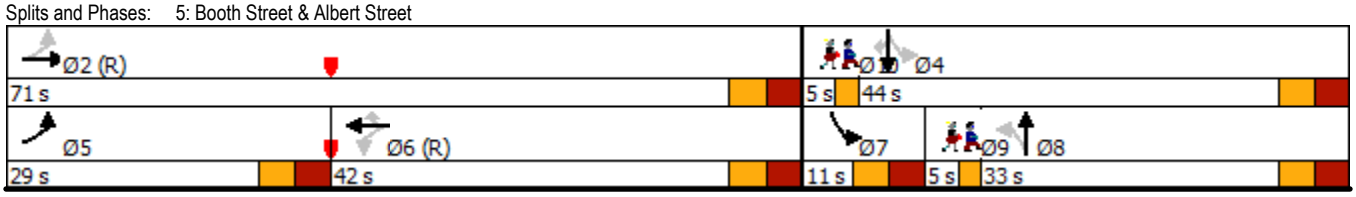
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 58.6 — Intersection LOS: E
Intersection Capacity Utilization 115.9% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	8	1279	9	0	794
Future Volume (Veh/h)	0	8	1279	9	0	794
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	8	1279	9	0	794
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.88	0.86			0.86	
vC, conflicting volume	1680	644			1288	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	811	271			1017	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	280	628			585	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	853	435	397	397
Volume Left	0	0	0	0	0
Volume Right	8	0	9	0	0
cSH	628	1700	1700	1700	1700
Volume to Capacity	0.01	0.50	0.26	0.23	0.23
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.8	0.0		0.0	
Approach LOS	B				

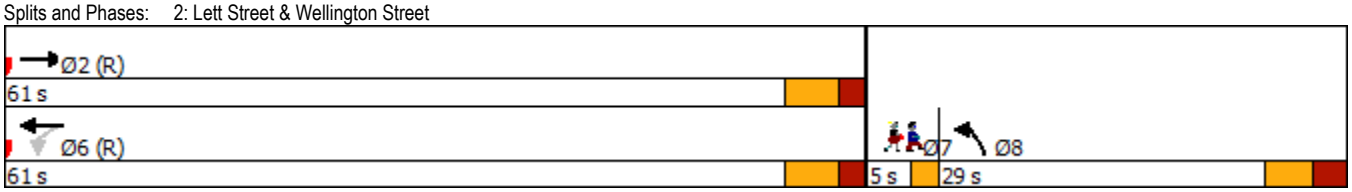
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1409	8	5	771	35	26	
Future Volume (vph)	1409	8	5	771	35	26	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3382	0	1710	3353	1636	0	
Flt Permitted			0.153		0.972		
Satd. Flow (perm)	3382	0	275	3353	1635	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	1						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1417	0	5	771	61	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	69.5		69.5	69.5	11.0		
Actuated g/C Ratio	0.73		0.73	0.73	0.12		
v/c Ratio	0.57		0.02	0.31	0.32		
Control Delay	2.0		7.0	6.2	40.4		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.1		7.0	6.2	40.4		
LOS	A		A	A	D		
Approach Delay	2.1			6.2	40.4		
Approach LOS	A			A	D		
Queue Length 50th (m)	9.2		0.2	22.9	11.3		
Queue Length 95th (m)	m22.0		2.1	52.1	20.0		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2475		201	2454	397		
Starvation Cap Reductn	147		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.61		0.02	0.31	0.15		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 4.5 — Intersection LOS: A
Intersection Capacity Utilization 56.3% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

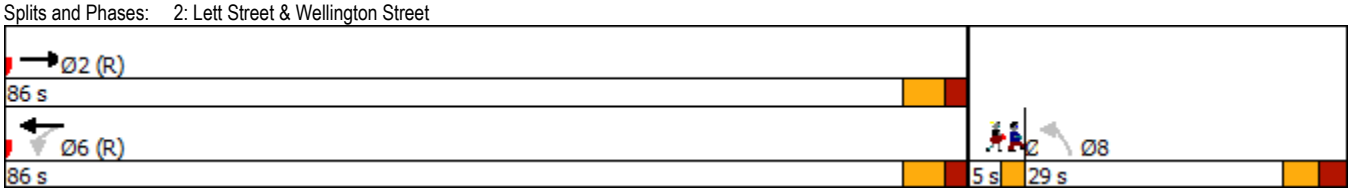


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1182	23	19	1472	12	24	
Future Volume (vph)	1182	23	19	1472	12	24	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3374	0	1710	3386	1545	0	
Flt Permitted			0.214		0.984		
Satd. Flow (perm)	3374	0	384	3386	1539	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	3						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1205	0	19	1472	36	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	97.1		97.1	97.1	12.6		
Actuated g/C Ratio	0.81		0.81	0.81	0.10		
v/c Ratio	0.44		0.06	0.54	0.22		
Control Delay	2.6		5.5	6.5	50.6		
Queue Delay	0.1		0.0	1.2	0.0		
Total Delay	2.7		5.5	7.7	50.6		
LOS	A		A	A	D		
Approach Delay	2.7			7.7	50.6		
Approach LOS	A			A	D		
Queue Length 50th (m)	16.0		0.9	63.2	8.5		
Queue Length 95th (m)	m32.3		4.5	124.8	17.3		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2729		310	2738	296		
Starvation Cap Reductn	459		0	389	0		
Spillback Cap Reductn	0		0	963	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.53		0.06	0.83	0.12		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 6.1 — Intersection LOS: A
Intersection Capacity Utilization 63.6% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

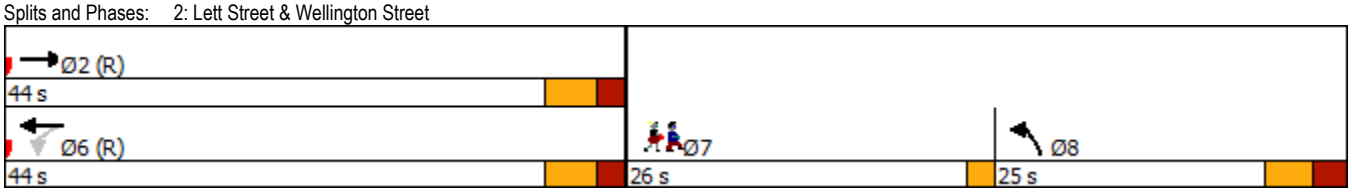


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1409	8	5	771	35	26	
Future Volume (vph)	1409	8	5	771	35	26	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3382	0	1710	3353	1635	0	
Flt Permitted			0.130		0.972		
Satd. Flow (perm)	3382	0	234	3353	1634	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	1				26		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1417	0	5	771	61	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	44.0		44.0	44.0	25.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	63.4		63.4	63.4	7.8		
Actuated g/C Ratio	0.67		0.67	0.67	0.08		
v/c Ratio	0.63		0.03	0.34	0.39		
Control Delay	15.1		13.4	11.6	33.6		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	15.1		13.4	11.6	33.6		
LOS	B		B	B	C		
Approach Delay	15.1			11.6	33.6		
Approach LOS	B			B	C		
Queue Length 50th (m)	76.0		0.4	45.9	6.5		
Queue Length 95th (m)	m86.8		2.7	65.9	18.5		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2256		156	2236	349		
Starvation Cap Reductn	72		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.65		0.03	0.34	0.17		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 14.4 — Intersection LOS: B
Intersection Capacity Utilization 55.3% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

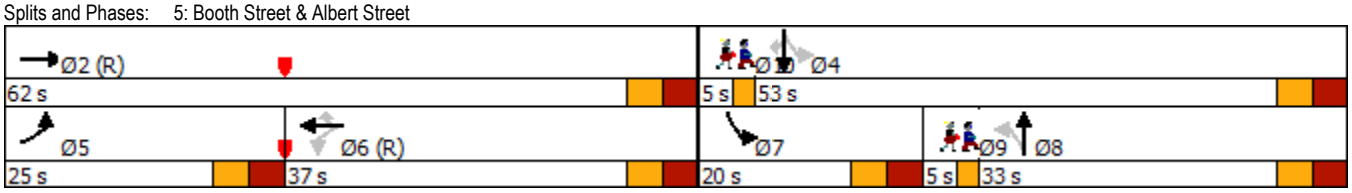


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	423	793	8	4	336	148	4	490	19	207	527	310
Future Volume (vph)	423	793	8	4	336	148	4	490	19	207	527	310
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3043	2706	0	1710	2478	1286	0	3318	0	1569	1782	1391
Flt Permitted	0.950			0.349				0.950		0.173		
Satd. Flow (perm)	2372	2706	0	544	2478	1001	0	3149	0	257	1782	983
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	423	801	0	4	336	148	0	513	0	207	527	310
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	25.0	62.0		37.0	37.0	37.0	33.0	33.0		20.0	53.0	53.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	19.1	58.3		32.7	32.7	32.7		23.7		48.7	43.7	43.7
Actuated g/C Ratio	0.16	0.49		0.27	0.27	0.27		0.20		0.41	0.36	0.36
v/c Ratio	0.87	0.61		0.03	0.50	0.54		0.82		0.83	0.81	0.87
Control Delay	68.9	25.6		34.5	40.6	47.2		57.2		51.9	45.2	59.6
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	68.9	25.6		34.5	40.6	47.2		57.2		51.9	45.2	59.6
LOS	E	C		C	D	D		E		D	D	E
Approach Delay		40.5			42.5			57.2			50.8	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	52.8	75.7		0.8	38.0	32.3		63.3		33.9	114.7	69.5
Queue Length 95th (m)	#83.0	100.1		3.9	53.8	56.1		82.6		#68.5	157.7	#119.4
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	489	1314		148	674	272		697		251	690	380
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.87	0.61		0.03	0.50	0.54		0.74		0.82	0.76	0.82

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 46.7 — Intersection LOS: D
Intersection Capacity Utilization 107.8% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



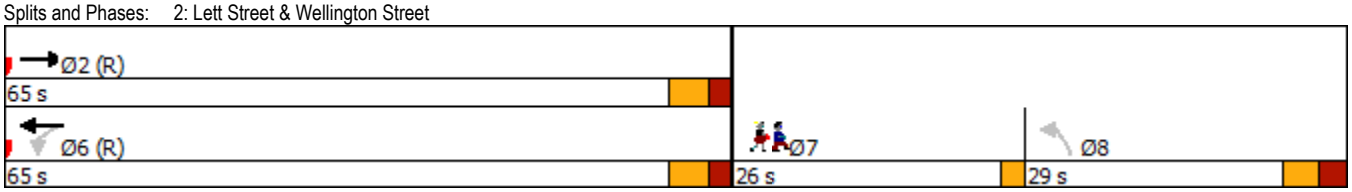
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1182	23	19	1472	12	24	
Future Volume (vph)	1182	23	19	1472	12	24	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3374	0	1710	3386	1545	0	
Flt Permitted			0.199		0.984		
Satd. Flow (perm)	3374	0	358	3386	1539	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	2				24		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1205	0	19	1472	36	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	65.0		65.0	65.0	29.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	91.4		91.4	91.4	10.0		
Actuated g/C Ratio	0.76		0.76	0.76	0.08		
v/c Ratio	0.47		0.07	0.57	0.24		
Control Delay	15.7		10.5	12.7	30.2		
Queue Delay	0.2		0.0	4.3	0.0		
Total Delay	15.9		10.5	17.0	30.2		
LOS	B		B	B	C		
Approach Delay	15.9			16.9	30.2		
Approach LOS	B			B	C		
Queue Length 50th (m)	76.6		1.9	127.1	2.8		
Queue Length 95th (m)	m102.1		5.6	154.5	13.7		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2569		272	2578	315		
Starvation Cap Reductn	552		0	0	0		
Spillback Cap Reductn	0		0	1010	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.60		0.07	0.94	0.11		

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 16.6	Intersection LOS: B
Intersection Capacity Utilization 61.0%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 2: Lett Street & Wellington Street

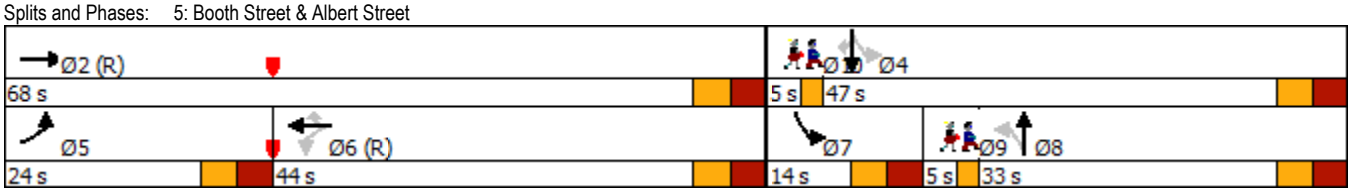


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	412	418	7	44	837	320	7	545	11	155	425	270
Future Volume (vph)	412	418	7	44	837	320	7	545	11	155	425	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3130	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.950			0.504				0.947		0.150		
Satd. Flow (perm)	2779	2432	0	691	2758	1130	0	3214	0	239	1800	1006
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				190		1				270
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	412	425	0	44	837	320	0	563	0	155	425	270
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	24.0	68.0		44.0	44.0	44.0	33.0	33.0		14.0	47.0	47.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	18.0	63.4		38.9	38.9	38.9		24.6		43.6	38.6	38.6
Actuated g/C Ratio	0.15	0.53		0.32	0.32	0.32		0.20		0.36	0.32	0.32
v/c Ratio	0.88	0.33		0.20	0.94	0.65		0.85		0.92	0.74	0.53
Control Delay	70.6	17.4		33.4	58.3	20.9		59.2		71.5	37.4	21.5
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	70.6	17.4		33.4	58.3	20.9		59.2		71.5	37.4	21.5
LOS	E	B		C	E	C		E		E	D	C
Approach Delay		43.5			47.4			59.2			38.6	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	52.2	31.2		8.0	107.5	27.4		70.0		33.2	112.3	43.4
Queue Length 95th (m)	#81.8	43.5		18.5	#151.2	62.9		91.3		#55.2	145.9	81.5
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	472	1286		223	894	494		710		169	607	518
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.87	0.33		0.20	0.94	0.65		0.79		0.92	0.70	0.52

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 46.2 — Intersection LOS: D
Intersection Capacity Utilization 104.2% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

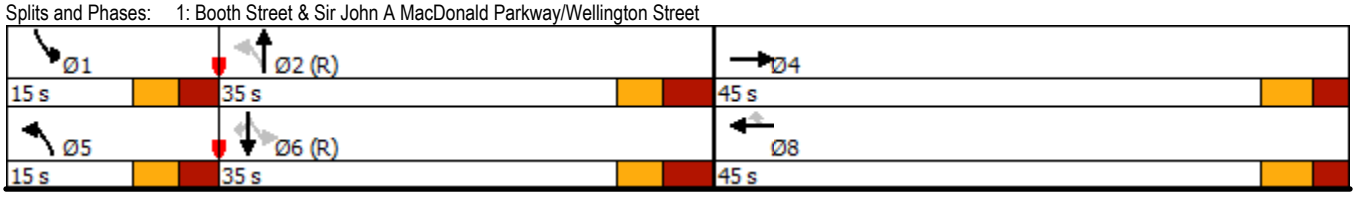
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1358	0	0	717	140	5	794	168	129	1144	341
Future Volume (vph)	0	1358	0	0	717	140	5	794	168	129	1144	341
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		35.0	10.0		0.0	135.0		50.0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	0	3386	0	0	3353	1500	1710	3088	0	1693	3320	1515
Flt Permitted							0.140			0.115		
Satd. Flow (perm)	0	3386	0	0	3353	1466	252	3088	0	202	3320	1448
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						127		27				221
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		115.0			144.3			74.7			217.9	
Travel Time (s)		8.3			10.4			5.4			15.7	
Lane Group Flow (vph)	0	1358	0	0	717	140	5	962	0	129	1144	341
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		45.0			45.0	45.0	15.0	35.0		15.0	35.0	35.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		38.6			38.6	38.6	35.1	28.6		43.2	40.7	40.7
Actuated g/C Ratio		0.41			0.41	0.41	0.37	0.30		0.45	0.43	0.43
v/c Ratio		0.99			0.53	0.21	0.03	1.01		0.58	0.81	0.46
Control Delay		50.5			18.1	2.8	14.6	66.0		27.4	30.5	9.7
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		50.5			18.1	2.8	14.6	66.0		27.4	30.5	9.7
LOS		D			B	A	B	E		C	C	A
Approach Delay		50.5			15.6			65.7			25.8	
Approach LOS		D			B			E			C	
Queue Length 50th (m)		133.6			54.4	7.0	0.5	~103.6		14.0	93.7	13.3
Queue Length 95th (m)		#185.3			26.1	3.6	2.5	#144.1		28.7	#170.0	44.5
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1375			1362	671	238	949		232	1421	746
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.99			0.53	0.21	0.02	1.01		0.56	0.81	0.46

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 31 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 39.0 Intersection LOS: D
Intersection Capacity Utilization 93.3% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street

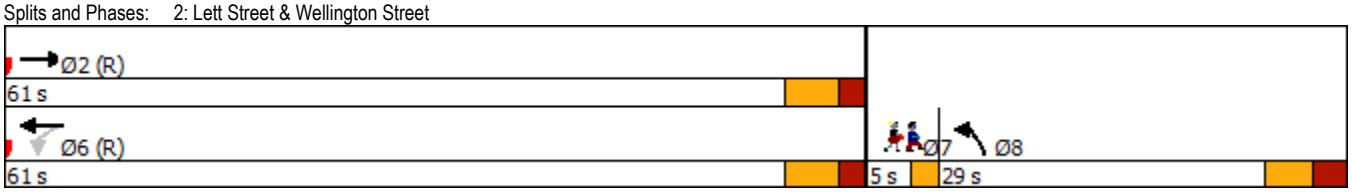


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1445	8	5	791	35	26	
Future Volume (vph)	1445	8	5	791	35	26	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3382	0	1710	3353	1636	0	
Flt Permitted			0.147		0.972		
Satd. Flow (perm)	3382	0	264	3353	1635	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	1				26		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1453	0	5	791	61	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	70.4		70.4	70.4	10.2		
Actuated g/C Ratio	0.74		0.74	0.74	0.11		
v/c Ratio	0.58		0.03	0.32	0.31		
Control Delay	2.2		7.0	5.9	27.2		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.3		7.0	5.9	27.2		
LOS	A		A	A	C		
Approach Delay	2.3			5.9	27.2		
Approach LOS	A			A	C		
Queue Length 50th (m)	8.7		0.2	22.0	6.5		
Queue Length 95th (m)	m22.1		2.1	53.7	15.6		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2506		195	2484	417		
Starvation Cap Reductn	154		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.62		0.03	0.32	0.15		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 4.2 — Intersection LOS: A
Intersection Capacity Utilization 57.3% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

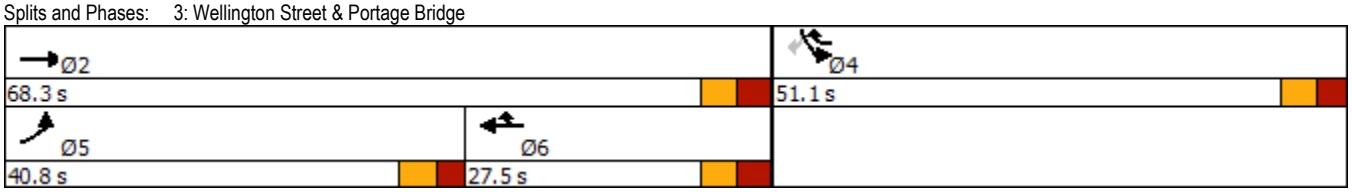
Splits and Phases: 2: Lett Street & Wellington Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	654	906	226	969	1214	375
Future Volume (vph)	654	906	226	969	1214	375
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0			115.0	0.0	35.0
Storage Lanes	2			3	3	1
Taper Length (m)	30.0				30.0	
Satd. Flow (prot)	3317	4865	3386	3322	4424	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3309	4865	3386	3322	4424	1371
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				125		227
Link Speed (k/h)		50	50		50	
Link Distance (m)		270.2	257.1		139.6	
Travel Time (s)		19.5	18.5		10.1	
Lane Group Flow (vph)	654	906	226	969	1214	375
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	40.8	68.3	27.5		51.1	51.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	27.9	61.9	28.2	75.4	41.0	41.0
Actuated g/C Ratio	0.24	0.54	0.24	0.65	0.35	0.35
v/c Ratio	0.82	0.35	0.27	0.44	0.77	0.59
Control Delay	50.3	16.3	39.1	9.6	36.9	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.3	16.3	39.1	9.6	36.9	15.3
LOS	D	B	D	A	D	B
Approach Delay		30.5	15.2		31.8	
Approach LOS		C	B		C	
Queue Length 50th (m)	78.5	46.3	24.2	39.7	90.1	26.9
Queue Length 95th (m)	94.1	56.9	39.0	59.8	107.6	59.1
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1006	2607	826	2322	1726	673
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	0.65	0.35	0.27	0.42	0.70	0.56

Intersection Summary			
Area Type:	Other		
Cycle Length: 119.4			
Actuated Cycle Length: 115.6			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 26.8		Intersection LOS: C	
Intersection Capacity Utilization 75.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Wellington Street & Portage Bridge

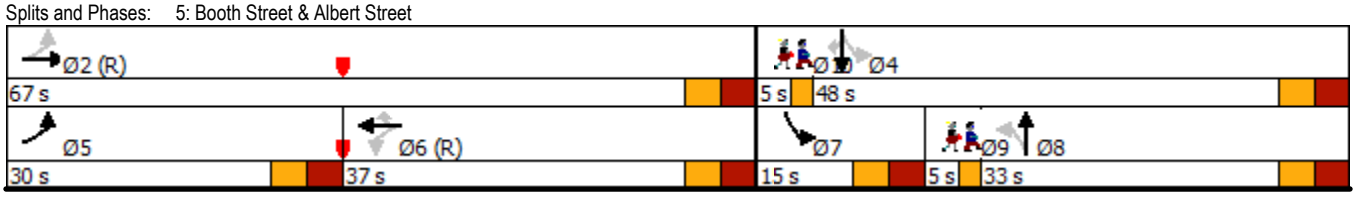


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	433	811	8	4	344	151	4	502	20	212	541	317
Future Volume (vph)	433	811	8	4	344	151	4	502	20	212	541	317
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	1569	2706	0	1710	2478	1286	0	3317	0	1569	1782	1391
Flt Permitted	0.407			0.343				0.950		0.181		
Satd. Flow (perm)	599	2706	0	537	2478	1001	0	3149	0	270	1782	982
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	433	819	0	4	344	151	0	526	0	212	541	317
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	30.0	67.0		37.0	37.0	37.0	33.0	33.0		15.0	48.0	48.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	61.7	61.7		32.3	32.3	32.3		25.3		45.3	40.3	40.3
Actuated g/C Ratio	0.51	0.51		0.27	0.27	0.27		0.21		0.38	0.34	0.34
v/c Ratio	0.88	0.59		0.03	0.52	0.56		0.79		1.10	0.90	0.96
Control Delay	41.6	22.7		34.5	41.2	48.1		54.0		123.5	58.1	80.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	41.6	22.7		34.5	41.2	48.1		54.0		123.5	58.1	80.9
LOS	D	C		C	D	D		D		F	E	F
Approach Delay		29.3			43.2			54.0			77.8	
Approach LOS		C			D			D			E	
Queue Length 50th (m)	71.1	73.3		0.8	39.0	33.0		64.2		~41.2	125.2	75.4
Queue Length 95th (m)	#111.6	94.4		3.9	55.1	57.4		85.0		#86.8	#189.7	#133.7
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	497	1392		144	667	269		697		193	616	339
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.87	0.59		0.03	0.52	0.56		0.75		1.10	0.88	0.94

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 50.8 Intersection LOS: D
Intersection Capacity Utilization 121.2% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	9	952	10	0	1144
Future Volume (Veh/h)	0	9	952	10	0	1144
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	9	952	10	0	1144
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.72	0.90			0.90	
vC, conflicting volume	1529	481			962	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	353	210			743	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	446	718			777	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	9	635	327	572	572
Volume Left	0	0	0	0	0
Volume Right	9	0	10	0	0
cSH	718	1700	1700	1700	1700
Volume to Capacity	0.01	0.37	0.19	0.34	0.34
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0
Control Delay (s)	10.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.1	0.0		0.0	
Approach LOS	B				

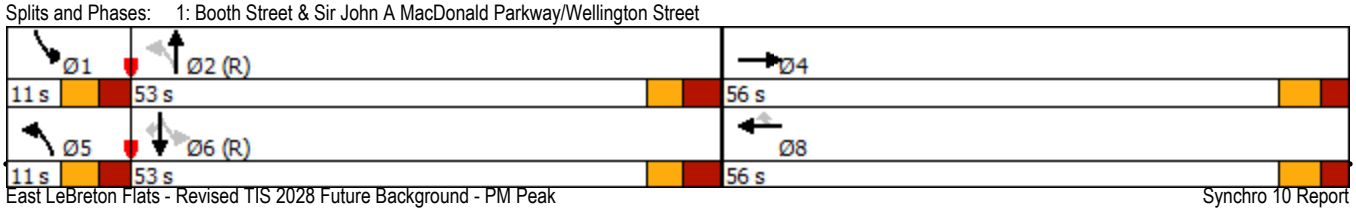
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1113	0	0	1406	268	5	1226	94	65	813	303
Future Volume (vph)	0	1113	0	0	1406	268	5	1226	94	65	813	303
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		35.0	10.0		0.0	135.0		50.0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	0	3386	0	0	3386	1500	1710	3267	0	1541	3257	1500
Flt Permitted							0.257			0.080		
Satd. Flow (perm)	0	3386	0	0	3386	1409	456	3267	0	130	3257	1370
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						100		8				101
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		115.0			144.3			74.7			217.9	
Travel Time (s)		8.3			10.4			5.4			15.7	
Lane Group Flow (vph)	0	1113	0	0	1406	268	5	1320	0	65	813	303
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		56.0			56.0	56.0	11.0	53.0		11.0	53.0	53.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		49.6			49.6	49.6	53.0	48.3		56.7	54.9	54.9
Actuated g/C Ratio		0.41			0.41	0.41	0.44	0.40		0.47	0.46	0.46
v/c Ratio		0.80			1.01	0.42	0.02	1.00		0.55	0.55	0.44
Control Delay		36.0			54.5	11.4	11.0	47.6		35.6	25.9	17.5
Queue Delay		0.0			14.1	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		36.0			68.6	11.4	11.0	47.6		35.6	25.9	17.5
LOS		D			E	B	B	D		D	C	B
Approach Delay		36.0			59.5			47.5			24.3	
Approach LOS		D			E			D			C	
Queue Length 50th (m)		124.8			~183.2	28.0	0.5	~187.0		8.5	72.1	31.1
Queue Length 95th (m)		153.7			#237.1	32.4	m0.6	m#209.6		#20.9	108.6	65.8
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1399			1399	641	253	1319		119	1489	681
Starvation Cap Reductn		0			58	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.80			1.05	0.42	0.02	1.00		0.55	0.55	0.44

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 3 (3%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 43.7 Intersection LOS: D
Intersection Capacity Utilization 100.5% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
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.

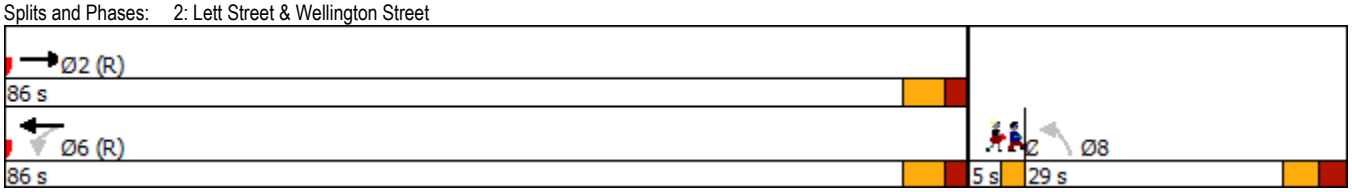
Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1216	23	19	1510	12	24	
Future Volume (vph)	1216	23	19	1510	12	24	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3374	0	1710	3386	1545	0	
Flt Permitted			0.205		0.984		
Satd. Flow (perm)	3374	0	368	3386	1539	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	3				24		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1239	0	19	1510	36	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	97.1		97.1	97.1	12.6		
Actuated g/C Ratio	0.81		0.81	0.81	0.10		
v/c Ratio	0.45		0.06	0.55	0.20		
Control Delay	2.8		5.5	6.7	25.5		
Queue Delay	0.1		0.0	0.5	0.0		
Total Delay	2.9		5.5	7.2	25.5		
LOS	A		A	A	C		
Approach Delay	2.9			7.1	25.5		
Approach LOS	A			A	C		
Queue Length 50th (m)	16.4		0.9	65.9	2.8		
Queue Length 95th (m)	m37.1		4.5	130.6	12.0		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2729		297	2738	315		
Starvation Cap Reductn	455		0	380	0		
Spillback Cap Reductn	0		0	702	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.54		0.06	0.74	0.11		

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 5.5	Intersection LOS: A
Intersection Capacity Utilization 64.7%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 2: Lett Street & Wellington Street

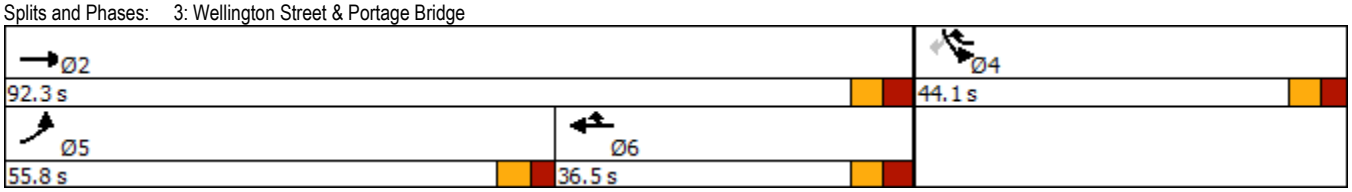


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	664	316	910	1735	726	663
Future Volume (vph)	664	316	910	1735	726	663
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0			115.0	0.0	35.0
Storage Lanes	2			3	3	1
Taper Length (m)	30.0				30.0	
Satd. Flow (prot)	3285	4865	3420	3230	4637	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3267	4865	3420	3230	4620	1342
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				225		507
Link Speed (k/h)		50	50		50	
Link Distance (m)		270.2	257.1		139.6	
Travel Time (s)		19.5	18.5		10.1	
Lane Group Flow (vph)	664	316	910	1735	726	663
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	55.8	92.3	36.5		44.1	44.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	33.5	85.9	46.5	88.5	35.8	35.8
Actuated g/C Ratio	0.25	0.64	0.35	0.66	0.27	0.27
v/c Ratio	0.81	0.10	0.77	0.79	0.59	0.91
Control Delay	55.6	9.7	45.5	17.9	44.9	28.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	9.7	45.5	17.9	44.9	28.9
LOS	E	A	D	B	D	C
Approach Delay		40.8	27.4		37.2	
Approach LOS		D	C		D	
Queue Length 50th (m)	92.3	12.2	121.6	123.8	62.6	50.1
Queue Length 95th (m)	107.0	16.6	#174.3	180.0	76.8	#138.7
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1224	3110	1184	2253	1312	743
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	0.54	0.10	0.77	0.77	0.55	0.89

Intersection Summary

Area Type: Other
Cycle Length: 136.4
Actuated Cycle Length: 134.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 32.8 — Intersection LOS: C
Intersection Capacity Utilization 92.9% — ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Wellington Street & Portage Bridge



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	421	426	7	45	855	328	7	558	12	158	436	275
Future Volume (vph)	421	426	7	45	855	328	7	558	12	158	436	275
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	1613	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.109			0.500				0.947		0.147		
Satd. Flow (perm)	179	2432	0	688	2758	1130	0	3214	0	235	1800	1006
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				162		2				275
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	421	433	0	45	855	328	0	577	0	158	436	275
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	29.0	71.0		42.0	42.0	42.0	33.0	33.0		11.0	44.0	44.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	66.1	66.1		35.5	35.5	35.5		24.9		40.4	35.9	35.9
Actuated g/C Ratio	0.55	0.55		0.30	0.30	0.30		0.21		0.34	0.30	0.30
v/c Ratio	1.09	0.32		0.22	1.05	0.73		0.86		1.22	0.81	0.56
Control Delay	105.5	15.8		35.5	86.4	29.6		59.7		173.8	39.9	20.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	105.5	15.8		35.5	86.4	29.6		59.7		173.8	39.9	20.9
LOS	F	B		D	F	C		E		F	D	C
Approach Delay		60.0			69.3			59.7			58.3	
Approach LOS		E			E			E			E	
Queue Length 50th (m)	~106.8	30.3		8.4	~121.3	37.8		71.6		~40.9	115.4	44.7
Queue Length 95th (m)	#171.8	41.7		19.2	#162.3	76.7		#94.2		#90.4	149.5	84.1
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	386	1340		203	815	448		711		129	562	503
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	1.09	0.32		0.22	1.05	0.73		0.81		1.22	0.78	0.55

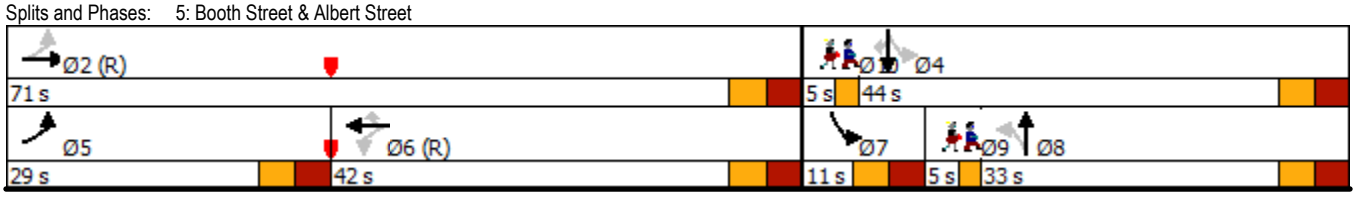
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 62.8 — Intersection LOS: E
Intersection Capacity Utilization 117.0% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	8	1310	9	0	813
Future Volume (Veh/h)	0	8	1310	9	0	813
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	8	1310	9	0	813
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.88	0.86			0.86	
vC, conflicting volume	1721	660			1319	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	824	274			1042	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	274	621			569	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	873	446	406	406
Volume Left	0	0	0	0	0
Volume Right	8	0	9	0	0
cSH	621	1700	1700	1700	1700
Volume to Capacity	0.01	0.51	0.26	0.24	0.24
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0
Control Delay (s)	10.9	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.9	0.0		0.0	
Approach LOS	B				

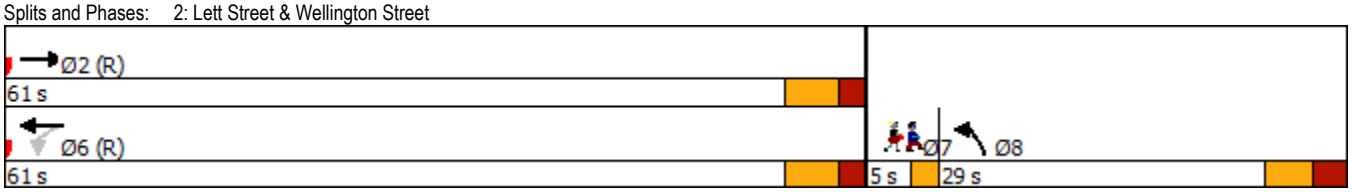
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1445	8	5	791	35	26	
Future Volume (vph)	1445	8	5	791	35	26	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3382	0	1710	3353	1636	0	
Flt Permitted			0.145		0.972		
Satd. Flow (perm)	3382	0	261	3353	1635	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	1						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1453	0	5	791	61	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	69.5		69.5	69.5	11.0		
Actuated g/C Ratio	0.73		0.73	0.73	0.12		
v/c Ratio	0.59		0.03	0.32	0.32		
Control Delay	2.3		7.2	6.2	40.4		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.4		7.2	6.2	40.4		
LOS	A		A	A	D		
Approach Delay	2.4			6.3	40.4		
Approach LOS	A			A	D		
Queue Length 50th (m)	9.4		0.2	23.8	11.3		
Queue Length 95th (m)	m22.1		2.1	53.7	20.0		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2475		190	2454	397		
Starvation Cap Reductn	147		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.62		0.03	0.32	0.15		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 4.7 — Intersection LOS: A
Intersection Capacity Utilization 57.3% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

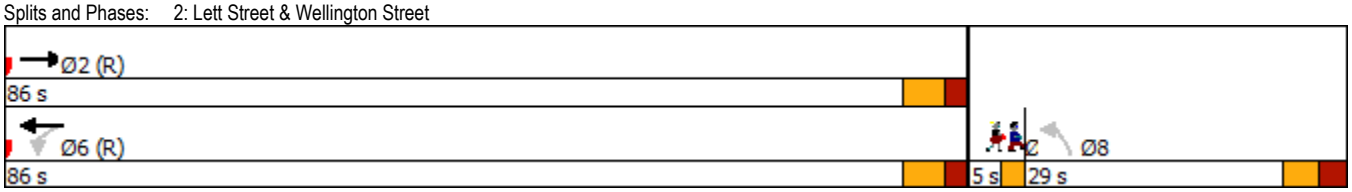


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1216	23	19	1510	12	24	
Future Volume (vph)	1216	23	19	1510	12	24	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3374	0	1710	3386	1545	0	
Flt Permitted			0.205		0.984		
Satd. Flow (perm)	3374	0	368	3386	1539	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	3						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1239	0	19	1510	36	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	97.1		97.1	97.1	12.6		
Actuated g/C Ratio	0.81		0.81	0.81	0.10		
v/c Ratio	0.45		0.06	0.55	0.22		
Control Delay	2.8		5.5	6.7	50.6		
Queue Delay	0.1		0.0	1.7	0.0		
Total Delay	2.9		5.5	8.3	50.6		
LOS	A		A	A	D		
Approach Delay	2.9			8.3	50.6		
Approach LOS	A			A	D		
Queue Length 50th (m)	16.4		0.9	65.9	8.5		
Queue Length 95th (m)	m37.1		4.5	130.6	17.3		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2729		297	2738	296		
Starvation Cap Reductn	455		0	380	0		
Spillback Cap Reductn	0		0	991	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.54		0.06	0.86	0.12		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 6.5 — Intersection LOS: A
Intersection Capacity Utilization 64.7% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

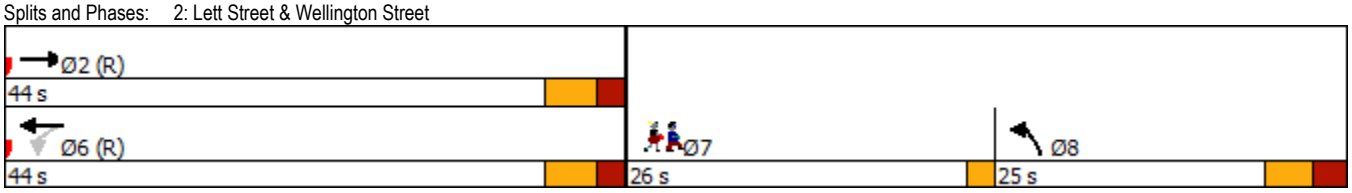


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1445	8	5	791	35	26	
Future Volume (vph)	1445	8	5	791	35	26	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3382	0	1710	3353	1635	0	
Flt Permitted			0.122		0.972		
Satd. Flow (perm)	3382	0	220	3353	1634	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	1				26		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1453	0	5	791	61	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	44.0		44.0	44.0	25.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	63.4		63.4	63.4	7.8		
Actuated g/C Ratio	0.67		0.67	0.67	0.08		
v/c Ratio	0.64		0.03	0.35	0.39		
Control Delay	15.5		13.4	11.7	33.6		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	15.5		13.4	11.7	33.6		
LOS	B		B	B	C		
Approach Delay	15.5			11.7	33.6		
Approach LOS	B			B	C		
Queue Length 50th (m)	80.6		0.4	47.5	6.5		
Queue Length 95th (m)	m87.0		2.7	68.0	18.5		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2256		147	2236	349		
Starvation Cap Reductn	72		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.67		0.03	0.35	0.17		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 14.7 — Intersection LOS: B
Intersection Capacity Utilization 56.4% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

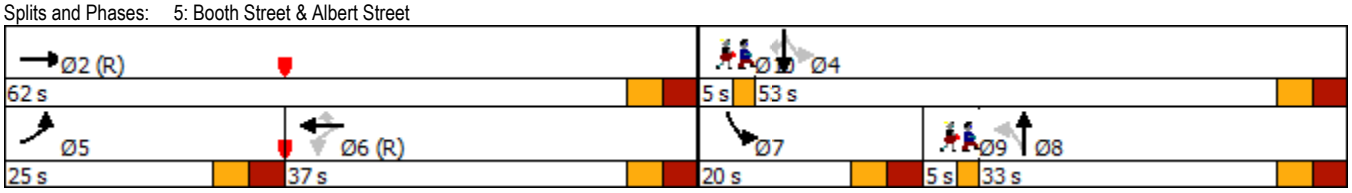


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	433	811	8	4	344	151	4	502	20	212	541	317
Future Volume (vph)	433	811	8	4	344	151	4	502	20	212	541	317
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3043	2706	0	1710	2478	1286	0	3317	0	1569	1782	1391
Flt Permitted	0.950			0.343				0.950		0.170		
Satd. Flow (perm)	2379	2706	0	537	2478	1001	0	3148	0	254	1782	983
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	433	819	0	4	344	151	0	526	0	212	541	317
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	25.0	62.0		37.0	37.0	37.0	33.0	33.0		20.0	53.0	53.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	19.2	57.8		32.1	32.1	32.1		24.2		49.2	44.2	44.2
Actuated g/C Ratio	0.16	0.48		0.27	0.27	0.27		0.20		0.41	0.37	0.37
v/c Ratio	0.89	0.63		0.03	0.52	0.56		0.83		0.85	0.83	0.88
Control Delay	70.8	26.2		34.5	41.3	48.3		57.3		54.1	46.0	60.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	70.8	26.2		34.5	41.3	48.3		57.3		54.1	46.0	60.8
LOS	E	C		C	D	D		E		D	D	E
Approach Delay		41.6			43.4			57.3			52.0	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	55.0	79.6		0.8	39.0	33.0		64.5		34.3	117.3	70.6
Queue Length 95th (m)	#85.9	103.2		3.9	55.1	57.4		85.0		#72.1	163.5	#123.0
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	487	1304		143	663	268		697		251	690	380
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.89	0.63		0.03	0.52	0.56		0.75		0.84	0.78	0.83

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 47.7 — Intersection LOS: D
Intersection Capacity Utilization 108.9% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

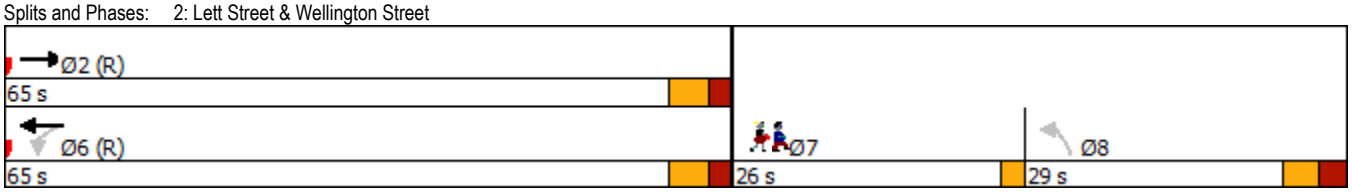
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1216	23	19	1510	12	24	
Future Volume (vph)	1216	23	19	1510	12	24	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3374	0	1710	3386	1545	0	
Flt Permitted			0.190		0.984		
Satd. Flow (perm)	3374	0	342	3386	1539	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	2				24		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1239	0	19	1510	36	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	65.0		65.0	65.0	29.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	91.4		91.4	91.4	10.0		
Actuated g/C Ratio	0.76		0.76	0.76	0.08		
v/c Ratio	0.48		0.07	0.59	0.24		
Control Delay	16.1		10.6	13.0	30.2		
Queue Delay	0.2		0.0	6.1	0.0		
Total Delay	16.3		10.6	19.1	30.2		
LOS	B		B	B	C		
Approach Delay	16.3			19.0	30.2		
Approach LOS	B			B	C		
Queue Length 50th (m)	80.9		1.9	132.8	2.8		
Queue Length 95th (m)	m106.8		5.7	161.6	13.7		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2569		260	2578	315		
Starvation Cap Reductn	550		0	0	0		
Spillback Cap Reductn	0		0	1009	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.61		0.07	0.96	0.11		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 18.0 — Intersection LOS: B
Intersection Capacity Utilization 62.1% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

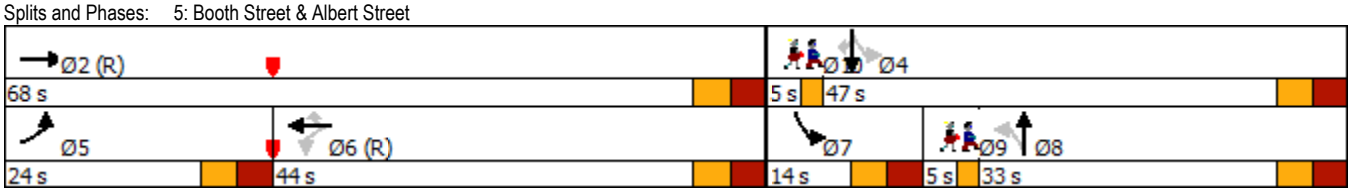


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	421	426	7	45	855	328	7	558	12	158	436	275
Future Volume (vph)	421	426	7	45	855	328	7	558	12	158	436	275
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3130	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.950			0.500				0.947		0.145		
Satd. Flow (perm)	2788	2432	0	688	2758	1130	0	3214	0	232	1800	1006
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				189		2				275
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	421	433	0	45	855	328	0	577	0	158	436	275
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	24.0	68.0		44.0	44.0	44.0	33.0	33.0		14.0	47.0	47.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	18.0	63.1		38.6	38.6	38.6		24.9		43.9	38.9	38.9
Actuated g/C Ratio	0.15	0.53		0.32	0.32	0.32		0.21		0.37	0.32	0.32
v/c Ratio	0.90	0.34		0.20	0.96	0.67		0.86		0.94	0.75	0.54
Control Delay	73.3	17.6		33.5	63.4	22.2		59.7		76.7	37.9	21.5
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	73.3	17.6		33.5	63.4	22.2		59.7		76.7	37.9	21.5
LOS	E	B		C	E	C		E		E	D	C
Approach Delay		45.1			51.3			59.7			39.7	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	53.8	32.2		8.2	110.8	29.8		71.6		34.0	115.2	44.6
Queue Length 95th (m)	#84.2	44.2		18.7	#156.1	66.6		#94.2		#58.4	149.2	82.9
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	468	1279		221	887	492		711		168	607	521
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.90	0.34		0.20	0.96	0.67		0.81		0.94	0.72	0.53

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 48.3 — Intersection LOS: D
Intersection Capacity Utilization 105.1% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

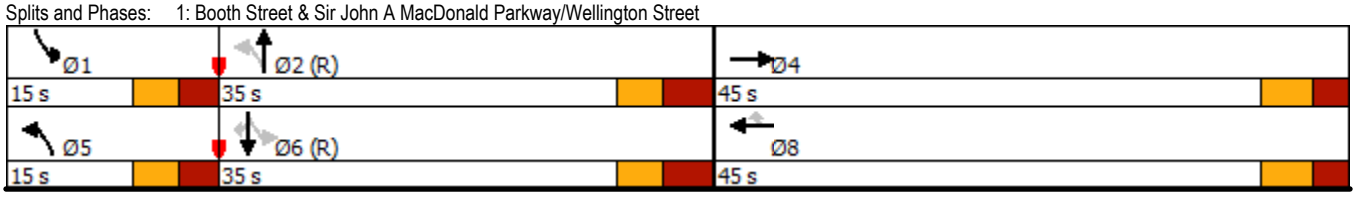
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1327	0	0	710	136	5	778	166	126	1116	333
Future Volume (vph)	0	1327	0	0	710	136	5	778	166	126	1116	333
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		35.0	10.0		0.0	135.0		50.0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	0	3386	0	0	3353	1500	1710	3088	0	1693	3320	1515
Flt Permitted							0.139			0.115		
Satd. Flow (perm)	0	3386	0	0	3353	1466	250	3088	0	202	3320	1448
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						125		27				221
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		115.0			144.3			74.7			217.9	
Travel Time (s)		8.3			10.4			5.4			15.7	
Lane Group Flow (vph)	0	1327	0	0	710	136	5	944	0	126	1116	333
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		45.0			45.0	45.0	15.0	35.0		15.0	35.0	35.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		38.6			38.6	38.6	35.2	28.7		43.2	40.7	40.7
Actuated g/C Ratio		0.41			0.41	0.41	0.37	0.30		0.45	0.43	0.43
v/c Ratio		0.97			0.52	0.20	0.03	0.99		0.57	0.79	0.45
Control Delay		45.8			17.6	2.7	14.6	61.1		26.8	29.6	9.3
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		45.8			17.6	2.7	14.6	61.1		26.8	29.6	9.3
LOS		D			B	A	B	E		C	C	A
Approach Delay		45.8			15.2			60.8			25.1	
Approach LOS		D			B			E			C	
Queue Length 50th (m)		128.7			53.8	5.7	0.5	~95.7		13.7	90.2	12.4
Queue Length 95th (m)		#178.5			26.4	3.4	2.5	#140.1		27.8	#163.7	42.3
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1375			1362	669	237	951		232	1421	746
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.97			0.52	0.20	0.02	0.99		0.54	0.79	0.45

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 31 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 36.4 Intersection LOS: D
Intersection Capacity Utilization 91.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street

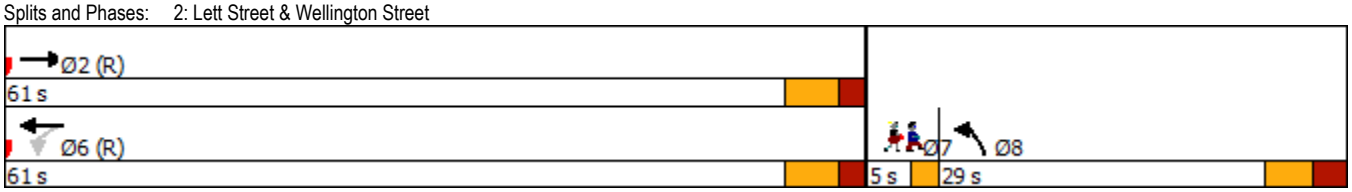


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1409	13	21	771	49	69	
Future Volume (vph)	1409	13	21	771	49	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3381	0	1710	3353	1608	0	
Flt Permitted			0.150		0.980		
Satd. Flow (perm)	3381	0	270	3353	1608	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	2				69		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1422	0	21	771	118	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	67.6		67.6	67.6	10.7		
Actuated g/C Ratio	0.71		0.71	0.71	0.11		
v/c Ratio	0.59		0.11	0.32	0.49		
Control Delay	2.2		8.2	6.5	23.7		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.3		8.2	6.5	23.7		
LOS	A		A	A	C		
Approach Delay	2.3			6.5	23.7		
Approach LOS	A			A	C		
Queue Length 50th (m)	8.7		1.0	22.4	9.1		
Queue Length 95th (m)	m22.1		5.8	52.1	21.8		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2404		191	2384	443		
Starvation Cap Reductn	148		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.63		0.11	0.32	0.27		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 4.8 — Intersection LOS: A
Intersection Capacity Utilization 59.5% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

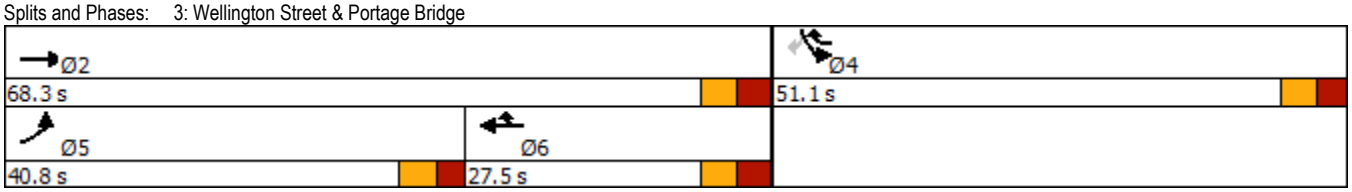


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	642	924	234	944	1183	366
Future Volume (vph)	642	924	234	944	1183	366
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0			115.0	0.0	35.0
Storage Lanes	2			3	3	1
Taper Length (m)	30.0				30.0	
Satd. Flow (prot)	3317	4865	3386	3322	4424	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3309	4865	3386	3322	4424	1371
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				133		227
Link Speed (k/h)		50	50		50	
Link Distance (m)		270.2	257.1		139.6	
Travel Time (s)		19.5	18.5		10.1	
Lane Group Flow (vph)	642	924	234	944	1183	366
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	40.8	68.3	27.5		51.1	51.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	27.5	61.9	28.6	75.2	40.4	40.4
Actuated g/C Ratio	0.24	0.54	0.25	0.65	0.35	0.35
v/c Ratio	0.81	0.35	0.28	0.43	0.76	0.58
Control Delay	50.0	16.1	38.7	9.2	36.5	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	16.1	38.7	9.2	36.5	14.7
LOS	D	B	D	A	D	B
Approach Delay		30.0	15.1		31.3	
Approach LOS		C	B		C	
Queue Length 50th (m)	76.5	46.5	24.6	36.8	87.0	24.7
Queue Length 95th (m)	92.2	58.2	40.2	57.0	104.2	56.1
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1011	2620	843	2347	1734	675
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	0.64	0.35	0.28	0.40	0.68	0.54

Intersection Summary

Area Type:	Other
Cycle Length: 119.4	
Actuated Cycle Length: 115	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 26.4	Intersection LOS: C
Intersection Capacity Utilization 74.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Wellington Street & Portage Bridge



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	423	793	8	4	336	148	4	496	19	207	527	310
Future Volume (vph)	423	793	8	4	336	148	4	496	19	207	527	310
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	1569	2706	0	1710	2478	1286	0	3322	0	1569	1782	1391
Flt Permitted	0.417			0.349				0.950		0.183		
Satd. Flow (perm)	612	2706	0	544	2478	1001	0	3153	0	272	1782	982
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	423	801	0	4	336	148	0	519	0	207	527	310
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	30.0	67.0		37.0	37.0	37.0	33.0	33.0		15.0	48.0	48.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	62.0	62.0		33.0	33.0	33.0		25.0		45.0	40.0	40.0
Actuated g/C Ratio	0.52	0.52		0.28	0.28	0.28		0.21		0.38	0.33	0.33
v/c Ratio	0.85	0.57		0.03	0.49	0.54		0.79		1.07	0.89	0.95
Control Delay	38.4	22.3		34.5	40.5	47.0		54.0		115.4	56.1	78.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	38.4	22.3		34.5	40.5	47.0		54.0		115.4	56.1	78.1
LOS	D	C		C	D	D		D		F	E	E
Approach Delay		27.8			42.4			54.0			74.4	
Approach LOS		C			D			D			E	
Queue Length 50th (m)	68.9	71.1		0.8	38.0	32.3		63.2		~38.5	120.6	73.1
Queue Length 95th (m)	#118.7	91.5		3.9	53.8	56.1		83.6		#83.4	#182.0	#130.1
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	503	1399		149	680	275		698		193	616	339
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.84	0.57		0.03	0.49	0.54		0.74		1.07	0.86	0.91

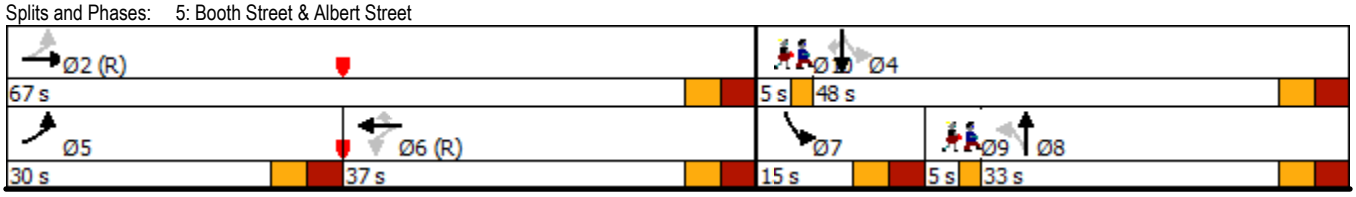
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 49.0 — Intersection LOS: D
Intersection Capacity Utilization 119.8% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	12	932	13	0	1116
Future Volume (Veh/h)	0	12	932	13	0	1116
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	12	932	13	0	1116
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.73	0.90			0.90	
vC, conflicting volume	1496	472			945	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	361	206			729	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	447	724			788	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	621	324	558	558
Volume Left	0	0	0	0	0
Volume Right	12	0	13	0	0
cSH	724	1700	1700	1700	1700
Volume to Capacity	0.02	0.37	0.19	0.33	0.33
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0
Control Delay (s)	10.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.1	0.0		0.0	
Approach LOS	B				

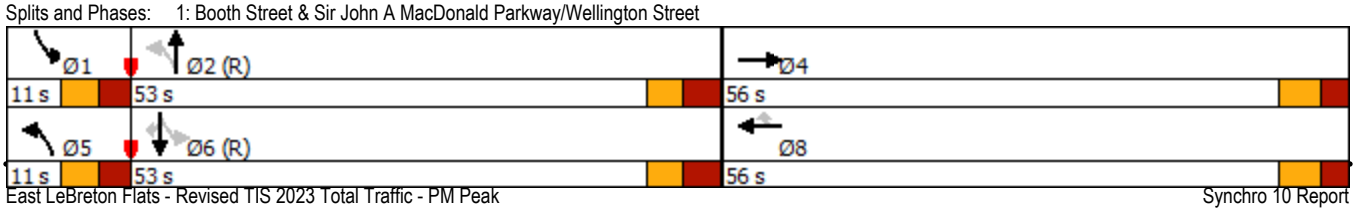
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1090	0	0	1378	262	5	1197	98	64	794	296
Future Volume (vph)	0	1090	0	0	1378	262	5	1197	98	64	794	296
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		35.0	10.0		0.0	135.0		50.0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	0	3386	0	0	3386	1500	1710	3266	0	1541	3257	1500
Flt Permitted							0.267			0.080		
Satd. Flow (perm)	0	3386	0	0	3386	1409	473	3266	0	130	3257	1370
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						99		8				102
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		115.0			144.3			74.7			217.9	
Travel Time (s)		8.3			10.4			5.4			15.7	
Lane Group Flow (vph)	0	1090	0	0	1378	262	5	1295	0	64	794	296
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		56.0			56.0	56.0	11.0	53.0		11.0	53.0	53.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		49.6			49.6	49.6	53.0	48.3		56.7	54.9	54.9
Actuated g/C Ratio		0.41			0.41	0.41	0.44	0.40		0.47	0.46	0.46
v/c Ratio		0.78			0.98	0.41	0.02	0.98		0.54	0.53	0.43
Control Delay		35.2			49.2	11.0	10.8	43.8		34.8	25.7	17.0
Queue Delay		0.0			11.1	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		35.2			60.3	11.0	10.8	43.8		34.8	25.7	17.0
LOS		D			E	B	B	D		C	C	B
Approach Delay		35.2			52.4			43.7			24.0	
Approach LOS		D			D			D			C	
Queue Length 50th (m)		121.1			175.2	27.2	0.5	~180.2		8.3	69.8	29.6
Queue Length 95th (m)		148.7			#229.0	32.8	m0.6	m#206.7		#19.9	105.4	63.3
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1399			1399	640	259	1319		119	1489	682
Starvation Cap Reductn		0			58	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.78			1.03	0.41	0.02	0.98		0.54	0.53	0.43

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 3 (3%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 40.3 Intersection LOS: D
Intersection Capacity Utilization 99.0% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
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.

Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street

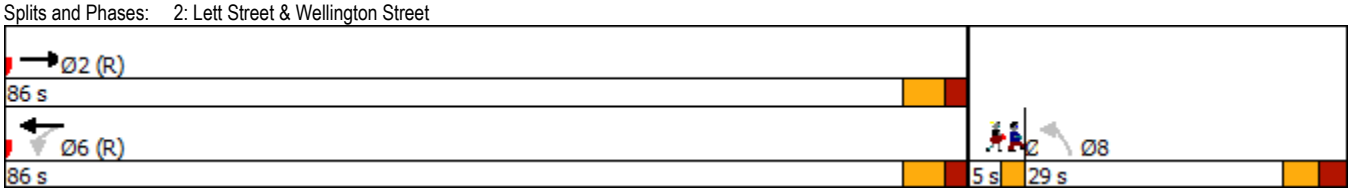


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1185	34	52	1471	20	51	
Future Volume (vph)	1185	34	52	1471	20	51	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3370	0	1710	3386	1540	0	
Flt Permitted			0.207		0.986		
Satd. Flow (perm)	3370	0	372	3386	1535	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	5				51		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1219	0	52	1471	71	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	93.9		93.9	93.9	12.6		
Actuated g/C Ratio	0.78		0.78	0.78	0.10		
v/c Ratio	0.46		0.18	0.56	0.34		
Control Delay	2.9		7.1	7.3	23.0		
Queue Delay	0.1		0.0	0.5	0.0		
Total Delay	3.1		7.1	7.9	23.1		
LOS	A		A	A	C		
Approach Delay	3.1			7.8	23.1		
Approach LOS	A			A	C		
Queue Length 50th (m)	16.0		2.8	63.2	4.7		
Queue Length 95th (m)	m33.4		11.0	124.7	17.3		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2637		291	2648	336		
Starvation Cap Reductn	453		0	389	0		
Spillback Cap Reductn	0		0	677	10		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.56		0.18	0.75	0.22		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 6.2 — Intersection LOS: A
Intersection Capacity Utilization 66.2% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

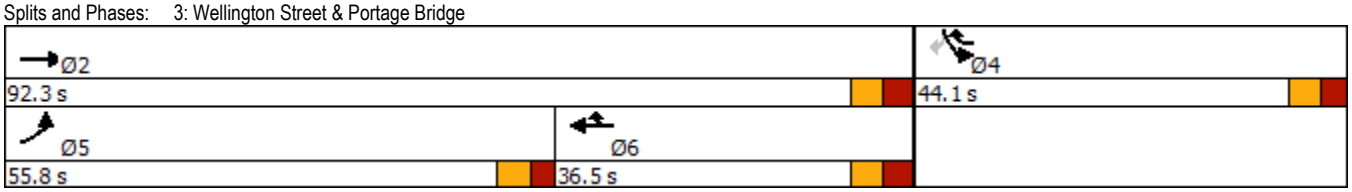


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	648	332	916	1691	707	648
Future Volume (vph)	648	332	916	1691	707	648
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0			115.0	0.0	35.0
Storage Lanes	2			3	3	1
Taper Length (m)	30.0				30.0	
Satd. Flow (prot)	3285	4865	3420	3230	4637	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3268	4865	3420	3230	4620	1342
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				239		508
Link Speed (k/h)		50	50		50	
Link Distance (m)		270.2	257.1		139.6	
Travel Time (s)		19.5	18.5		10.1	
Lane Group Flow (vph)	648	332	916	1691	707	648
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	55.8	92.3	36.5		44.1	44.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	32.7	85.9	47.4	88.6	35.1	35.1
Actuated g/C Ratio	0.24	0.64	0.35	0.66	0.26	0.26
v/c Ratio	0.81	0.11	0.76	0.76	0.58	0.89
Control Delay	55.8	9.6	44.2	16.4	44.8	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.8	9.6	44.2	16.4	44.8	26.2
LOS	E	A	D	B	D	C
Approach Delay		40.1	26.2		35.9	
Approach LOS		D	C		D	
Queue Length 50th (m)	90.1	12.9	121.8	113.5	60.7	42.7
Queue Length 95th (m)	104.8	17.3	#173.4	165.3	74.6	#128.7
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1230	3127	1213	2288	1319	745
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	0.53	0.11	0.76	0.74	0.54	0.87

Intersection Summary

Area Type: Other
Cycle Length: 136.4
Actuated Cycle Length: 133.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 31.6 — Intersection LOS: C
Intersection Capacity Utilization 92.6% — ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Wellington Street & Portage Bridge



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	412	418	7	44	837	320	7	557	11	155	425	270
Future Volume (vph)	412	418	7	44	837	320	7	557	11	155	425	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	1613	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.117			0.504				0.947		0.148		
Satd. Flow (perm)	191	2432	0	691	2758	1130	0	3215	0	236	1800	1006
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				165		1				270
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	412	425	0	44	837	320	0	575	0	155	425	270
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	29.0	71.0		42.0	42.0	42.0	33.0	33.0		11.0	44.0	44.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	66.1	66.1		35.5	35.5	35.5		24.9		40.4	35.9	35.9
Actuated g/C Ratio	0.55	0.55		0.30	0.30	0.30		0.21		0.34	0.30	0.30
v/c Ratio	1.05	0.32		0.22	1.03	0.71		0.86		1.20	0.79	0.55
Control Delay	93.6	15.7		35.3	80.4	27.6		59.8		165.2	38.7	20.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	93.6	15.7		35.3	80.4	27.6		59.8		165.2	38.7	20.9
LOS	F	B		D	F	C		E		F	D	C
Approach Delay		54.1			64.7			59.8			56.1	
Approach LOS		D			E			E			E	
Queue Length 50th (m)	~99.8	29.6		8.2	~116.4	34.7		71.5		~39.2	112.0	43.3
Queue Length 95th (m)	#164.9	41.0		19.0	#157.4	72.2		#93.7		#87.9	146.2	82.6
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	391	1341		204	815	450		710		129	562	500
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	1.05	0.32		0.22	1.03	0.71		0.81		1.20	0.76	0.54

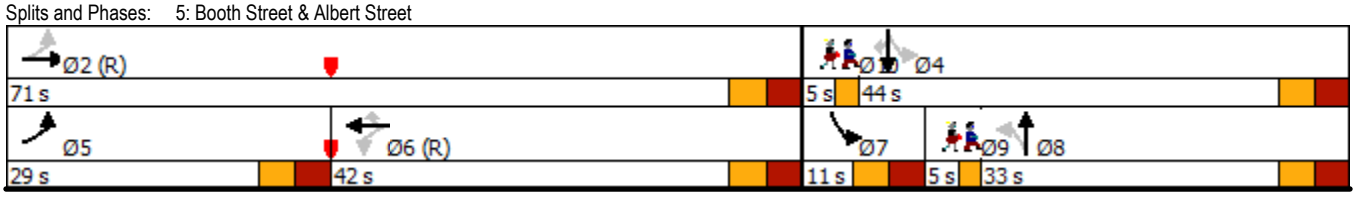
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.20
Intersection Signal Delay: 59.2 — Intersection LOS: E
Intersection Capacity Utilization 115.9% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	10	1284	16	0	794
Future Volume (Veh/h)	0	10	1284	16	0	794
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	10	1284	16	0	794
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.89	0.86			0.86	
vC, conflicting volume	1689	650			1300	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	805	265			1021	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	284	630			580	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	10	856	444	397	397
Volume Left	0	0	0	0	0
Volume Right	10	0	16	0	0
cSH	630	1700	1700	1700	1700
Volume to Capacity	0.02	0.50	0.26	0.23	0.23
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.8	0.0		0.0	
Approach LOS	B				

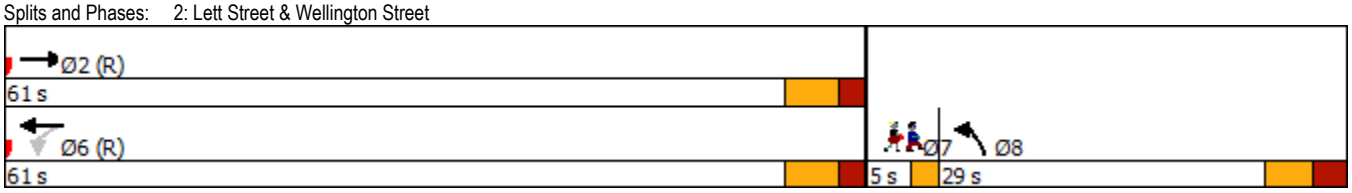
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1409	13	21	771	46	69	
Future Volume (vph)	1409	13	21	771	46	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3381	0	1710	3353	1604	0	
Flt Permitted			0.143		0.980		
Satd. Flow (perm)	3381	0	257	3353	1604	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	2						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1422	0	21	771	115	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	65.0		65.0	65.0	13.3		
Actuated g/C Ratio	0.68		0.68	0.68	0.14		
v/c Ratio	0.62		0.12	0.34	0.51		
Control Delay	2.5		9.2	7.4	44.3		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.6		9.2	7.4	44.3		
LOS	A		A	A	D		
Approach Delay	2.6			7.5	44.3		
Approach LOS	A			A	D		
Queue Length 50th (m)	11.8		1.2	26.7	21.2		
Queue Length 95th (m)	m22.1		5.9	52.1	33.9		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2312		175	2293	390		
Starvation Cap Reductn	138		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.65		0.12	0.34	0.29		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 6.3 — Intersection LOS: A
Intersection Capacity Utilization 59.4% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

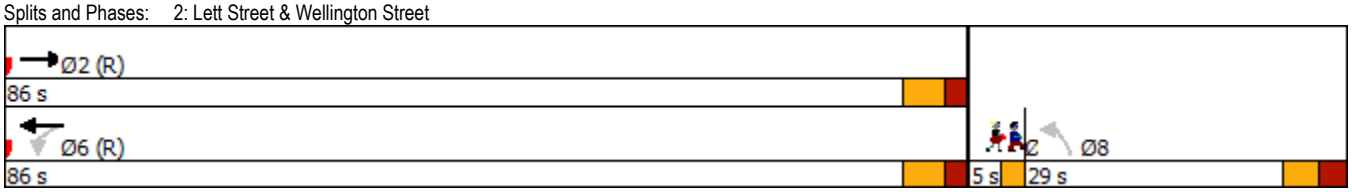


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1185	34	52	1471	46	69	
Future Volume (vph)	1185	34	52	1471	46	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3370	0	1710	3386	1548	0	
Flt Permitted			0.199		0.980		
Satd. Flow (perm)	3370	0	357	3386	1541	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	5						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1219	0	52	1471	115	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	88.2		88.2	88.2	15.1		
Actuated g/C Ratio	0.74		0.74	0.74	0.13		
v/c Ratio	0.49		0.20	0.59	0.59		
Control Delay	3.6		8.4	9.3	61.1		
Queue Delay	0.1		0.0	8.6	0.0		
Total Delay	3.7		8.4	17.9	61.1		
LOS	A		A	B	E		
Approach Delay	3.7			17.5	61.1		
Approach LOS	A			B	E		
Queue Length 50th (m)	17.2		3.4	75.9	27.6		
Queue Length 95th (m)	m33.4		11.2	124.7	44.1		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2477		262	2487	296		
Starvation Cap Reductn	383		0	344	0		
Spillback Cap Reductn	0		0	986	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.58		0.20	0.98	0.39		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 13.4 — Intersection LOS: B
Intersection Capacity Utilization 66.2% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

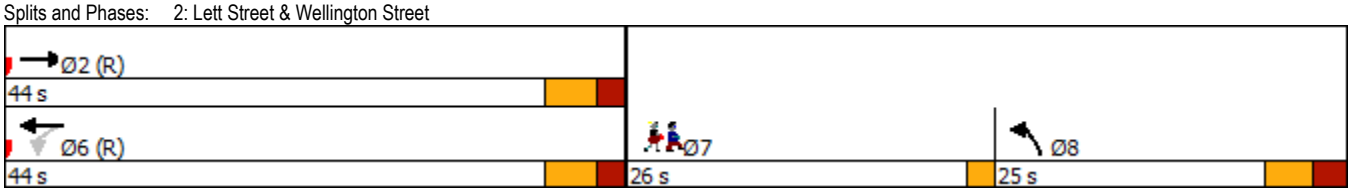


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1409	13	21	771	46	69	
Future Volume (vph)	1409	13	21	771	46	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3381	0	1710	3353	1603	0	
Flt Permitted			0.122		0.980		
Satd. Flow (perm)	3381	0	220	3353	1602	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	1				69		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1422	0	21	771	115	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	44.0		44.0	44.0	25.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	59.0		59.0	59.0	8.7		
Actuated g/C Ratio	0.62		0.62	0.62	0.09		
v/c Ratio	0.68		0.15	0.37	0.55		
Control Delay	16.7		17.8	12.7	28.5		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	16.8		17.8	12.7	28.5		
LOS	B		B	B	C		
Approach Delay	16.8			12.8	28.5		
Approach LOS	B			B	C		
Queue Length 50th (m)	77.2		2.1	46.7	8.5		
Queue Length 95th (m)	m88.2		8.3	69.7	24.5		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2100		136	2082	377		
Starvation Cap Reductn	66		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.70		0.15	0.37	0.31		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 16.0 — Intersection LOS: B
Intersection Capacity Utilization 58.6% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

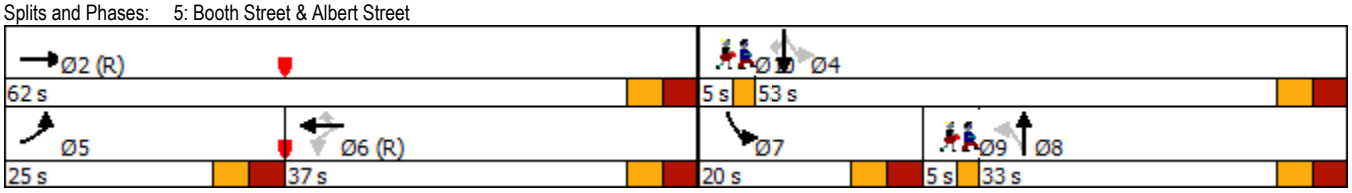


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	423	793	8	4	336	148	4	496	19	207	527	310
Future Volume (vph)	423	793	8	4	336	148	4	496	19	207	527	310
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3043	2706	0	1710	2478	1286	0	3322	0	1569	1782	1391
Flt Permitted	0.950			0.349				0.950		0.170		
Satd. Flow (perm)	2372	2706	0	544	2478	1001	0	3153	0	253	1782	983
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	423	801	0	4	336	148	0	519	0	207	527	310
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	25.0	62.0		37.0	37.0	37.0	33.0	33.0		20.0	53.0	53.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	19.1	58.2		32.6	32.6	32.6		23.8		48.8	43.8	43.8
Actuated g/C Ratio	0.16	0.48		0.27	0.27	0.27		0.20		0.41	0.36	0.36
v/c Ratio	0.87	0.61		0.03	0.50	0.55		0.83		0.83	0.81	0.87
Control Delay	68.8	25.6		34.5	40.6	47.3		57.6		52.5	45.1	59.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	68.8	25.6		34.5	40.6	47.3		57.6		52.5	45.1	59.4
LOS	E	C		C	D	D		E		D	D	E
Approach Delay		40.5			42.6			57.6			50.8	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	52.8	75.6		0.8	38.0	32.3		64.3		34.0	114.9	69.5
Queue Length 95th (m)	#83.0	100.1		3.9	53.8	56.1		83.6		#69.2	157.7	#119.4
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	489	1313		147	672	271		698		250	690	380
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.87	0.61		0.03	0.50	0.55		0.74		0.83	0.76	0.82

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 46.8 — Intersection LOS: D
Intersection Capacity Utilization 107.8% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

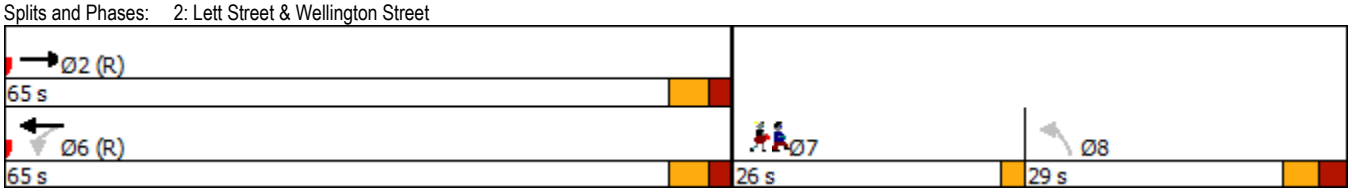
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1185	34	52	1471	20	51	
Future Volume (vph)	1185	34	52	1471	20	51	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3370	0	1710	3386	1540	0	
Flt Permitted			0.191		0.986		
Satd. Flow (perm)	3370	0	344	3386	1535	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	3				51		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1219	0	52	1471	71	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	65.0		65.0	65.0	29.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	86.7		86.7	86.7	10.3		
Actuated g/C Ratio	0.72		0.72	0.72	0.09		
v/c Ratio	0.50		0.21	0.60	0.40		
Control Delay	17.3		13.5	13.8	27.3		
Queue Delay	0.3		0.0	17.2	0.0		
Total Delay	17.6		13.5	31.0	27.4		
LOS	B		B	C	C		
Approach Delay	17.6			30.4	27.4		
Approach LOS	B			C	C		
Queue Length 50th (m)	77.6		5.7	127.0	4.7		
Queue Length 95th (m)	m103.2		14.6	160.5	19.5		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2435		248	2446	336		
Starvation Cap Reductn	534		0	0	0		
Spillback Cap Reductn	0		0	1000	14		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.64		0.21	1.02	0.22		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 24.8 — Intersection LOS: C
Intersection Capacity Utilization 63.7% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

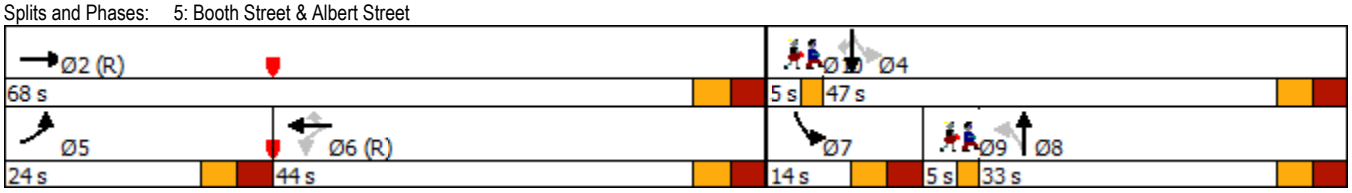


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	412	418	7	44	837	320	7	557	11	155	425	270
Future Volume (vph)	412	418	7	44	837	320	7	557	11	155	425	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3130	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.950			0.504				0.947		0.146		
Satd. Flow (perm)	2779	2432	0	691	2758	1130	0	3214	0	233	1800	1006
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				189		1				270
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	412	425	0	44	837	320	0	575	0	155	425	270
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	24.0	68.0		44.0	44.0	44.0	33.0	33.0		14.0	47.0	47.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	17.9	63.1		38.8	38.8	38.8		24.9		43.9	38.9	38.9
Actuated g/C Ratio	0.15	0.53		0.32	0.32	0.32		0.21		0.37	0.32	0.32
v/c Ratio	0.89	0.33		0.20	0.94	0.65		0.86		0.92	0.73	0.53
Control Delay	71.6	17.5		33.4	59.0	21.1		59.8		73.1	37.2	21.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	71.6	17.5		33.4	59.0	21.1		59.8		73.1	37.2	21.4
LOS	E	B		C	E	C		E		E	D	C
Approach Delay		44.1			48.0			59.8			38.7	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	52.4	31.4		8.0	107.5	27.6		71.5		33.2	112.3	43.4
Queue Length 95th (m)	#81.8	43.5		18.5	#151.2	63.2		#93.7		#56.2	145.9	81.5
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	468	1280		222	890	493		710		168	607	518
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.88	0.33		0.20	0.94	0.65		0.81		0.92	0.70	0.52

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 46.7 — Intersection LOS: D
Intersection Capacity Utilization 104.2% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

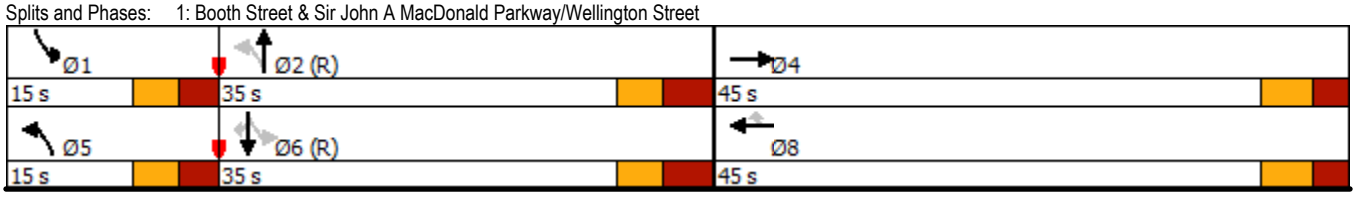
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1361	0	0	728	140	5	797	171	129	1144	341
Future Volume (vph)	0	1361	0	0	728	140	5	797	171	129	1144	341
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		35.0	10.0		0.0	135.0		50.0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	0	3386	0	0	3353	1500	1710	3088	0	1693	3320	1515
Flt Permitted							0.140			0.115		
Satd. Flow (perm)	0	3386	0	0	3353	1466	252	3088	0	203	3320	1448
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						125		27				221
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		115.0			144.3			74.7			217.9	
Travel Time (s)		8.3			10.4			5.4			15.7	
Lane Group Flow (vph)	0	1361	0	0	728	140	5	968	0	129	1144	341
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		45.0			45.0	45.0	15.0	35.0		15.0	35.0	35.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		38.6			38.6	38.6	35.1	28.6		43.2	40.7	40.7
Actuated g/C Ratio		0.41			0.41	0.41	0.37	0.30		0.45	0.43	0.43
v/c Ratio		0.99			0.53	0.21	0.03	1.02		0.58	0.81	0.46
Control Delay		51.0			17.8	2.8	14.6	67.6		27.4	30.5	9.7
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		51.0			17.8	2.8	14.6	67.6		27.4	30.5	9.7
LOS		D			B	A	B	E		C	C	A
Approach Delay		51.0			15.4			67.3			25.8	
Approach LOS		D			B			E			C	
Queue Length 50th (m)		134.2			55.5	6.0	0.5	~104.9		14.0	93.7	13.3
Queue Length 95th (m)		#186.1			27.0	3.6	2.5	#145.6		28.6	#170.0	44.5
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1375			1362	669	238	949		232	1421	746
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.99			0.53	0.21	0.02	1.02		0.56	0.81	0.46

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 31 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 39.4 — Intersection LOS: D
Intersection Capacity Utilization 93.4% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street

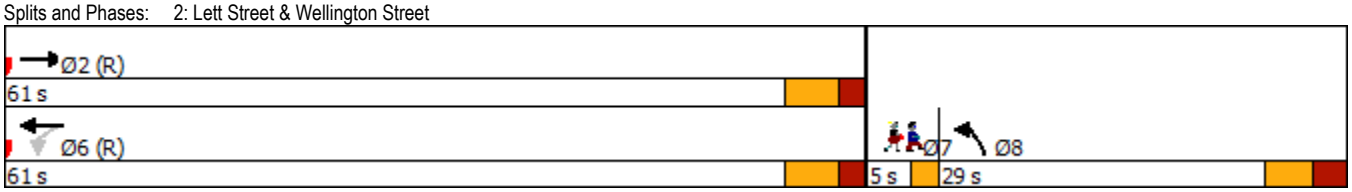


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1445	13	21	791	46	69	
Future Volume (vph)	1445	13	21	791	46	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3381	0	1710	3353	1604	0	
Flt Permitted			0.142		0.980		
Satd. Flow (perm)	3381	0	255	3353	1604	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	2				69		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1458	0	21	791	115	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	67.7		67.7	67.7	10.6		
Actuated g/C Ratio	0.71		0.71	0.71	0.11		
v/c Ratio	0.61		0.12	0.33	0.48		
Control Delay	2.4		8.5	6.5	23.2		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.5		8.5	6.5	23.2		
LOS	A		A	A	C		
Approach Delay	2.5			6.5	23.2		
Approach LOS	A			A	C		
Queue Length 50th (m)	8.8		1.0	22.8	8.5		
Queue Length 95th (m)	m22.2		5.9	53.7	21.3		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2409		181	2388	442		
Starvation Cap Reductn	150		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.65		0.12	0.33	0.26		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 4.9 — Intersection LOS: A
Intersection Capacity Utilization 60.4% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

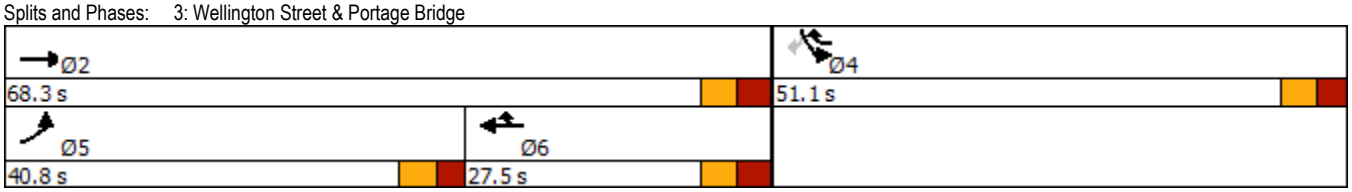


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	658	946	240	969	1214	376
Future Volume (vph)	658	946	240	969	1214	376
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	135.0			115.0	0.0	35.0
Storage Lanes	2			3	3	1
Taper Length (m)	30.0				30.0	
Satd. Flow (prot)	3317	4865	3386	3322	4424	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3309	4865	3386	3322	4424	1371
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				123		227
Link Speed (k/h)		50	50		50	
Link Distance (m)		270.2	257.1		139.6	
Travel Time (s)		19.5	18.5		10.1	
Lane Group Flow (vph)	658	946	240	969	1214	376
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	40.8	68.3	27.5		51.1	51.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	28.0	61.9	28.1	75.3	41.0	41.0
Actuated g/C Ratio	0.24	0.54	0.24	0.65	0.35	0.35
v/c Ratio	0.82	0.36	0.29	0.44	0.77	0.59
Control Delay	50.3	16.4	39.4	9.7	36.9	15.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.3	16.4	39.4	9.7	36.9	15.4
LOS	D	B	D	A	D	B
Approach Delay		30.3	15.6		31.8	
Approach LOS		C	B		C	
Queue Length 50th (m)	79.0	48.8	25.8	39.8	90.1	27.0
Queue Length 95th (m)	94.8	59.8	41.1	59.9	107.6	59.4
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1006	2607	823	2318	1726	673
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	0.65	0.36	0.29	0.42	0.70	0.56

Intersection Summary

Area Type: Other
Cycle Length: 119.4
Actuated Cycle Length: 115.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 26.8 — Intersection LOS: C
Intersection Capacity Utilization 75.3% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Wellington Street & Portage Bridge



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	433	811	8	4	344	151	4	508	20	212	541	317
Future Volume (vph)	433	811	8	4	344	151	4	508	20	212	541	317
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	1569	2706	0	1710	2478	1286	0	3317	0	1569	1782	1391
Flt Permitted	0.407			0.343				0.950		0.177		
Satd. Flow (perm)	599	2706	0	537	2478	1001	0	3149	0	265	1782	982
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	433	819	0	4	344	151	0	532	0	212	541	317
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	30.0	67.0		37.0	37.0	37.0	33.0	33.0		15.0	48.0	48.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	61.7	61.7		32.3	32.3	32.3		25.3		45.3	40.3	40.3
Actuated g/C Ratio	0.51	0.51		0.27	0.27	0.27		0.21		0.38	0.34	0.34
v/c Ratio	0.88	0.59		0.03	0.52	0.56		0.80		1.10	0.90	0.96
Control Delay	41.6	22.7		34.5	41.2	48.1		54.5		125.4	58.1	80.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	41.6	22.7		34.5	41.2	48.1		54.5		125.4	58.1	80.9
LOS	D	C		C	D	D		D		F	E	F
Approach Delay		29.3			43.2			54.5			78.2	
Approach LOS		C			D			D			E	
Queue Length 50th (m)	71.1	73.3		0.8	39.0	33.0		65.1		~36.8	125.2	75.4
Queue Length 95th (m)	#111.6	94.4		3.9	55.1	57.4		86.0		#87.7	#189.7	#133.7
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	497	1392		144	667	269		697		192	616	339
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.87	0.59		0.03	0.52	0.56		0.76		1.10	0.88	0.94

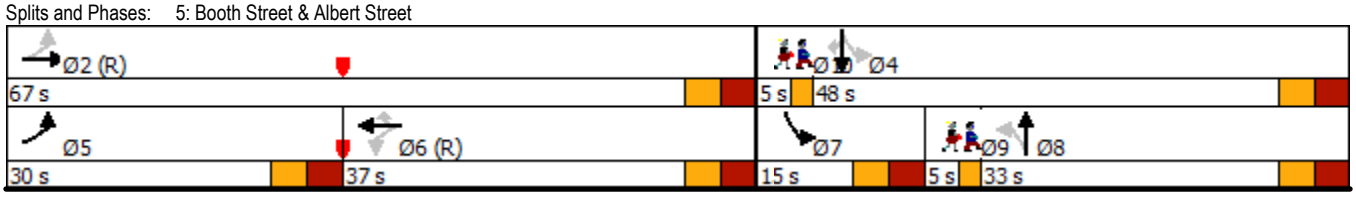
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 51.0 — Intersection LOS: D
Intersection Capacity Utilization 121.2% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	12	955	16	0	1144
Future Volume (Veh/h)	0	12	955	16	0	1144
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	12	955	16	0	1144
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.72	0.90			0.90	
vC, conflicting volume	1535	486			971	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	347	205			745	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	450	721			773	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	637	334	572	572
Volume Left	0	0	0	0	0
Volume Right	12	0	16	0	0
cSH	721	1700	1700	1700	1700
Volume to Capacity	0.02	0.37	0.20	0.34	0.34
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0
Control Delay (s)	10.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.1	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

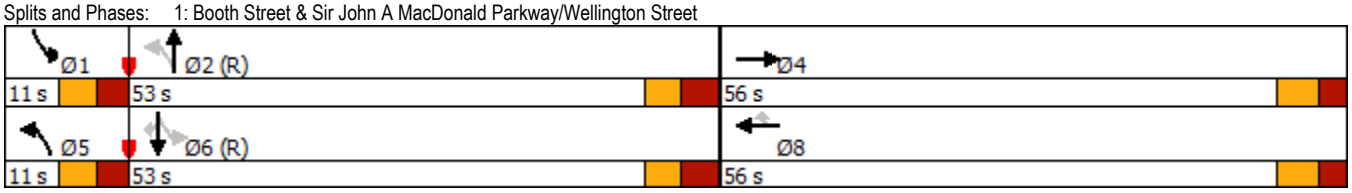
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1118	0	0	1413	268	5	1227	100	65	813	303
Future Volume (vph)	0	1118	0	0	1413	268	5	1227	100	65	813	303
Satd. Flow (prot)	0	3386	0	0	3386	1500	1710	3266	0	1541	3257	1500
Flt Permitted							0.257			0.080		
Satd. Flow (perm)	0	3386	0	0	3386	1409	456	3266	0	130	3257	1370
Satd. Flow (RTOR)						99		8				101
Lane Group Flow (vph)	0	1118	0	0	1413	268	5	1327	0	65	813	303
Turn Type		NA			NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases						8	2			6		6
Total Split (s)		56.0			56.0	56.0	11.0	53.0		11.0	53.0	53.0
Total Lost Time (s)		6.4			6.4	6.4	6.1	6.9		6.1	6.9	6.9
Act Effct Green (s)		49.6			49.6	49.6	53.0	48.3		56.7	54.9	54.9
Actuated g/C Ratio		0.41			0.41	0.41	0.44	0.40		0.47	0.46	0.46
v/c Ratio		0.80			1.01	0.42	0.02	1.01		0.55	0.55	0.44
Control Delay		36.2			55.1	11.1	11.0	48.6		35.6	25.9	17.5
Queue Delay		0.0			14.4	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		36.2			69.5	11.1	11.0	48.6		35.6	25.9	17.5
LOS		D			E	B	B	D		D	C	B
Approach Delay		36.2			60.2			48.5			24.3	
Approach LOS		D			E			D			C	
Queue Length 50th (m)		125.7			~186.5	28.3	0.5	~189.1		8.5	72.1	31.1
Queue Length 95th (m)		154.5			#239.4	33.4	m0.6	m#211.4		#20.9	108.6	65.8
Internal Link Dist (m)		91.0			120.3			50.7			193.9	
Turn Bay Length (m)						35.0	10.0			135.0		50.0
Base Capacity (vph)		1399			1399	640	253	1319		119	1489	681
Starvation Cap Reductn		0			57	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.80			1.05	0.42	0.02	1.01		0.55	0.55	0.44

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 3 (3%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 44.2 — Intersection LOS: D
Intersection Capacity Utilization 101.0% — ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
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.

Splits and Phases: 1: Booth Street & Sir John A MacDonald Parkway/Wellington Street

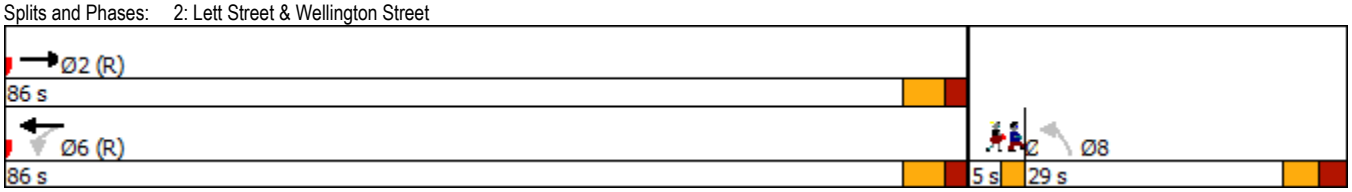


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1215	34	52	1509	20	51	
Future Volume (vph)	1215	34	52	1509	20	51	
Satd. Flow (prot)	3370	0	1710	3386	1540	0	
Flt Permitted			0.200		0.986		
Satd. Flow (perm)	3370	0	359	3386	1535	0	
Satd. Flow (RTOR)	5				51		
Lane Group Flow (vph)	1249	0	52	1509	71	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	93.9		93.9	93.9	12.6		
Actuated g/C Ratio	0.78		0.78	0.78	0.10		
v/c Ratio	0.47		0.19	0.57	0.34		
Control Delay	3.1		7.2	7.5	23.0		
Queue Delay	0.1		0.0	0.7	0.0		
Total Delay	3.3		7.2	8.2	23.1		
LOS	A		A	A	C		
Approach Delay	3.3			8.2	23.1		
Approach LOS	A			A	C		
Queue Length 50th (m)	16.4		2.8	65.8	4.7		
Queue Length 95th (m)	m38.0		11.1	130.4	17.3		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2637		281	2648	336		
Starvation Cap Reductn	453		0	381	0		
Spillback Cap Reductn	0		0	715	10		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.57		0.19	0.78	0.22		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 6.4 — Intersection LOS: A
Intersection Capacity Utilization 66.2% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

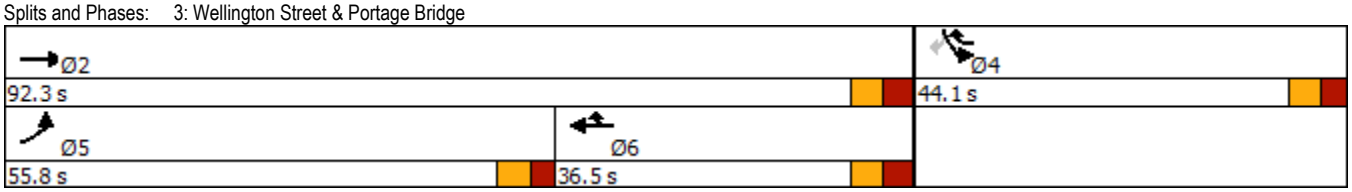


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	665	340	938	1735	726	665
Future Volume (vph)	665	340	938	1735	726	665
Satd. Flow (prot)	3285	4865	3420	3230	4637	1515
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3268	4865	3420	3230	4620	1342
Satd. Flow (RTOR)				224		509
Lane Group Flow (vph)	665	340	938	1735	726	665
Turn Type	Prot	NA	NA	pt+ov	Prot	Perm
Protected Phases	5	2	6	6 4	4	
Permitted Phases		2				4
Total Split (s)	55.8	92.3	36.5		44.1	44.1
Total Lost Time (s)	5.8	6.5	6.5		6.1	6.1
Act Effct Green (s)	33.6	85.9	46.5	88.4	35.8	35.8
Actuated g/C Ratio	0.25	0.64	0.35	0.66	0.27	0.27
v/c Ratio	0.81	0.11	0.79	0.79	0.59	0.91
Control Delay	55.6	9.8	46.6	18.0	44.9	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	9.8	46.6	18.0	44.9	29.0
LOS	E	A	D	B	D	C
Approach Delay		40.1	28.0		37.3	
Approach LOS		D	C		D	
Queue Length 50th (m)	92.4	13.2	127.1	124.1	62.6	50.2
Queue Length 95th (m)	107.0	17.8	#183.3	180.3	76.8	#139.0
Internal Link Dist (m)		246.2	233.1		115.6	
Turn Bay Length (m)	135.0			115.0		35.0
Base Capacity (vph)	1224	3110	1183	2252	1313	745
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	0.54	0.11	0.79	0.77	0.55	0.89

Intersection Summary

Cycle Length: 136.4
Actuated Cycle Length: 134.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 33.0 — Intersection LOS: C
Intersection Capacity Utilization 93.7% — ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Wellington Street & Portage Bridge



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	421	426	7	45	855	328	7	570	12	158	436	275
Future Volume (vph)	421	426	7	45	855	328	7	570	12	158	436	275
Satd. Flow (prot)	1613	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.109			0.500				0.948		0.141		
Satd. Flow (perm)	179	2432	0	688	2758	1130	0	3218	0	225	1800	1006
Satd. Flow (RTOR)		2				161		2				275
Lane Group Flow (vph)	421	433	0	45	855	328	0	589	0	158	436	275
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8			4		4
Total Split (s)	29.0	71.0		42.0	42.0	42.0	33.0	33.0		11.0	44.0	44.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	65.9	65.9		35.5	35.5	35.5		25.1		40.6	36.1	36.1
Actuated g/C Ratio	0.55	0.55		0.30	0.30	0.30		0.21		0.34	0.30	0.30
v/c Ratio	1.10	0.32		0.22	1.05	0.73		0.87		1.25	0.81	0.56
Control Delay	108.2	15.9		35.5	86.4	29.8		60.5		183.1	39.6	20.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	108.2	15.9		35.5	86.4	29.8		60.5		183.1	39.6	20.9
LOS	F	B		D	F	C		E		F	D	C
Approach Delay		61.4			69.4			60.5			59.8	
Approach LOS		E			E			E			E	
Queue Length 50th (m)	~106.8	30.3		8.4	~121.3	38.0		73.5		~41.9	115.4	44.7
Queue Length 95th (m)	#171.8	41.7		19.2	#162.3	77.1		#100.5		#91.4	149.5	84.1
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	384	1336		203	815	447		712		126	562	503
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	1.10	0.32		0.22	1.05	0.73		0.83		1.25	0.78	0.55

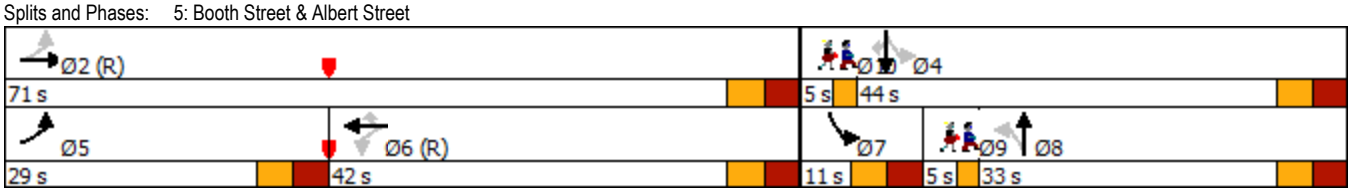
Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.25
Intersection Signal Delay: 63.6 — Intersection LOS: E
Intersection Capacity Utilization 117.0% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	10	1315	16	0	813
Future Volume (Veh/h)	0	10	1315	16	0	813
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	10	1315	16	0	813
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			334			75
pX, platoon unblocked	0.88	0.85			0.85	
vC, conflicting volume	1730	666			1331	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	817	267			1046	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	277	624			564	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	10	877	454	406	406
Volume Left	0	0	0	0	0
Volume Right	10	0	16	0	0
cSH	624	1700	1700	1700	1700
Volume to Capacity	0.02	0.52	0.27	0.24	0.24
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0
Control Delay (s)	10.9	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.9	0.0		0.0	
Approach LOS	B				

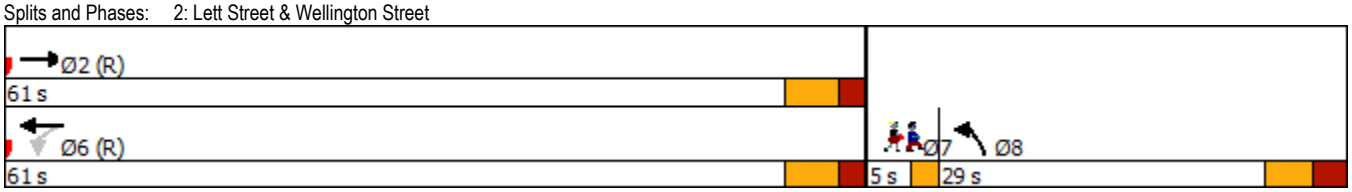
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1445	13	21	791	46	69	
Future Volume (vph)	1445	13	21	791	46	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3381	0	1710	3353	1604	0	
Flt Permitted			0.135		0.980		
Satd. Flow (perm)	3381	0	243	3353	1604	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	2						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1458	0	21	791	115	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	61.0		61.0	61.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	65.0		65.0	65.0	13.3		
Actuated g/C Ratio	0.68		0.68	0.68	0.14		
v/c Ratio	0.63		0.13	0.34	0.51		
Control Delay	2.7		9.5	7.5	44.3		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	2.8		9.5	7.5	44.3		
LOS	A		A	A	D		
Approach Delay	2.8			7.5	44.3		
Approach LOS	A			A	D		
Queue Length 50th (m)	12.2		1.2	27.6	21.2		
Queue Length 95th (m)	m22.2		6.0	53.7	33.9		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2312		166	2293	390		
Starvation Cap Reductn	138		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.67		0.13	0.34	0.29		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 6.4 — Intersection LOS: A
Intersection Capacity Utilization 60.4% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

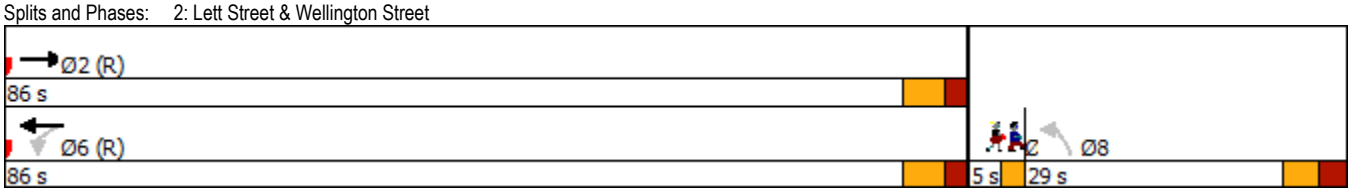


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1215	34	52	1509	20	51	
Future Volume (vph)	1215	34	52	1509	20	51	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3370	0	1710	3386	1540	0	
Flt Permitted			0.198		0.986		
Satd. Flow (perm)	3370	0	356	3386	1535	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)	5						
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1249	0	52	1509	71	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	86.0		86.0	86.0	29.0		5.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	93.2		93.2	93.2	13.3		
Actuated g/C Ratio	0.78		0.78	0.78	0.11		
v/c Ratio	0.48		0.19	0.57	0.42		
Control Delay	3.2		7.6	7.9	55.7		
Queue Delay	0.1		0.0	4.0	0.0		
Total Delay	3.4		7.6	11.8	55.7		
LOS	A		A	B	E		
Approach Delay	3.4			11.7	55.7		
Approach LOS	A			B	E		
Queue Length 50th (m)	16.4		2.9	68.7	17.1		
Queue Length 95th (m)	m38.0		11.2	130.4	29.2		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2617		276	2628	295		
Starvation Cap Reductn	439		0	371	0		
Spillback Cap Reductn	0		0	1015	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.57		0.19	0.94	0.24		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 9.2 — Intersection LOS: A
Intersection Capacity Utilization 66.2% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

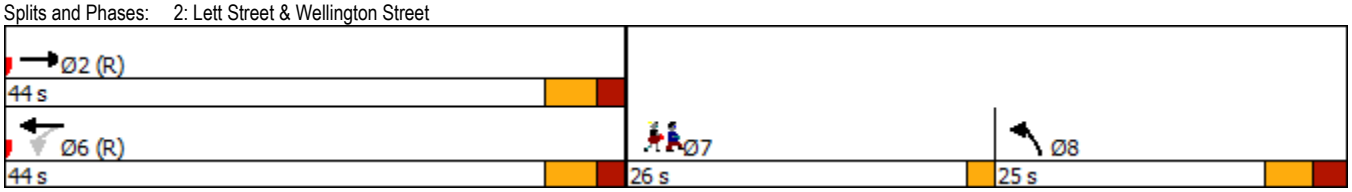


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1445	13	21	791	46	69	
Future Volume (vph)	1445	13	21	791	46	69	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3381	0	1710	3353	1603	0	
Flt Permitted			0.114		0.980		
Satd. Flow (perm)	3381	0	205	3353	1602	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	1				69		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1458	0	21	791	115	0	
Turn Type	NA		Perm	NA	Prot		
Protected Phases	2			6	8		7
Permitted Phases			6				
Total Split (s)	44.0		44.0	44.0	25.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	59.0		59.0	59.0	8.7		
Actuated g/C Ratio	0.62		0.62	0.62	0.09		
v/c Ratio	0.69		0.17	0.38	0.55		
Control Delay	17.1		18.5	12.8	28.5		
Queue Delay	0.1		0.0	0.0	0.0		
Total Delay	17.2		18.5	12.8	28.5		
LOS	B		B	B	C		
Approach Delay	17.2			12.9	28.5		
Approach LOS	B			B	C		
Queue Length 50th (m)	82.0		2.1	48.3	8.5		
Queue Length 95th (m)	m88.4		8.5	71.8	24.5		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2100		127	2082	377		
Starvation Cap Reductn	66		0	0	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.72		0.17	0.38	0.31		

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 95
Offset: 60 (63%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 16.3 — Intersection LOS: B
Intersection Capacity Utilization 59.7% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

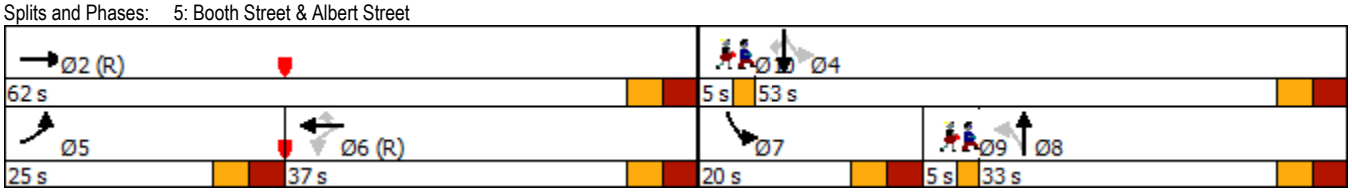


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	433	811	8	4	344	151	4	508	20	212	541	317
Future Volume (vph)	433	811	8	4	344	151	4	508	20	212	541	317
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3043	2706	0	1710	2478	1286	0	3317	0	1569	1782	1391
Flt Permitted	0.950			0.343				0.950		0.166		
Satd. Flow (perm)	2379	2706	0	537	2478	1001	0	3149	0	248	1782	983
Right Turn on Red			Yes			No			Yes			No
Satd. Flow (RTOR)		1						3				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	433	819	0	4	344	151	0	532	0	212	541	317
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	25.0	62.0		37.0	37.0	37.0	33.0	33.0		20.0	53.0	53.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	19.2	57.8		32.1	32.1	32.1		24.2		49.2	44.2	44.2
Actuated g/C Ratio	0.16	0.48		0.27	0.27	0.27		0.20		0.41	0.37	0.37
v/c Ratio	0.89	0.63		0.03	0.52	0.57		0.84		0.85	0.82	0.88
Control Delay	70.8	26.3		34.5	41.3	48.4		57.8		55.0	45.9	60.5
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	70.8	26.3		34.5	41.3	48.4		57.8		55.0	45.9	60.5
LOS	E	C		C	D	D		E		D	D	E
Approach Delay		41.7			43.4			57.8			52.0	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	55.0	79.6		0.8	39.0	33.0		65.4		34.3	117.3	70.6
Queue Length 95th (m)	#85.9	103.2		3.9	55.1	57.4		86.0		#73.1	163.5	#123.0
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	487	1303		143	662	267		697		250	690	380
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.89	0.63		0.03	0.52	0.57		0.76		0.85	0.78	0.83

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 47.8 — Intersection LOS: D
Intersection Capacity Utilization 108.9% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

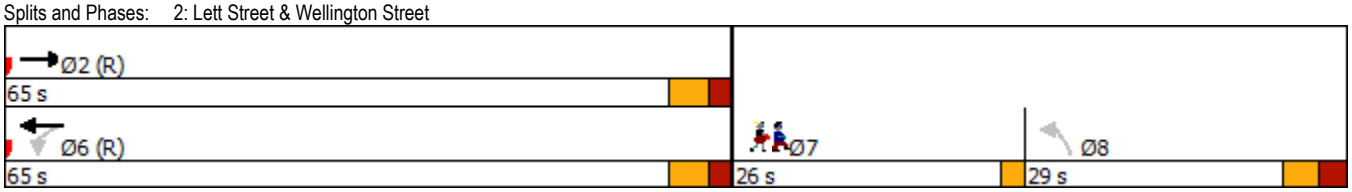
Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø7
Lane Configurations							
Traffic Volume (vph)	1216	34	52	1509	20	51	
Future Volume (vph)	1216	34	52	1509	20	51	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Storage Length (m)		0.0	60.0		0.0	0.0	
Storage Lanes		0	1		1	0	
Taper Length (m)			30.0		30.0		
Satd. Flow (prot)	3370	0	1710	3386	1540	0	
Flt Permitted			0.183		0.986		
Satd. Flow (perm)	3370	0	329	3386	1535	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	3				51		
Link Speed (k/h)	50			50	50		
Link Distance (m)	144.3			270.2	146.6		
Travel Time (s)	10.4			19.5	10.6		
Lane Group Flow (vph)	1250	0	52	1509	71	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			7
Permitted Phases			6		8		
Total Split (s)	65.0		65.0	65.0	29.0		26.0
Total Lost Time (s)	5.8		5.8	5.8	5.9		
Act Effct Green (s)	86.7		86.7	86.7	10.3		
Actuated g/C Ratio	0.72		0.72	0.72	0.09		
v/c Ratio	0.51		0.22	0.62	0.40		
Control Delay	17.8		13.9	14.2	27.3		
Queue Delay	0.3		0.0	26.2	0.0		
Total Delay	18.1		13.9	40.4	27.4		
LOS	B		B	D	C		
Approach Delay	18.1			39.5	27.4		
Approach LOS	B			D	C		
Queue Length 50th (m)	81.7		5.7	132.7	4.7		
Queue Length 95th (m)	m107.5		14.9	168.0	19.5		
Internal Link Dist (m)	120.3			246.2	122.6		
Turn Bay Length (m)			60.0				
Base Capacity (vph)	2435		237	2446	336		
Starvation Cap Reductn	533		0	0	0		
Spillback Cap Reductn	0		0	1001	14		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.66		0.22	1.04	0.22		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 27 (23%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 29.9 — Intersection LOS: C
Intersection Capacity Utilization 63.7% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lett Street & Wellington Street

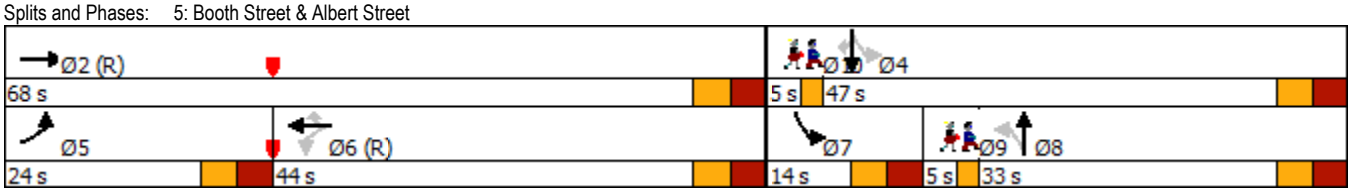


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	421	426	7	45	855	328	7	570	12	158	436	275
Future Volume (vph)	421	426	7	45	855	328	7	570	12	158	436	275
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	140.0		0.0	0.0		50.0	0.0		0.0	100.0		0.0
Storage Lanes	2		0	1		1	0		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Satd. Flow (prot)	3130	2432	0	1710	2758	1471	0	3396	0	1569	1800	1404
Flt Permitted	0.950			0.500				0.948		0.139		
Satd. Flow (perm)	2788	2432	0	688	2758	1130	0	3217	0	222	1800	1006
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				188		2				275
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		167.4			213.1			205.5			334.4	
Travel Time (s)		12.1			15.3			14.8			24.1	
Lane Group Flow (vph)	421	433	0	45	855	328	0	589	0	158	436	275
Turn Type	Prot	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases				6		6	8			4		4
Total Split (s)	24.0	68.0		44.0	44.0	44.0	33.0	33.0		14.0	47.0	47.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5		6.5		6.5	6.5	6.5
Act Effct Green (s)	17.9	62.9		38.5	38.5	38.5		25.1		44.1	39.1	39.1
Actuated g/C Ratio	0.15	0.52		0.32	0.32	0.32		0.21		0.37	0.33	0.33
v/c Ratio	0.90	0.34		0.20	0.97	0.67		0.87		0.96	0.74	0.54
Control Delay	74.1	17.7		33.5	63.9	22.4		60.6		80.6	37.7	21.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	74.1	17.7		33.5	63.9	22.4		60.6		80.6	37.7	21.4
LOS	E	B		C	E	C		E		F	D	C
Approach Delay		45.5			51.7			60.6			40.4	
Approach LOS		D			D			E			D	
Queue Length 50th (m)	53.8	32.2		8.2	110.8	30.1		73.5		34.0	115.2	44.6
Queue Length 95th (m)	#84.2	44.2		18.7	#156.1	66.9		#100.5		#60.1	149.2	82.9
Internal Link Dist (m)		143.4			189.1			181.5			310.4	
Turn Bay Length (m)	140.0					50.0				100.0		
Base Capacity (vph)	466	1275		221	885	490		711		165	607	521
Starvation Cap Reductn	0	0		0	0	0		0		0	0	0
Spillback Cap Reductn	0	0		0	0	0		0		0	0	0
Storage Cap Reductn	0	0		0	0	0		0		0	0	0
Reduced v/c Ratio	0.90	0.34		0.20	0.97	0.67		0.83		0.96	0.72	0.53

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 9 (8%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 48.9 — Intersection LOS: D
Intersection Capacity Utilization 105.1% — ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Booth Street & Albert Street



Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Total Split (s)	5.0	5.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary