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36 Years

208-212 Slater Street

Transportation Impact Assessment

208-212 Slater Street

Transportation Impact Assessment

Prepared By:

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

May 2019

Novatech File: 119055
Ref: R-2019-071

May 30th, 2019

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

Attention: **Mr. Wally Dubyk**
Project Manager, Infrastructure Approvals

Dear Mr. Dubyk:

Reference: **208-212 Slater Street**
Transportation Impact Assessment
Novatech File No. 119055

We are pleased to submit the following Transportation Impact Assessment (TIA) in support of a Site Plan Control application for 208 to 212 Slater Street. The structure and format of this report is in accordance with the City of Ottawa Transportation Impact Assessment Guidelines (June 2017).

If you have any questions or comments regarding this report, please feel free to contact the undersigned.

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.**

City Of Ottawa
Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d 'infrastructure et Viabilité des collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at Ottawa (City) this 30th day of May, 2019.

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)	
Address:	240 Michael Cowpland Drive
City / Postal Code:	Ottawa, ON K2M 1P6
Telephone / Extension:	613-254-9643 ext. 286
E-Mail Address:	b.byvelds@novaetch-eng.com

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EXECUTIVE SUMMARY

This Transportation Impact Assessment (TIA) has been prepared in support of a Site Plan Control application for 208 to 212 Slater Street. The subject site has an area of approximately 0.07 hectares and is currently occupied by a two-storey commercial development containing approximately 12,600ft^2 of gross floor area (GFA) with no on-site parking. However, the subject site currently provides access to eight rear-yard parking spaces for 161 Bank Street. The subject site is surrounded by the following:

- Mixed-use office/commercial development to the north and south;
- Mixed-use residential/commercial development to the west; and
- Office development to the east.

The concept considered for this report includes a mixed-use building containing either 180 apartment units and 1,000ft^2 of retail GFA or 220 hotel units and approximately 1,000ft^2 of retail GFA. However, it is acknowledged that the Site Plan included in **Appendix A** reflects a mixed-use building containing 162 apartment units and approximately 1,000ft^2 of retail GFA. The concept considered for this report is considered conservative, and the TIA will review the development concepts from a 'worst case' traffic perspective and on-site parking perspective.

The existing access to Slater Street will be maintained, and will continue to serve the eight rear-yard parking spaces for the 161 Bank Street site. This driveway will also facilitate access to surface/puzzle parking
for visitors to the proposed development, if the residential development is pursued. No new access is proposed as part of this application.

The proposed development is anticipated to commence construction in 2020, with a build-out of year of 2022.

The City's 2017 TIA Guidelines identify three triggers for completing a TIA report, including trip generation, location, and safety. The criteria for each trigger are outlined in the City's TIA Screening Form. Based on the TIA Screening Form, both scenarios meet the trip generation and location triggers and a TIA is required.

The conclusions and recommendations of this TIA can be summarized as follows:

Development Design and Parking

- The hotel scenario is anticipated to generate approximately 30 additional vehicle trips during the AM peak hour and 27 vehicle trips during the PM peak hour, compared to the existing development.
- The residential scenario is anticipated to generate approximately 18 additional vehicle trips during the weekday AM peak hour and nine vehicle trips during the weekday PM peak hour, compared to the existing development.
- To provide a conservative analysis, the hotel scenario has been carried forward for the intersection analysis in this report.
- Pedestrian facilities will be provided between the main building entrance and the sidewalk along Slater Street.

- If the hotel scenario is pursued, loading will be accommodated within the access carriage way on-site. Maneuvering into this area will require trucks to reverse into the driveway and stop within the carriage way.
- All required TDM-supportive design and infrastructure measures in the TDM checklist are met.
- Based on the hotel scenario, no vehicular parking is required under the City's Zoning By-law. As such, no vehicular parking is proposed under this scenario. Patrons who drive to the hotel and commercial unit are anticipated to use either on-street parking or area public parking garages. On-street and public parking lots in the vicinity of the subject site are anticipated to accommodate the expected parking demand from the proposed hotel scenario.
- Based on the residential scenario, no tenant parking is required under the City's Zoning By-law. However, visitor parking spaces are required at a rate of 0.1 spaces per unit in excess of 12 units. No tenant parking will be provided, and 18 visitor parking will be provided within a surface/puzzle type parking garage using a tri-stacking automotive mechanical lift system, exceeding the minimum requirement of the City's Zoning By-law.
- Bicycle parking under either scenario will be provided in the basement in accordance with the City's Zoning By-law.

Boundary Street MMLOS

- The City of Ottawa is undertaking the Albert and Slater Streets Improvement Project which will repurpose Albert Street and Slater Street corridor between Bay Street and Elgin Street following the launch of the Confederation Line LRT. This project will remove bus transit from these streets, and will incorporate improved pedestrian and cycling facilities, implementing the vision established in the City's 2013 Downtown Moves Study.
- The planned modifications to Slater Street will improve the Level of Service (LOS) for all modes of transportation along the corridor.
- No changes to the existing access location is proposed as part of this application. The design for Slater Street adjacent to the site is currently being reviewed by the City to accommodate the existing access to the subject site.

Access Design

- The proposed access will be maintained in the existing location. The proposed access will be 6m in width, located 5.4m from the western property line and approximately 25m from the Bank Street right-of-way limit.
- The proposed width and location of the access adheres to the requirements of both the Private Approach By-law and Zoning By-law.

Transportation Demand Management and Transit

- As the hotel scenario is not anticipated to have more than 60 employees on-site at any given time, the TDM – Measures checklist is exempt from the required analysis.
- To encourage travel by sustainable modes under the residential scenario, no vehicle parking will be provided for tenants of the building. Only visitor parking spaces will be provided in a surface/puzzle parking configuration. The site also conforms to the City's TDM initiatives by providing easy access to area pedestrian, cycling and transit facilities.
- The proposed hotel scenario is anticipated to generate an additional 59 transit trips (35 in, 24 out) during the AM peak hour and 54 transit trips (28 in, 26 out) during the PM peak hour, compared to the existing development.

- The proposed residential scenario is anticipated to generate an additional 68 transit trips (23 in, 45 out) during the AM peak hour and 54 transit trips (33 in, 21 out) during the PM peak hour, compared to the existing development.
- Following the completion of the Confederation Line LRT, transit service in the vicinity of the subject site will be improved. The additional transit trips generated by the proposed development are anticipated to be accommodated by the future transit facilities in the vicinity of the subject site.

Intersection MMLOS

- The Slater Street/Bank Street intersection meets the target Auto LOS, however it does not meet the target PLOS, BLOS, TLOS, and TkLOS.
- The Slater Street/O'Connor Street intersection meets the target TkLOS and Auto LOS, however it does not meet the target PLOS, BLOS, and TLOS.
- The Slater Street/Metcalfe Street intersection meets the target TkLOS and Auto LOS, however it does not meet the target PLOS, BLOS, and TLOS.
- The Albert and Slater Streets Improvement Project is anticipated to improve the PLOS and BLOS at all intersections along Slater Street within the study area.
- The Bank Street/Laurier Avenue intersection meets the target TLOS, however it does not meet the target PLOS, BLOS, TkLOS, and Auto LOS.
- To achieve the target PLOS at the Bank Street/Laurier Avenue intersection, a reduction in the crossing distance on all legs is required. However, as this intersection is currently operating with an Auto LOS F, the removal of auxiliary lanes is not recommended. Consideration should be given by the City to implementing ladder or textured crosswalks on all legs to improve the visibility of the crosswalk.
- To achieve the target BLOS at the Bank Street/Laurier Avenue intersection, a reduction in the length of the northbound right turn lane is required. Based on the Synchro analysis, the existing storage length is appropriate based on the 95th percentile queue length for this movement. As such a reduction in the length of the northbound right turn lane is not recommended.
- To achieve the target TkLOS at the Bank Street/Laurier Avenue intersection, an increased effective corner radii is required on all legs of the intersection. An increase in the corner radii for the north, east, and west legs of the intersection is limited due to the existing buildings proximity to the right-of-way. Consideration could be given by the City to increasing the corner radius on the south leg, however this will reduce the PLOS at this intersection.
- The critical Auto LOS associated with the northbound right turn movement is a resultant of high north-south pedestrian volumes, an advanced pedestrian walk phase, and a right turn on red restrictions on all legs of this intersection. It is recommended that the advanced pedestrian walk phase and right turn on red restriction for the northbound right turn movement remain in place as a trade-off for the low Auto LOS.

2022 and 2027 Background Traffic

- Consistent with the existing condition, the Bank Street/Laurier Avenue intersection is anticipated to continue to operate with a LOS F.
- All other intersections within the study area are anticipated to operate with a LOS C or better.

2022 and 2027 Total Traffic

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

- The Bank Street/Laurier Avenue intersection is anticipated to operate with a LOS F, consistent with the existing/background traffic conditions.
- All other intersections are anticipated to operate with a LOS C or better.

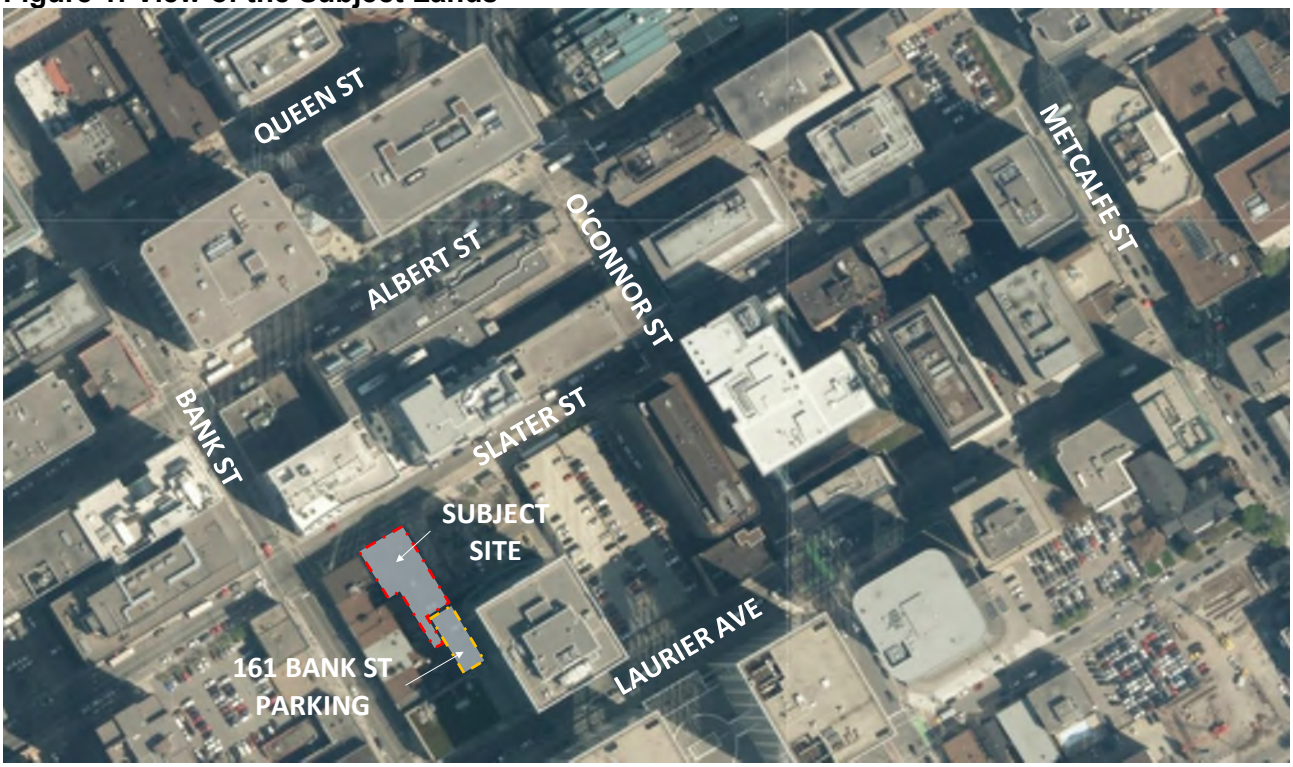
1.0 INTRODUCTION

This Transportation Impact Assessment (TIA) has been prepared in support of a Site Plan Control application for 208 to 212 Slater Street. The subject site has an area of approximately 0.07 hectares and is currently occupied by a two-storey commercial development containing approximately 12,600ft^2 of gross floor area (GFA) with no on-site parking. However, the subject site currently provides access to eight rear-yard parking spaces for 161 Bank Street. The subject site is surrounded by the following:

- Mixed-use office/commercial development to the north and south;
- Mixed-use residential/commercial development to the west; and
- Office development to the east.

An aerial photo of the subject site is provided in **Figure 1**.

Figure 1: View of the Subject Lands



2.0 PROPOSED DEVELOPMENT

The concept considered for this report includes a mixed-use building containing either 180 apartment units and 1,000ft^2 of retail GFA or 220 hotel units and approximately 1,000ft^2 of retail GFA. However, it is acknowledged that the Site Plan included in **Appendix A** reflects a mixed-use building containing 162 apartment units and approximately 1,000ft^2 of retail GFA. The concept considered for this report is considered conservative, and the TIA will review the development concepts from a 'worst case' traffic perspective and on-site parking perspective.

The existing access to Slater Street will be maintained, and will continue to serve the eight rear-yard parking spaces for the 161 Bank Street site. If the residential development is pursued, the driveway will also facilitate access to surface/puzzle parking for visitors to the proposed development,. No new access is proposed as part of this application.

The proposed development is anticipated to commence construction in 2020, with a build-out of year of 2022. A copy of the preliminary site plan is included in **Appendix A**.

3.0 SCREENING AND SCOPING

3.1 Screening Form

The City's 2017 TIA Guidelines identify three triggers for completing a TIA report, including trip generation, location, and safety. The criteria for each trigger are outlined in the City's TIA Screening Form. A copy of the TIA Screening Forms for the hotel and residential scenarios are included in **Appendix B**.

Based on the TIA Screening Form, both scenarios meet the trip generation and location triggers, and a TIA is required.

3.2 Existing Conditions

3.2.1 Roadways

All roadways within the study area fall under the jurisdiction of the City of Ottawa.

Slater Street is an arterial roadway that runs on an east-west alignment between Albert Street and the Mackenzie King Bridge. It operates one-way eastbound with two travel lanes and one transit lane. Parking is permitted in the northern lane, with parking prohibitions between 9:00AM and 3:00PM and stopping prohibitions between 7:00-9:00AM and 3:00-6:00PM on weekdays. A curbside loading zone is currently provided on the south side of Slater Street adjacent to the subject site. Slater Street is classified as a truck route, permitting full loads, and has a regulatory speed limit of 50km/hr.

The City of Ottawa's Official Plan identifies a maximum land requirement of 1.25m from properties abutting existing right-of-way along Slater Street. The existing heritage building and parking structure on either side of the subject property limit the City's ability to secure the full extent of the right-of-way along Slater Street in the vicinity of the subject site. As such, it is recommended that the City waive the right-of-way requirement along the frontage of the subject site.

Bank Street is a bi-directional arterial roadway that runs on a north-south alignment within the study area. It has a two-lane undivided urban cross section with a regulatory speed limit of 50km/hr within the study area. Bank Street is not classified as a truck route.

O'Connor Street is an arterial roadway that runs on a north-south alignment between Wellington Street and Holmwood Avenue. It operates one-way southbound with four travel lanes. North of Slater Street, parking is generally permitted in the western travel lane with one-hour restrictions between 9:00AM and 3:00PM and stopping prohibitions between 7:00-9:00AM and 3:00-6:00PM on weekdays. South of Slater Street, parking is generally permitted in the eastern travel lane with one-hour restrictions, as well as the western travel lane with parking prohibitions between 9:00AM and

3:30PM and stopping prohibitions between 7:00-9:00AM and 3:30-5:30PM on weekdays. O'Connor Street is classified as a truck route, permitting full loads, and has a regulatory speed limit of 50km/hr.

Metcalfe Street is an arterial roadway that runs on a north-south alignment between Wellington Street and Monkland Avenue. It operates one-way northbound with three travel lanes. Parking is permitted in the eastern travel lane, with parking prohibitions between 9:00AM and 3:00PM and stopping prohibitions between 7:00-9:00AM and 3:00-6:00PM on weekdays. One-hour parking is permitted on the west side of Metcalfe Street south of Slater Street with stopping restrictions between 7:00-

9:00AM and 3:00-6:00PM. Metcalfe Street is classified as a truck route, permitting full loads, and has a regulatory speed limit of 50km/hr.

Laurier Avenue West is a bi-directional arterial roadway that runs on an east-west alignment between Cambridge Street and Nicholas Street. It has a two-lane undivided urban cross section with a regulatory speed limit of 50km/hr. Laurier Avenue is classified as a truck route, permitting full loads.

3.2.2 Intersections

A review of the existing lane configurations and traffic control at the study area intersections is provided below.

Slater Street/Bank Street

- Signalized intersection
- Northbound: one shared through/ right turn lane
- Southbound: one shared through/ left turn lane
- Eastbound: two through lanes, one transit lane and one right turn lane
- The southbound left turn movement is prohibited
- The northbound right turn movement is prohibited from 7:00AM to 5:30PM on weekdays
- The eastbound left turn movement is restricted from 7:00AM to 9:00AM and 3:00PM to 6:00PM on weekdays

Slater Street/O'Connor Street

- Signalized intersection
- Southbound: three through lanes and one shared through/left turn lane
- Eastbound: two through lanes, one transit lane and one right turn lane
- The eastbound right turn movement is prohibited from 7:00AM to 9:00AM and 3:00PM to 6:00PM on weekdays
- The southbound through/left turn lane generally operates as a left turn lane due to on-street parking south of Slater Street

Slater Street/Metcalfe Street

- Signalized intersection
- Northbound: two through lanes and a through/right turn lane
- Eastbound: two through lanes, one transit lane and one left turn lane

Bank Street/Laurier Avenue

- Signalized intersection
- Northbound/Southbound/Eastbound: one through lane and one right turn lane
- Westbound: One approach lane
- Segregated cycle tracks are provided on the east and west legs of the intersection
- Left turn movements and right turn on red movements are prohibited on all legs of the intersection

3.2.3 Driveways

A review of adjacent driveways along Slater Street is summarized below:

North Side

- Driveway to office development at 215 Slater Street
- Driveway to residential/ hotel development at 199 Slater Street
- Driveway to office development at 171 Slater Street

South Side

- Driveway to office development at 269 Laurier Avenue

3.2.4 Pedestrian and Bicycle Facilities

Sidewalks are provided on both sides of Slater Street, Bank Street, O'Connor Street, Metcalfe Street, and Laurier Avenue.

Slater Street, O'Connor Street, Metcalfe Street and Laurier Avenue are identified as spine cycling routes, and Bank Street is identified as a local cycling route in the City's Ultimate Cycling Network. O'Connor Street and Laurier Avenue are also identified as a Cross-Town Bikeways. Segregated cycle tracks are provided along Laurier Avenue. Shared travel lanes are provided along all other roadways within the study area. However, O'Connor Street transitions to a bi-directional cycle track along the west side of the roadway at Laurier Avenue.

3.2.5 Transit

The locations of all OC Transpo bus stops within a 400m walking distance, or approximately a five-minute walk, of the subject site are described in the following table. A snapshot of the OC Transpo System Map in the vicinity of the subject site is included in **Appendix C**.

Table 1: OC Transpo Bus Stop's within 400m Walking Distance

OC Transpo Bus Stop	Location	Walking Distance
#3006	South Side of Slater Street, midblock between Lyon Street and Kent Street	340m
#3007	South side of Slater Street, midblock between Bank Street and O'Connor Street	80m
#3008	South side of Slater Street, midblock between Metcalfe Street and Elgin Street	360m
#3002	North side of Albert Street, midblock between Bank Street and O'Connor Street	200m
#3003	North side of Albert Street, midblock between Lyon Street and Kent Street	400m
#7687	Northwest corner of the Slater Street/ Bank Street intersection	85m
#7688	Southeast corner of the Slater Street/ Bank Street intersection	60m
#1368	Northeast corner of the Queen Street/ Kent Street intersection	370m
#7561	Southwest corner of the Queen Street/ Bank Street intersection	240m
#3052	Northwest corner of the Queen Street/ O'Connor Street intersection	290m
#2486	Northwest corner of the Gloucester Street/ Bank Street intersection	220m
#2484	Southeast corner of the Gloucester Street/ Bank Street intersection	230m

The above bus stops serve numerous OC Transpo routes, providing comprehensive transit coverage across the City of Ottawa. The location of the bus stops is shown in **Figure 2**.

Figure 2: OC Transpo Bus Stop Locations

3.2.6 Existing Area Traffic Management Measures

There are currently no area traffic management measures in place along the study area roadways.

3.2.7 Existing Traffic Volumes

Weekday traffic counts were completed by the City of Ottawa at the study area intersections on the following dates:

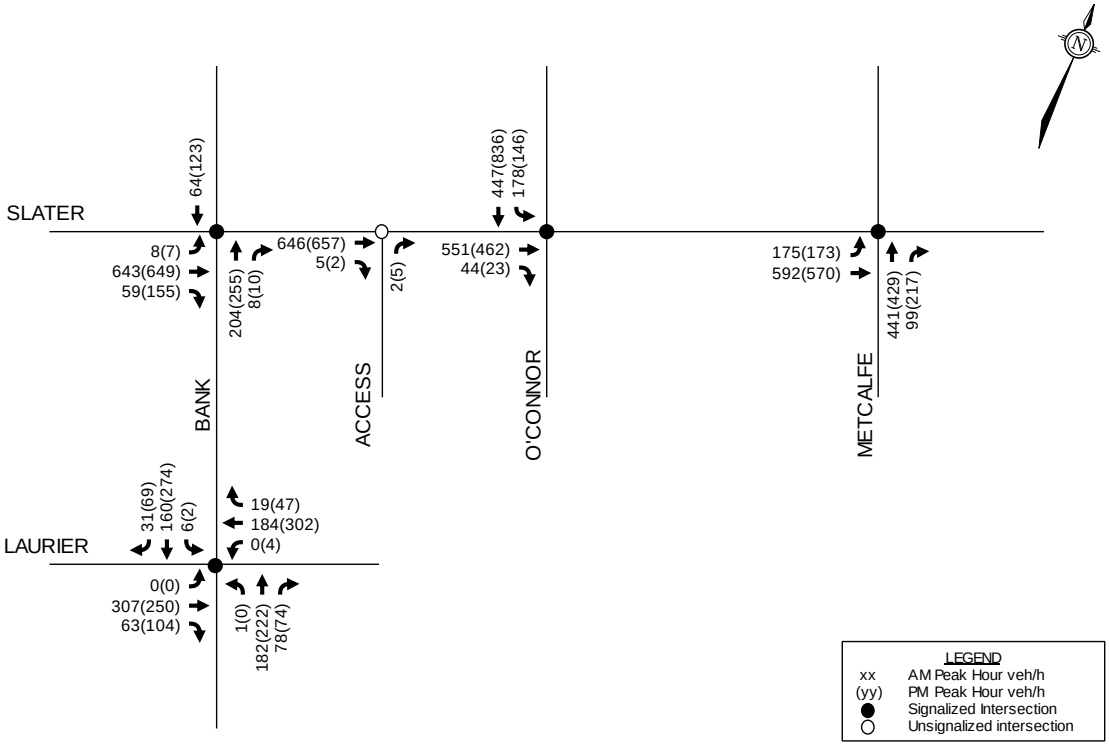
- Slater Street/Bank Street — July 6th, 2015
- Slater Street/O'Connor Street — August 24th, 2015 and March 21st, 2017
- Slater Street/Metcalfe Street — August 19th, 2015 and April 4th, 2017
- Bank Street/Laurier Avenue — July 24th, 2015

Queen Street, an east-west bi-directional arterial roadway to the north, was under construction from spring 2016 to December 2018. As a result of the Queen Street construction, east-west traffic along Slater Street was significantly higher in 2017 compared to 2015. As the Queen Street construction is now completed, traffic along Slater Street is anticipated to be consistent with the 2015 traffic counts. For the purposes of this analysis, the 2015 traffic counts along Slater Street are considered representative of existing conditions. Peak hour summary sheets of the aforementioned traffic counts are included in **Appendix D**.

Traffic volumes at the existing access have been estimated based on Table 14-1 in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 5th Edition for a parking lot in the central business district. It has been assumed that 60% of the parking lot arrives and 20% departs during the AM peak hour, while 20% arrives and 60% departs during the PM peak hour. Relevant excerpts from the ITE Trip Generation Manual, 5th Edition are included in **Appendix E**.

The existing traffic volumes at the study area intersections during the weekday AM and PM peak hours are shown in **Figure 3**.

Figure 3: Existing Traffic Volumes



3.2.8 Collision Records

Historical collision data from the last five years was obtained from the City of Ottawa for the study area intersections and roadways. Copies of the collision summary reports are included in **Appendix F**. The following table summarizes the reported collisions for each intersection and roadway segment within the last five years.

Table 2: Historical Collision Records

Intersection/ Roadway Segment	Number of Collision					
	SMV[1]/ Other	Rear-End	Angle	Turning Mvmt	Side-swipe	Total
Slater Street/ Bank Street	3	6	8	4	9	30
Slater Street/ O'Connor Street	3	5	2	2	8	20
Slater Street/ Metcalfe Street	6	2	9	2	8	27
Bank Street/ Laurier Avenue	5	7	5	10	8	35
Slater Street – Bank Street to O'Connor Street	8	4	0	0	9	21

Intersection/ Roadway Segment	Number of Collision					
	SMV[1]/ Other	Rear-End	Angle	Turning Mvmt	Side-swipe	Total
Slater Street – O'Connor Street to Metcalfe Street	5	0	2	0	3	10

1. SMV = Single Motor Vehicle

Slater Street/Bank Street

A total of 30 collisions were reported at the Slater Street/Bank Street intersection over the last five years. Eight of the collisions caused personal injuries, none of which resulted in a fatality. One of the collisions involved a pedestrian. Nine of the collisions were sideswipe impacts, eight were angle impacts, six were rear-end impacts, four were turning movement impacts, and three were single vehicle/other impacts.

Of the nine sideswipe impacts, five involved eastbound vehicles, three involved southbound vehicles, and one involved northbound vehicles. Four of the nine collisions occurred under either wet or snowy surface conditions.

Of the eight angle impacts, four involved southbound and eastbound vehicles, three involved northbound and eastbound vehicles, and one involved a northbound and westbound vehicle. Three of the collisions occurred under wet or snowy surface conditions.

Of the three single vehicle/other impacts, one involved an eastbound delivery van and a pedestrian, one involved a northbound vehicle reversing, and one involved an eastbound vehicle reversing (other impact). One of the collisions occurred under wet surface conditions.

Slater Street/O'Connor Street

A total of 20 collisions were reported at the Slater Street/O'Connor Street intersection over the last five years. Three of the collisions caused personal injuries, none of which resulted in a fatality. Five of the collisions involved pedestrians. Eight of the collisions were sideswipe impacts, five were rear-end impacts, three were single vehicle/other impacts, two were angle impacts, and two were turning movement impacts.

Of the eight sideswipe impacts, five involved eastbound vehicles and three involved southbound vehicles. Two of the collisions occurred under wet surface conditions.

Of the three single vehicle/others impacts, two involved southbound left turning vehicles and pedestrians and one involved an eastbound truck (other impact).

Slater Street/Metcalfe Street

A total of 27 collisions were reported at the Slater Street/Metcalfe Street intersection over the last five years. Seven of the collisions caused personal injuries, none of which resulted in a fatality. Two of the collisions involved pedestrians. Nine of the collisions were angle impacts, eight were sideswipe impacts, six were single vehicle/other impacts, two were rear-end impacts, and two were turning movement impacts.

All of the angle impacts involved northbound and eastbound vehicles. One of the collisions involved an eastbound bus and one involved an eastbound bus and a northbound right turning cyclist. Five of the collisions occurred under either wet or slushy surface conditions.

Of the eight sideswipe impacts, five involved eastbound vehicles and three involved northbound vehicles. Four of the collisions occurred under either wet or slushy surface conditions.

Of the six single vehicle/other impacts, four involved eastbound left turning vehicles and pedestrians, one involved a northbound right turning vehicle, and a pedestrian and one involved a northbound vehicle (other impact). Two of the collisions occurred under either wet or snowy surface conditions.

Bank Street/Laurier Avenue

A total of 35 collisions were reported at the Bank Street/Laurier Avenue intersection over the last five years. Fifteen of the collisions caused personal injuries, one of which resulted in a fatality. Four of the collisions involved pedestrians. Ten of the collisions were turning movement impacts, eight were sideswipe impacts, seven were rear-end impacts, five were angle impacts, and five were single vehicle/other impacts.

Of the ten turning movement impacts, four involved eastbound right turning vehicles and a cyclist, two involved westbound right turning vehicles and cyclists, one involved a eastbound left turning vehicle and a cyclist, one involved a westbound left turning vehicle and a cyclist, one involved an eastbound left turning vehicle and a westbound vehicle, and one involved a northbound right turning vehicle.

Of the eight sideswipe impacts, three involved northbound vehicles, three involved eastbound vehicles, and two involved southbound vehicles. Two of the collisions occurred under wet or snowy surface conditions.

Of the seven rear-end impacts, three involved westbound vehicles, two involved eastbound vehicles, and two involved southbound vehicles. Three of the collisions occurred under wet or snowy surface conditions.

Of the five single vehicle/other impacts, two involved eastbound vehicles and pedestrians/cyclist, two involved northbound vehicles and pedestrians, and one involved a westbound vehicle and a pedestrian. Two of the collisions occurred under wet surface conditions.

Of the five angle impacts, three involved westbound and southbound vehicles, one involved an eastbound right turning vehicle and a southbound vehicle, one involved northbound, southbound and westbound vehicles. One of the collisions involved southbound and westbound vehicles resulted in a fatality.

Slater Street – Bank Street to O'Connor Street

A total of 21 collisions were reported along Slater Street between Bank Street and O'Connor Street over the last five years. Four of the collisions caused personal injuries, none of which resulted in a fatality. Two of the collisions involved pedestrians. Nine of the collisions were sideswipe impacts, eight were single vehicle/other impacts, and four were rear-end impacts. Four of the nine sideswipe impacts occurred under wet surface conditions.

Of the eight single vehicle/other impacts, four involved parked vehicles, two involve eastbound vehicles reversing (other impact), one involved a bus and a pedestrian, and one involved a vehicle reversing and a pedestrian.

Slater Street – O'Connor Street to Metcalfe Street

A total of ten collisions were reported along Slater Street between O'Connor Street and Metcalfe Street over the last five years. Four of the collisions caused personal injuries, none of which resulted

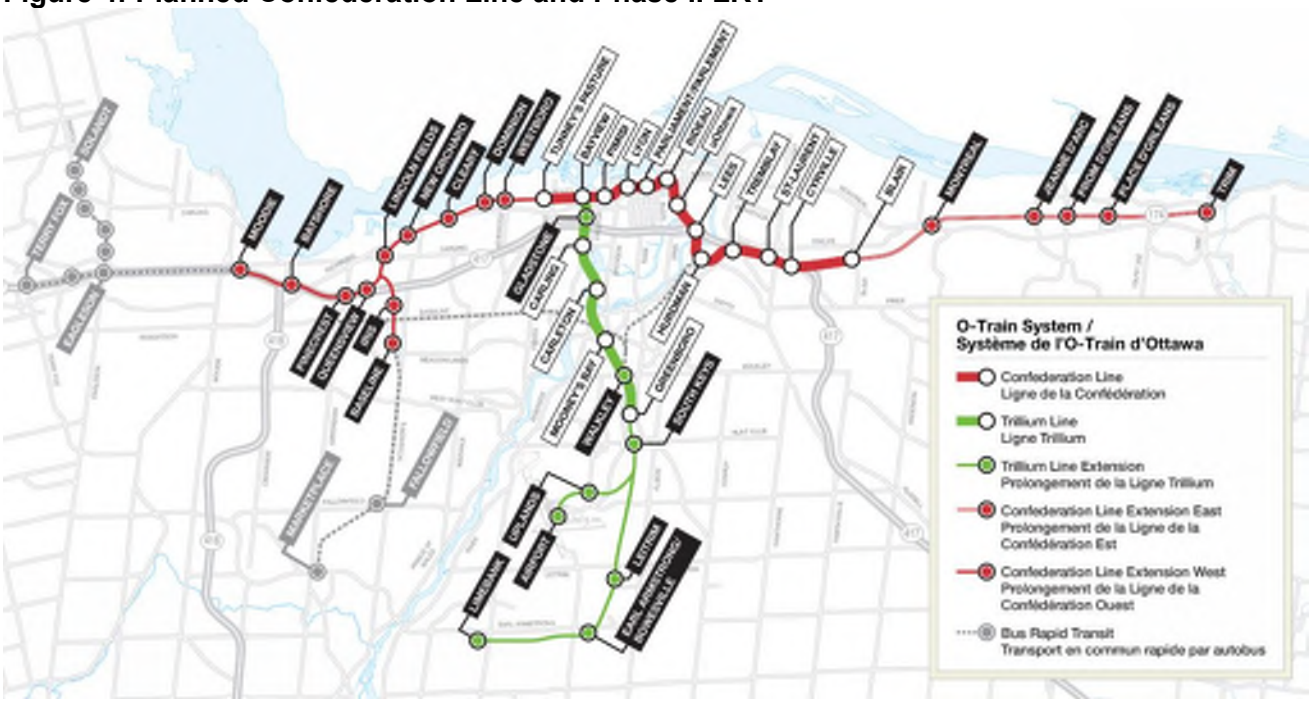
in a fatality. Two of the collisions involved pedestrians. Five of the collisions were single vehicle/other impacts, three were sideswipe impacts, and two were angle impacts.

Of the five single vehicle/other impacts, two involved a reversing vehicles and pedestrians, two involved reversing vehicles (other impact), and one involved a parked vehicle.

3.3 Planned Conditions

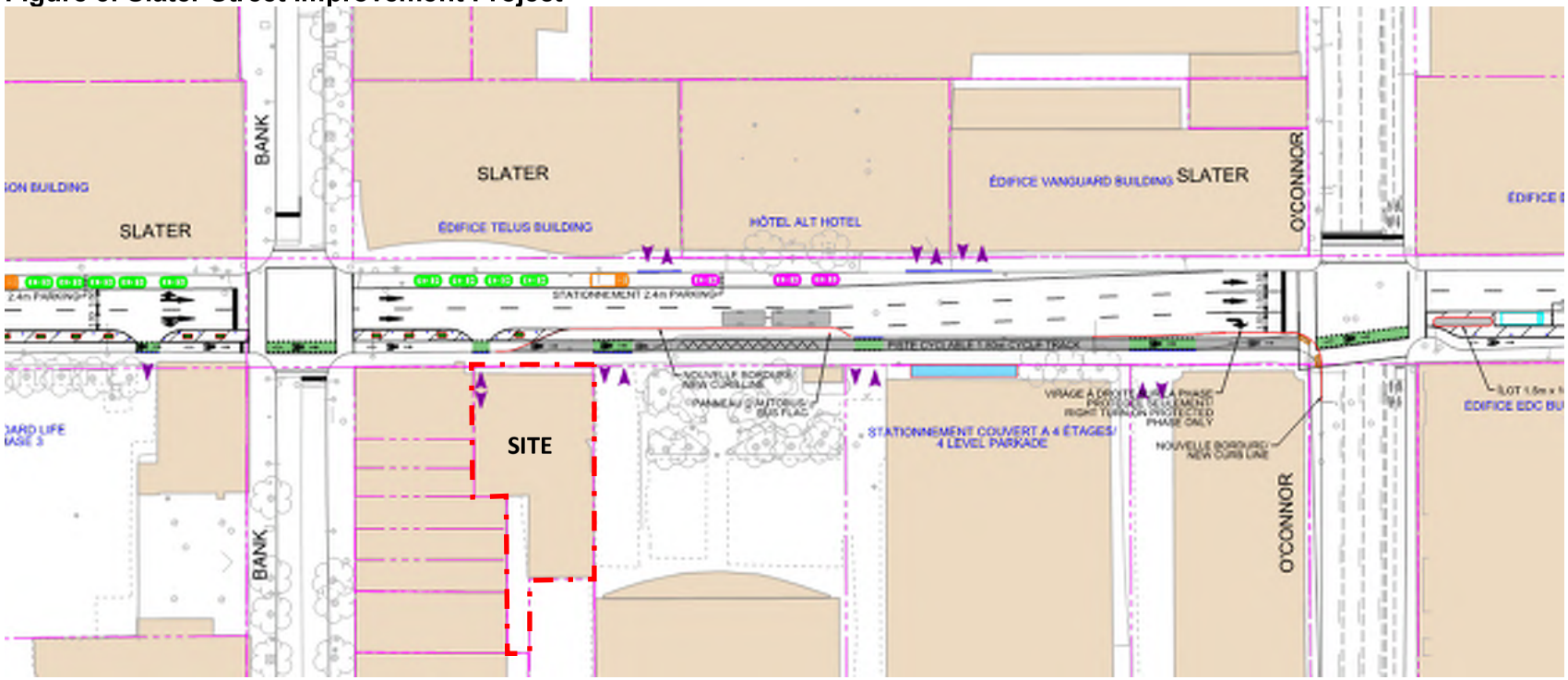
The City of Ottawa is currently constructing Phase I of Light Rail Transit (LRT), also known as the Confederation Line. The Confederation Line will convert the existing transitway between the Tunney's Pasture and Blair Stations to LRT, improving transit in the vicinity of the subject site. Phase II of the LRT has been approved by City Council, and is anticipated to commence construction in 2019-2020. Phase II of the LRT will extend the Trillium Line south from Greenboro to Limebank Road in Riverside South, along with an additional three-kilometre spur line to provide a connection to the Macdonald-Cartier International Airport. It will also extend the Confederation Line east from Blair Road to Trim Road and west from Tunney's Pasture to Moodie and Baseline Stations. Phase II of the LRT is anticipated to further improve transit in the vicinity of the subject site. The following figure illustrates the planned Confederation Line and Phase II LRT within the City of Ottawa.

Figure 4: Planned Confederation Line and Phase II LRT



The City of Ottawa is undertaking the Albert and Slater Streets Improvement Project which will repurpose Albert Street and Slater Street corridor between Bay Street and Elgin Street following the launch of the Confederation Line LRT. This project will remove bus transit from these streets, and will incorporate improved pedestrian and cycling facilities, implementing the vision established in the City's 2013 Downtown Moves Study. Construction of this project is anticipated to commence in 2020 or 2021. The functional design of the Albert and Slater Streets Improvement project between Bank Street and O'Connor Street is shown in **Figure 5**.

Figure 5: Slater Street Improvement Project



3.4 Other Area Developments

A review of the City's Development Application Search Tool was conducted to determine other area developments in the vicinity of the subject site, and are summarized below.

- 96 Nepean Street – Community Transportation Study/Transportation Impact Study, dated March 2012, prepared by Novatech in support of Zoning By-law Amendment and Site Plan Control applications. Development consists of 201 residential units.
- 180 Metcalfe Street – Transportation Impact Assessment, dated September 2018, prepared by Parsons in support of a Site Plan Control application. Development consists of 303 residential units and 5,275ft^2 GFA of retail.
- 318 Lisgar Street – Modified Traffic Brief, dated June 2014, and Addendum #1, dated March 2016, prepared by Delcan/Parsons in support of a Zoning By-law Amendment application. The development consists of 2,891ft^2 of specialty retail, a 1,885ft^2 coffee shop, eleven residential units and six office units.
- 383 Albert Street and 340 Queen Street – Transportation Impact Assessment Addendum 2, dated February 2019, prepared by Novatech in support of Zoning By-law Amendment and Site Plan Control applications. Development consists of 572 residential units and a 25,084ft^2 supermarket.
- 280 Slater Street and 333 Laurier Avenue – Transportation Impact Study, dated August 2009, prepared by BA Consulting Group Ltd. in support of Site Plan Control application. The development consists of an office expansion containing 366,845ft2 office and 14,000ft^2 of retail.

3.5 Study Area and Time Periods

This report will review the Slater Street, Bank Street, and Laurier Avenue boundary roadways. The proposed study area for this report includes the access to the proposed development, as well as the following intersections:

- Slater Street/Bank Street;
- Slater Street/O'Connor Street;
- Slater Street/Metcalfe Street; and
- Bank Street/Laurier Avenue.

The selected time periods for the analysis are the weekday AM and PM peak hours, which represent the 'worst case' combination of site generated traffic and adjacent street traffic. Analysis will be completed for the 2022 build-out year and the 2027 horizon year.

3.6 Exemptions Review

This module reviews possible exemptions from the final TIA, as outlined in the TIA Guidelines. The applicable exemptions for the subject lands are shown in **Table 3**.

Table 3: TIA Exemptions

Module	Element	Exemption Criteria	Exemption Applies
Design Review Component			
4.1 Development Design	*4.1.2* Circulation and Access	• Only required for site plans	No
	4.1.3 New Street Networks	• Only required for plans of subdivision	Yes
4.2 Parking	*4.2.1* Parking Supply	• Only required for site plans	No
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	Yes
Network Impact Component			
4.5 Transportation Demand Management	*All elements*	• Not required for non-residential site plans expected to have fewer than 60 employees and/or students on location at any given time	No
4.6 Neighbourhood Traffic Management	*4.6.1* Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Yes
4.8 Network Concept	*All elements*	• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by the established zoning	Yes

4.0 FORECASTING

4.1 Development-Generated Traffic

4.1.1 Trip Generation

The proposed development may ultimately contain a mix of residential and hotel units with ground floor retail. However, for the purposes of this analysis, it has been assumed that the development would either be all hotel or all residential, with ground floor retail. This will provide a conservative representation of trips generated by all permutations of the development that could occur.

Trips generated by the existing and proposed development (both hotel and residential scenarios) have been estimated using relevant land use codes in the ITE *Trip Generation Manual, 10th Edition*. For comparison, trips generated by the residential scenario have also been estimated using the City's *2009 TRANS Trip Generation Manual*.

Trips generated by the existing commercial development have been estimated using the ITE Shopping Center Land Use Code 820. Trips generated by the proposed commercial development have been estimated using the ITE Convenience Market Land Use Code 851. Trips generated by the hotel development under the first scenario have been estimated using the ITE Hotel Land Use Code 310. Trips generated by the residential development under the second scenario have been

estimated using the ITE Multi-Family Housing (High-Rise) Land Use Code 222 which uses data from apartments, townhouses and condominiums that have more than 10 levels (floors). For comparison, trips generated by the residential development have also been estimated using the TRANS recommended rates for high rise apartments.

Trips generated using ITE rates have been converted to person trips using a 1.28 ITE trip to person trip adjustment factor. Trips generated using the TRANS rates have been converted to person trips using the assumed modal shares in the *2009 TRANS Trip Generation Manual*. Trips generated by the proposed development are summarized in the following table.

Table 4: Person Trip Generation

Land Use	ITE Code	Units/ GFA	AM Peak			PM Peak		
			IN	OUT	TOT	IN	OUT	TOT
Existing Development								
Shopping Center	820	12,600 ft^2	9	6	15	29	32	61
1) Hotel Scenario								
Hotel	310	220 units	79	55	134	91	87	178
Convenience Market	851	1,000 ft^2	50	30	80	32	31	63
		Total	*129*	*85*	*214*	*123*	*118*	*241*
		Net Differential	120	79	199	94	86	180
2) Residential Scenario (ITE Rates)								
Multi-Family Housing (High Rise)	222	180 units	19	62	81	54	35	89
Convenience Market	851	1,000 ft^2	50	30	80	32	31	63
		Total	*69*	*92*	*161*	*86*	*66*	*152*
		Net Differential	60	86	146	57	34	91
2) *Residential Scenario (TRANS Rates)*								
High-Rise Apartments	-	180 units	28	87	115	78	48	126
Convenience Market	851	1,000 ft^2	50	30	80	32	31	63
		Total	*78*	*117*	*195*	*110*	*79*	*189*
		Net Differential	68	111	180	81	47	128

From the previous table, the hotel scenario is anticipated to generate an additional 199 person trips during the AM peak hour and 180 person trips during the PM peak hour, compared to the existing development. Based on ITE rates, the residential scenario is anticipated to generate an additional 146 person trips during the AM peak hour and 91 person trips during the PM peak hour, compared to the existing development.

It is recognized that use of the *2009 TRANS Trip Generation Manual* is preferred by the City of Ottawa to estimate the trip generation of residential developments. However, person trip generation using the TRANS rates are approximately 40% higher than the ITE rates during both the AM and PM

peak hour. The TRANS rates are based on local data from 2009, using Origin-Destination survey data from 2005, and have a smaller sample size. The person trip conversion has not been as thoroughly tested as the conversion of ITE rates using a person trip adjustment factor of 1.28. Based on the foregoing, the ITE rates for residential developments have been carried forward for the residential scenario. It is noteworthy that the person trips generated by the hotel scenario are higher than the residential scenario (using both ITE and TRANS rates), and is considered the 'worst case' scenario.

The modal shares for the proposed development have been developed based on the City's modal share targets for Transit Oriented Developments, and have been tailored based on the specific land uses to reflect existing modal shares associated with the Central Area. A full breakdown of the projected person trips by modal share are shown in the below table.

Table 5: Person Trips by Modal Share

Travel Mode	Modal Share	AM Peak			PM Peak		
		IN	OUT	TOT	IN	OUT	TOT
Existing Person Trips		*9*	*6*	*15*	*29*	*32*	*61*
Auto Driver	15%	1	1	2	4	5	9
Auto Passenger	5%	0	0	0	1	2	3
Transit	30%	3	2	5	9	9	18
Non-Auto	50%	5	3	8	15	16	31
1) Hotel Person Trips		*129*	*85*	*214*	*123*	*118*	*241*
Auto Driver	15%/15%[1]	19	13	32	18	18	36
Auto Passenger	15%/5%[1]	15	9	24	16	14	30
Transit	30%/30%[1]	38	26	64	37	35	72
Non-Auto	40%/50%[1]	57	37	94	52	51	103
Auto Driver (Difference)		18	12	30	14	13	27
Auto Passenger (Difference)		15	9	24	15	12	27
Transit (Difference)		35	24	59	28	26	54
Non-Auto (Difference)		52	34	86	37	35	72
2) Residential Person Trips		*69*	*92*	*161*	*86*	*66*	*152*
Auto Driver	10%/15%[2]	9	11	20	9	9	18
Auto Passenger	5%/5%[2]	4	4	8	5	3	8
Transit	60%/30%[2]	26	47	73	42	30	72
Non-Auto	25%/50%[2]	30	30	60	30	24	54
Auto Driver (Difference)		8	10	18	5	4	9
Auto Passenger (Difference)		4	4	8	4	1	5
Transit (Difference)		23	45	68	33	21	54
Non-Auto (Difference)		25	27	52	15	8	23

1. Hotel/Commercial
2. Residential/Commercial

Based on the foregoing, the hotel scenario is anticipated to generate approximately 30 additional vehicle trips during the AM peak hour and 27 vehicle trips during the PM peak hour, compared to the existing development. The residential scenario is anticipated to generate approximately 18 additional vehicle trips during the weekday AM peak hour and nine vehicle trips during the weekday PM peak hour, compared to the existing development. To provide a conservative analysis, the hotel scenario has been carried forward for the intersection analysis in this report.

4.1.2 Trip Distribution

The assumed distribution of trips generated by the proposed hotel scenario has been derived from existing traffic patterns on the roadways within the study area. The assumed distribution of trips generated by the hotel scenario is summarized as follows:

- 25% to/from the north;
- 30% to/from the south;
- 20% to/from the east; and
- 25% to/from the west.

Under the hotel scenario, on-site parking will not be provided for patrons of the hotel. Vehicle trips to the hotel are anticipated to park in public parking lots or on-street parking in the area and walk to the subject site. As such, new vehicles are not anticipated to arrive/depart the access to the subject site. The proposed access will exclusively serve as an access to the rear-yard parking for the 161 Bank Street site.

A review of off-street public parking lots in the area was conducted. The following public parking lots are available within a reasonable walking distance to the south:

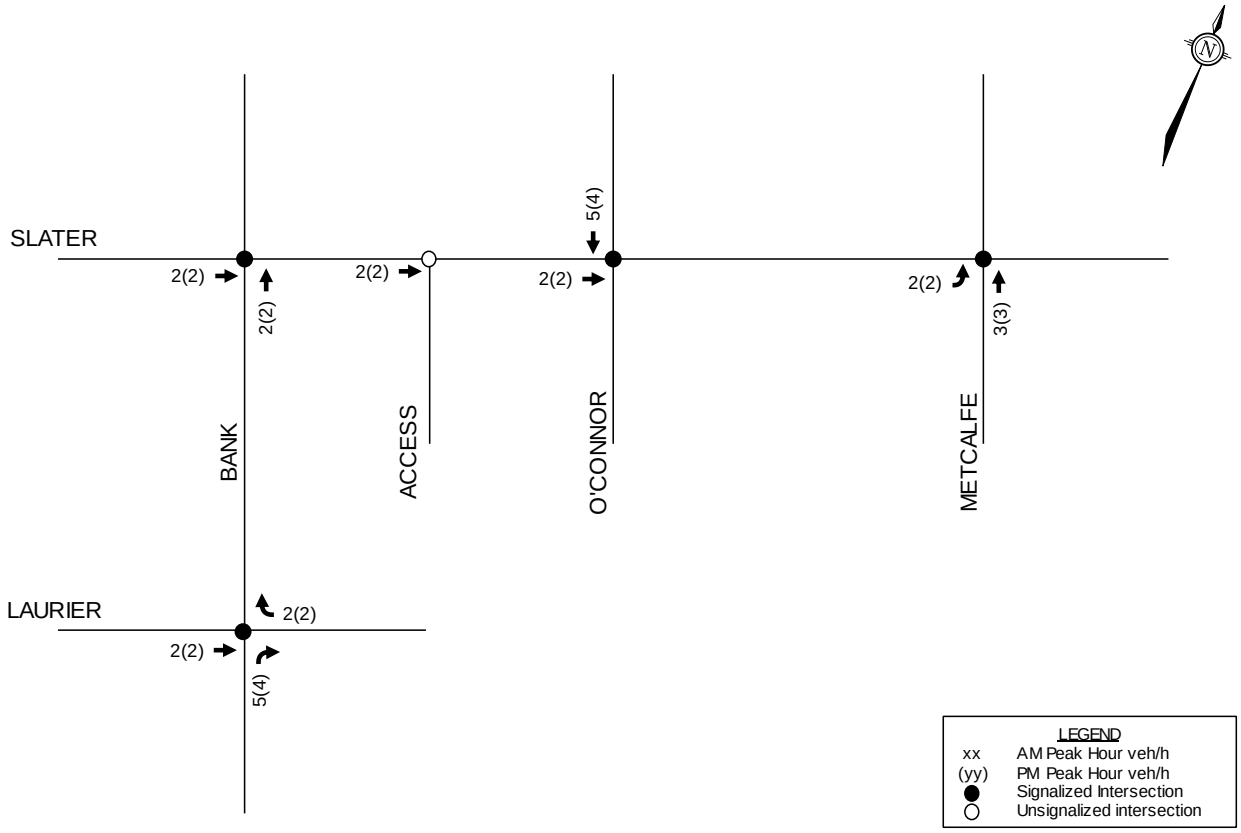
- 234 Laurier Avenue – 238 Parking Spaces
- 265 Laurier Avenue – 378 Parking Spaces
- 328 Laurier Avenue – 240 Parking Spaces

Based on the functional design for the Albert and Slater Streets Improvement Project, on-street parking will also be permitted along the north side of Slater Street east and west of Banks Street.

For the purposes of this analysis, it has been assumed that patrons of the hotel/commercial who require parking will either use on-street parking or the public parking lots along Laurier Avenue. Traffic arriving and departing to the east are not anticipated to use the study area intersections. Traffic arriving from the south have been assumed to use Bank Street, while traffic departing to the south have been assumed to use O'Connor Street and do not show up within the study area. Traffic arriving from the west are anticipated to use Laurier Avenue/Slater Street, while traffic departing to the west are anticipated to use Bank Street/Metcalfe Street to Wellington Street. Traffic arriving from the north are anticipated to use O'Connor Street, while traffic departing to the north are anticipated to use Metcalfe Street.

Site generated traffic volumes are shown in **Figure 6**.

Figure 6: Site Generated Traffic



4.2 Background Traffic

4.2.1 General Background Growth Rate

With the opening of the Confederation Line, traffic within the study area is not anticipated to grow significantly within the horizon year. For the purposes of this analysis, traffic within the study area is anticipated to remain generally consistent with the existing condition. No growth rate has been applied to the existing traffic volumes within the study area.

4.2.2 Other Area Development Traffic

As identified in Section 3.4, the following developments are proposed in the vicinity of the subject site:

- 96 Nepean Street;
- 180 Metcalfe Street;
- 318 Lisgar Street;
- 383 Albert Street and 340 Queen Street; and
- 280 Slater Street and 333 Laurier Avenue.

Traffic generated by these developments have been added to the study area roadways under the 2022 and 2027 background traffic conditions. Relevant excerpts from other developments are included in **Appendix G**.

Background traffic volumes within the study area are shown in **Figure 7**. Total traffic volumes within the study area are shown in **Figure 8**.

Figure 7: 2022 and 2027 Background Traffic

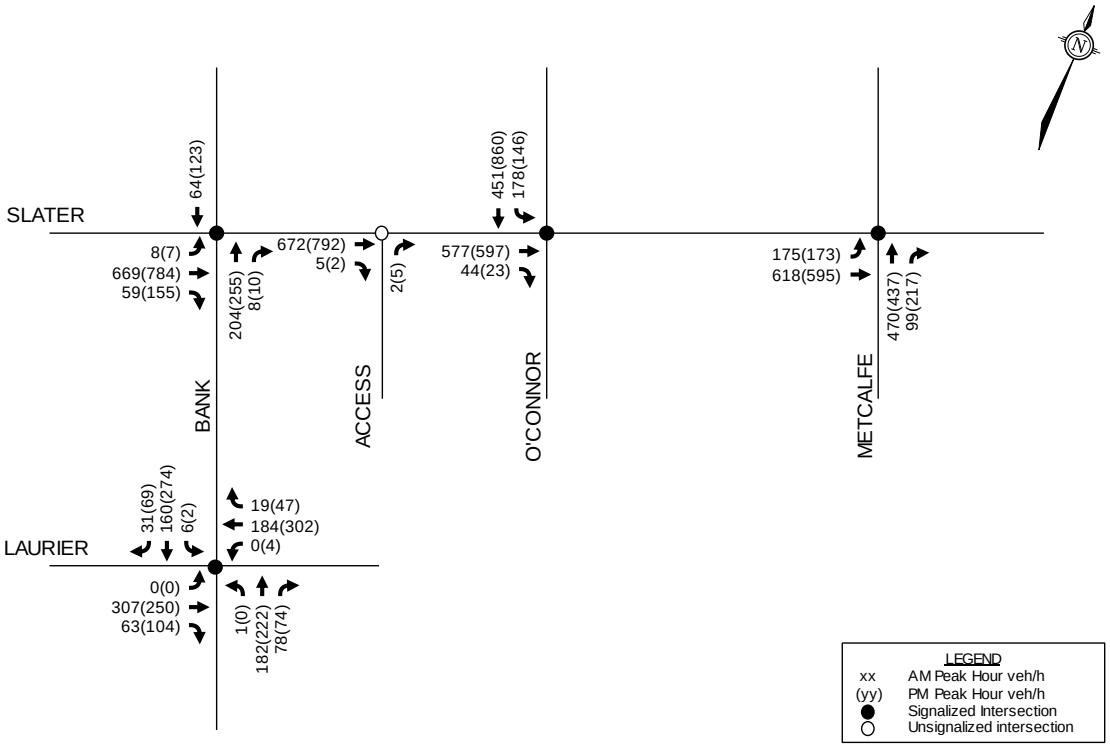
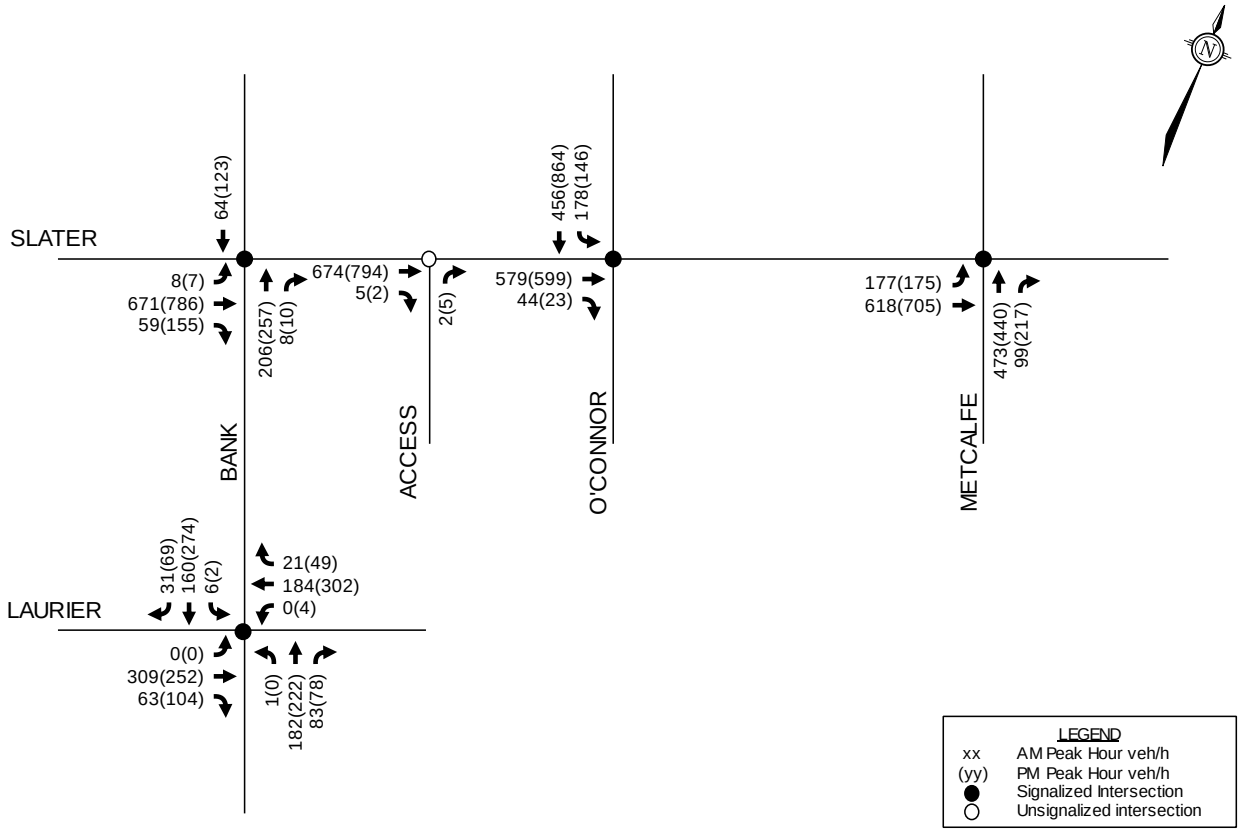


Figure 8: 2022 and 2027 Total Traffic



5.0 ANALYSIS

5.1 Development Design

Pedestrian facilities will be provided between the main building entrance and the sidewalk along Slater Street. Bicycle parking for the proposed development will be provided in accordance with the City of Ottawa Zoning By-law.

Numerous transit routes are available within a 400m walking distance of the subject site, providing comprehensive transit coverage across the City of Ottawa. The City of Ottawa is currently converting the east-west transitway between Tunney's Pasture and Blair stations to LRT. This construction is ongoing and is anticipated to be complete in 2019. With the implementation of the Confederation Line LRT in the downtown core, it is expected that overall transit volumes will increase, and bus transit volumes will decrease as riders will prefer to use the LRT instead.

Based on the City's Zoning By-law, no loading spaces are required for residential developments, while two loading spaces are required for non-residential developments containing more than 2,000m^2 of GFA. If the hotel scenario is pursued, loading will be accommodated within the access carriage way on-site. Maneuvering into this area will require trucks to reverse into the driveway and stop within the carriage way. A further review of the access is included in Section 5.4.

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

5.2 Parking

The subject site is located in Area A of Schedule 1 and Area Z of Schedule 1A of the City's Zoning By-law. Minimum vehicular and bicycle parking spaces for both scenarios of the proposed development are identified in the Zoning By-law, and are summarized in the following table.

Table 6: Vehicle, Bicycle and Loading Requirements

Land Use	Rate	Units/ GFA	Requirement
1) Hotel Scenario			
Vehicle Parking			
Hotel	No parking required[1]	220	0
Commercial	No parking required[1]	92m^2	0
		Total	0
Bicycle Parking			
Hotel	1 per 1,500m^2 of GFA	11,338m^2	8
Commercial	1 per 250m^2 of GFA	92m^2	0
		Total	8
2) Residential Scenario			
Vehicle Parking			
Apartment	No resident parking required[1]	180	0
	0.1 per unit in excess of 12 (Visitor)		17
Commercial	No parking required[1]	92m^2	0
		Total	17
Bicycle Parking			
Apartment	0.5 per unit	180	90
Commercial	1 per 250m^2 of GFA	92m^2	0
		Total	90

1. Zoning By-law Section 101 (2)

Hotel Scenario

Based on the hotel scenario, no vehicular parking is required under the City's Zoning By-law. As such, no vehicular parking is proposed under this scenario. Patrons who drive to the hotel and commercial unit are anticipated to use either on-street parking or area public parking garages.

The Centretown Local Area Parking Study (CLAPS) was prepared by the City of Ottawa Public Works Department in March 2016. The CLAPS reviewed parking within a study area bounded by Gloucester Street/Lisgar Street in the north, Highway 417 in the south, the Rideau Canal in the east, and Bronson Avenue in the west. The study area was divided into five sections (Areas A to E). Area B is located south of the proposed development and is bound by Gloucester Street in the north, Highway 417/McLeod Street in the south, Metcalfe Street/O'Connor Street in the east, and Kent Street in the west. Relevant excerpts from the CLAPS are included in **Appendix I**. A general overview of the findings for the Area B parking review, as identified in the CLAPS, is summarized as follows:

- Area-wide, when paid parking is in effect, the level of parking demand is moderate (45-56% full); and
- Demand for on-street parking is much higher during weekday evenings and weekends.

Parking occupancy maps presented in Appendix 2 of the CLAPS were also reviewed to determine the utilization of on-street parking and public parking lots along Gloucester Street. The general findings are summarized as follows:

- On-street parking along Gloucester Street between Kent Street and O'Connor Street is generally utilized (>85% utilization) on weekdays and weekends.
- Public parking lots along Gloucester Street west of Bank Street are underutilized (<50% utilization) on weekdays. Data was not available for weekends.
- Public parking lots along Gloucester Street between Bank Street and O'Connor Street are generally utilized (>85% utilization) on weekdays and underutilized (<50% utilization) on weekends.
- Public parking lots along Gloucester Street east of O'Connor Street are generally utilized (>85% utilization) on weekday morning and afternoons, and underutilized (<50% utilized) on weekday evenings and weekends.

Other area public parking lots containing 240 or more parking spaces include 265 Laurier Avenue and 328 Laurier Avenue are also available in the vicinity of the subject site. Based on the functional design for the Albert and Slater Streets Improvement Project, on-street parking will also be permitted along the north side of Slater Street east and west of Bank Street. Utilization information for the aforementioned public parking lots and on-street parking along Slater Street were not provided in the CLAPS.

Based on the trip generation presented in Section 4.1, the hotel scenario is anticipated to generate 30 vehicle trips (18 in, 12 out) during the AM peak hour and 27 vehicle trips (14 in, 13 out) during the PM peak hour. On-street and public parking lots in the vicinity of the subject site are anticipated to accommodate the expected parking demand from the proposed hotel scenario.

If the hotel scenario is pursued, bicycle parking will be provided in the basement in accordance with the City's Zoning By-law.

Residential Scenario
Based on the residential scenario, no tenant parking is required under the City of Ottawa's Zoning By-Law. However, visitor parking spaces are required at a rate of 0.1 spaces per unit in excess of 12 units. No tenant parking will be provided, and 18 visitor parking will be provided within a surface/puzzle type parking garage using a tri-stacking automotive mechanical lift system, exceeding the minimum requirement of the City's Zoning By-law.

If the residential scenario is pursued, bicycle parking will be provided in the basement in accordance with the City's Zoning By-law.

5.3 Boundary Streets

As identified in Section 3.3 above, the City of Ottawa is undertaking the Albert and Slater Streets Improvement Project which will repurpose Albert Street and Slater Street corridor between Bay

Street and Elgin Street following the launch of the Confederation Line LRT. This project will remove bus transit from these streets, and will incorporate improved pedestrian and cycling facilities, implementing the vision established in the City's 2013 Downtown Moves Study.

The planned modifications to Slater Street will improve the Level of Service (LOS) for all modes of transportation along the corridor. Based on the Slater Street functional design, Slater Street between Bank Street and Metcalfe Street is planned to include the following characteristics:

- Two traffic lanes;
- Protected bike lane/cycle track on south side;
- Sidewalks on both sides;
- On-street parking on north side for approximately 35 metres west of Bank Street;
- Loading space on north side;
- Hotel vehicle zone on north side adjacent to the Alt hotel (199 Slater Street); and
- Bus stop on south side adjacent to 269 Laurier Avenue.

No changes to the existing access location is proposed as part of this application. The design for Slater Street adjacent to the site is currently being reviewed by the City to accommodate the existing access to the subject site.

5.4 Access Intersections Design

The proposed access will be maintained in the existing location. The proposed access will be 6m in width, located 5.4m from the western property line and approximately 25m from the Bank Street right-of-way limit. Under the hotel scenario, no on-site parking will be provided and the access will exclusively serve the eight rear-yard parking spaces for 161 Bank Street. Under the residential scenario, the proposed access will serve 18 visitor parking spaces for the subject site, as well as the eight rear-yard parking spaces for 161 Bank Street.

Section 25 (c) of the City's Private Approach By-law identifies a requirement for two-way accesses to have a width no greater than 9m, as measured at the street line. The City's Zoning By-law identifies a minimum requirement of 3m for a single traffic lane driveway, and a maximum width of 6.7m where the driveway leads to more than 20 parking spaces. The proposed 6m width of the access adheres to the requirements of both the Private Approach By-law and Zoning By-law.

Section 25 (l) of the City's Private Approach By-law identifies a requirement to provide a minimum distance of 18m between the private approach and the nearest intersecting street line. Section 25 (o) of the City's Private Approach By-law identifies a minimum requirement to provide 3m between the nearest edge of the access and the property line, as measured at the street line. The location of the proposed access adheres to the requirements of the City's Private Approach By-law.

Under the hotel scenario, loading will be accommodated in the carriage way. Maneuvering into this area will require trucks to reverse into the driveway and stop within the carriage way. The turning movements for a Heavy Single Unit Truck reversing into the access is shown in **Figure 9**.

5.5 Transportation Demand Management

As the hotel scenario is not anticipated to have more than 60 employees on-site at any given time, the TDM – Measures checklist is exempt from the required analysis.

A review of the TDM – Measures checklist was conducted for the residential scenario and can be found in **Appendix H**. To encourage travel by sustainable modes, no vehicle parking will be provided for tenants of the building. Only visitor parking spaces will be provided in a surface/puzzle parking configuration. The site also conforms to the City's TDM initiatives by providing easy access to area pedestrian, cycling and transit facilities.

5.6 Neighbourhood Traffic Management

As identified in Section 3.6, this module is exempt.

5.7 Transit

The proposed hotel scenario is anticipated to generate an additional 59 transit trips (35 in, 24 out) during the AM peak hour and 54 transit trips (28 in, 26 out) during the PM peak hour, compared to the existing development. The proposed residential scenario is anticipated to generate an additional 68 transit trips (23 in, 45 out) during the AM peak hour and 54 transit trips (33 in, 21 out) during the PM peak hour, compared to the existing development.

Following the completion of the Confederation Line LRT, transit service in the vicinity of the subject site will be improved. The additional transit trips generated by the proposed development are anticipated to be accommodated by the future transit facilities in the vicinity of the subject site.

5.8 Review of Network Concept

As identified in Section 3.6, this module is exempt.

5.9 Intersection Design

5.9.1 Existing Intersection MMLOS Analysis

This section provides a review of the signalized study area intersections using complete streets principles. The MMLOS guidelines produced by IBI Group in October 2015 were used to evaluate the LOS of all study area intersections for each mode of transportation. Schedule B of the City of Ottawa's Official Plan indicates all study area intersections fall within the Central Policy Area. The following table summarizes the findings of the MMLOS intersection analysis. Detailed intersection MMLOS calculations are included in **Appendix J**.

SLATER STREET

BANK STREET

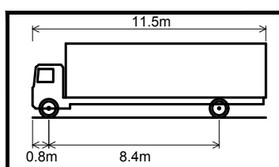
HSU - Heavy Single Unit Truck

RETAIL UNIT
FFE=72.70

PROPOSED
23 STOREY
APARTMENT BUILDING
FFE=72.55

AUTOMATED PARKING
SYSTEM (STACKED)

PLANTER



HSU - Heavy Single Unit Truck

Overall Length	11.500m
Overall Width	2.600m
Overall Body Height	3.650m
Track Width	2.600m
Curb to Curb Turning Radius	14.100m

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

208-210 SLATER ST

LOADING MOVEMENT

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

DATE MAY 2019 | JOB 119055 | FIGURE FIGURE 9

SHT11X17.DWG - 279mmX432mm

C:\temp\AcPublish_4904\119055-TM-Fig9.dwg, FIG9, May 29, 2019 - 5:23pm, rhillier

Table 7: Intersection MMLOS Summary

Segment	PLOS	BLOS	TLOS	TkLOS	Auto LOS
Slater Street/ Bank Street	C	F	C	F	A
Target	**A**	**C**	**A**	**D**	**E**
Slater Street/ O'Connor Street	C	F	C	D	A
Target	**A**	**C**	**A**	**D**	**E**
Slater Street/ Metcalfe Street	C	F	C	D	A
Target	**A**	**C**	**A**	**D**	**E**
Bank Street/ Laurier Avenue	C	D	D	F	F
Target	**A**	**C**	**D**	**D**	**E**

Slater Street/Bank Street

The Slater Street/Bank Street intersection meets the target Auto LOS, however it does not meet the target Pedestrian LOS (PLOS), Bicycle LOS (BLOS), Transit LOS (TLOS), and Truck LOS (TkLOS). Based on the Slater Street functional design, the following improvements are planned for this intersection:

- A reduction in the number of vehicle lanes crossed along Slater Street
- Removal of the eastbound right turn lane
- Cycle track on south side
- Increased effective corner radii on north, south and west legs

Based on the foregoing, the planned modifications to Slater Street are anticipated to improve the PLOS, BLOS, and TkLOS at this intersection. The modifications will remove a transit lane along Slater Street, effectively reducing the TLOS along this corridor. However, the Confederation Line LRT will be operational and provide improved east-west transit in this area.

Slater Street/O'Connor Street

The Slater Street/O'Connor Street intersection meets the target TkLOS and Auto LOS, however it does not meet the target PLOS, BLOS, and TLOS. Based on the Slater Street functional design, the following improvements are planned for this intersection:

- A reduction in the number of vehicle lanes crossed along Slater Street
- Cycle track on south side
- Increased effective corner radii on north and west legs

Based on the foregoing, the planned modifications to Slater Street are anticipated to improve the PLOS and BLOS at this intersection.

Slater Street/Metcalfe Street
The Slater Street/Metcalfe Street intersection meets the target TkLOS and Auto LOS, however it does not meet the target PLOS, BLOS, and TLOS. Based on the Slater Street functional design, the following improvements are planned for this intersection:

- A reduction in the number of vehicle lanes crossed along Slater Street
- Removal of eastbound left turn lane
- Cycle track on south side and bike box
- Increased effective corner radii on south leg

Based on the foregoing, the planned modifications to Slater Street are anticipated to improve the PLOS and BLOS at this intersection.

Bank Street/Laurier Avenue
The Bank Street/Laurier Avenue intersection meets the target TLOS, however it does not meet the target PLOS, BLOS, TkLOS, and Auto LOS.

To achieve the target PLOS at this intersection, a reduction in the crossing distance on all legs is required. However, as this intersection is currently operating with an Auto LOS F, the removal of auxiliary lanes is not recommended. Consideration should be given by the City to implementing ladder or textured crosswalks on all legs to improve the visibility of the crosswalk.

To achieve the target BLOS, a reduction in the length of the northbound right turn lane is required. Based on the Synchro analysis, the existing storage length is appropriate based on the 95th percentile queue length for this movement. As such a reduction in the length of the northbound right turn lane is not recommended.

To achieve the target TkLOS, an increased effective corner radii is required on all legs of the intersection. An increase in the corner radii for the north, east, and west legs of the intersection is limited due to the existing buildings proximity to the right-of-way. Consideration could be given to increasing the corner radius on the south leg, however this will reduce the PLOS at this intersection.

The critical Auto LOS associated with the northbound right turn movement is a resultant of high north-south pedestrian volumes, an advanced pedestrian walk phase, and a right turn on red restrictions on all legs of this intersection. The advanced pedestrian walk phase and right turn on red restriction for this movement provides additional safety for pedestrians and cyclists. As such, it is recommended that the advanced pedestrian walk phase and right turn on red restriction for the northbound right turn movement remain in place as a trade-off for the low Auto LOS. It is noteworthy that the 95th percentile queue length associated with the northbound right turn movement is estimated at 30m during the PM peak hour, and is not anticipated to queue through the downstream intersection of Bank Street/Gloucester Street.

5.9.2 Background Traffic Intersection Operations

Intersection capacity analysis has been completed for the 2022 and 2027 background traffic conditions. The intersection parameters used in the analysis are consistent with the TIA guidelines (saturation flow rate: 1800 vphpl, PHF: 1.0). The assumed lane configurations at the intersections along Slater Street reflect the proposed lane configurations presented in the Slater Street Functional Design.

The results of the intersection capacity analysis are summarized in the following table. Detailed summary sheets are provided in **Appendix K**.

Table 8: Background Intersection Operations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Slater Street/ Bank Street	AM	0.63	B	EB	16 sec	0.57	A
	PM	0.80	C	EB	19 sec	0.72	C
Slater Street/ O'Connor Street	AM	0.46	A	EBT	9 sec	0.43	A
	PM	0.65	B	SBT/L	19 sec	0.58	A
Slater Street/ Metcalfe Street	AM	0.77	C	EBT/L	16 sec	0.57	A
	PM	0.64	B	EBT/L	14 sec	0.58	A
Bank Street/ Laurier Avenue	AM	0.80	C	EBT	29 sec	0.75	C
	PM	1.64	F	NBR	50 sec	1.14	F
Slater Street/ Access[1]	AM	9 sec	A	NB	-	-	-
	PM	9 sec	A	NB	-	-	-

1. Unsignalized Intersection

Based on the foregoing, the Bank Street/Laurier Avenue intersection is anticipated to continue to operate with a LOS F. It is noteworthy that the v/c ratio's at this intersection have improved compared to the existing conditions. However this can be attributed to an increased peak hour factor of 1.0, consistent with the recommendations for future conditions identified in the City of Ottawa's 2017 TIA Guidelines.

All other intersections within the study area are anticipated to operate with a LOS C or better.

5.9.3 Total Traffic Intersection Operations

Intersection capacity analysis has been completed for the 2022 and 2027 total traffic conditions. The results of the intersection capacity analysis are summarized in the following table. Detailed summary sheets are provided in **Appendix K**.

Table 9: 2021 Total Intersection Operations

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Slater Street/ Bank Street	AM	0.63	B	EB	16 sec	0.57	A
	PM	0.81	C	EB	19 sec	0.73	C
Slater Street/ O'Connor Street	AM	0.46	A	EBT	9 sec	0.43	A
	PM	0.65	B	SBT/L	19 sec	0.58	A
Slater Street/ Metcalfe Street	AM	0.77	C	EBT/L	16 sec	0.57	A
	PM	0.64	B	EBT/L	14 sec	0.58	A
Bank Street/ Laurier Avenue	AM	0.80	D	EBT	30 sec	0.76	C
	PM	1.73	F	NBR	54 sec	1.19	F
Slater Street/ Access[1]	AM	9 sec	A	NB	-	-	-
	PM	9 sec	A	NB	-	-	-

1. Unsignalized Intersection

Based on the foregoing, the addition of site generated traffic is not anticipated to have a significant impact on the overall intersection operations within the study area. The Bank Street/Laurier Avenue intersection is anticipated to operate with a LOS F, consistent with the existing/background traffic conditions. All other intersections are anticipated to operate with a LOS C or better.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing, the conclusions and recommendations of this TIA can be summarized as follows:

Development Design and Parking

- The hotel scenario is anticipated to generate approximately 30 additional vehicle trips during the AM peak hour and 27 vehicle trips during the PM peak hour, compared to the existing development.
- The residential scenario is anticipated to generate approximately 18 additional vehicle trips during the weekday AM peak hour and nine vehicle trips during the weekday PM peak hour, compared to the existing development.
- To provide a conservative analysis, the hotel scenario has been carried forward for the intersection analysis in this report.
- Pedestrian facilities will be provided between the main building entrance and the sidewalk along Slater Street.
- If the hotel scenario is pursued, loading will be accommodated within the access carriage way on-site. Maneuvering into this area will require trucks to reverse into the driveway and stop within the carriage way.
- All required TDM-supportive design and infrastructure measures in the TDM checklist are met.
- Based on the hotel scenario, no vehicular parking is required under the City's Zoning By-law. As such, no vehicular parking is proposed under this scenario. Patrons who drive to the hotel and commercial unit are anticipated to use either on-street parking or area public parking garages. On-street and public parking lots in the vicinity of the subject site are anticipated to accommodate the expected parking demand from the proposed hotel scenario.
- Based on the residential scenario, no tenant parking is required under the City's Zoning By-law. However, visitor parking spaces are required at a rate of 0.1 spaces per unit in excess

of 12 units. No tenant parking will be provided, and 18 visitor parking will be provided within a surface/puzzle type parking garage using a tri-stacking automotive mechanical lift system, exceeding the minimum requirement of the City's Zoning By-law.
- Bicycle parking under either scenario will be provided in the basement in accordance with the City's Zoning By-law.

Boundary Street MMLOS
- The City of Ottawa is undertaking the Albert and Slater Streets Improvement Project which will repurpose Albert Street and Slater Street corridor between Bay Street and Elgin Street following the launch of the Confederation Line LRT. This project will remove bus transit from these streets, and will incorporate improved pedestrian and cycling facilities, implementing the vision established in the City's 2013 Downtown Moves Study.
- The planned modifications to Slater Street will improve the Level of Service (LOS) for all modes of transportation along the corridor.
- No changes to the existing access location is proposed as part of this application. The design for Slater Street adjacent to the site is currently being reviewed by the City to accommodate the existing access to the subject site.

Access Design
- The proposed access will be maintained in the existing location. The proposed access will be 6m in width, located 5.4m from the western property line and approximately 25m from the Bank Street right-of-way limit.
- The proposed width and location of the access adheres to the requirements of both the Private Approach By-law and Zoning By-law.

Transportation Demand Management and Transit
- As the hotel scenario is not anticipated to have more than 60 employees on-site at any given time, the TDM – Measures checklist is exempt from the required analysis.
- To encourage travel by sustainable modes under the residential scenario, no vehicle parking will be provided for tenants of the building. Only visitor parking spaces will be provided in a surface/puzzle parking configuration. The site also conforms to the City's TDM initiatives by providing easy access to area pedestrian, cycling and transit facilities.
- The proposed hotel scenario is anticipated to generate an additional 59 transit trips (35 in, 24 out) during the AM peak hour and 54 transit trips (28 in, 26 out) during the PM peak hour, compared to the existing development.
- The proposed residential scenario is anticipated to generate an additional 68 transit trips (23 in, 45 out) during the AM peak hour and 54 transit trips (33 in, 21 out) during the PM peak hour, compared to the existing development.
- Following the completion of the Confederation Line LRT, transit service in the vicinity of the subject site will be improved. The additional transit trips generated by the proposed development are anticipated to be accommodated by the future transit facilities in the vicinity of the subject site.

Intersection MMLOS

- The Slater Street/Bank Street intersection meets the target Auto LOS, however it does not meet the target PLOS, BLOS, TLOS, and TkLOS.
- The Slater Street/O'Connor Street intersection meets the target TkLOS and Auto LOS, however it does not meet the target PLOS, BLOS, and TLOS.
- The Slater Street/Metcalfe Street intersection meets the target TkLOS and Auto LOS, however it does not meet the target PLOS, BLOS, and TLOS.
- The Albert and Slater Streets Improvement Project is anticipated to improve the PLOS and BLOS at all intersections along Slater Street within the study area.
- The Bank Street/Laurier Avenue intersection meets the target TLOS, however it does not meet the target PLOS, BLOS, TkLOS, and Auto LOS.
- To achieve the target PLOS at the Bank Street/Laurier Avenue intersection, a reduction in the crossing distance on all legs is required. However, as this intersection is currently operating with an Auto LOS F, the removal of auxiliary lanes is not recommended. Consideration should be given by the City to implementing ladder or textured crosswalks on all legs to improve the visibility of the crosswalk.
- To achieve the target BLOS at the Bank Street/Laurier Avenue intersection, a reduction in the length of the northbound right turn lane is required. Based on the Synchro analysis, the existing storage length is appropriate based on the 95th percentile queue length for this movement. As such a reduction in the length of the northbound right turn lane is not recommended.
- To achieve the target TkLOS at the Bank Street/Laurier Avenue intersection, an increased effective corner radii is required on all legs of the intersection. An increase in the corner radii for the north, east, and west legs of the intersection is limited due to the existing buildings proximity to the right-of-way. Consideration could be given by the City to increasing the corner radius on the south leg, however this will reduce the PLOS at this intersection.
- The critical Auto LOS associated with the northbound right turn movement is a resultant of high north-south pedestrian volumes, an advanced pedestrian walk phase, and a right turn on red restrictions on all legs of this intersection. It is recommended that the advanced pedestrian walk phase and right turn on red restriction for the northbound right turn movement remain in place as a trade-off for the low Auto LOS.

2022 and 2027 Background Traffic

- Consistent with the existing condition, the Bank Street/Laurier Avenue intersection is anticipated to continue to operate with a LOS F.
- All other intersections within the study area are anticipated to operate with a LOS C or better.

2022 and 2027 Total Traffic

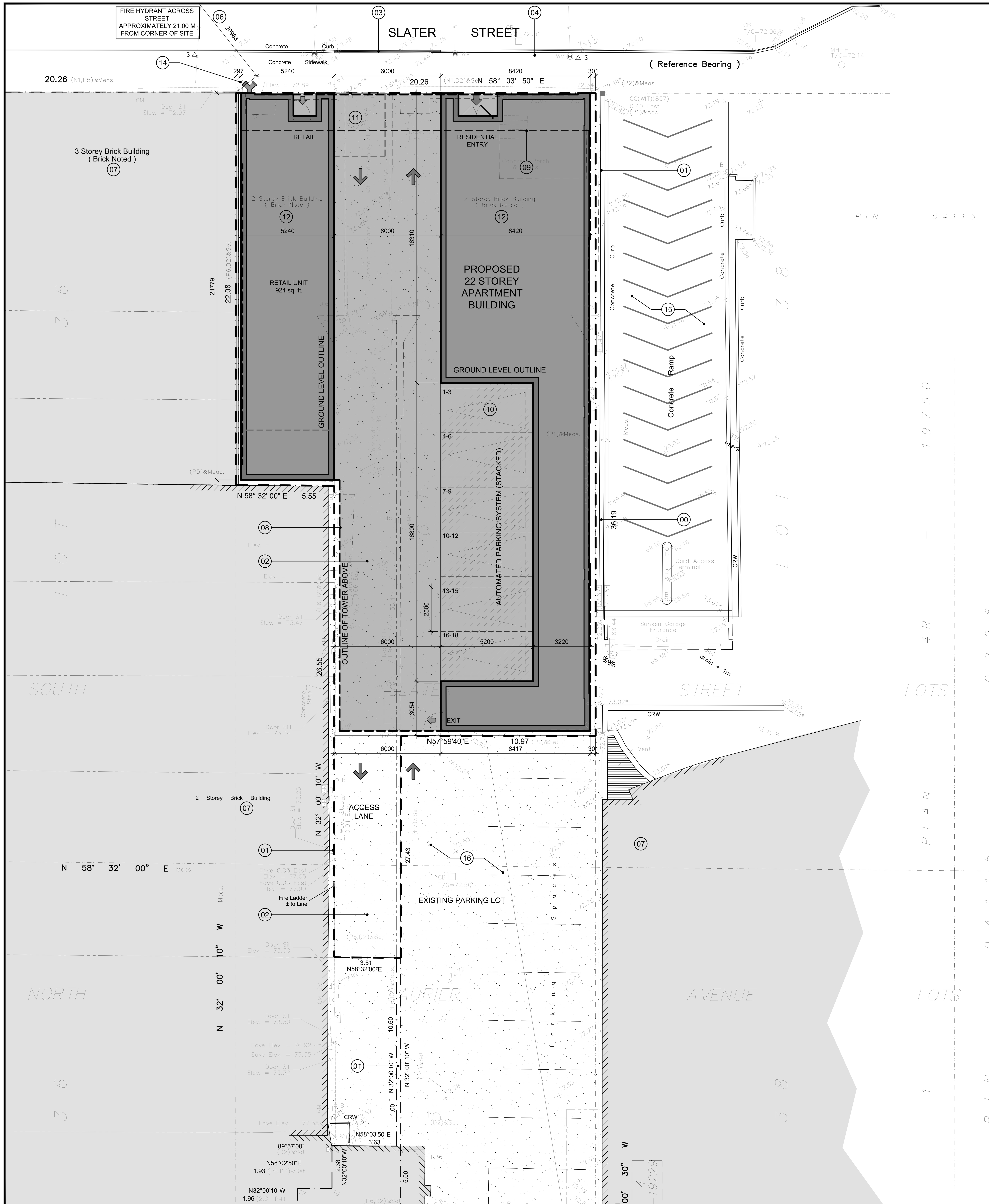
- The addition of site generated traffic is not anticipated to have a significant impact on the overall intersection operations within the study area.
- The Bank Street/Laurier Avenue intersection is anticipated to operate with a LOS F, consistent with the existing/background traffic conditions.
- All other intersections are anticipated to operate with a LOS C or better.

NOVATECH
Prepared by:

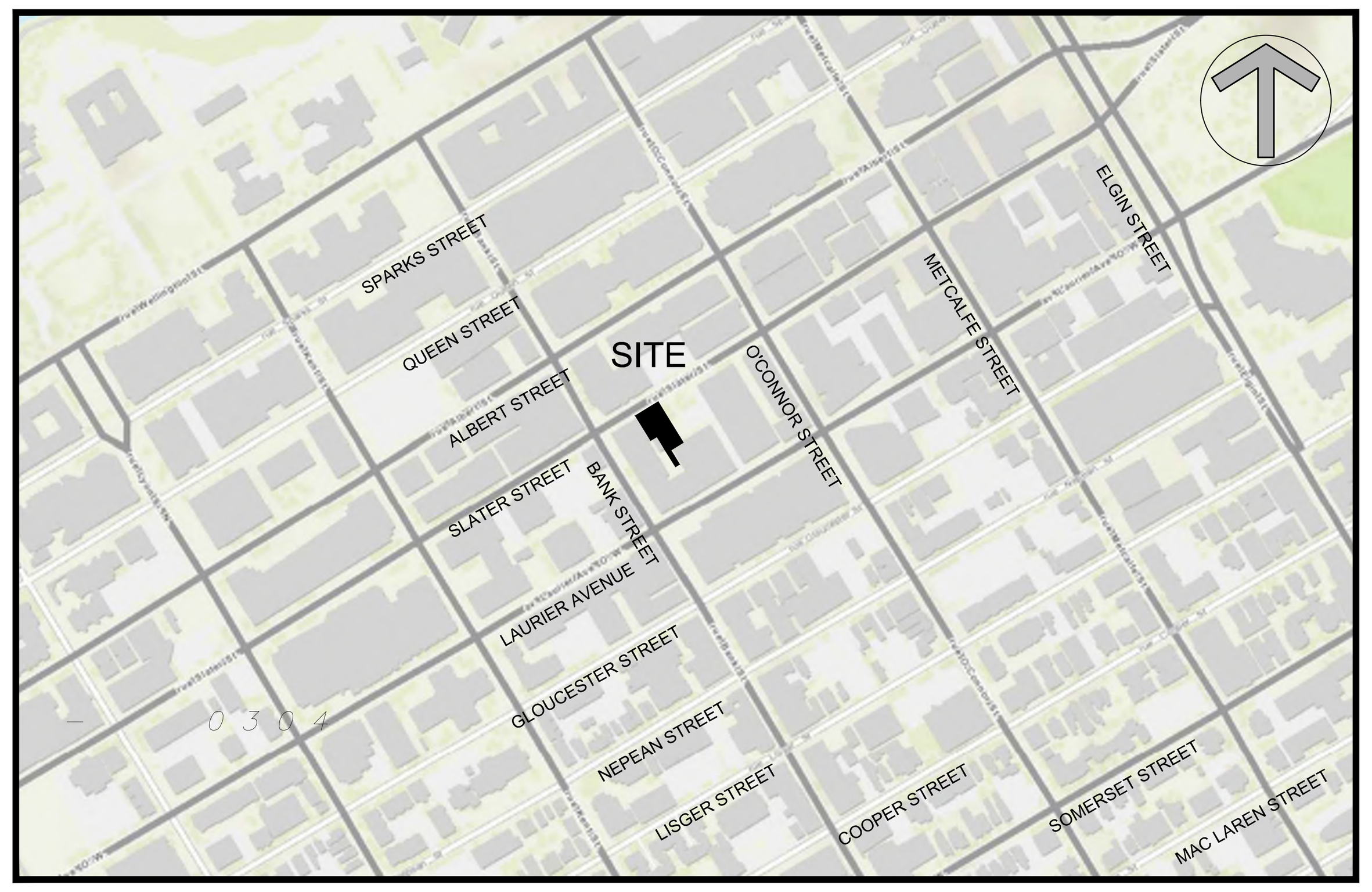
Brad Byvelds, P. Eng.
Project Coordinator | Transportation/Traffic

APPENDIX A

Preliminary Site Plan



KEY MAP



1 SP-1 SITE PLAN
SCALE =1/100

0m 2.5 5 7.5 10
SCALE 1:100

DRAWING NOTES

1. PROPERTY LINE
2. HARD SURFACE PAVING, SEE LANDSCAPE PLAN FOR PATTERN AND TYPE
3. DEPRESSED CURB TO CITY OF OTTAWA STANDARD DETAIL
4. EXISTING STREET CURB AND SIDEWALK
5. GARBAGE ROOM
6. EXISTING FIRE HYDRANT
7. EXISTING BUILDINGS ON ADJACENT PROPERTY
8. BUILDING ABOVE
9. EDGE OF 3rd FLOOR
10. AUTOMATED PARKING SYSTEM (STACKED) 2.5 X 5.2 M
11. CISTERN IN BELOW GRADE LEVEL
12. EXISTING BUILDING TO BE REMOVED
13. PROPOSED SERVICES
14. SIAMESE CONNECTION
15. EXISTING RAMP ON ADJACENT PROPERTY
16. EXISTING ASPHALT PARKING LOT ON ADJACENT PROPERTY
17. 00

SITE PLAN SYMBOLS

- CONCRETE UNIT PAVERS SURFACE
- DRIVING SURFACE SURFACE
- AUTOMATED PARKING SYSTEM
- TWO WAY VEHICLE CIRCULATION
- MAIN ENTRANCE
- UNIT BALCONY DOOR / FIRE EXIT
- PROPERTY LINE

PROJECT INFORMATION

ZONING BY-LAW 2008-250	MD S32
SITE AREA	725.11 sq. m. 7,805 sq. ft.
GRADE (GEODETIC ELEVATION)	72.70 m. easl
BUILDING HEIGHT- S32	141.4 to 148.0m. easl
AMENITY AREA - AFTER 162 UNITS (6m²)	972 sq. m.

PROJECT STATISTICS

BUILDING HEIGHT	68.7 m (141.4 m. easl)
TOWER FLOOR PLATE AREA	623.4 sq. m. 6,710 sq. ft.

GROSS BUILDING FLOOR AREA
(OTTAWA ZONING DEFINITION)

GROUND FLOOR - RETAIL		82.9 sq. m. 892 sq. ft.
1st FLOOR - AMENITY		000 sq. m. 000 sq. ft.
2nd FLOOR - AMENITY		000 sq. m. 000 sq. ft.
3rd FLOOR - AMENITY		000 sq. m. 000 sq. ft.
4th to 22rd FLOOR	18 x 486.0 sq. m. 18 x (5,231) sq. ft.	8,748.0 sq. m. 94,158 sq. ft.
TOTAL AREA ABOVE GRADE		8,830.4 sq. m. 95,050 sq. ft.

UNIT STATISTICS

1 BEDROOM UNIT	153
2 BEDROOM UNIT	9
TOTAL	162

CAR PARKING

REQUIRED		
RESIDENCE	- NOT REQUIRED	0
VISITOR	- 0.1 PER DWELLING UNIT (AFTER 12 UNITS)	15
TOTAL		15
PROVIDED		
RESIDENCE		0
VISITOR	- 0.1 PER UNIT (162 UNITS)	18
TOTAL		18
AUTOMATED PARKING SYSTEM	SPACE SIZE 2.4 x 5.2M	

BICYCLE PARKING

REQUIRED		
RESIDENCE	- 0.5 PER UNIT (162 UNITS)	81
COMMERCIAL RETAIL	- 1.0 PER 250m² OF G.F.A.	1
TOTAL		82
PROVIDED		
BELOW GRADE LEVEL		85
GROUND FLOOR		0
TOTAL		85

AMENITY SPACE

2nd FL. COMMUNAL INTERIOR =	551.3 sq. m.
3rd FL. COMMUNAL INTERIOR =	551.3 sq. m.
4th FL. COMMUNAL INTERIOR =	512.8 sq. m.
TOTAL =	1,615.4 sq. m.

NOTATION SYMBOLS:

- 00 — INDICATES DRAWING NOTES, LISTED ON EACH SHEET.
- 00 — INDICATES ASSEMBLIE TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDUAL.
- 00 — INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.
- 000 — INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.
- DETAIL NUMBER / TITLE / SCALE / DETAIL REFERENCE PAGE / DETAIL CROSS REFERENCE PAGE

SURVEYOR
Annis O'Sullivan Vollebekk Ltd.
Ontario Land Surveyors
14 Concourse Gate, Suite 500,
Nepean, Ontario K2E 7S6
Tel: (613) 727-0850
Fax: (613) 727-1079
Email: EdH@aovltd.com

LEGAL DESCRIPTION
SURVEYOR'S REAL PROPERTY REPORT
PART 1 Plan of
PART OF LOT 37
REGISTERED PLAN 3922
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

CIVIL ENGINEER
Novatech Eng. Consultants Limited
200 - 240 Michael Cowpland Drive
Ottawa, Ontario, K2M 1P6
Tel: 613 254-9643
Fax: 613 254-5867
Email: c.ruddle@novatech-eng.com

PROPERTY OWNER
208 Slater Street (Realty) Inc.
16766 Transcanadienne, Suite 500
Kirkland, Quebec H9H 4M7
Tel.: (___) ---------
E-Mail: james@broccolini.com

GEOTECHNICAL ENGINEER
paterson group
154 Colonnade Road South
Ottawa, Ontario
K2E 7J5
Tel: 613.226-7381
Email: DGilbert@Patersongroup.ca

URBAN PLANNER
FoTenn Consultants Inc.
223 McLeod Street
Ottawa, ON Canada, K2P 0Z8
Tel.: (613) 730-5709
Fax: (613) 730-1136
E-Mail: tremblay@fotenn.com

LANDSCAPE ARCHITECT
Gino J. Aiello Landscape Architect
110 Didsbury Rod #9,
Ottawa Ontario K2T 0C2
Tel: (613) 852-1343
Email: gino@giala.com

HERITAGE PLANNER
John Stewart
53 Herriott Street
Perth, ON, K7H 1T5
Tel.: (613) 267-7040
E-Mail: jjs@chrml.com

No.	DESCRIPTION	DATE
5		
4		
3		
2	ISSUED FOR SITE PLAN CONTROL	June 30, 19
1	ISSUED FOR DESIGN CONCEPT	June 21, 19

REVISIONS:

ARCHITECT SEAL: ONTARIO ASSOCIATION OF ARCHITECTS RODERICK I. LAHEY LICENCE 4375
SEAL DATE: STAMP DATE

NORTH ARROW:

CLIENT: BROCCOLINI

ARCHITECT: RODERICKLAHEY ARCHITECT INC
56 Beech Street, Ottawa, Ontario K1S 3J6
t.613.724.9932 f.613.724.1209 www.rodericklahey.ca

PROJECT TITLE: 212 SLATER
OTTAWA ONTARIO

SHEET TITLE: SITE PLAN

DRAWN: RV	CHECKED: A.A.
SCALE: 1:100	SHEET No. SP-1
PROJECT No. 1917	

D07-16-08-0022

PAPER SIZE: ISO Full Bleed B1 (707.00 X 1000.00 MM) PLOT DATE: Thursday, May 30, 2019 PLOT SCALE: 1:1 PEN STYLE: 0-RLA-MASTER-100%.ctb F:\2019\1917 - 212 Slater Street\01_Design Development\1917 SP-1 Site Plan 2019 05 29.dwg

Plan No.: #16789

APPENDIX B

TIA Screening Form

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	**208-212 Slater Street**
Description of Location	**Midblock between Bank Street and O'Connor Street**
Land Use Classification	**Hotel/Retail**
Development Size (units)	**220 Hotel**
Development Size (m^2)	**93m^2 Retail**
Number of Accesses and Locations	**Maintain existing access to Slater Street**
Phase of Development	**One**
Buildout Year	**2022**

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?		X
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*	✓	

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		X
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		X
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		X
Is the proposed driveway within auxiliary lanes of an intersection?		X
Does the proposed driveway make use of an existing median break that serves an existing site?		X
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X
Does the development include a drive-thru facility?		X

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	✓	
Does the development satisfy the Location Trigger?	✓	
Does the development satisfy the Safety Trigger?		X

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	**208-212 Slater Street**
Description of Location	**Midblock between Bank Street and O'Connor Street**
Land Use Classification	**Residential/Retail**
Development Size (units)	**180 Units**
Development Size (m^2)	**93m^2 Retail**
Number of Accesses and Locations	**Maintain existing access to Slater Street**
Phase of Development	**One**
Buildout Year	**2022**

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?		X
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*	✓	

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		X
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		X
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		X
Is the proposed driveway within auxiliary lanes of an intersection?		X
Does the proposed driveway make use of an existing median break that serves an existing site?		X
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X
Does the development include a drive-thru facility?		X

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

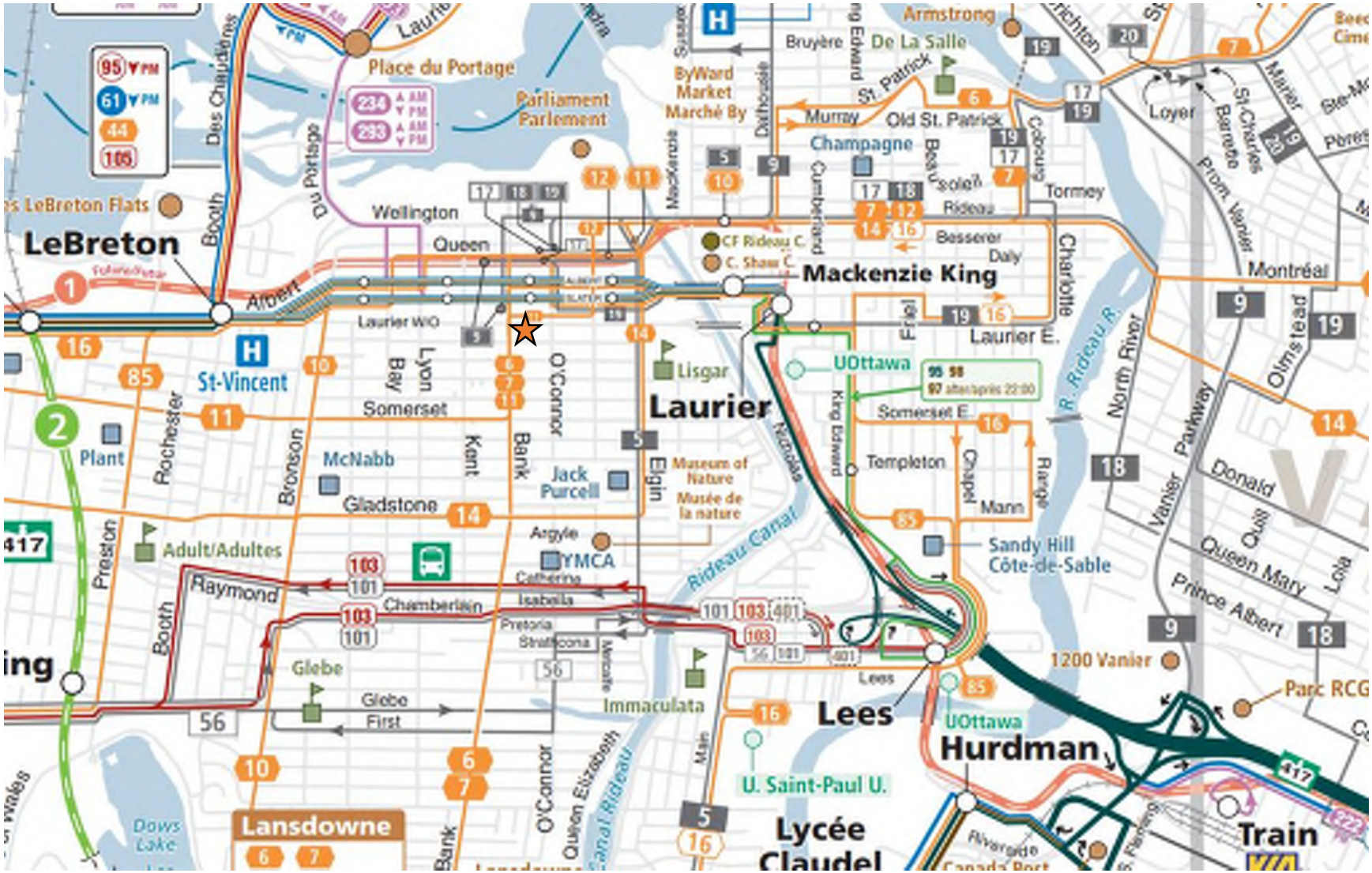
5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	✓	
Does the development satisfy the Location Trigger?	✓	
Does the development satisfy the Safety Trigger?		X

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

APPENDIX C

OC Transpo System Information



SUBJECT SITE

APPENDIX D

Traffic Count and Signal Timing Data

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ SLATER ST

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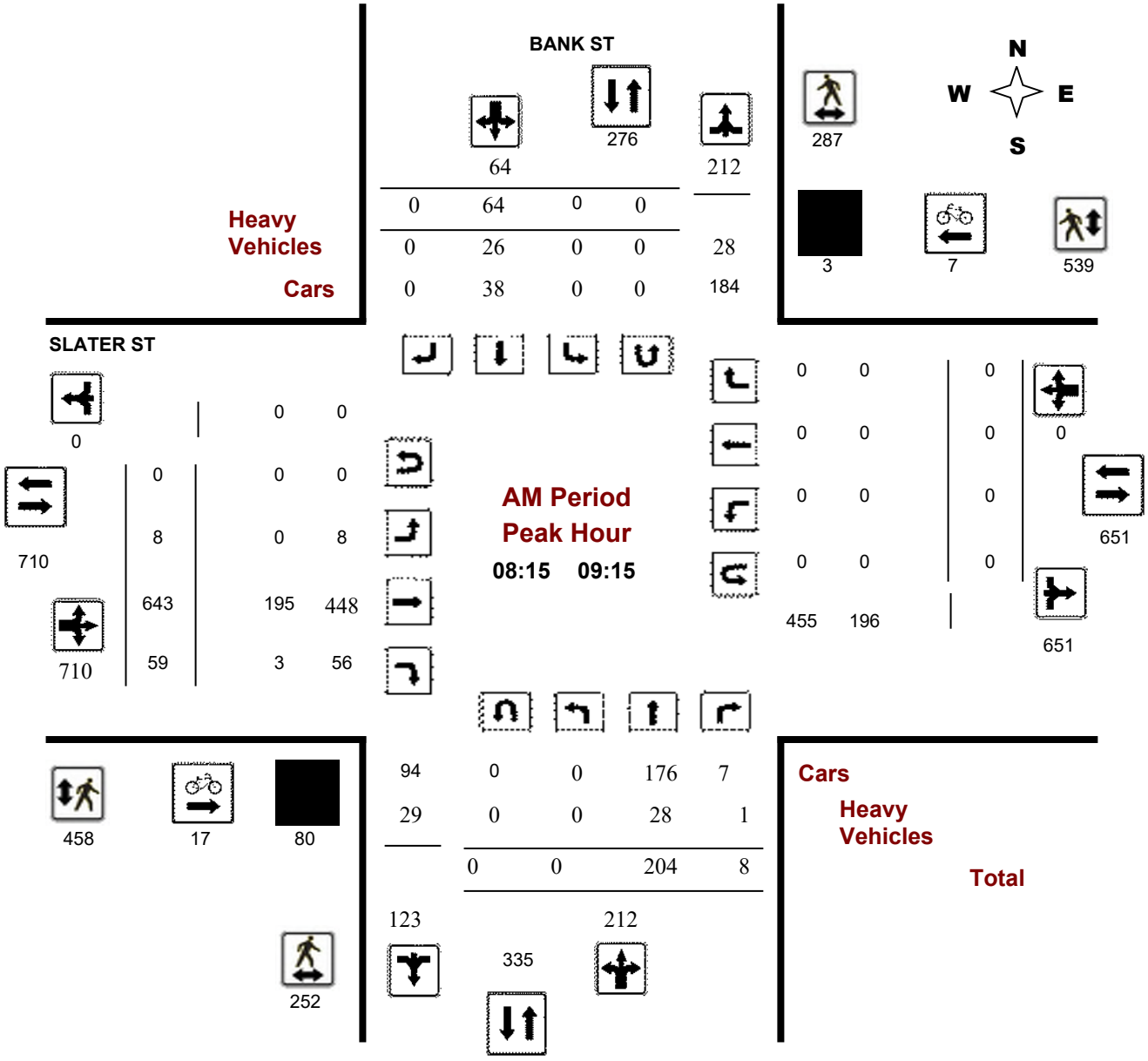
Start Time: 07:00

WO No: 34835
Device: Jamar Technologies, Inc



Comments

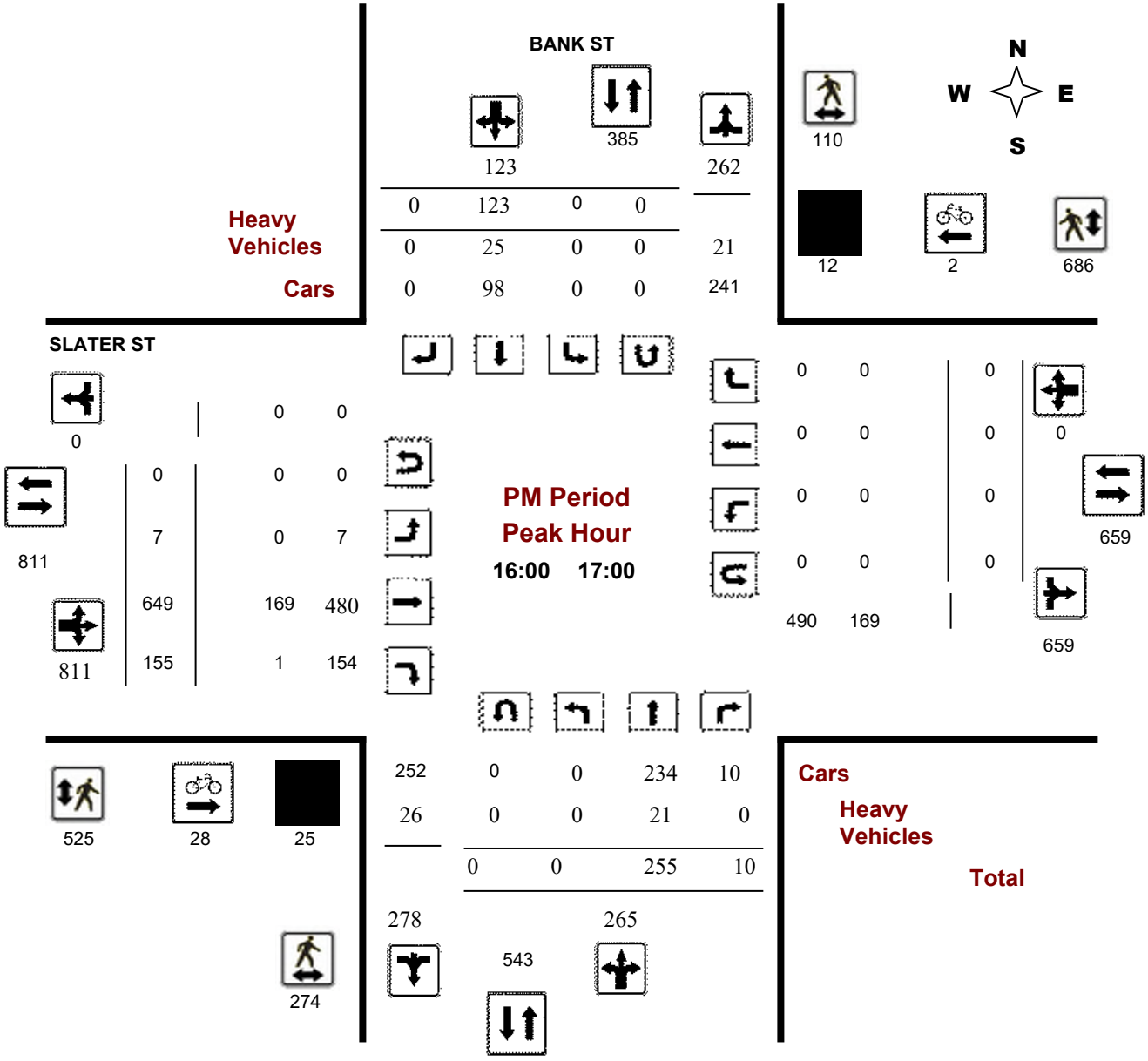
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ SLATER ST

Survey Date: Monday, July 06, 2015
Start Time: 07:00

WO No: 34835
Device: Jamar Technologies, Inc



Comments

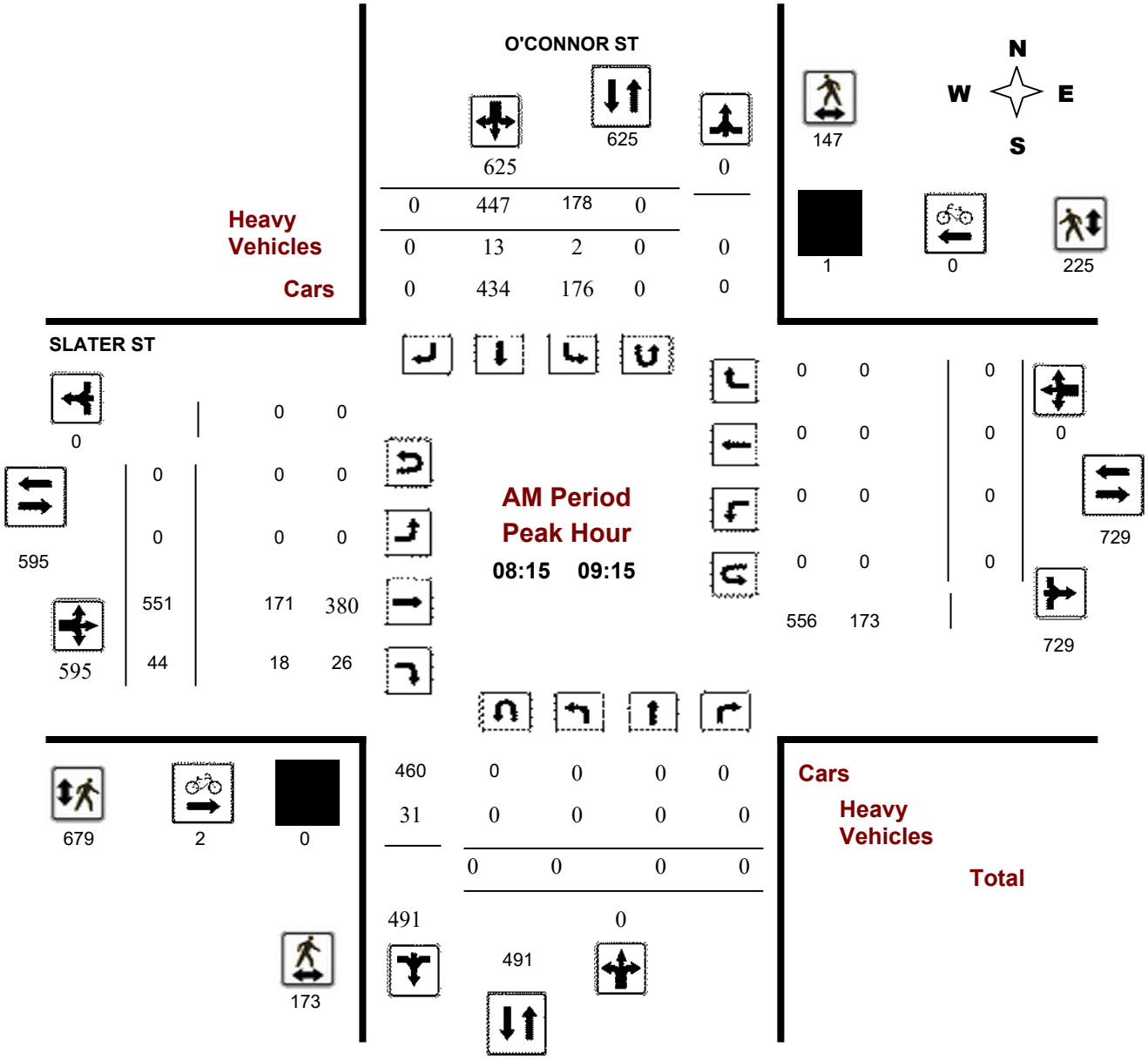
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

O'CONNOR ST @ SLATER ST

Survey Date: Monday, August 24, 2015
Start Time: 07:00

WO No: 34834
Device: Jamar Technologies, Inc



Comments

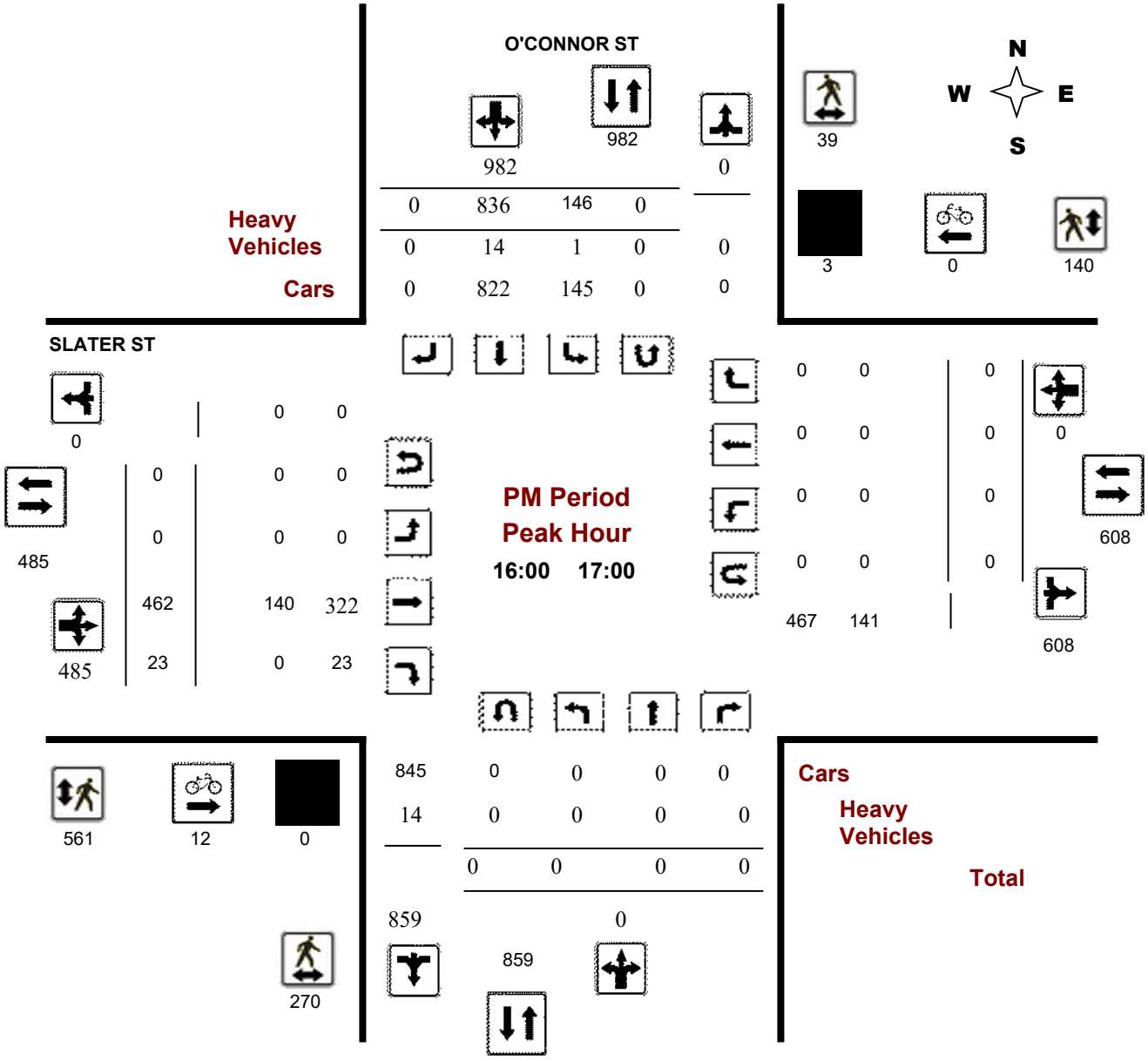
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

O'CONNOR ST @ SLATER ST

Survey Date: Monday, August 24, 2015
Start Time: 07:00

WO No: 34834
Device: Jamar Technologies, Inc



Comments

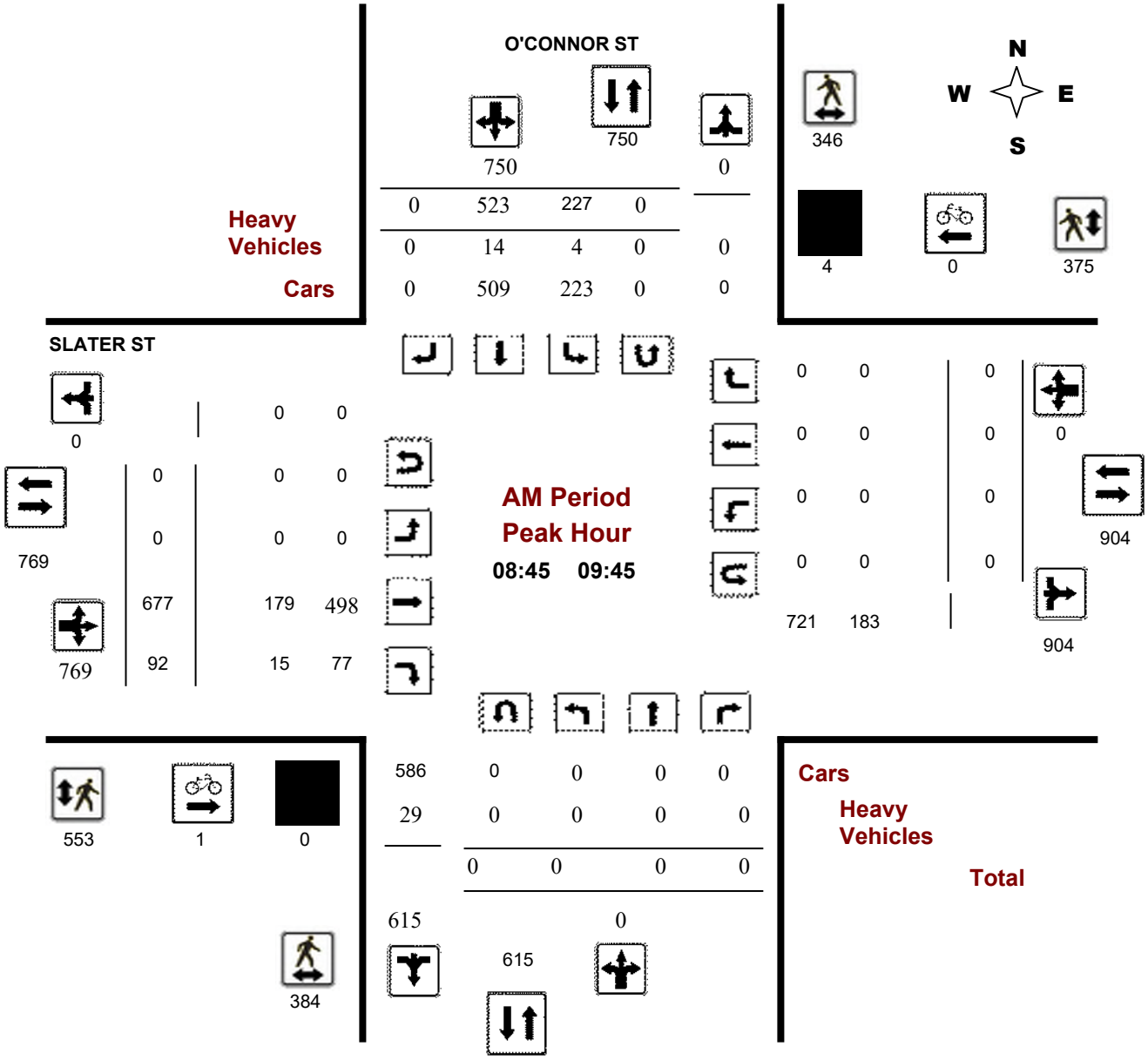
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

O'CONNOR ST @ SLATER ST

Survey Date: Tuesday, March 21, 2017 **WO No:** 36792

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



Comments

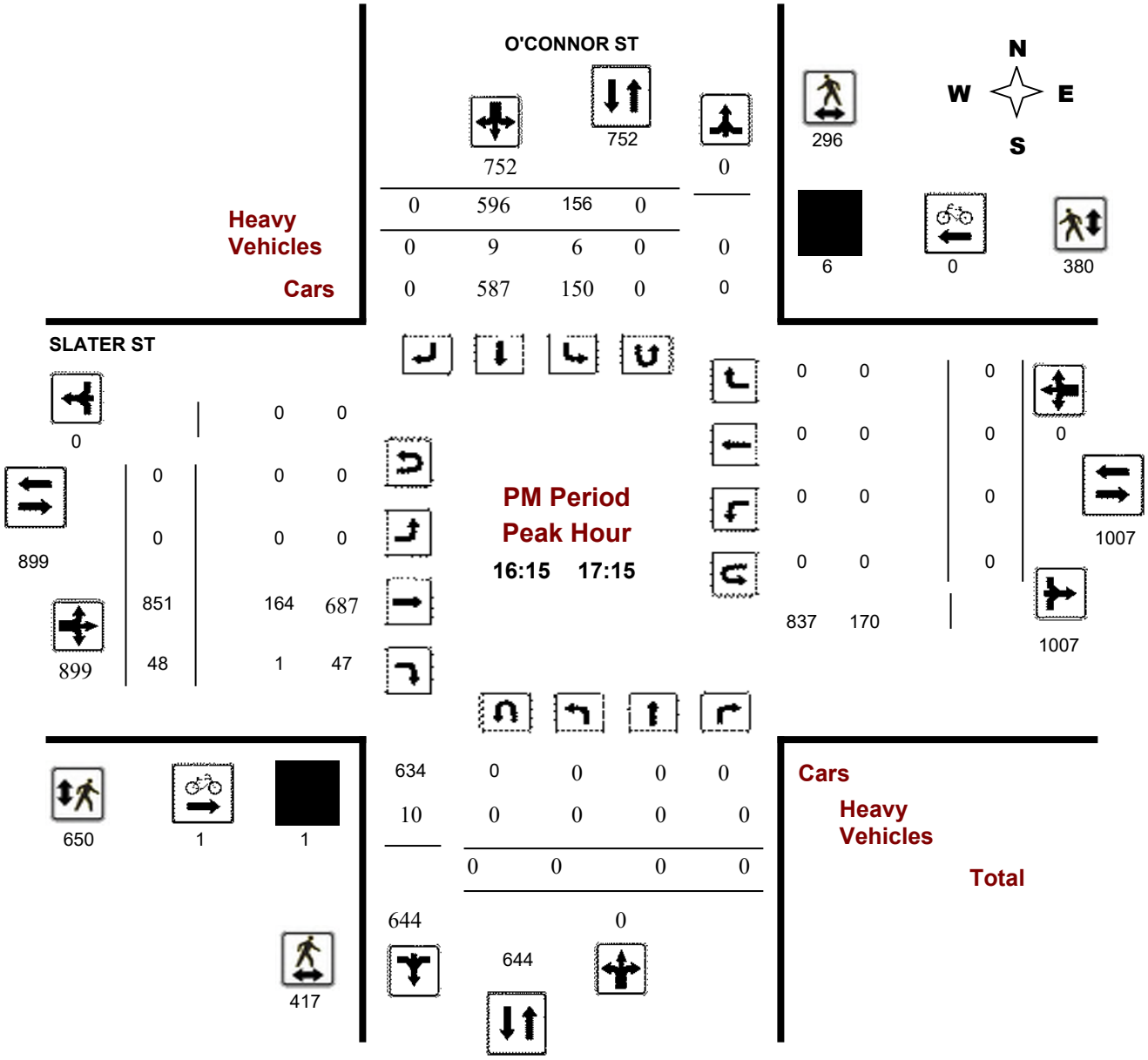
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

O'CONNOR ST @ SLATER ST

Survey Date: Tuesday, March 21, 2017 **WO No:** 36792

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



Comments

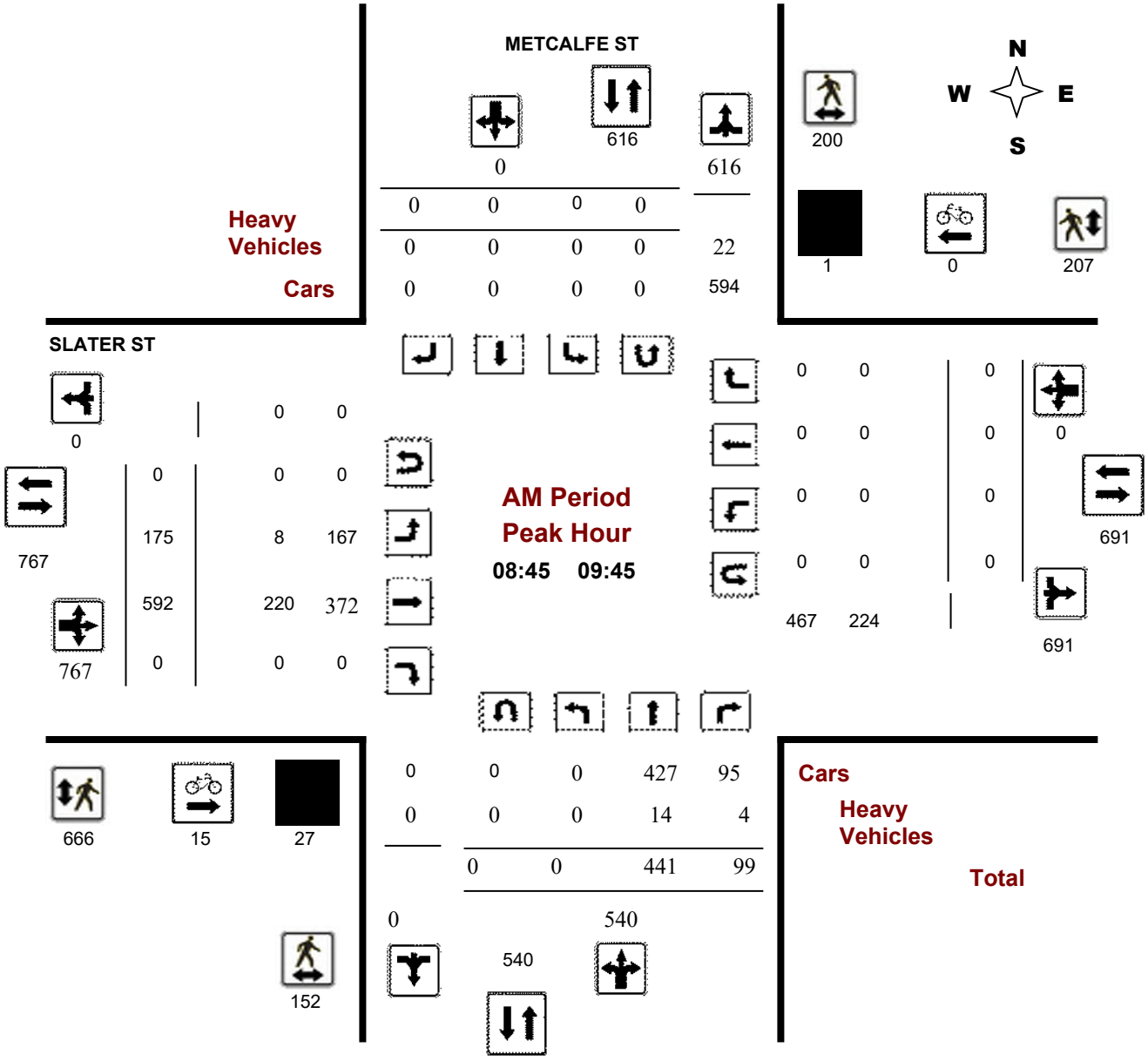
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

METCALFE ST @ SLATER ST

Survey Date: Wednesday, August 19, 2015
Start Time: 07:00

WO No: 35203
Device: Jamar Technologies, Inc



Comments

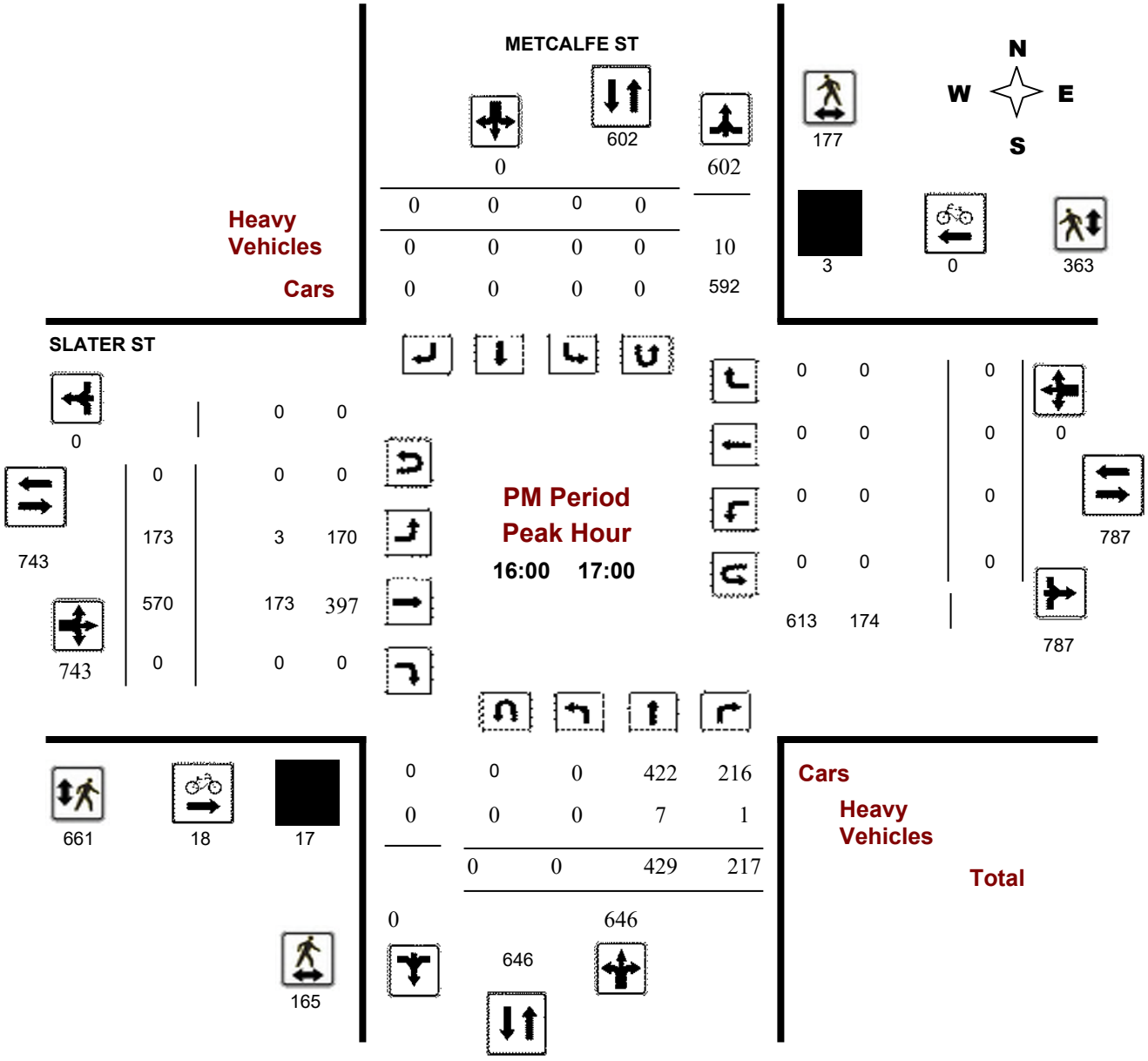
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

METCALFE ST @ SLATER ST

Survey Date: Wednesday, August 19, 2015
Start Time: 07:00

WO No: 35203
Device: Jamar Technologies, Inc



Comments

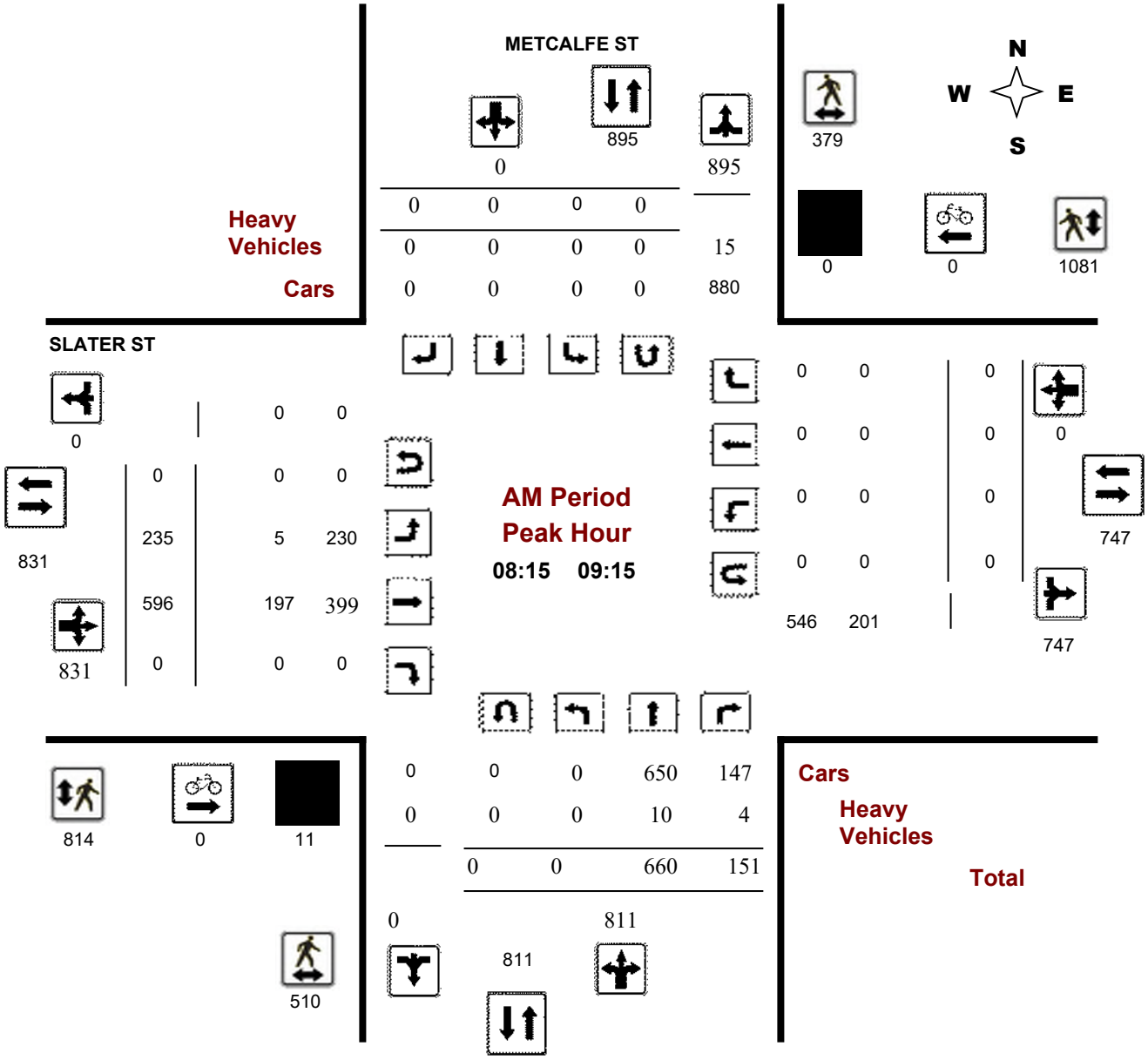
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

METCALFE ST @ SLATER ST

Survey Date: Tuesday, April 04, 2017
Start Time: 07:00

WO No: 36841
Device: Miovision



Comments

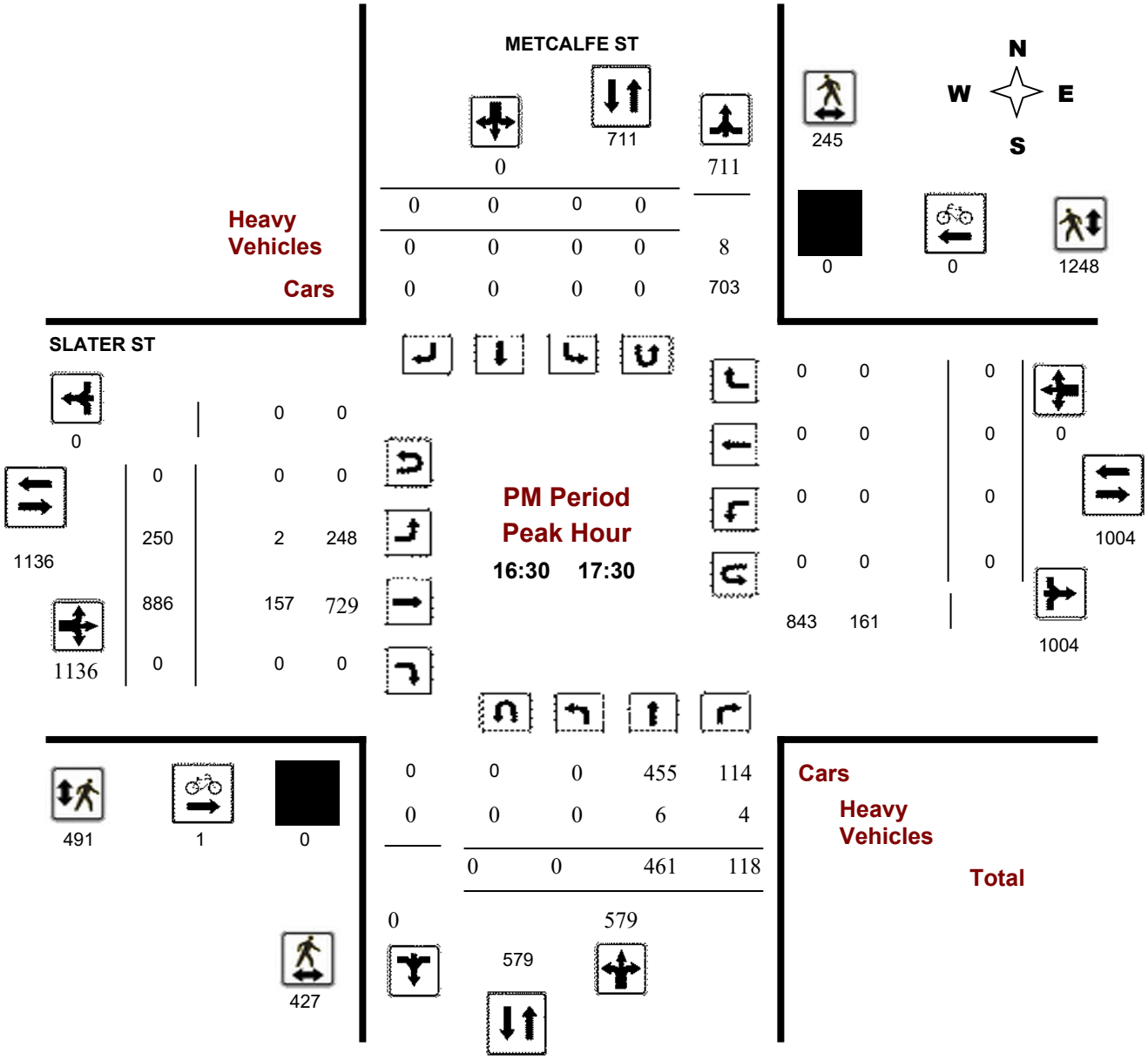
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

METCALFE ST @ SLATER ST

Survey Date: Tuesday, April 04, 2017
Start Time: 07:00

WO No: 36841
Device: Miovision



Comments

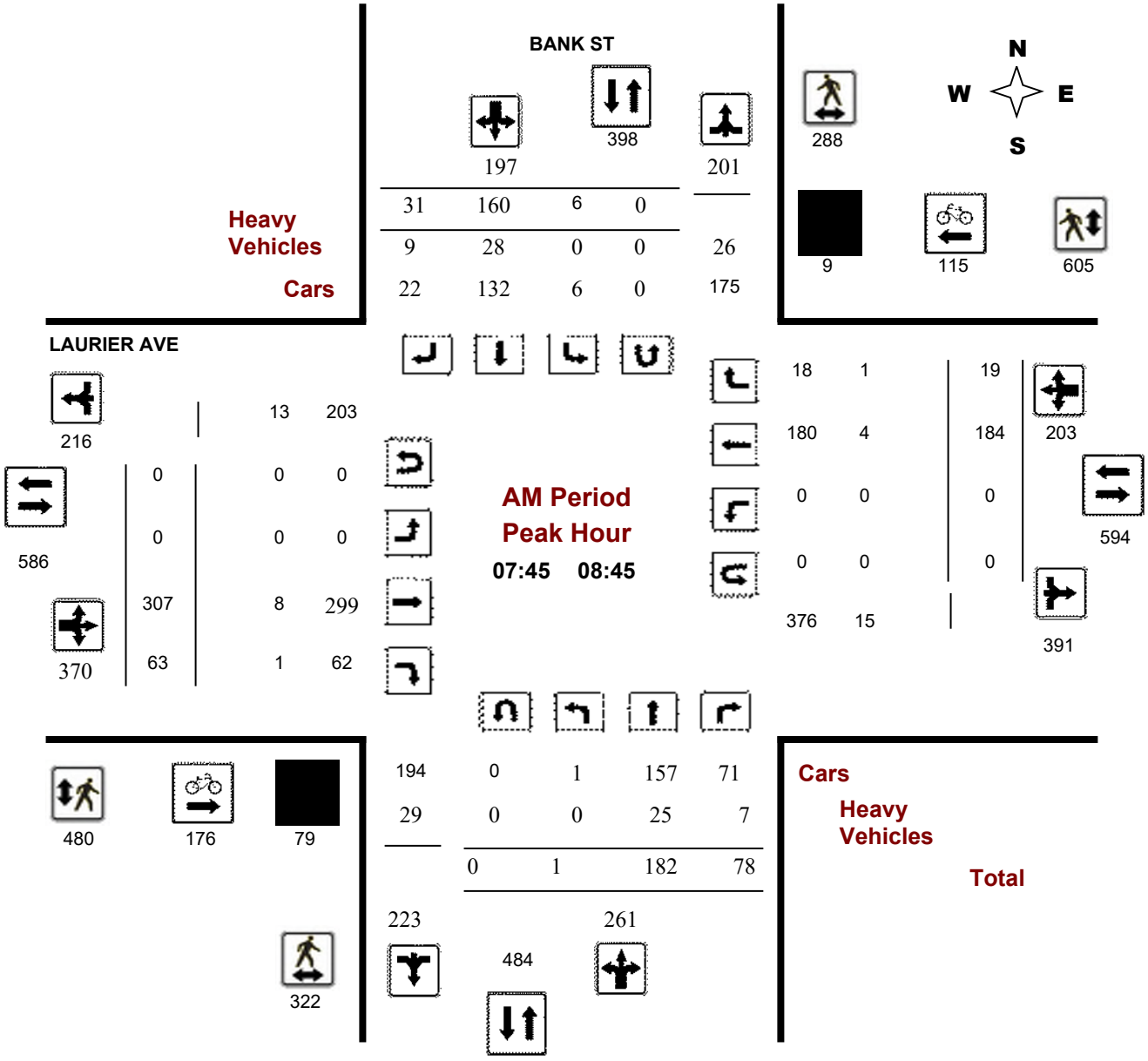
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ LAURIER AVE

Survey Date: Friday, July 24, 2015
Start Time: 07:00

WO No: 35004
Device: Jamar Technologies, Inc



Comments

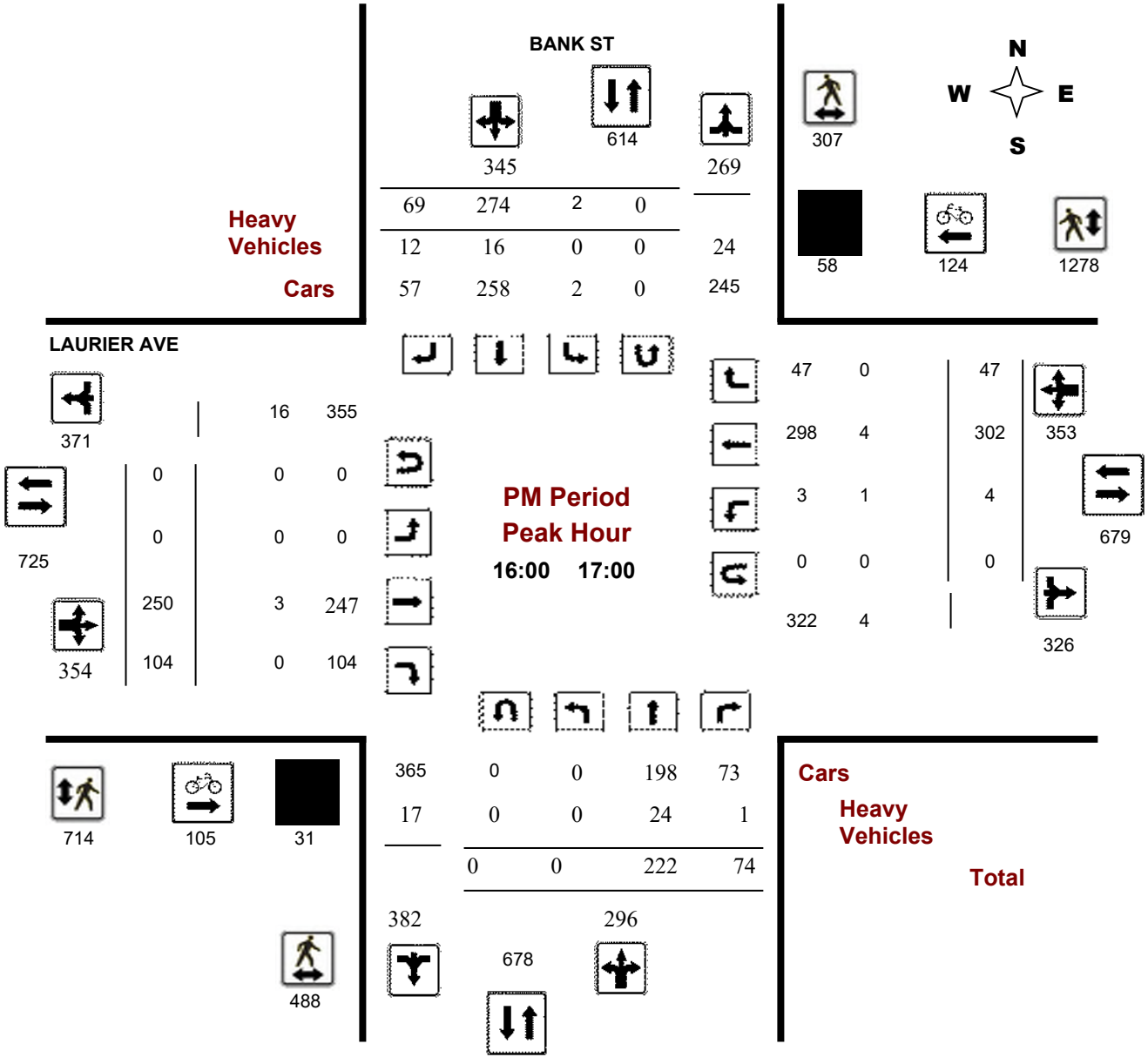
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ LAURIER AVE

Survey Date: Friday, July 24, 2015
Start Time: 07:00

WO No: 35004
Device: Jamar Technologies, Inc



Comments

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

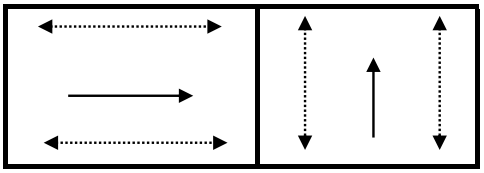
Intersection:	**Main:** Slater	**Side:**	Metcalfe
Controller:	**MS-3200**	**TSD:**	**5057**
Author:	Yassine Bennani	**Date:**	08-Apr-2019

Existing Timing Plans†

	Plan						Ped Minimum Time		
	AM Peak	**Off Peak**	**PM Peak**	**Night**	**Weekend**	**PM Rush**	***Walk***	***DW***	***A+R***
	1	2	3	4	5	17			
Cycle	60	55	55	55	55	55			
Offset	15	29	48	8	29	48			
EB Thru	29	30	33	30	30	33	15	8	3.3+2.1
NB Thru	31	25	22	25	25	22	8	8	3.3+2.2

Phasing Sequence‡

Plan: ALL



Schedule

Weekday

Time	Plan
0:15	4
6:00	1
9:30	2
15:00	3
15:30	17
18:00	2
22:30	4

Saturday

Time	Plan
0:15	4
8:00	2
10:00	5
18:30	2
22:00	4

Sunday

Time	Plan
0:15	4
8:00	2
22:00	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·····► Pedestrian signal

Cost is $57.63 ($51 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

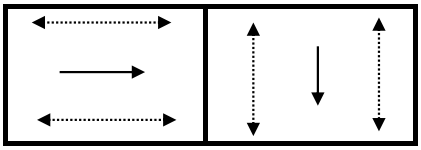
Intersection:	**Main:** Slater	**Side:**	O'Connor
Controller:	**MS-3200**	**TSD:**	**5058**
Author:	Yassine Bennani	**Date:**	08-Apr-2019

Existing Timing Plans†

	Plan					**Ped Minimum Time**		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	***Walk***	***DW***	***A+R***
Cycle	60	55	55	55	55			
Offset	10	13	28	45	13			
EB Thru	34	32	32	32	32	15	10	3.3+2.2
SB Thru	26	23	23	23	23	7	10	3.3+2.2

Phasing Sequence‡

Plan: All



Notes:

1) The EB right turn is prohibited from 7am-9am, and 3pm-6pm, Monday to Friday, with authorized vehicles, taxis, and bicycles excepted.

Schedule

Weekday

Time	Plan
0:15	4
6:00	1
9:30	2
15:00	3
18:00	2
22:30	4

Saturday

Time	Plan
0:15	4
8:00	2
10:00	5
18:30	2
22:00	4

Sunday

Time	Plan
1:00	4
8:00	2
22:00	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·····► Pedestrian signal

Cost is $57.63 ($51 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

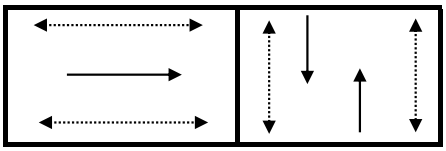
Intersection:	**Main:** Bank	**Side:**	Slater
Controller:	**MS-3200**	**TSD:**	**5059**
Author:	Yassine Bennani	**Date:**	08-Apr-2019

Existing Timing Plans†

	Plan					Ped Minimum Time		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	***Walk***	***DW***	***A+R***
Cycle	60	55	55	55	55			
Offset	35	20	19	35	20			
EB Thru	32	28	30	30	30	10	9	3.3+1.7
NB Thru	28	27	25	25	25	7	10	3.3+2.2
SB Thru	28	27	25	25	25	7	10	3.3+2.2

Phasing Sequence‡

Plan: ALL



Notes:
1) The SB left turn movement is prohibited.
2) The NB right turn is prohibited between 7am-5:30pm Monday to Friday with buses excepted.
3) The EB left turn is prohibited from 7am-9am, and 3pm-6pm, Monday to Friday, with bicycles excepted.

Schedule

Weekday

Time	Plan
0:15	4
6:00	1
9:30	2
15:00	3
18:00	2
22:30	4

Saturday

Time	Plan
0:15	4
8:00	2
10:00	5
22:00	4

Sunday

Time	Plan
0:15	4
8:00	2
22:00	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·····► Pedestrian signal

Cost is $57.63 ($51 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

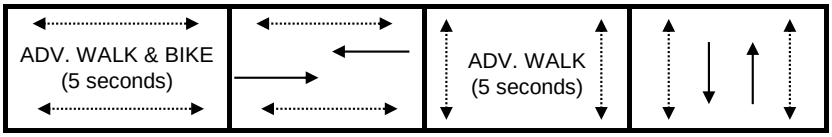
Intersection:	**Main:** Laurier	**Side:**	Bank
Controller:	**MS-3200**	**TSD:**	**5085**
Author:	Yassine Bennani	**Date:**	23-Apr-2019

Existing Timing Plans†

	Plan						**Ped Minimum Time**		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	**Evening** 12	***Walk***	***DW***	***A+R***
Cycle	60	55	55	55	55	55			
Offset	45	23	20	36	23	22			
EB Thru	24	26	27	24	24	25	7	8	3.3+2.6
WB Thru	24	26	27	24	24	25	7	8	3.3+2.6
NB Thru	36	29	28	31	31	30	7	8	3.3+2.3
SB Thru	36	29	28	31	31	30	7	8	3.3+2.3

Phasing Sequence‡

Plan: ALL



Notes: 1) The Thru arrow is displayed during the North-South advanced walk, followed by the green ball.

2) The right turn on red is prohibited in all directions.

3) The left turn movement is prohibited in all directions. Bicycles are excepted for the SB Left only.

Schedule

Weekday

Time	Plan
0:15	4
7:00	1
9:30	2
15:00	3
18:00	12
22:30	4

Saturday

Time	Plan
0:10	4
8:00	2
10:00	5
22:00	4

Sunday

Time	Plan
0:15	4
8:00	2
22:00	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·····► Pedestrian signal

Cost is $57.63 ($51 + HST)

APPENDIX E

Relevant Excerpts from ITE Trip Generation Manual, 5th Edition

ITE Traffic Eng Handbook 4th Edition

Table 14–1 Typical Peak-Hour Volumes as a Percentage of the Total Parking Stalls

	A.M. Peak Hour		P.M. Peak Hour	
Type of Activity	In	Out	In	Out
Hotel-motel	30 – 50	30 – 50	30 – 60	10 – 30
Residential	5 – 10	30 – 50	30 – 50	10 – 30
Office	40 – 70	5 – 15	5 – 20	40 – 70
Medical Office	40 – 60	10 – 20	10 – 30	60 – 80
Hospital				
Visitor	30 – 40	40 – 50	40 – 60	50 – 75
Employee	60 – 75	5 – 10	10 – 15	60 – 75
Retail-commercial	10 – 30	10 – 20	30 – 60	40 – 65
Central business district	40 – 60	10 – 20	10 – 30	40 – 60
Airport All Traffic[a]	40 – 65	30 – 50	70 – 80	70 – 80
Short-term (0 – 3 hr)	50 – 75	80 – 100	90 – 100	90 – 100
Mid-term (4 – 24 hr)	10 – 30	5 – 10	10 – 30	10 – 30
Long-term (more than 24 hr)	5 – 10	5 – 10	5 – 10	5 – 10
Special events	Before event—(In) 80 – 100		After event—(Out) 85 – 200[b]	

[a] Parking and bypass (loading–unloading).
[b] Maximum assumes a 30-min departure.

Source: Adapted from Robert A. Weant and Herbert S. Levinson, *Parking*, Westport, Conn. Eno Foundation for Transportation, Inc., 1990. Adapted from Robert W. Crommelin, *Entrance-Exit Design and Control for Major Parking Facilities*, a seminar presentation (Encino, Calif., 1972); and Anthony P. Chest, Mary S. Smith, and Sam Bhuyan, *Parking Structures Planning, Design, Construction, Maintenance and Repair* (New York, Van Nostrand Reinhold, 1989).

on the type of generator served, user characteristics (employee, shopper, etc.), and parking capacity. Volumes are typically expressed as a ratio of the number of vehicles to the number of parking stalls in the facility. Table 14–1 gives peak-hour ratios for a number of activities.

The number of vehicles that can enter (acceptance rate) or leave a parking facility, per lane, is related to the angle of approach (sharp turns have less capacity then straight-in runs), whether any control is used, the familiarity of the driver with the facility, the freedom of internal circulation (for entry), the amount of vehicular traffic on the streets (for exit) and the degree of conflict with pedestrians crossing the driveway. In general, for a self-parking facility with no control, the capacity per lane ranges up to 800 vph. One engineer has recommended a design value of 400 vph.[5] Guidelines have been developed for considering capacities related to control methods, and also to street traffic (but not pedestrian sidewalk conflicts).[6]

Table 14–2 Vehicle Acceptance Rates of Large Parking Areas

		Average Acceptance Rates Vehicles per Hour per Lane	
Approach to Entrance	Number of Studies	Unfamiliar Entrance[a]	Familiar Entrance[b]
Straight approach (no turn movement)	20	850	1,100
90° right turn	15	750	1,000
90° left turn	24	830	900
Oblique angle, right	8	650	1,000
Oblique angle, left	4	720	[c]

[a] Includes racetracks, stadiums, and other facilities not frequently visited by the same individuals.
[b] Includes industrial plants, military bases, and other facilities where the same drivers enter daily.
[c] No data available.

Source: A.A. Carter, Jr. "Vehicle Acceptance Rates of Parking Areas," *Public Roads* (Oct. 1959).

[5] R.T. Hinerasteiner, "Parking Control Guidelines for the Design of Parking Facility Portals," *ITE Journal* (Jan. 1989), p. 28–31.

[6] J.M. Frantzeskakis, "Traffic Flow Analysis for Dimensioning Entrances-Exits and Reservoir Space for Off Street Parking," *ITE Journal* (May 1981), pp. 16–24.

APPENDIX F

Collision Records

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2013 **To:** December 31, 2017

Location: BANK ST @ SLATER ST

Traffic Control: Traffic signal

Total Collisions: 30

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Dec-18, Mon,09:24	Snow	Rear end	Non-fatal injury	Slush	North	Slowing or stopping	Truck - closed	Other motor vehicle	
					North	Slowing or stopping	Passenger van	Other motor vehicle	
2017-Dec-09, Sat,17:33	Snow	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Sep-25, Mon,02:24	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Jun-29, Thu,16:35	Rain	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-May-08, Mon,14:08	Clear	Rear end	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2017-Jan-15, Sun,06:18	Clear	Angle	Non-fatal injury	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	

					East	Going ahead	Municipal transit bus	Other motor vehicle
2016-Dec-29, Thu,13:42	Snow	Rear end	Non-fatal injury	Loose snow	East	Going ahead	Municipal transit bus	Other motor vehicle
					East	Stopped	Municipal transit bus	Other motor vehicle
2016-Sep-02, Fri,10:30	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Pick-up truck	Other motor vehicle
					East	Turning right	Passenger van	Other motor vehicle
2016-Aug-03, Wed,01:08	Clear	Angle	P.D. only	Dry	West	Turning right	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Truck-other	Other motor vehicle
2016-Apr-25, Mon,09:45	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle
2016-Jan-26, Tue,13:15	Clear	Sideswipe	P.D. only	Wet	South	Overtaking	Pick-up truck	Other motor vehicle
					South	Stopped	Municipal transit bus	Other motor vehicle
2016-Jan-21, Thu,16:23	Clear	Sideswipe	P.D. only	Wet	North	Unknown	Unknown	Other motor vehicle
					North	Stopped	Municipal transit bus	Other motor vehicle
2015-Aug-03, Mon,20:33	Clear	Sideswipe	P.D. only	Dry	South	Overtaking	Automobile, station wagon	Other motor vehicle

					South	Stopped	Municipal transit bus	Other motor vehicle	
2015-Jul-29, Wed,12:31	Clear	SMV other	Non-fatal injury	Dry	East	Going ahead	Delivery van	Pedestrian	1
2015-Jan-30, Fri,23:07	Clear	Angle	P.D. only	Packed snow	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Municipal transit bus	Other motor vehicle	
2015-Jan-19, Mon,10:22	Clear	Turning movement	P.D. only	Dry	East	Turning left	Passenger van	Other motor vehicle	
					East	Going ahead	Delivery van	Other motor vehicle	
2014-Dec-27, Sat,01:33	Clear	Other	P.D. only	Dry	South	Reversing	Pick-up truck	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Mar-19, Wed,12:26	Clear	Turning movement	P.D. only	Dry	North	Turning right	Delivery van	Other motor vehicle	
					North	Turning right	Pick-up truck	Other motor vehicle	
2014-Feb-18, Tue,12:10	Snow	Sideswipe	P.D. only	Loose snow	South	Overtaking	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Municipal transit bus	Other motor vehicle	
2013-Dec-21, Sat,23:29	Snow	Angle	P.D. only	Loose snow	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	

					North	Turning right	Automobile, station wagon	Other motor vehicle
2013-Nov-03, Sun,17:22	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2013-Oct-02, Wed,16:30	Clear	Angle	Non-reportable	Dry	East	Turning left	Municipal transit bus	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2013-Sep-15, Sun,17:00	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Municipal transit bus	Other motor vehicle
2013-Sep-08, Sun,03:10	Clear	Other	P.D. only	Wet	East	Reversing	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2013-Sep-07, Sat,13:16	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Municipal transit bus	Other motor vehicle
2013-Jun-21, Fri,18:21	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle

2013-May-29, Wed,18:05	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2013-Feb-19, Tue,14:26	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Jan-18, Fri,17:03	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Jan-12, Sat,18:40	Clear	Turning movement	P.D. only	Wet	East	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Municipal transit bus	Other motor vehicle	

Location: METCALFE ST @ SLATER ST

Traffic Control: Traffic signal **Total Collisions:** 27

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Nov-02, Thu,21:45	Rain	SMV other	Non-fatal injury	Wet	East	Turning left	Automobile, station wagon	Pedestrian	1
2017-Mar-14, Tue,15:53	Snow	SMV other	Non-fatal injury	Loose snow	East	Turning left	Passenger van	Pedestrian	1
2017-Jan-19, Thu,08:14	Clear	Sideswipe	P.D. only	Wet	East	Going ahead	Truck-other	Other motor vehicle	
					East	Stopped	Municipal transit bus	Other motor vehicle	

2017-Jan-11, Wed,06:30	Rain	Angle	P.D. only	Slush	East	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Dec-15, Thu,12:58	Clear	Sideswipe	P.D. only	Wet	East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jun-19, Sun,23:07	Clear	Angle	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2016-May-25, Wed,15:33	Clear	SMV other	Non-fatal injury	Dry	North	Turning right	Pick-up truck	Pedestrian	1
2015-Nov-30, Mon,22:20	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Jun-18, Thu,15:56	Clear	SMV other	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Pedestrian	1
2015-Mar-03, Tue,14:23	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Changing lanes	Pick-up truck	Other motor vehicle	
2015-Feb-23, Mon,16:00	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	
					West	Turning left	Automobile, station wagon	Other motor vehicle	

2015-Jan-24, Sat,19:15	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Jan-03, Sat,20:45	Snow	Turning movement	P.D. only	Ice	East	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2014-Dec-09, Tue,15:12	Clear	Rear end	P.D. only	Dry	East	Unknown	Automobile, station wagon	Other motor vehicle	
					East	Unknown	Delivery van	Other motor vehicle	
2014-Oct-28, Tue,02:27	Rain	Angle	P.D. only	Wet	East	Going ahead	Municipal transit bus	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Aug-10, Sun,22:23	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other	
2014-Jun-19, Thu,14:30	Clear	SMV other	Non-fatal injury	Dry	East	Turning left	Pick-up truck	Pedestrian	1
2014-May-27, Tue,10:52	Clear	Angle	Non-fatal injury	Dry	North	Turning right	Bicycle	Other motor vehicle	
					East	Going ahead	Municipal transit bus	Cyclist	
2014-Mar-14, Fri,19:33	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

2013-Dec-21, Sat,10:30	Clear	Sideswipe	Non-reportable	Slush	East	Changing lanes	Delivery van	Other motor vehicle
					East	Going ahead	Passenger van	Other motor vehicle
2013-Dec-18, Wed,15:24	Clear	Sideswipe	P.D. only	Slush	North	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2013-Dec-14, Sat,19:08	Snow	Angle	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2013-Nov-30, Sat,08:23	Snow	Angle	P.D. only	Slush	East	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2013-Nov-10, Sun,03:36	Clear	Angle	P.D. only	Wet	North	Going ahead	Pick-up truck	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2013-Nov-02, Sat,17:50	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Passenger van	Other motor vehicle
2013-Jul-02, Tue,12:08	Clear	Sideswipe	P.D. only	Dry	North	Pulling away from shoulder or curb	Delivery van	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle

2013-May-28, Tue,12:47	Clear	Sideswipe	Non-fatal injury	Dry	North	Stopped	Automobile, station wagon	Cyclist	
					North	Going ahead	Bicycle	Other motor vehicle	

Location: O'CONNOR ST @ SLATER ST

Traffic Control: Traffic signal **Total Collisions:** 20

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Nov-14, Tue,13:41	Clear	Sideswipe	P.D. only	Dry	South	Pulling away from shoulder or curb	Unknown	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jul-25, Tue,05:54	Rain	Turning movement	P.D. only	Wet	East	Turning right	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jan-30, Mon,19:03	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2017-Jan-16, Mon,14:52	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Truck - closed	Other motor vehicle	
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2016-Jul-26, Tue,19:35	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jul-27, Wed,12:10	Clear	SMV other	Non-fatal injury	Dry	South	Turning left	Pick-up truck	Pedestrian	1

2016-Jul-08, Fri,14:18	Clear	Sideswipe	P.D. only	Dry	East	Unknown	Unknown	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2016-Feb-12, Fri,17:11	Snow	Rear end	P.D. only	Loose snow	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2016-Jan-19, Tue,12:00	Clear	Turning movement	P.D. only	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Sep-16, Wed,14:52	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Pick-up truck	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle
2015-Jan-24, Sat,19:35	Snow	Sideswipe	P.D. only	Wet	South	Changing lanes	Automobile, station wagon	Other motor vehicle
					South	Unknown	Passenger van	Other motor vehicle
2015-Jan-18, Sun,07:15	Clear	Angle	Non-fatal injury	Wet	South	Going ahead	Passenger van	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Sep-13, Sat,11:59	Rain	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Municipal transit bus	Other motor vehicle

2014-May-22, Thu,19:35	Clear	SMV other	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Pedestrian	1
2014-Feb-18, Tue,15:30	Snow	Rear end	P.D. only	Loose snow	South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Feb-14, Fri,08:50	Snow	Rear end	P.D. only	Packed snow	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Sep-30, Mon,09:45	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Sep-30, Mon,08:20	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Pick-up truck	Other motor vehicle	
2013-Apr-29, Mon,12:01	Clear	SMV other	P.D. only	Dry	East	Going ahead	Truck - closed	Other	
2013-Mar-28, Thu,13:36	Clear	Sideswipe	P.D. only	Dry	East	Going ahead	Municipal transit bus	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: SLATER ST btwn BANK ST & O'CONNOR ST

Traffic Control: No control **Total Collisions:** 21

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

2017-Jun-18, Sun,22:30	Clear	SMV unattended vehicle	P.D. only	Dry	Unknown	Unknown	Unknown	Unattended vehicle	
2017-Feb-07, Tue,15:21	Clear	Sideswipe	P.D. only	Wet	East	Pulling onto shoulder or toward curb	Delivery van	Other motor vehicle	
					East	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	
2016-Oct-26, Wed,07:00	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Pick-up truck	Other motor vehicle	
					East	Going ahead	Delivery van	Other motor vehicle	
2016-Sep-28, Wed,15:46	Clear	Other	P.D. only	Dry	South	Reversing	Delivery van	Other motor vehicle	
					East	Going ahead	Municipal transit bus	Other motor vehicle	
2016-Jun-18, Sat,19:48	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Pick-up truck	Other motor vehicle	
					East	Going ahead	Municipal transit bus	Other motor vehicle	
2016-Jun-10, Fri,15:16	Clear	SMV other	Non-fatal injury	Dry	East	Slowing or stopping	Municipal transit bus	Pedestrian	1
2016-Apr-06, Wed,18:26	Snow	Rear end	P.D. only	Loose snow	East	Slowing or stopping	Municipal transit bus	Other motor vehicle	
					East	Stopped	Municipal transit bus	Other motor vehicle	
2015-Dec-08, Tue,17:17	Clear	SMV other	Non-fatal injury	Dry	West	Reversing	Passenger van	Pedestrian	1

2015-Jul-14, Tue,13:21	Clear	Sideswipe	P.D. only	Dry	West	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Apr-01, Wed,12:00	Clear	SMV unattended vehicle	P.D. only	Dry	East	Pulling away from shoulder or curb	Pick-up truck	Unattended vehicle
2015-Feb-08, Sun,09:46	Snow	Rear end	Non-fatal injury	Packed snow	East	Slowing or stopping	Municipal transit bus	Other motor vehicle
					East	Stopped	Municipal transit bus	Other motor vehicle
2015-Jan-05, Mon,21:47	Snow	Sideswipe	P.D. only	Wet	East	Going ahead	Municipal transit bus	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Dec-15, Mon,02:46	Clear	Sideswipe	P.D. only	Wet	East	Unknown	Unknown	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2014-Nov-04, Tue,21:12	Rain	Sideswipe	P.D. only	Wet	East	Going ahead	Passenger van	Other motor vehicle
					East	Going ahead	Municipal transit bus	Other motor vehicle
2014-Sep-23, Tue,23:43	Clear	Sideswipe	P.D. only	Dry	East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Municipal transit bus	Other motor vehicle
2014-Jul-14, Mon,17:45	Clear	Sideswipe	P.D. only	Dry	East	Going ahead	Truck and trailer	Other motor vehicle

					East	Stopped	Automobile, station wagon	Other motor vehicle
2014-Mar-18, Tue,08:11	Clear	Other	P.D. only	Dry	West	Reversing	Truck - dump	Other motor vehicle
					East	Going ahead	Municipal transit bus	Other motor vehicle
2013-Jul-13, Sat,01:17	Clear	SMV unattended vehicle	P.D. only	Dry	East	Making "U" turn	Automobile, station wagon	Unattended vehicle
2013-Feb-28, Thu,13:00	Clear	SMV unattended vehicle	P.D. only	Slush	Unknown	Unknown	Unknown	Unattended vehicle
2013-Feb-08, Fri,15:37	Snow	Rear end	Non-fatal injury	Loose snow	East	Slowing or stopping	Municipal transit bus	Other motor vehicle
					East	Stopped	Municipal transit bus	Other motor vehicle
2013-Jan-18, Fri,23:14	Snow	Rear end	Non-reportable	Loose snow	East	Slowing or stopping	Municipal transit bus	Other motor vehicle
					East	Stopped	Municipal transit bus	Other motor vehicle

Location: SLATER ST btwn O'CONNOR ST & METCALFE ST

Traffic Control: No control

Total Collisions: 10

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Jun-01, Thu,17:07	Clear	SMV other	Non-fatal injury	Wet	West	Reversing	Automobile, station wagon	Pedestrian	1
2016-Oct-14, Fri,20:50	Clear	SMV unattended vehicle	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Unattended vehicle	

2016-Jan-17, Sun,23:15	Snow	Sideswipe	P.D. only	Slush	East	Slowing or stopping	Passenger van	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Municipal transit bus	Other motor vehicle	
2015-Jul-31, Fri,16:14	Clear	Other	P.D. only	Dry	West	Reversing	Truck - closed	Other motor vehicle	
					East	Stopped	Pick-up truck	Other motor vehicle	
2015-Jun-24, Wed,15:15	Clear	Other	P.D. only	Dry	West	Reversing	Pick-up truck	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Sep-25, Thu,11:10	Clear	Sideswipe	Non-fatal injury	Dry	East	Pulling away from shoulder or curb	Bicycle	Other motor vehicle	
					East	Going ahead	Municipal transit bus	Cyclist	
2014-Feb-28, Fri,12:52	Clear	SMV other	Non-fatal injury	Dry	West	Reversing	Automobile, station wagon	Pedestrian	1
2014-Feb-06, Thu,06:53	Clear	Sideswipe	Non-fatal injury	Wet	East	Changing lanes	Pick-up truck	Other motor vehicle	
					East	Going ahead	Municipal transit bus	Other motor vehicle	
2014-Feb-04, Tue,16:00	Clear	Angle	P.D. only	Slush	South	Turning left	Passenger van	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	

2013-Oct-18, Fri,16:57	Clear	Angle	P.D. only	Dry	South	Turning left	Pick-up truck	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2013 **To:** December 31, 2017

Location: BANK ST @ LAURIER AVE

Traffic Control: Traffic signal

Total Collisions: 35

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Nov-02, Fri,17:30	Rain	SMV other	Non-fatal injury	Wet	East	Going ahead	Bicycle	Pedestrian	
2018-Aug-13, Mon,10:40	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Unknown	Cyclist	
					East	Going ahead	Bicycle	Other motor vehicle	
2018-Jun-06, Wed,17:06	Clear	Turning movement	P.D. only	Dry	East	Making "U" turn	Unknown	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Apr-25, Wed,13:56	Clear	Sideswipe	P.D. only	Dry	East	Unknown	Automobile, station wagon	Other motor vehicle	
					East	Unknown	Automobile, station wagon	Other motor vehicle	
2018-Mar-08, Thu,17:15	Snow	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2017-Oct-02, Mon,19:06	Clear	Turning movement	Non-fatal injury	Dry	West	Turning right	Automobile, station wagon	Cyclist	
					West	Going ahead	Bicycle	Other motor vehicle	

2017-Sep-06, Wed,12:53	Clear	Sideswipe	Non-fatal injury	Dry	East	Going ahead	Bicycle	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Cyclist	
2017-Aug-03, Thu,16:30	Clear	Sideswipe	P.D. only	Dry	North	Unknown	Unknown	Other motor vehicle	
					North	Stopped	Passenger van	Other motor vehicle	
2017-Jun-09, Fri,14:56	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Unknown	Cyclist	
					East	Going ahead	Bicycle	Other motor vehicle	
2017-Jun-01, Thu,15:01	Clear	SMV other	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Pedestrian	1
2016-Dec-20, Tue,21:07	Clear	Turning movement	P.D. only	Loose snow	North	Turning right	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-May-24, Tue,15:30	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Passenger van	Other motor vehicle	
2016-May-23, Mon,07:59	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Passenger van	Other motor vehicle	

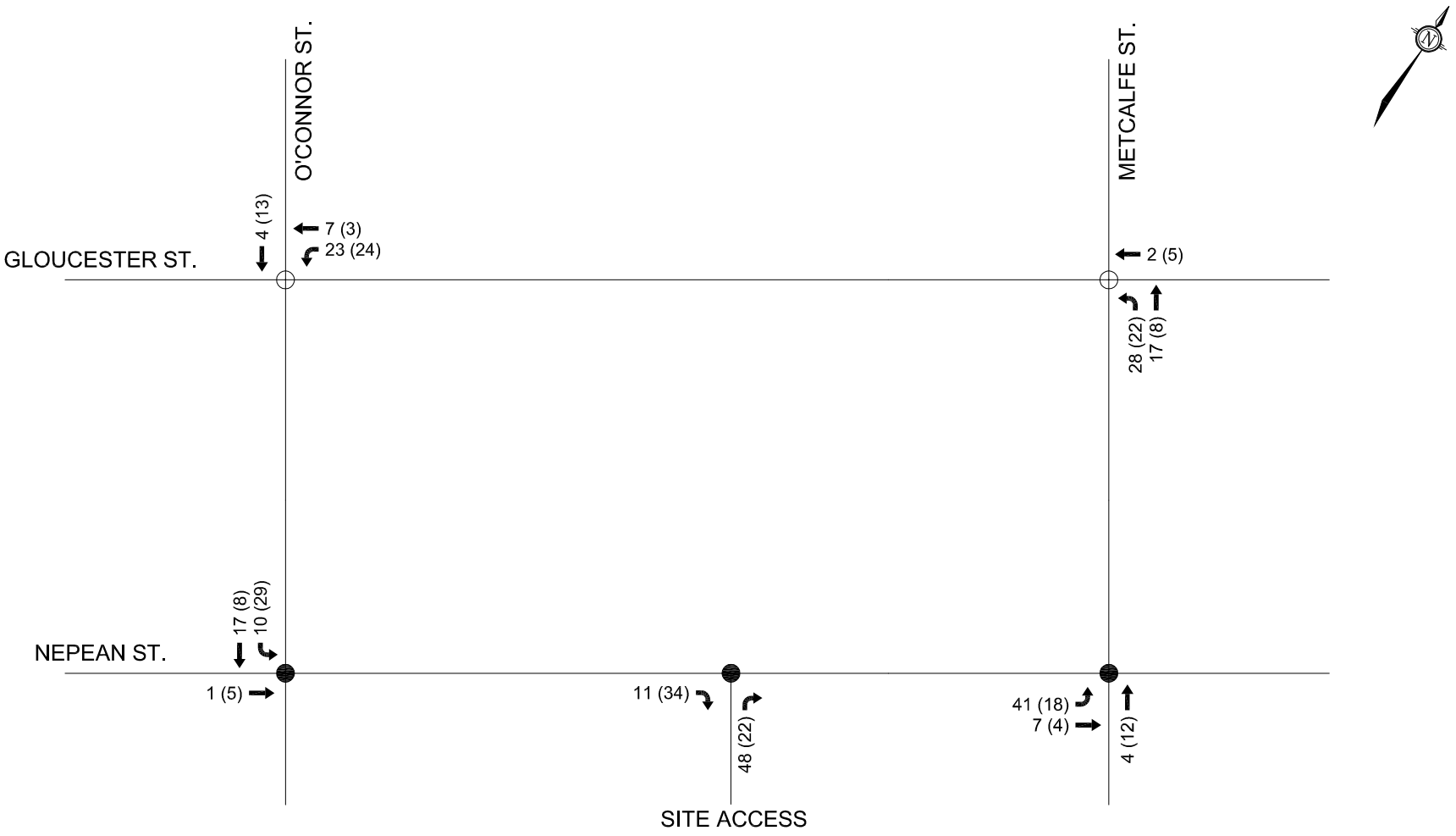
2016-Apr-10, Sun,02:30	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jan-26, Tue,11:05	Clear	SMV other	Non-fatal injury	Wet	West	Going ahead	Delivery van	Pedestrian	1
2016-Jan-21, Thu,14:03	Clear	Sideswipe	P.D. only	Dry	South	Turning right	School bus	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Sep-16, Wed,20:32	Clear	Angle	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	
2015-Aug-24, Mon,06:42	Clear	Turning movement	Non-fatal injury	Dry	East	Turning right	Pick-up truck	Cyclist	
					East	Going ahead	Bicycle	Other motor vehicle	
2015-Jul-24, Fri,12:15	Clear	Sideswipe	P.D. only	Dry	North	Overtaking	Pick-up truck	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2015-Jun-27, Sat,13:29	Clear	Turning movement	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Cyclist	
					East	Going ahead	Bicycle	Other motor vehicle	
2015-Feb-03, Tue,17:36	Snow	Rear end	P.D. only	Loose snow	East	Slowing or stopping	Pick-up truck	Other motor vehicle	
					East	Stopped	Passenger van	Other motor vehicle	

2015-Jan-15, Thu,19:42	Snow	Sideswipe	P.D. only	Packed snow	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2014-Oct-03, Fri,18:11	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Sep-03, Wed,09:10	Clear	Turning movement	P.D. only	Dry	West	Turning right	Automobile, station wagon	Cyclist	
					West	Going ahead	Bicycle	Other motor vehicle	
2014-Mar-18, Tue,11:30	Clear	Turning movement	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Cyclist	
					East	Going ahead	Bicycle	Other motor vehicle	
2014-Jan-11, Sat,08:00	Rain	Rear end	Non-fatal injury	Packed snow	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Dec-18, Wed,16:01	Clear	Sideswipe	Non-reportable	Dry	South	Overtaking	Pick-up truck	Other motor vehicle	
					South	Stopped	Municipal transit bus	Other motor vehicle	
2013-Oct-30, Wed,11:31	Clear	SMV other	Non-fatal injury	Dry	North	Turning right	Automobile, station wagon	Pedestrian	1

2013-Oct-02, Wed,03:53	Clear	Angle	Fatal injury	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Sep-16, Mon,00:54	Rain	Angle	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Aug-20, Tue,08:43	Clear	Turning movement	Non-fatal injury	Dry	East	Turning right	Pick-up truck	Cyclist	
					East	Going ahead	Bicycle	Other motor vehicle	
2013-Jul-16, Tue,15:08	Clear	SMV other	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Pedestrian	1
2013-Jun-07, Fri,17:10	Rain	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2013-Mar-23, Sat,00:30	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Mar-15, Fri,15:18	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	

APPENDIX G

Relevant Excerpts from Other Area Developments



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: novainfo@novatech-eng.com

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

96 NEPEAN STREET

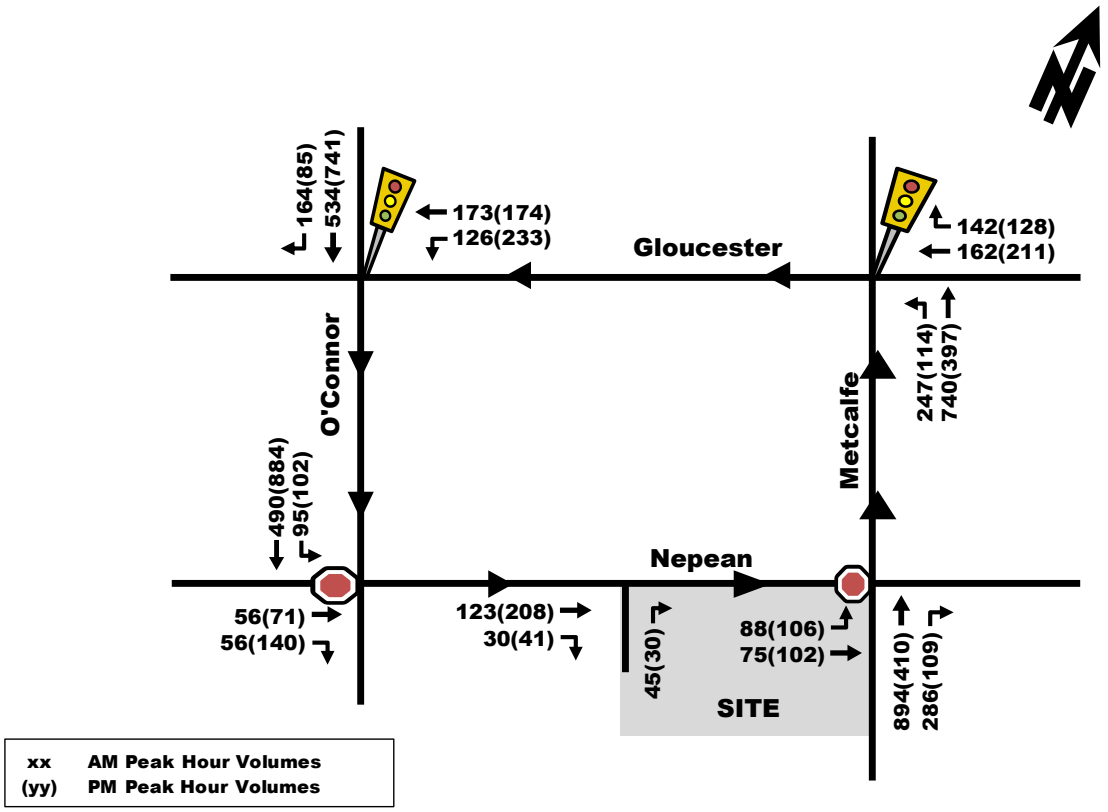
SITE TRAFFIC

MAR 2012 111153 FIGURE 12

8.0 FUTURE TRAFFIC OPERATIONS

For this project in its downtown location, future traffic conditions are determined by analysing the combination of existing traffic (Figure 4) plus the "net" increase in site-generated traffic (Figure 6). The result is depicted in Figure 7.

Figure 7: Projected Peak Hour Traffic Volumes



The following Table 6 provides a summary of projected peak hour performance of the study area intersections. The Synchro model output of projected conditions is provided within Appendix F.

Table 6: Projected Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Metcalfe/Nepean	A(A)	0.45(0.36)	NBT(EBT)	7.0(6.1)	A(A)	0.44(0.25)
O'Connor/Nepean	B(C)	13.2(20.8)	EB(EB)	3.2(4.4)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 6, the study area intersections and the 'critical movements' are projected to operate at an acceptable LoS 'D' or better during both peak hours. This is the same or very similar to existing conditions summarized in Table 1 and no modifications are required to the study area roads or intersections.

9.0 DEMAND RATIONALIZATION

Due to the minimal increase in site-generated traffic and negligible impact on study area traffic operations, demand rationalization is not required for this project.

Table 1: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Residential Condominium	ITE 230	T = 0.44(x); Ln(T) = 0.80(x) + 0.26	T = 0.52(x); Ln(T) = 0.82(x) + 0.32
Retail	ITE 826	T = 1.36(x); T = 1.20(x) + 10.74	T = 2.71(x); T = 2.40(x) + 21.48
Coffee Shop	ITE 936	T = 108.38(x)	T = 40.75(x)
Office	ITE 710	T = 1.56(x)	T = 1.49(x)

Notes: T = Average Vehicle Trip Ends
x = Dwelling Units or 1,000 ft² of GFA

Table 2: Residential Condominium Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	30%	1	3	4	3	2	5
Auto Passenger	10%	0	1	1	1	1	2
Transit	35%	0	4	4	2	1	3
Non-motorized	25%	0	2	2	2	1	3
Total Person Trips	100%	1	10	11	8	5	13
Projected 'New' Vehicle Trips		**1**	**3**	**4**	**3**	**2**	**5**

Table 3: Retail Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	40%	4	4	8	7	9	16
Auto Passenger	10%	1	0	1	1	2	3
Transit	25%	3	2	5	4	5	9
Non-motorized	25%	2	2	4	4	5	9
Total Person Trips	100%	10	8	18	16	21	37
Less Pass-by (50%)		-2	-2	-4	-4	-4	-8
Projected 'New' Vehicle Trips		**2**	**2**	**4**	**3**	**5**	**8**

Table 4: Coffee Shop Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	10%	14	14	28	5	5	10
Auto Passenger	0%	0	0	0	0	0	0
Transit	10%	13	13	26	5	5	10
Non-motorized	80%	108	104	212	40	40	80
Total Person Trips	100%	135	131	266	50	50	100
Less Pass-by (100%)		-14	-14	-28	-5	-5	-10
Projected 'New' Vehicle Trips		**0**	**0**	**0**	**0**	**0**	**0**

Table 5: Office Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	40%	8	2	10	2	7	9
Auto Passenger	10%	2	1	3	1	2	3
Transit	25%	4	0	4	0	4	4
Non-motorized	25%	4	0	4	0	4	4
Total Person Trips	100%	18	3	21	3	17	20
Projected 'New' Vehicle Trips		**8**	**2**	**10**	**2**	**7**	**9**

The following Table 6 provides a summary of the resultant total projected site-generated vehicle traffic.

Table 6: Total Site Vehicle Trip Generation

Land Use	AM Peak (veh/hr)			PM Peak (veh/hr)		
	In	Out	Total	In	Out	Total
Residential Condominium	1	3	4	3	2	5
Retail	4	4	8	7	9	16
Coffee Shop	14	14	28	5	5	10
Office Trip Generation	8	2	10	2	7	9
Less Retail Pass-by (50%)	-2	-2	-4	-4	-4	-8
Less Coffee Shop Pass-by (100%)	-14	-14	-28	-5	-5	-10
Total 'New' Auto Trips	**11**	**7**	**18**	**8**	**14**	**22**
Previous Report 'New' Auto Trips	***3***	***8***	***11***	***8***	***8***	***16***

As shown in Table 6, the resulting number of potential 'new' two-way vehicle trips for the proposed development is approximately 18 and 22 veh/h during the weekday morning and afternoon peak hours, respectively. When compared to the amount of projected site-generated traffic identified in the original 2014 report, the revised Site Plan is projected to generate an additional 6 to 7 veh/h during peak hours. This amount of additional traffic is considered to be negligible and will have little to no impact on the original results, findings and conclusions.

3. Findings and Conclusions

Based on the foregoing analysis of the proposed revised Site Plan, the following transportation-related findings and conclusions are offered:

- The proposed revised Site Plan is projected to generate similar traffic when compared to the Site Plan submitted with the original 2014 report; and

- The original report did not identify any required changes to off-site roadway geometry or traffic control and as the revised projected site-generated traffic will be similar to the original projected site-generated traffic, no further analysis is required.

Table 14-1 of the *ITE Traffic Engineering Handbook* suggests the number of vehicle trips generated by a parking facility serving central business district activities in the AM peak hour typically range from 40% to 60% of the total parking spaces for inbound trips, and 10% to 20% of the total parking spaces for outbound trips. A peak hour rate of 70% for inbound trips and 30% for outbound trips has been assumed, resulting in 92 inbound trips and 40 outbound trips during the AM peak hour.

In the PM peak hour, the number of vehicle trips generated typically range from 10% to 30% of the total parking spaces for inbound trips, and 40% to 60% of the total parking for outbound trips. A peak hour rate of 40% for inbound trips and 70% for outbound trips has been assumed, resulting in 53 inbound trips and 92 outbound trips during the PM peak hour.

The person trips generated by the residential and supermarket uses of the proposed development, compared to the assumed trip generation for the subject site in the previous TIS, is summarized in **Table 2**. All trip generation values were calculated using the *ITE Trip Generation Manual, 9th Edition*.

Table 2: Person Trip Generation

Land Use	ITE Code	Units/GFA	AM Peak (PPH[1])			PM Peak (PPH)		
			IN	OUT	TOT	IN	OUT	TOT
Previous TIS								
High-Rise Residential Condominiums	232	590 units	52	219	271	188	115	303
Specialty Retail	826	26,500 ft^2	0	0	0	48	49	97
		Total	**52**	**219**	**271**	**236**	**164**	**400**
Proposed Development								
High-Rise Residential Condominiums	232	572 units	48	201	249	172	106	278
Supermarket	850	25,080 ft^2	67	42	109	155	149	304
		Total	**115**	**243**	**358**	**327**	**255**	**582**
		Difference	**63**	**24**	**87**	**91**	**91**	**182**

1) PPH = Persons Per Hour – Calculated using an ITE Trip to Person Trip factor of 1.28, consistent with the TIA Guidelines

Based on the previous table, the proposed development is anticipated to generate an additional 87 person trips during the AM peak hour and 182 person trips during the PM peak hour, compared to the assumed development in the previous TIS.

The modal shares outlined in the previous TIS overestimate the vehicle trips generated by the proposed development, as the Confederation Line LRT will provide improved transit service by the buildout year. Per discussions with City staff, the modal shares have been adjusted from those used in the previous TIS to better reflect the subject site as a transit-oriented development, and to reflect the new land uses. The modal shares assigned to the residential land use assume a higher transit modal share and lower non-auto modal share when compared to the modal shares assigned to the supermarket land use.

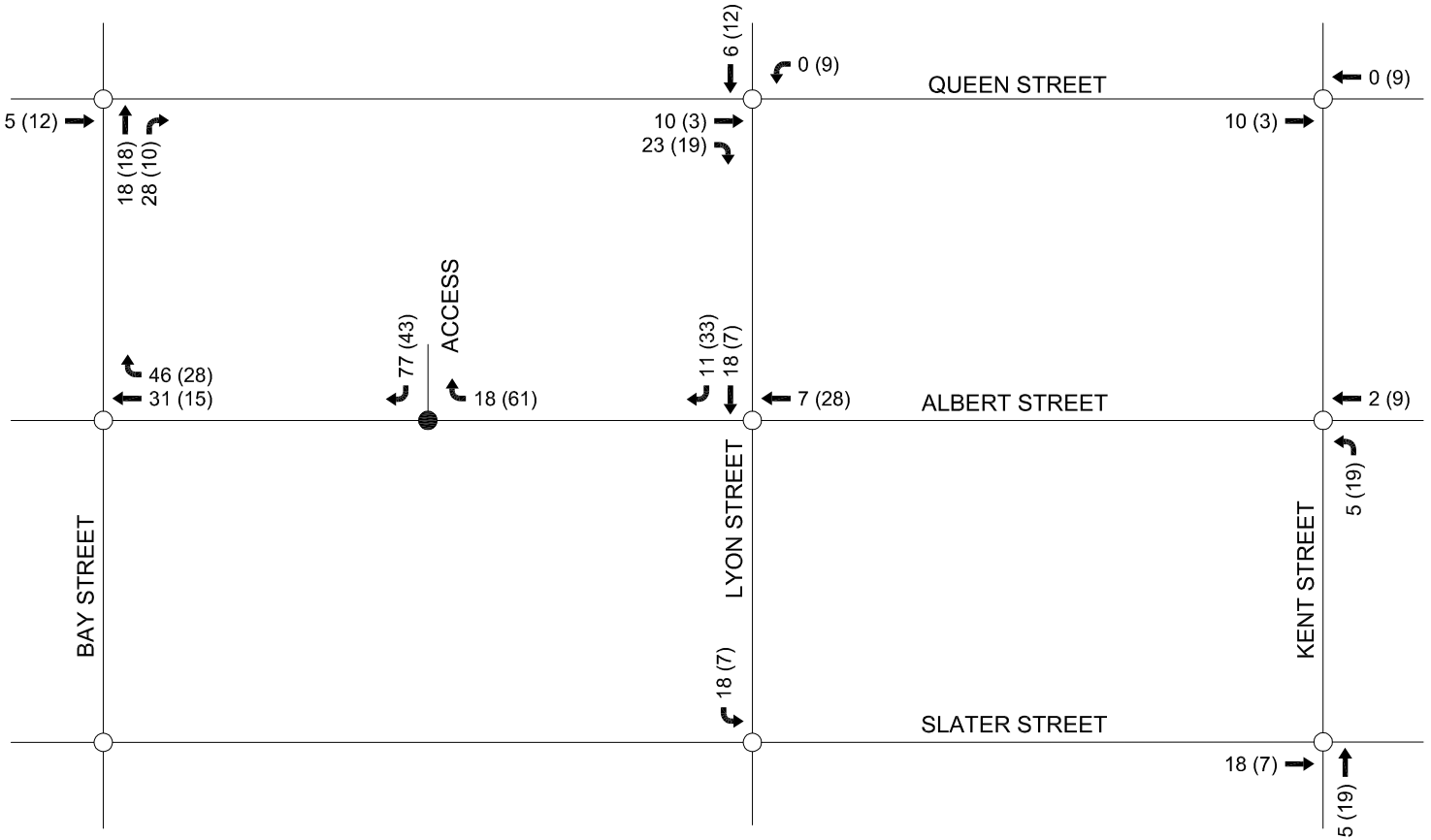
The projected person trips by modal share, compared to the assumed trip generation for the subject site in the previous TIS is summarized in **Table 3**.

Table 3: Person Trips by Modal Share

Travel Mode	Modal Share		AM Peak			PM Peak		
	AM	PM	IN	OUT	TOT	IN	OUT	TOT
Previous TIS								
Residential Person Trips			*52*	*219*	*271*	*188*	*115*	*303*
Auto Driver	35%	26%	18	77	95	49	30	79
Auto Passenger	3%	10%	3	6	9	19	11	30
Transit	19%	26%	9	42	51	49	30	79
Non-Auto	43%	38%	22	94	116	71	44	115
Commercial Person Trips			*0*	*0*	*0*	*48*	*49*	*97*
Auto Driver	35%	26%	0	0	0	12	13	25
Auto Passenger	3%	10%	0	0	0	5	5	10
Transit	19%	26%	0	0	0	13	13	26
Non-Auto	43%	38%	0	0	0	18	18	38
Auto Driver (Total)			**18**	**77**	**95**	**61**	**43**	**104**
Auto Passenger (Total)			**3**	**6**	**9**	**24**	**16**	**40**
Transit (Total)			**9**	**42**	**51**	**62**	**43**	**105**
Non-Auto (Total)			**22**	**94**	**116**	**89**	**62**	**151**
Proposed Development								
Residential Person Trips			*48*	*201*	*249*	*172*	*106*	*278*
Auto Driver	10%		5	20	25	17	10	27
Auto Passenger	5%		2	10	12	9	5	14
Transit	60%		29	121	150	103	64	167
Non-Auto	25%		12	50	62	43	27	70
Supermarket Person Trips			*67*	*42*	*109*	*155*	*149*	*304*
Auto Driver	15%		10	5	15	22	21	43
Auto Passenger	5%		3	3	6	8	7	15
Transit	40%		27	17	44	63	60	123
Non-Auto	40%		27	17	44	62	61	123
Auto Driver (Total)			**15**	**25**	**40**	**39**	**31**	**70**
Auto Passenger (Total)			**5**	**13**	**18**	**17**	**12**	**29**
Transit (Total)			**56**	**138**	**194**	**166**	**124**	**290**
Non-Auto (Total)			**39**	**67**	**106**	**105**	**88**	**193**
Auto Driver (Difference)			-3	-52	-55	-22	-12	-34
Auto Pass. (Difference)			2	7	9	-7	-4	-11
Transit (Difference)			47	96	143	104	81	185
Non-Auto (Difference)			17	-27	-10	16	26	42

Based on the revised modal shares shown above in **Table 3**, the proposed development is anticipated to generate 55 fewer vehicle trips during the AM peak hour and 34 fewer vehicle trips during the PM peak hour, compared to the projections of the previous TIS.

It is recognized that some trips generated by the proposed development will be internally captured (for example, a resident making a trip to the ground level to buy groceries at the supermarket and then immediately returning upstairs). However, it is likely that trips of this nature will make up only a small proportion of the overall site-generated trip volume, and as such, no deductions have been



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: novainfo@novatech-eng.com

LEGEND

- Unsignalized Intersection
- Signalized Intersection

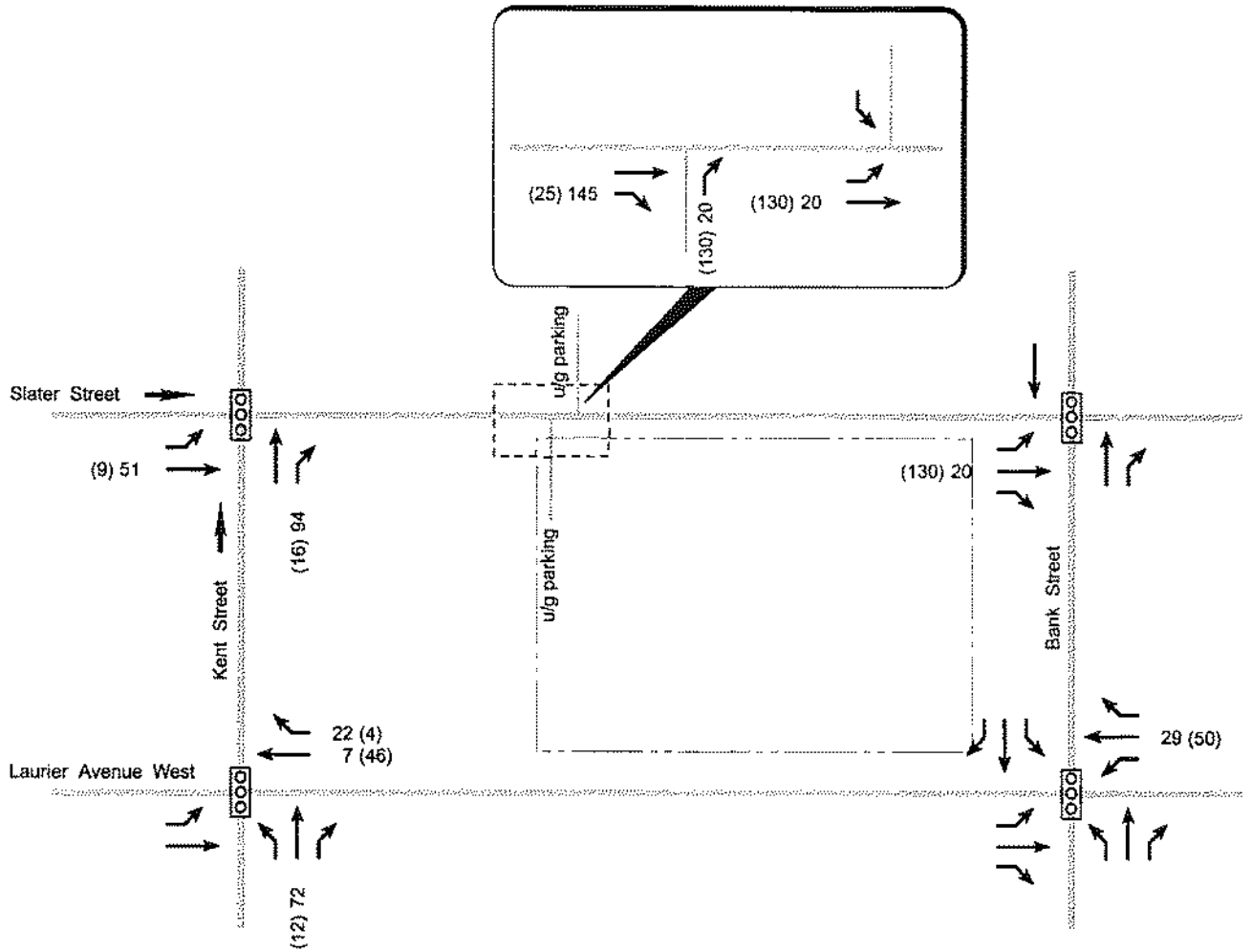
xx VPH AM Peak Hour

(xx) VPH PM Peak Hour

383 ALBERT STREET

SITE-GENERATED TRAFFIC

OCT 2013 109111 FIGURE 7



SITE TRAFFIC VOLUMES

00 AM Peak Hour

(00) PM Peak Hour

Existing Traffic Signal

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DATE PLOTTED: August 20, 2009

APPENDIX H

Transportation Demand Management Checklists

TDM-Supportive Development Design and Infrastructure Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

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: *Non-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: *Non-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	☐
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)	☐

		TDM-supportive design & infrastructure measures: *Non-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)*	☑
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 commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office 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)*	☒ Not Applicable
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
	2.4	**Bicycle repair station**	
BETTER	2.4.1	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)	☐

	TDM-supportive design & infrastructure measures: *Non-residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site 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	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	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	☐
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(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	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	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	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

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	☐
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)	☐

		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)*	☑
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)*	☑
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	☐
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	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		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	☐

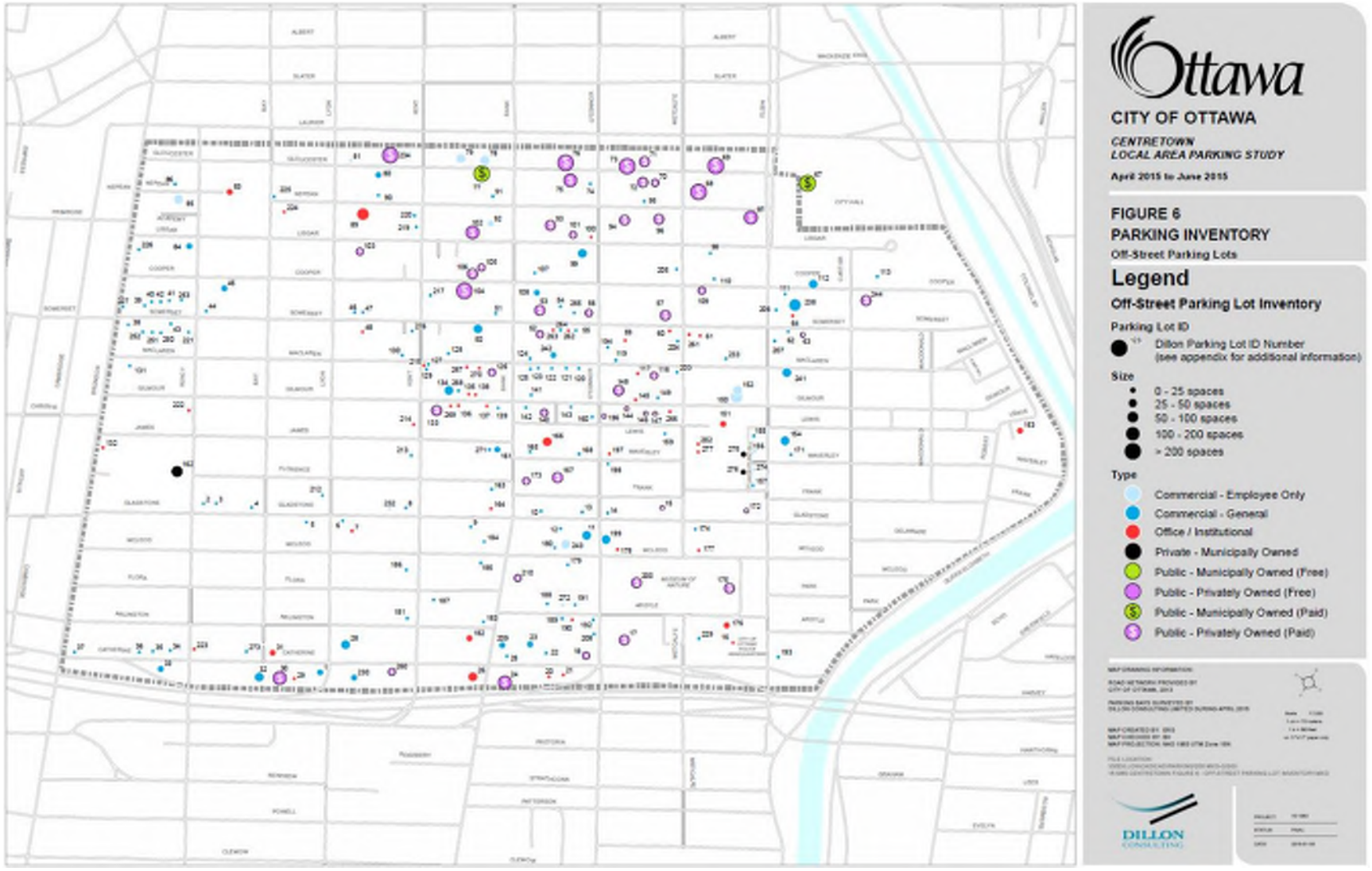
			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☐
BETTER		3.1.2	Provide real-time arrival information display at entrances *(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	☐

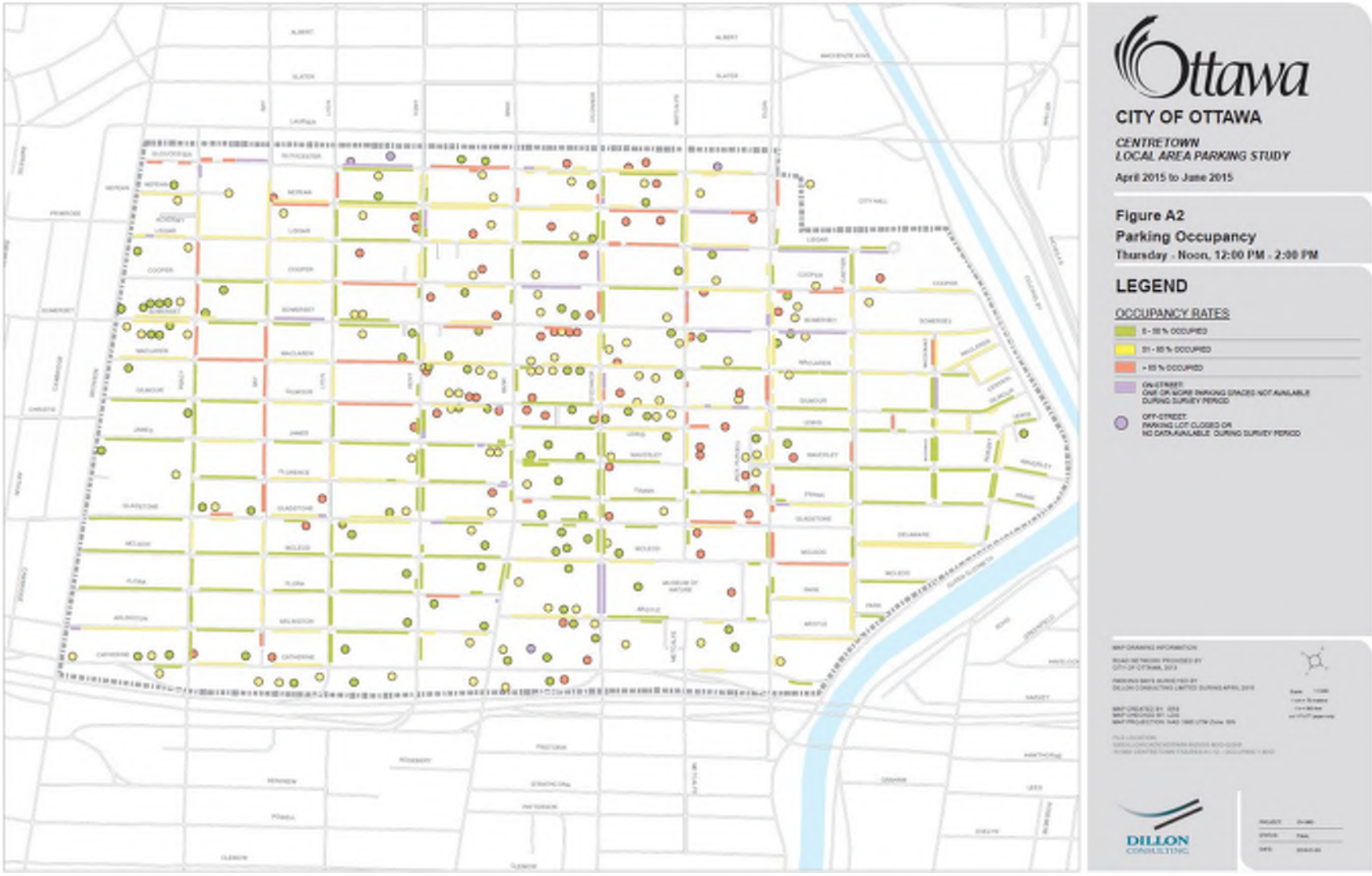
APPENDIX I

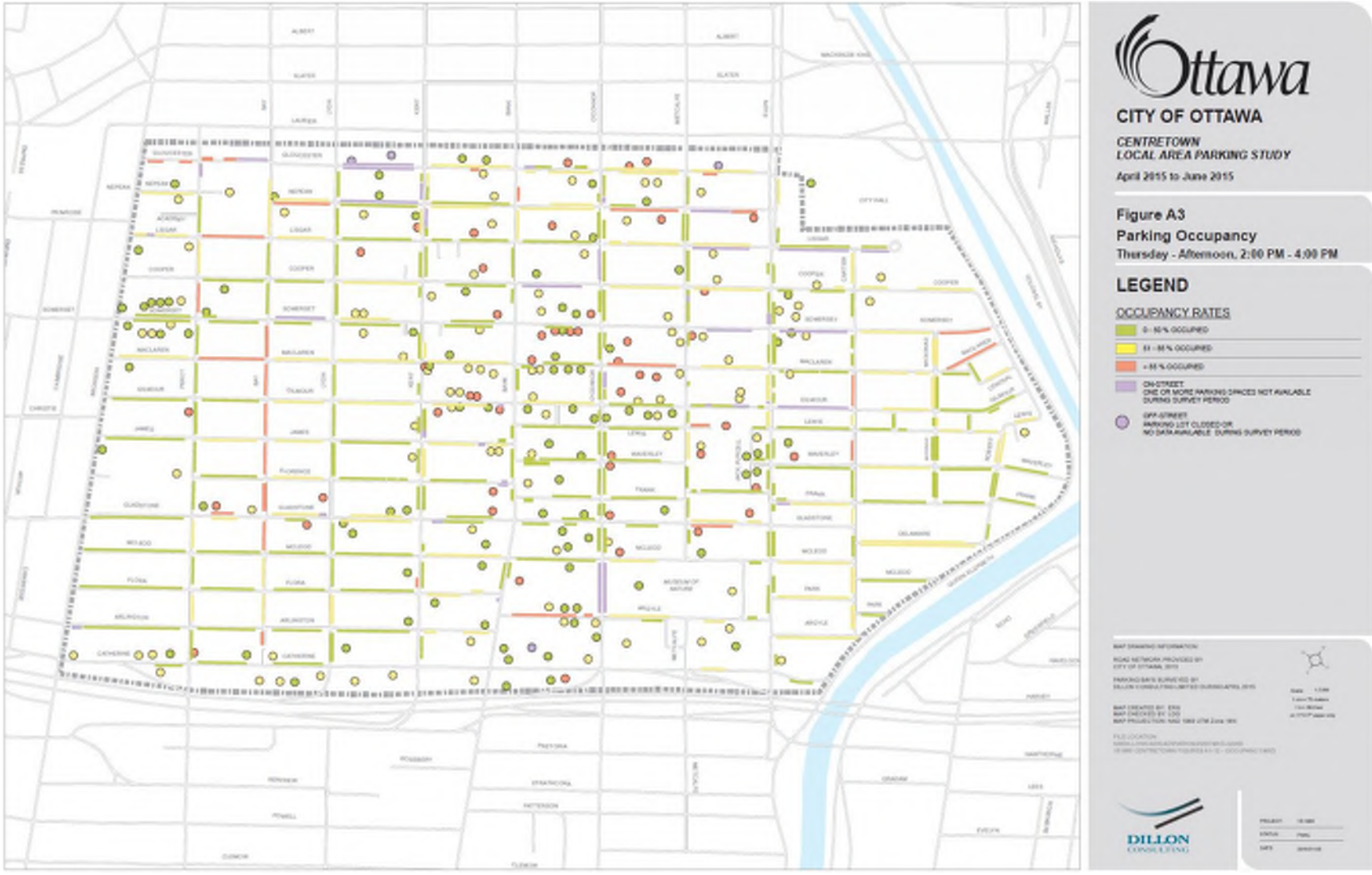
Relevant Excerpts from Centretown Local Area Parking Study

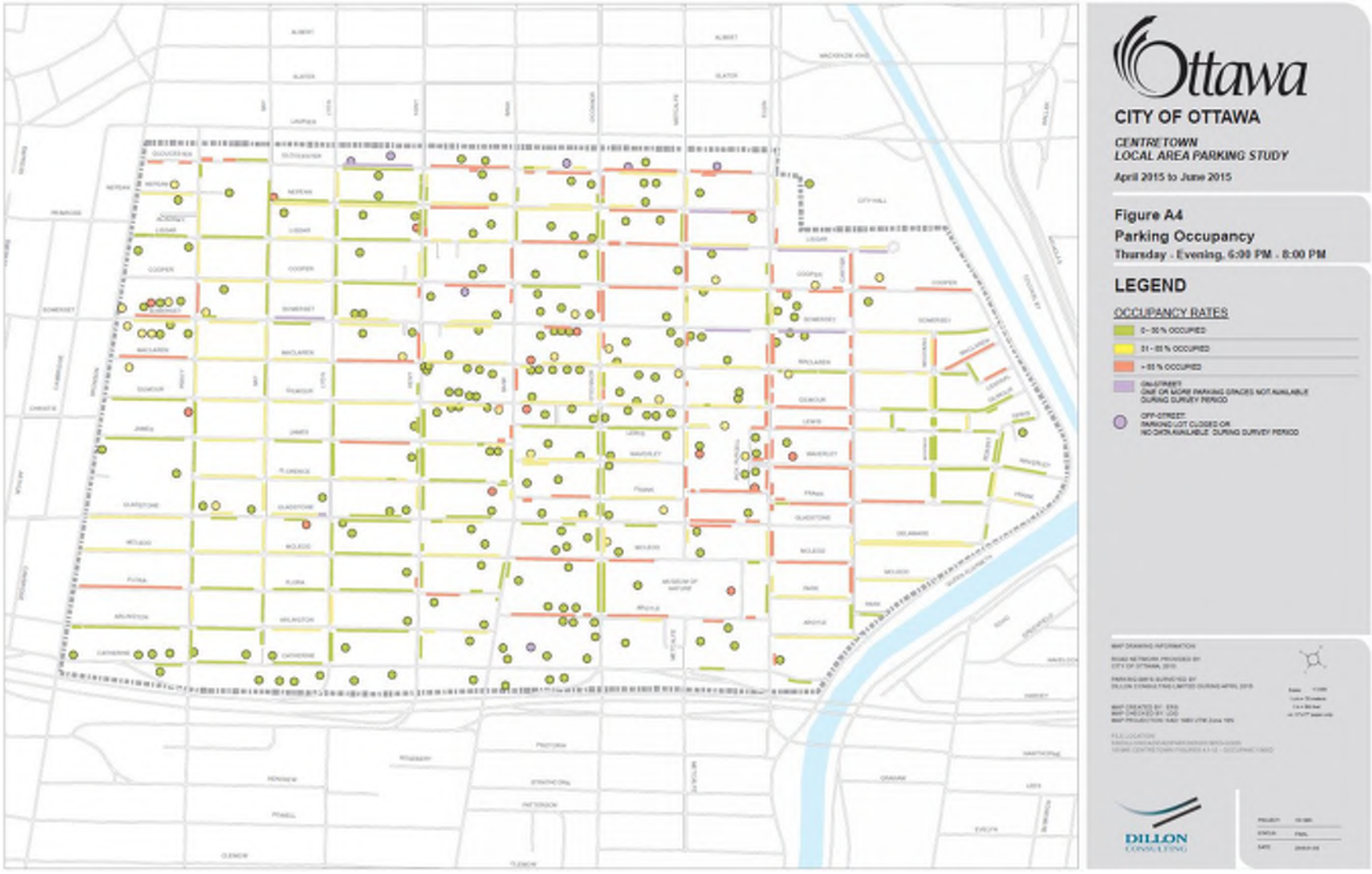
Map 14 - Off-Street Parking Lots by Type

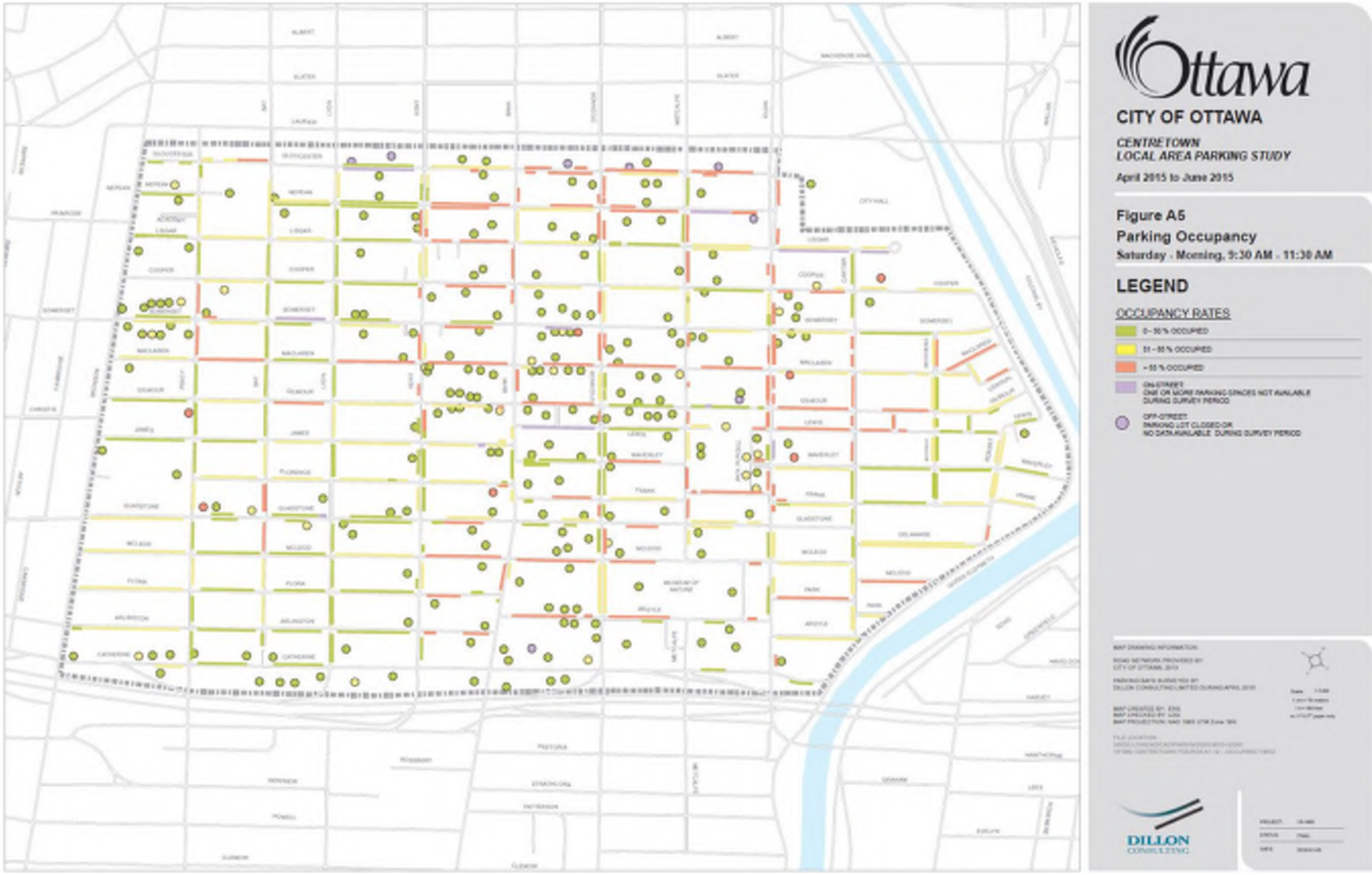


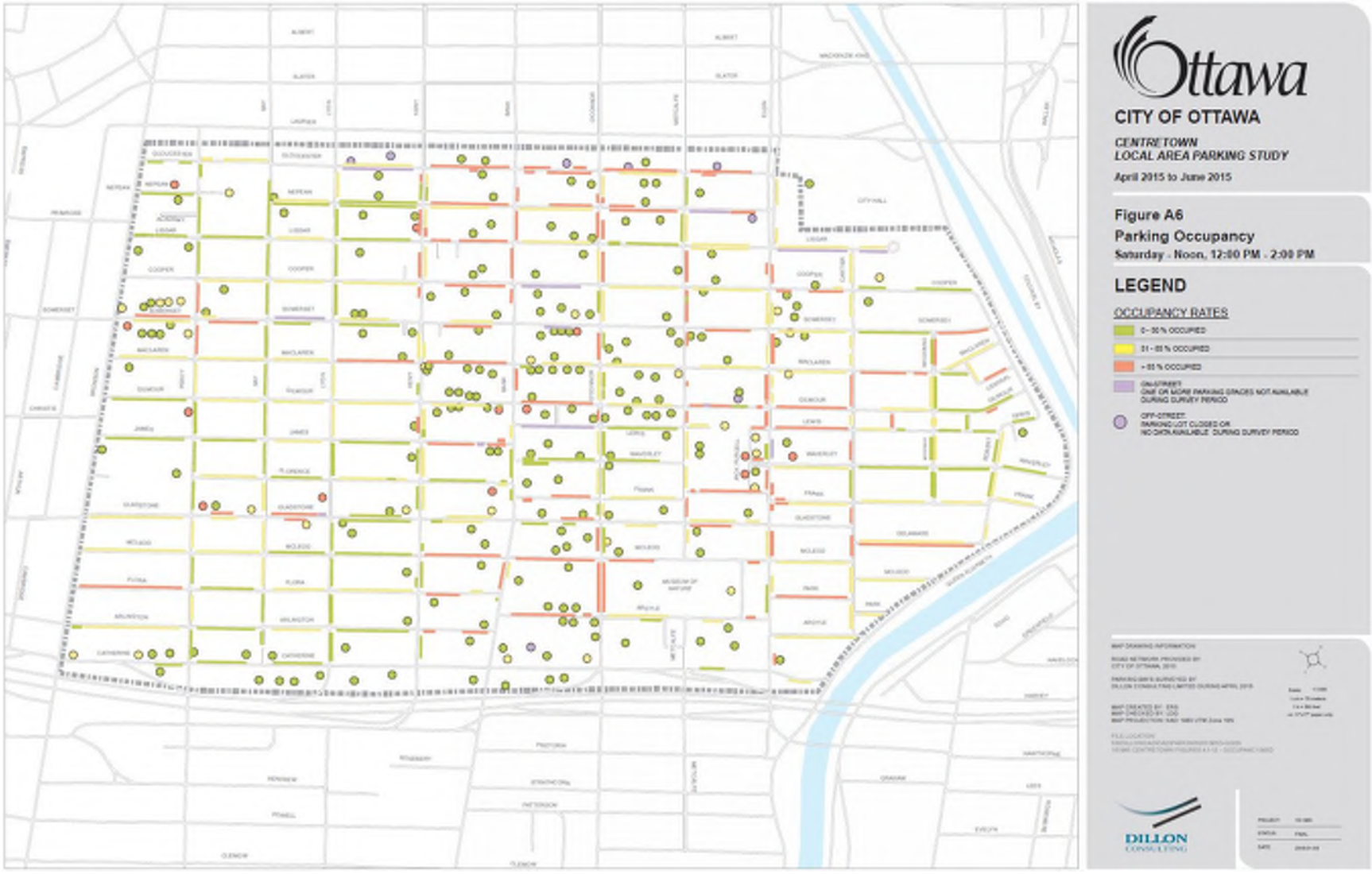

Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A1
Parking Occupancy
Thursday - Morning, 9:30 AM - 11:30 AM
LEGEND
OCCUPANCY RATES
DILLON
CONSULTING

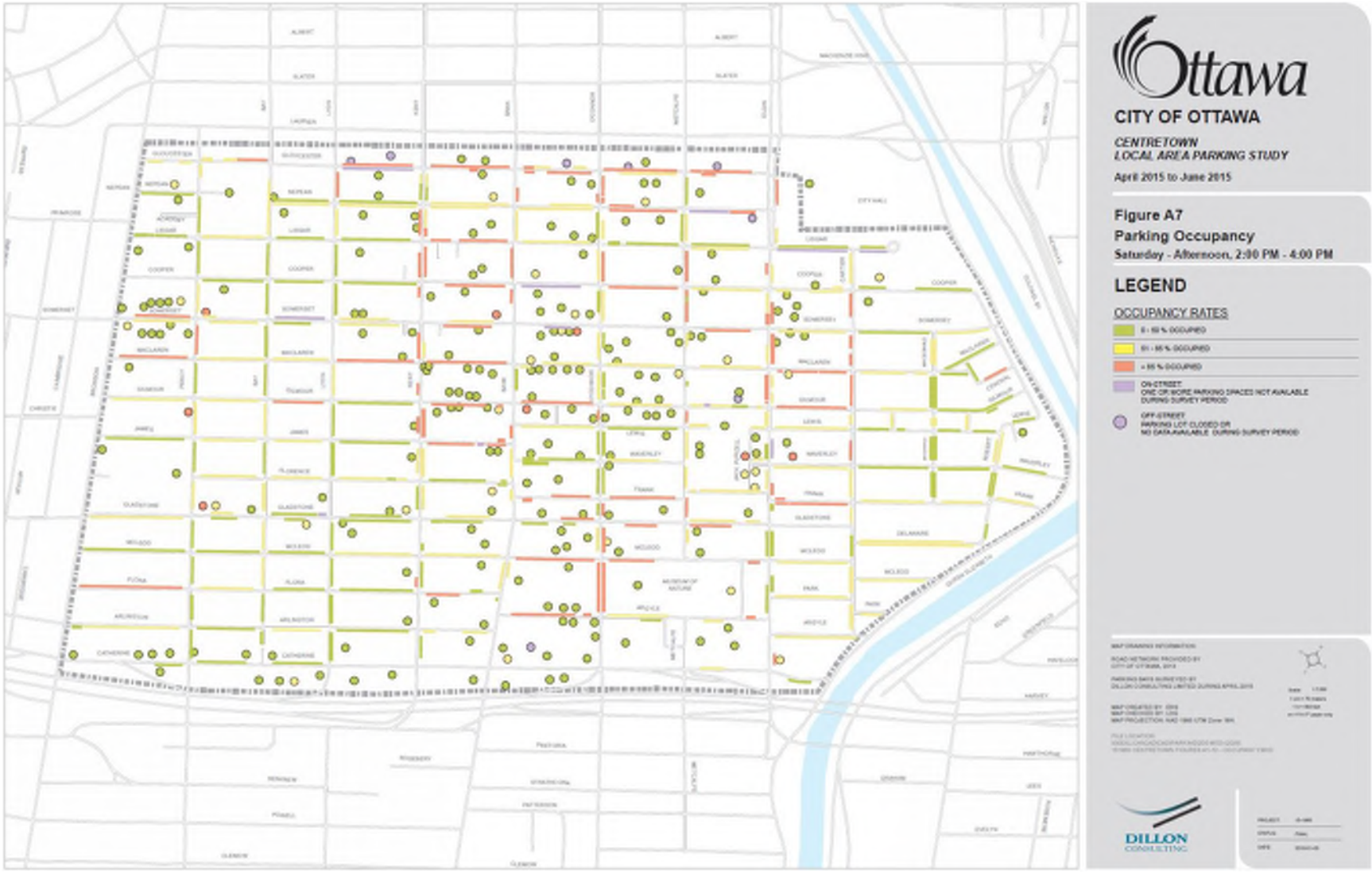

Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A2
Parking Occupancy
Thursday - Noon, 12:00 PM - 2:00 PM
LEGEND
OCCUPANCY RATES
0 - 50 % OCCUPIED
51 - 85 % OCCUPIED
> 85 % OCCUPIED
ON-STREET:
ONE OR MORE PARKING SPACES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET:
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON CONSULTING

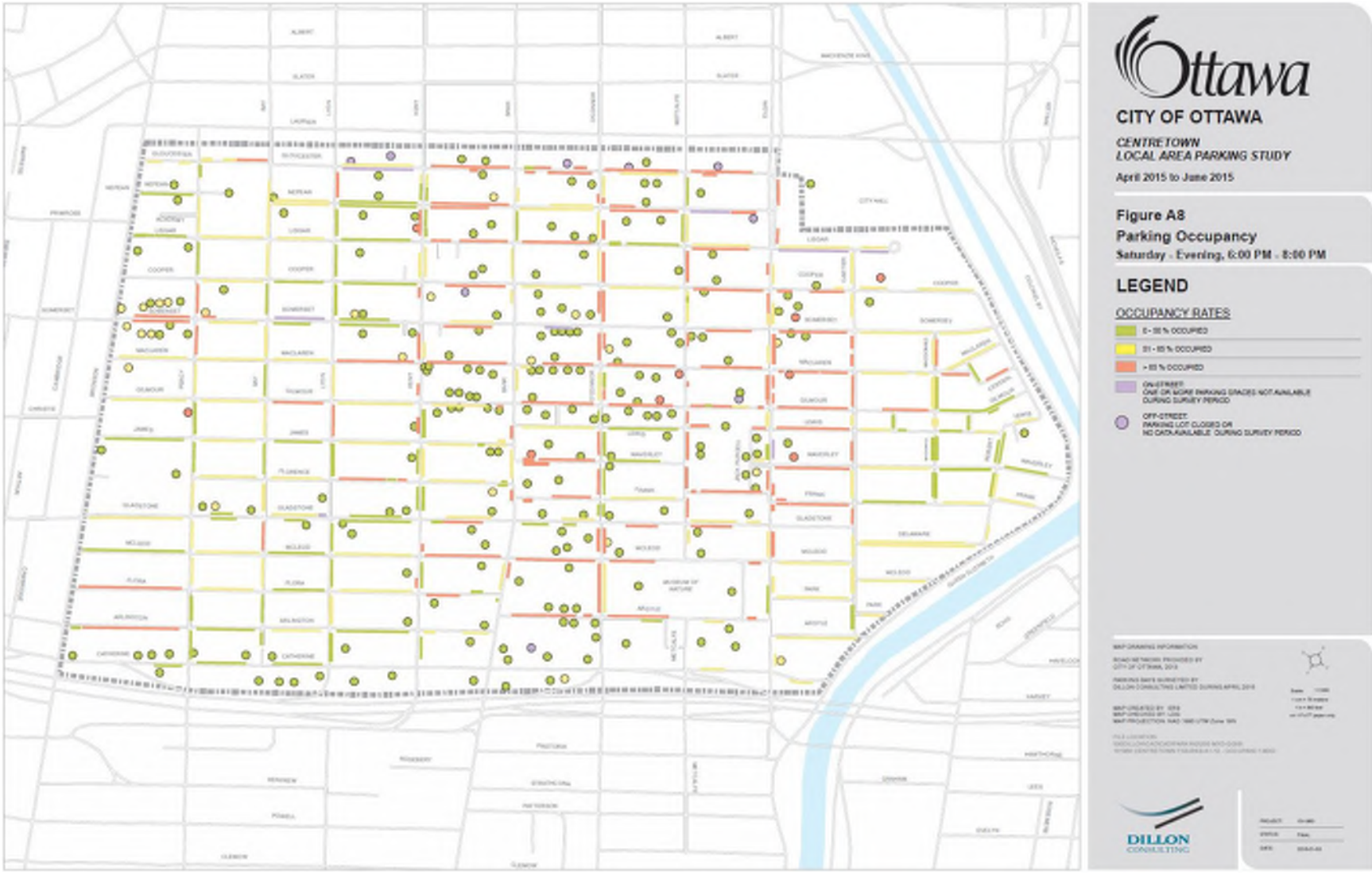

Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A3
Parking Occupancy
Thursday - Afternoon, 2:00 PM - 4:00 PM
LEGEND
OCCUPANCY RATES
0 - 80 % OCCUPIED
81 - 95 % OCCUPIED
+ 95 % OCCUPIED
ON-STREET
ONE OR MORE PARKING SPACES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON CONSULTING

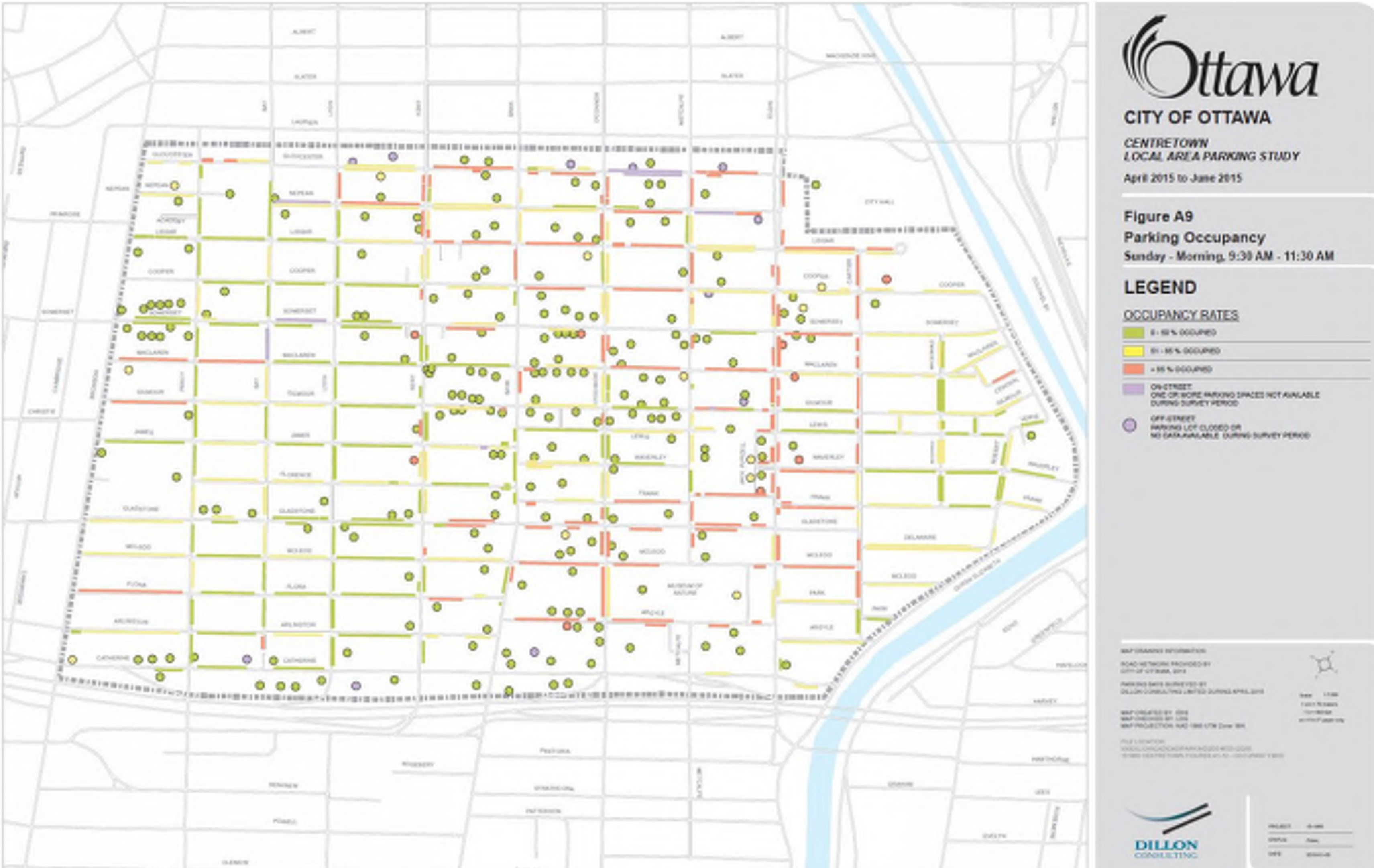

Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A4
Parking Occupancy
Thursday - Evening, 6:00 PM - 8:00 PM
LEGEND
OCCUPANCY RATES
0 - 30 % OCCUPIED
31 - 85 % OCCUPIED
+ 85 % OCCUPIED
ON-STREET
ONE OR MORE PARKING SPACES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON
CONSULTING

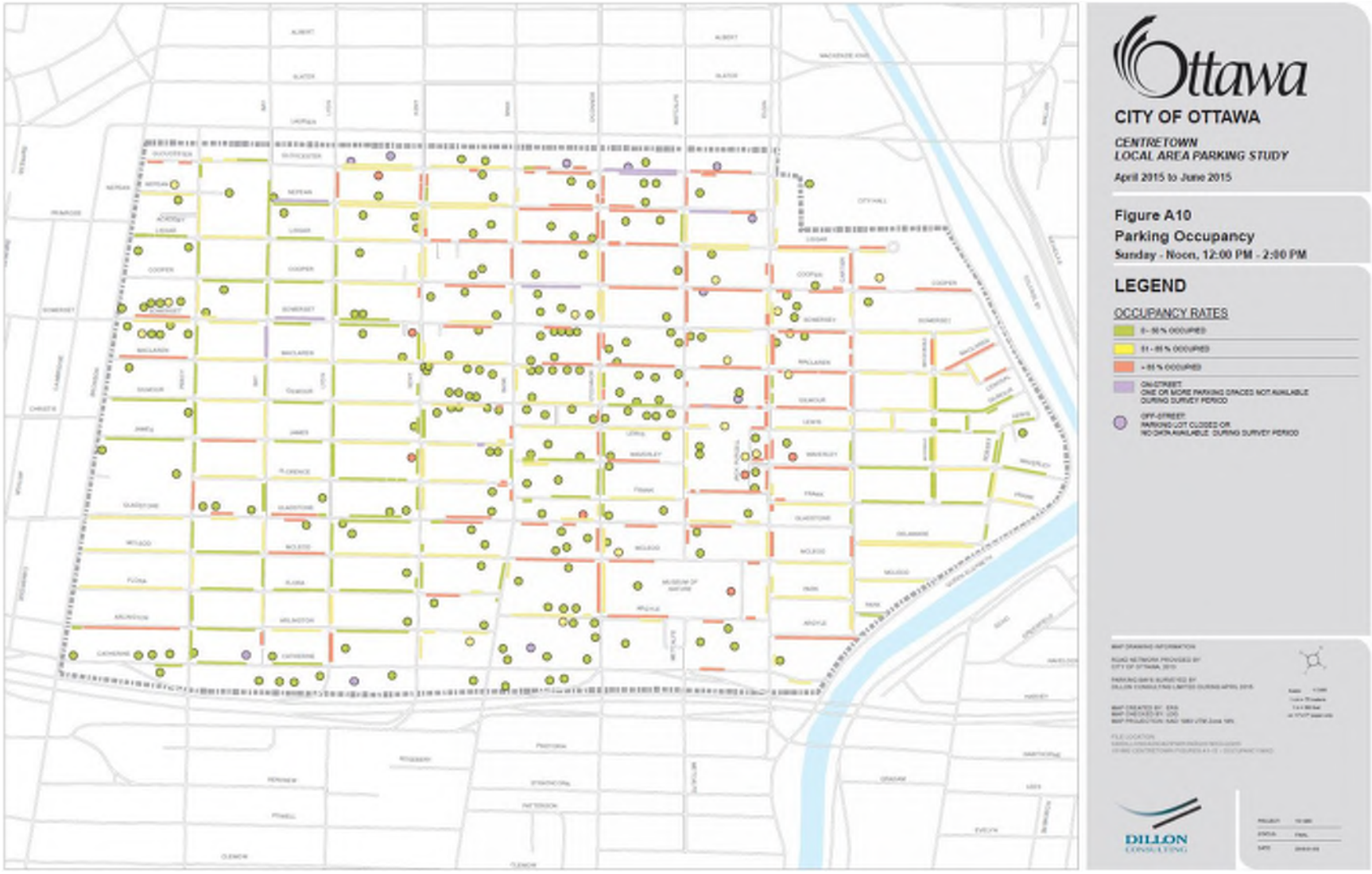

Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A5
Parking Occupancy
Saturday - Morning, 9:30 AM - 11:30 AM
LEGEND
OCCUPANCY RATES
0 - 50 % OCCUPIED
51 - 85 % OCCUPIED
> 85 % OCCUPIED
ON-STREET
ONE OR MORE PARKING SPACES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON CONSULTING

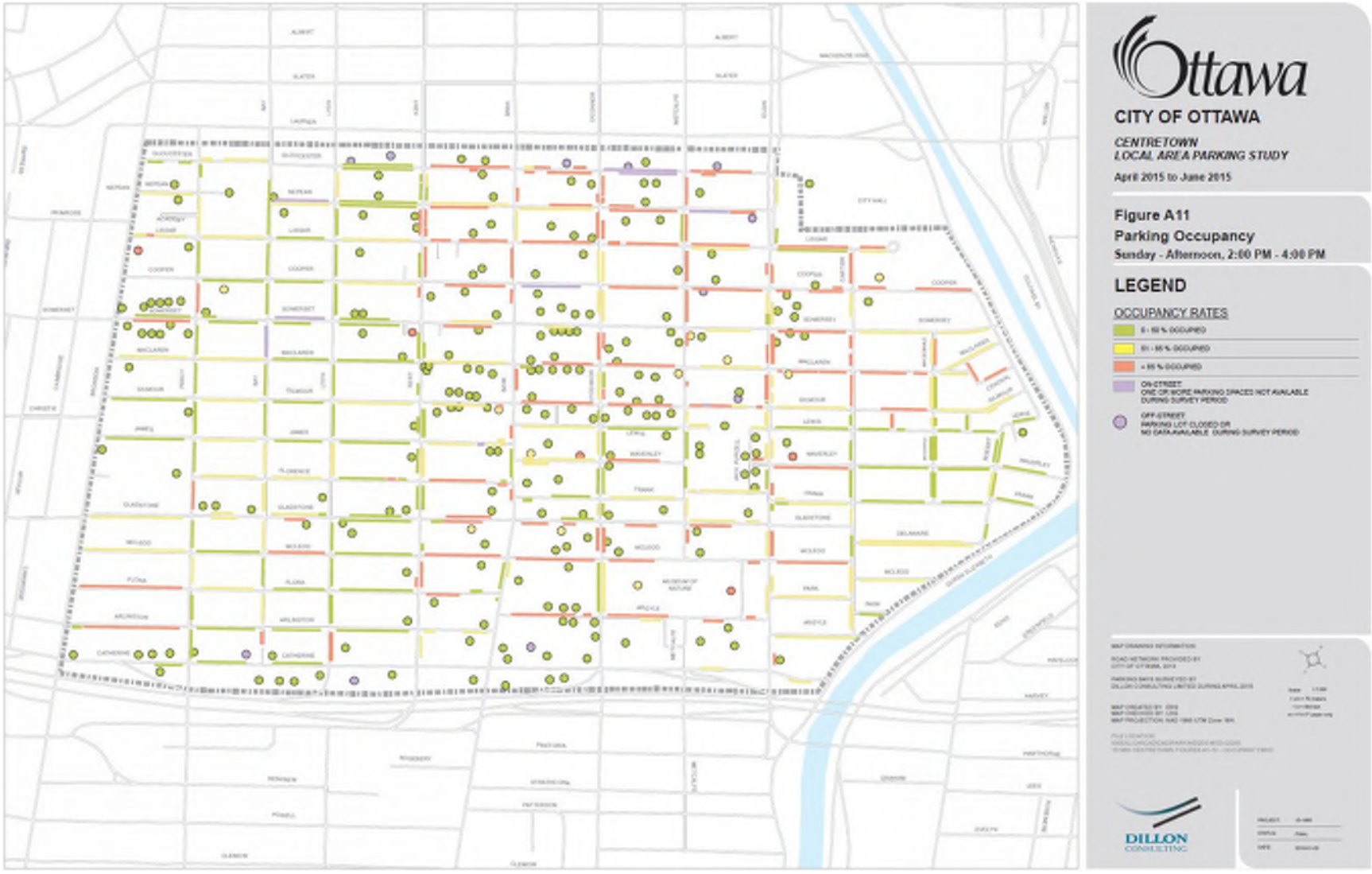

Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A6
Parking Occupancy
Saturday - Noon, 12:00 PM - 2:00 PM
LEGEND
OCCUPANCY RATES
0 - 30 % OCCUPIED
31 - 85 % OCCUPIED
+ 85 % OCCUPIED
ON-STREET:
ONE OR MORE PARKING SPACES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET:
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON
CONSULTING

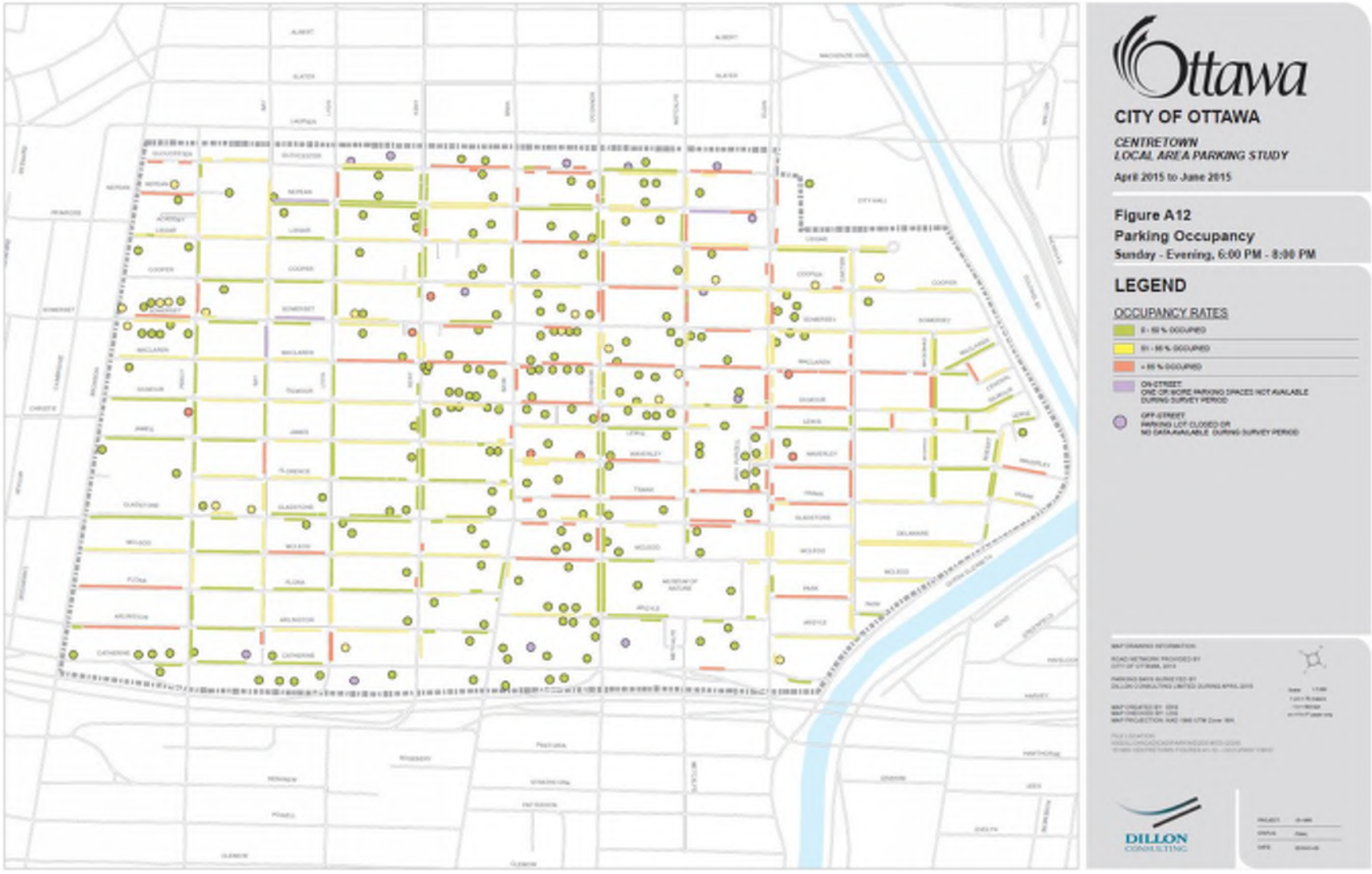

Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A7
Parking Occupancy
Saturday - Afternoon, 2:00 PM - 4:00 PM
LEGEND
OCCUPANCY RATES
ON-STREET
ONE OR MORE PARKING SPACES NOT AVAILABLE
DURING SURVEY PERIOD
OFF-STREET
PARKING LOT CLOSED OR
NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON
CONSULTING


Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A8
Parking Occupancy
Saturday - Evening, 6:00 PM - 8:00 PM
LEGEND
OCCUPANCY RATES
0 - 30 % OCCUPIED
31 - 85 % OCCUPIED
> 85 % OCCUPIED
ON-STREET:
ONE OR MORE PARKING GRADES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET:
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON CONSULTING


Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A9
Parking Occupancy
Sunday - Morning, 9:30 AM - 11:30 AM
LEGEND
OCCUPANCY RATES
ON-STREET
OFF-STREET
DILLON
CONSULTING


Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A10
Parking Occupancy
Sunday - Noon, 12:00 PM - 2:00 PM
LEGEND
OCCUPANCY RATES
0 - 50 % OCCUPIED
51 - 85 % OCCUPIED
+ 85 % OCCUPIED
ON-STREET
ONE OR MORE PARKING SPACES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON CONSULTING


Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A11
Parking Occupancy
Sunday - Afternoon, 2:00 PM - 4:00 PM
LEGEND
OCCUPANCY RATES
ON-STREET
ONE OR MORE PARKING SPACES NOT AVAILABLE DURING SURVEY PERIOD
OFF-STREET
PARKING LOT CLOSED OR NO DATA AVAILABLE DURING SURVEY PERIOD
DILLON
CONSULTING


Ottawa
CITY OF OTTAWA
CENTRETOWN
LOCAL AREA PARKING STUDY
April 2015 to June 2015
Figure A12
Parking Occupancy
Sunday - Evening, 6:00 PM - 8:00 PM
LEGEND
OCCUPANCY RATES
DILLON
CONSULTING

APPENDIX J

Intersection MMLOS Analysis

Pedestrian Level of Service (PLOS)

Criteria	North Approach		South Approach		East Approach		West Approach	
Slater Street/Bank Street								
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	120	No	120	No	88	No	88
Lanes Crossed (3.5m Lane Width)	2		2		4		4	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0
Right Turn Conflict	No Right Turn/Prohibited	0	Permissive or Yield	-5	No Right Turn/Prohibited	0	No Right Turn/Prohibited	0
Right Turn on Red	N/A	0	N/A	0	N/A	0	RTOR Allowed	-3
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	> 5m to 10m	-5	> 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 Channel	-4	No Right Turn	0
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		**102**		**97**		**70**		**76**
LOS		**A**		**A**		**C**		**B**
DELAY SCORE								
Cycle Length		60		60		60		60
Pedestrian Walk Time		18		18		12.5		12.5
DELAY SCORE		**14.7**		**14.7**		**18.8**		**18.8**
LOS		**B**		**B**		**B**		**B**
OVERALL		**B**		**B**		**C**		**B**

Criteria	North Approach		South Approach		East Approach		West Approach	
Slater Street/O'Connor Street								
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	88	No	88	No	105	No	88
Lanes Crossed (3.5m Lane Width)	4		4		3		4	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0	Permissive	-8	No Left Turn/Prohibited	0
Right Turn Conflict	No Right Turn/Prohibited	0	No Right Turn/Prohibited	0	No Right Turn/Prohibited	0	No Right Turn/Prohibited	0
Right Turn on Red	N/A	0	N/A	0	N/A	0	N/A	0
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	No Right Turn	0	No Right Turn	0	No Right Turn	0	No Right Turn	0
Parallel Right Turn Channel	No Right Turn	0	No Right Turn	0	No Right Turn	0	No Right Turn	0
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		**79**		**79**		**88**		**79**
LOS		**B**		**B**		**B**		**B**
DELAY SCORE								
Cycle Length		60		60		60		60
Pedestrian Walk Time		18.5		18.5		10.5		10.5
DELAY SCORE		**14.4**		**14.4**		**20.4**		**20.4**
LOS		**B**		**B**		**C**		**C**
OVERALL		**B**		**B**		**C**		**C**

Criteria	North Approach		South Approach		East Approach		West Approach	
Slater Street/Metcalfe Street								
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	105	No	105	No	88	No	88
Lanes Crossed (3.5m Lane Width)	3		3		4		4	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	Permissive	-8	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0
Right Turn Conflict	No Right Turn/Prohibited	0	No Right Turn/Prohibited	0	Permissive or Yield	-5	No Right Turn/Prohibited	0
Right Turn on Red	N/A	0	RTOR Allowed	-3	N/A	0	N/A	0
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	No Right Turn	0	No Right Turn	0	> 5m to 10m	-5	No Right Turn	0
Parallel Right Turn Channel	No Right Turn	0	No Right Turn	0	No Right Turn Channel	-4	No Right Turn	0
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		**88**		**93**		**65**		**79**
LOS		**B**		**A**		**C**		**B**
DELAY SCORE								
Cycle Length		60		60		60		60
Pedestrian Walk Time		15.6		15.6		17.5		17.5
DELAY SCORE		**16.4**		**16.4**		**15.1**		**15.1**
LOS		**B**		**B**		**B**		**B**
OVERALL		**B**		**B**		**C**		**B**

Criteria	North Approach		South Approach		East Approach		West Approach	
Bank Street/Laurier Avenue								
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	105	No	105	No	88	No	88
Lanes Crossed (3.5m Lane Width)	3		3		4		4	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0	No Left Turn/Prohibited	0
Right Turn Conflict	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5
Right Turn on Red	RTOR Prohibited	0	RTOR Prohibited	0	RTOR Prohibited	0	RTOR Prohibited	0
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	> 5m to 10m	-5	> 3m to 5m	-4	> 5m to 10m	-5	> 5m to 10m	-5
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	Standard	-7	Standard	-7	Standard	-7	Standard	-7
PETSI SCORE		**82**		**83**		**65**		**65**
LOS		**B**		**B**		**C**		**C**
DELAY SCORE								
Cycle Length		60		60		60		60
Pedestrian Walk Time		10.1		10.1		22.4		22.4
DELAY SCORE		**20.8**		**20.8**		**11.8**		**11.8**
LOS		**C**		**C**		**B**		**B**
OVERALL		**C**		**C**		**C**		**C**

Bicycle Level of Service (BLOS)

Approach	Bikeway Facility Type	Criteria	Travel Lanes and/or Speed	BLOS
Slater Street/Bank Street				
North Approach	Mixed Traffic	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	No lane crossed, 50km/hr	B
South Approach	Mixed Traffic	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	No lane crossed, 50km/hr	B
West Approach	Mixed Traffic	Right Turn Lane Characteristics	Right turn lane <25m; No impact to LTS	A
		Left Turn Accommodation	Two lanes crossed, 50km/hr	F
Slater Street/O'Connor Street				
North Approach	Mixed Traffic	Right Turn Lane Characteristics	N/A	-
		Left Turn Accommodation	Three lanes crossed, 50km/hr	F
West Approach	Mixed Traffic	Right Turn Lane Characteristics	Right turn lane 25-50m, Turning speed <25km/hr	D
		Left Turn Accommodation	N/A	-
Slater Street/Metcalfe Street				
South Approach	Mixed Traffic	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	N/A	-
West Approach	Mixed Traffic	Right Turn Lane Characteristics	N/A	-
		Left Turn Accommodation	Two lanes crossed, 50km/hr	F
Bank Street/Laurier Avenue				
North Approach	Mixed Traffic	Right Turn Lane Characteristics	Right turn lane <25m; No impact to LTS	A
		Left Turn Accommodation	No lane crossed, 50km/hr	B
South Approach	Mixed Traffic	Right Turn Lane Characteristics	Right turn lane >50m	F
		Left Turn Accommodation	No lane crossed, 50km/hr	B
East Approach	Separated Facility	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	Two-Stage	A

Approach	Bikeway Facility Type	Criteria	Travel Lanes and/or Speed	BLOS
West Approach	Separated Facility	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	Two-Stage	A

Transit Level of Service (TLOS)

Approach	Facility Type	Delay[1]	Movement	TLOS
Slater Street/Bank Street				
North Approach	Mixed Traffic (No TSP)	14 sec	SBT	C
South Approach	Mixed Traffic (No TSP)	18 sec	NBT/R	C
West Approach	High Level TSP[2]	-	-	B
Slater Street/O'Connor Street				
North Approach[2]	Mixed Traffic (No TSP)	18 sec	SB	C
West Approach	High Level TSP[2]	-	-	B
Slater Street/Metcalfe Street				
South Approach[2]	Mixed Traffic (No TSP)	16 sec	NB	C
West Approach	High Level TSP[2]	-	-	B
Bank Street/Laurier Avenue				
North Approach	Mixed Traffic (No TSP)	24 sec	SBT/R	D
South Approach	Mixed Traffic (No TSP)	19 sec	NBT/R	C
East Approach[2]	Mixed Traffic (No TSP)[3]	-	-	-
West Approach[2]	Mixed Traffic (No TSP)[3]	-	-	-

1. Mixed traffic delay based on the critical approach delay in Synchro analysis
2. Bus lanes currently provided along Slater Street
3. No OC Transpo Service Laurier Avenue

Truck Level of Service (TkLOS)

Approach	Effective Corner Radius	Number of Receiving Lanes on Departure from Intersection	LOS
Slater Street/Bank Street			
North Approach	N/A	N/A	-
South Approach	< 10m	Two	D
West Approach	< 10m	One	F
Slater Street/O'Connor Street			
North Approach	< 10m	Two	D
West Approach	< 10m	Four	D
Slater Street/Metcalfe Street			
South Approach	10m to 15m	Two	B
West Approach	< 10m	Three	D
Bank Street/Laurier Avenue			
North Approach	< 10m	One	F
South Approach	< 10m	One	F
East Approach	< 10m	One	F
West Approach	< 10m	One	F

Auto LOS

Intersection	Period	Critical Movement			Intersection		
		V/C or Delay	LOS	Mvmt	Delay	V/C	LOS
Slater Street/ Bank Street	AM	0.61	B	EBT/L	15 sec	0.56	A
	PM	0.59	A	EBT/L	15 sec	0.56	A
Slater Street/ O'Connor Street	AM	0.49	A	EBT	9 sec	0.47	A
	PM	0.60	A	SBT	18 sec	0.53	A
Slater Street/ Metcalfe Street	AM	0.66	B	EBT	14 sec	0.49	A
	PM	0.55	A	NBT/R	12 sec	0.51	A
Bank Street/ Laurier Avenue	AM	0.89	D	EBT	35 sec	0.84	D
	PM	1.82	F	NBR	59 sec	1.27	F
Slater Street/ Access	AM	9 sec	A	NB	-	-	-
	PM	9 sec	A	NB	-	-	-

Notes:

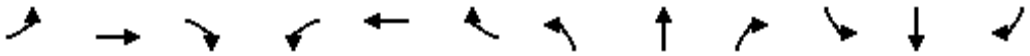
- Intersection paramaters used in the analysis are consistent with the TIA guidelines (saturation flow rate: 1800vphpl, PHF: 0.90).
- As the Synchro software is unable to distinguish between general travel lanes and bus only lanes, it has been assumed that Slater Street operates with two eastbound lanes.
- Traffic signal timings obtained from City of Ottawa, included in Appendix D.
- Detailed Synchro reports are included in Appendix K.

	Intersection	Slater Street/Bank Street				Slater Street/O'Connor Street			
		North	South	East	West	North	South	East	West
Pedestrian	Median > 2.4m in Width	No	No	No	No	No	No	No	No
	Lanes (3.5m Lane Width)	2	2	4	4	4	4	3	4
	Conflicting Left Turns	No Left Turn	No Left Turn	No Left Turn	No Left Turn	No Left Turn	No Left Turn	Permissive	No Left Turn
	Conflicting Right Turns	No Right Turn	Permissive	No Right Turn	No Right Turn	No Right Turn	No Right Turn	No Right Turn	No Right Turn
	Right Turn on Red	N/A	N/A	N/A	Allowed	N/A	N/A	N/A	N/A
	Pedestrian Leading Interval	No	No	No	No	No	No	No	No
	Parallel Radius	>5m to 10m	>5m to 10m	>5m to 10m	No Right Turn	No Right Turn	No Right Turn	No Right Turn	No Right Turn
	Parallel Channel	No Channel	No Channel	No Channel	No Right Turn	No Right Turn	No Right Turn	No Right Turn	No Right Turn
	Perpendicular Radius	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Perpendicular Channel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Crosswalk Type	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
	PETSI Score	102	97	70	76	79	79	88	79
	Delay Score	14.7	14.7	18.8	18.8	14.4	14.4	20.4	20.4
	Level of Service	B	B	C	B	B	B	C	C
		C				C			
	Target	A				A			
Cyclist	Type of Bikeway	Mixed Traffic	Mixed Traffic	-	Mixed Traffic	Mixed Traffic	-	Mixed Traffic	-
	Turning Speed	N/A	N/A	-	<25km/hr	N/A	-	<25km/hr	-
	Right Turn Storage	N/A	N/A	-	<25m	N/A	-	25m-50m	-
	Dual Right Turn Lanes	No	No	-	No	N/A	-	No	-
	Shared Through-Right Lane	Yes	No	-	No	N/A	-	No	-
	Bike Box	No	No	-	No	No	-	N/A	-
	Lanes Crossed for Left Turns	None	None	-	Two	Three	-	N/A	-
	Dual Left Turn Lanes	No	No	-	No	No	-	N/A	-
	Approach Speed	50km/hr	50km/hr	-	50km/hr	50km/hr	-	N/A	-
	Level of Service	B	B	-	F	F	-	D	-
		F				F			
	Target	C				C			
Transit	Facility Type	Mixed Traffic	Mixed Traffic	-	High Level TSP	Mixed Traffic	-	-	High Level TSP
	Average Signal Delay	14 seconds	18 seconds	-	-	18 seconds	-	-	-
	Level of Service	C	C	-	B	C	-	-	B
		C				C			
	Target	A				A			
Truck	Turning Radius	-	<10m	-	<10m	<10m	-	-	<10m
	Receiving Lanes	-	Two	-	One	Two	-	-	Four
	Level of Service	-	D	-	F	D	-	-	D
		F				D			
	Target	D				D			
Auto	Volume to Capacity Ratio	0.56				0.53			
	Level of Service	A				A			
	Target	E				E			

	Intersection	Slater Street/Metcalfe Street				Bank Street/Laurier Avenue			
		North	South	East	West	North	South	East	West
Pedestrian	Median > 2.4m in Width	No	No	No	No	No	No	No	No
	Lanes (3.5m Lane Width)	3	3	4	4	3	3	4	4
	Conflicting Left Turns	Permissive	No Left Turn	No Left Turn	No Left Turn	No Left Turn	No Left Turn	No Left Turn	No Left Turn
	Conflicting Right Turns	No Right Turn	No Right Turn	Permissive	No Right Turn	Permissive	Permissive	Permissive	Permissive
	Right Turn on Red	N/A	Allowed	N/A	N/A	Allowed	Allowed	Allowed	Allowed
	Pedestrian Leading Interval	No	No	No	No	No	No	No	No
	Parallel Radius	No Right Turn	No Right Turn	>5m to 10m	No Right Turn	>5m to 10m	>3m to 5m	>5m to 10m	>5m to 10m
	Parallel Channel	No Right Turn	No Right Turn	No Channel	No Right Turn	No Channel	No Channel	No Channel	No Channel
	Perpendicular Radius	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Perpendicular Channel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Crosswalk Type	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
	PETSI Score	88	93	65	79	82	83	65	65
	Delay Score	16.4	16.4	15.1	15.1	20.8	20.8	11.8	11.8
	Level of Service	B	B	C	B	C	C	C	C
		C				C			
	Target	A				A			
Cyclist	Type of Bikeway	Mixed Traffic	-	Mixed Traffic	-	Mixed Traffic	Mixed Traffic	Separated	Separated
	Turning Speed	N/A	-	N/A	-	<25km/hr	<25km/hr	N/A	N/A
	Right Turn Storage	N/A	-	N/A	-	<25m	>50m	N/A	N/A
	Dual Right Turn Lanes	No	-	N/A	-	No	No	No	No
	Shared Through-Right Lane	Yes	-	N/A	-	No	No	Yes	Yes
	Bike Box	N/A	-	No	-	No	No	Yes	Yes
	Lanes Crossed for Left Turns	N/A	-	Two	-	None	None	N/A	N/A
	Dual Left Turn Lanes	N/A	-	No	-	No	No	No	No
	Approach Speed	N/A	-	50km/hr	-	50km/hr	50km/hr	50km/hr	50km/hr
	Level of Service	F	-	D	-	B	D	A	A
		F				D			
	Target	C				C			
Transit	Facility Type	-	Mixed Traffic	-	High Level TSP	Mixed Traffic	Mixed Traffic	-	-
	Average Signal Delay	-	16 seconds	-	-	24 seconds	19 seconds	-	-
	Level of Service	-	C	-	B	D	C	-	-
		C				D			
	Target	A				D			
Truck	Turning Radius	-	10m to 15m	-	<10m	<10m	<10m	<10m	<10m
	Receiving Lanes	-	Two	-	Three	One	One	One	One
	Level of Service	-	B	-	D	F	F	F	F
		D				F			
	Target	D				D			
Auto	Volume to Capacity Ratio	0.51				1.29			
	Level of Service	A				F			
	Target	E				E			

APPENDIX K

Synchro Analysis Reports

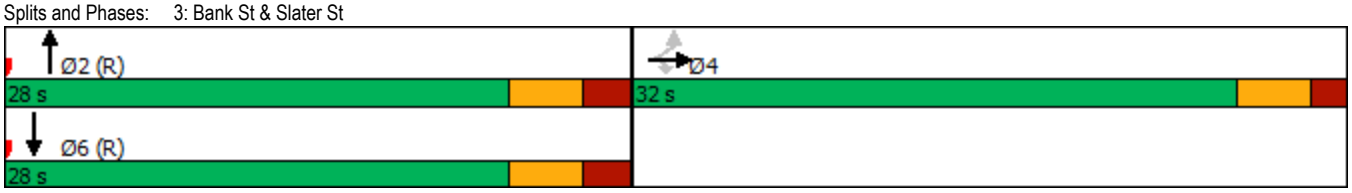


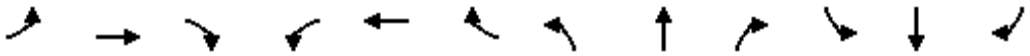
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	643	59	0	0	0	0	204	8	0	64	0
Future Volume (vph)	8	643	59	0	0	0	0	204	8	0	64	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		20.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99	0.58					0.99				
Frt			0.850					0.995				
Flt Protected		0.999										
Satd. Flow (prot)	0	2665	1473	0	0	0	0	1566	0	0	1291	0
Flt Permitted		0.999										
Satd. Flow (perm)	0	2650	857	0	0	0	0	1566	0	0	1291	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			45					4				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.7			46.9			108.1			79.3	
Travel Time (s)		14.2			3.4			7.8			5.7	
Confl. Peds. (#/hr)	287		252	252		287	458		539	539		458
Confl. Bikes (#/hr)			17			7			80			3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	30%	5%	0%	0%	0%	0%	14%	13%	0%	41%	0%
Adj. Flow (vph)	9	714	66	0	0	0	0	227	9	0	71	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	723	66	0	0	0	0	236	0	0	71	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4		4									
Minimum Split (s)	24.0	24.0	24.0					22.5			22.5	
Total Split (s)	32.0	32.0	32.0					28.0			28.0	
Total Split (%)	53.3%	53.3%	53.3%					46.7%			46.7%	
Maximum Green (s)	27.0	27.0	27.0					22.5			22.5	
Yellow Time (s)	3.3	3.3	3.3					3.3			3.3	
All-Red Time (s)	1.7	1.7	1.7					2.2			2.2	
Lost Time Adjust (s)		0.0	0.0					0.0			0.0	
Total Lost Time (s)		5.0	5.0					5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	10.0	10.0	10.0					7.0			7.0	
Flash Dont Walk (s)	9.0	9.0	9.0					10.0			10.0	
Pedestrian Calls (#/hr)	100	100	100					100			100	
Act Effct Green (s)		27.0	27.0					22.5			22.5	
Actuated g/C Ratio		0.45	0.45					0.38			0.38	
v/c Ratio		0.61	0.16					0.40			0.15	
Control Delay		15.2	6.0					18.0			13.5	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		15.2	6.0					18.0			13.5	
LOS		B	A					B			B	
Approach Delay		14.4						18.0			13.5	
Approach LOS		B						B			B	
Queue Length 50th (m)		29.8	1.2					25.1			5.0	
Queue Length 95th (m)		45.1	7.1					m46.6			12.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.7			22.9			84.1			55.3	
Turn Bay Length (m)			20.0									
Base Capacity (vph)		1192	410					589			484	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.61	0.16					0.40			0.15	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 35 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 45.3%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: Bank St & Slater St



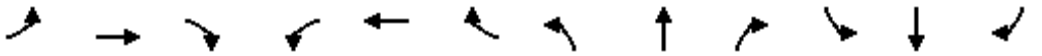


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	551	44	0	0	0	0	0	0	178	447	0
Future Volume (vph)	0	551	44	0	0	0	0	0	0	178	447	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor			0.87							0.76		
Frt			0.850									
Flt Protected										0.950		
Satd. Flow (prot)	0	2640	1097	0	0	0	0	0	0	1712	4824	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	2640	949	0	0	0	0	0	0	1304	4824	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			45							87		
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.1			179.9			110.3			85.4	
Travel Time (s)		9.7			13.0			7.9			6.1	
Confl. Peds. (#/hr)	147		173	173		147	679		225	225		679
Confl. Bikes (#/hr)			2									1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	31%	41%	0%	0%	0%	0%	0%	0%	1%	3%	0%
Adj. Flow (vph)	0	612	49	0	0	0	0	0	0	198	497	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	612	49	0	0	0	0	0	0	198	497	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Minimum Split (s)		30.5	30.5							22.5	22.5	
Total Split (s)		34.0	34.0							26.0	26.0	
Total Split (%)		56.7%	56.7%							43.3%	43.3%	
Maximum Green (s)		28.5	28.5							20.5	20.5	
Yellow Time (s)		3.3	3.3							3.3	3.3	
All-Red Time (s)		2.2	2.2							2.2	2.2	
Lost Time Adjust (s)		0.0	0.0							0.0	0.0	
Total Lost Time (s)		5.5	5.5							5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		15.0	15.0							7.0	7.0	
Flash Dont Walk (s)		10.0	10.0							10.0	10.0	
Pedestrian Calls (#/hr)		100	100							100	100	
Act Effct Green (s)		28.5	28.5							20.5	20.5	
Actuated g/C Ratio		0.48	0.48							0.34	0.34	
v/c Ratio		0.49	0.10							0.39	0.30	
Control Delay		3.6	0.5							11.4	15.1	
Queue Delay		0.0	0.0							0.0	0.0	
Total Delay		3.6	0.5							11.4	15.1	
LOS		A	A							B	B	
Approach Delay		3.4									14.1	
Approach LOS		A									B	
Queue Length 50th (m)		3.7	0.0							8.6	14.3	
Queue Length 95th (m)		5.1	m0.0							22.6	21.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		110.1			155.9			86.3			61.4	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1254	474							502	1648	
Starvation Cap Reductn		0	0							0	0	
Spillback Cap Reductn		0	0							0	0	
Storage Cap Reductn		0	0							0	0	
Reduced v/c Ratio		0.49	0.10							0.39	0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 10 (17%), Referenced to phase 2:EBT and 6:, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 8.9		Intersection LOS: A	
Intersection Capacity Utilization 44.2%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 6: O'Connor St & Slater St

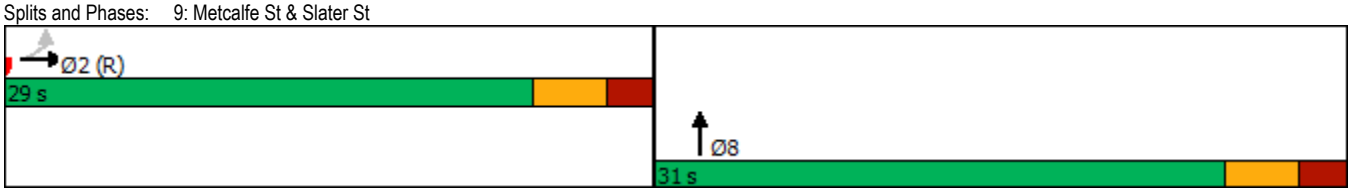


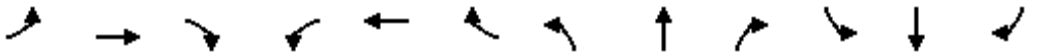
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	592	0	0	0	0	0	441	99	0	0	0
Future Volume (vph)	175	592	0	0	0	0	0	441	99	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor	0.84							0.95				
Frt								0.972				
Flt Protected	0.950											
Satd. Flow (prot)	1647	2524	0	0	0	0	0	4467	0	0	0	0
Flt Permitted	0.950											
Satd. Flow (perm)	1389	2524	0	0	0	0	0	4467	0	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	45							41				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		179.9			187.0			120.3			79.0	
Travel Time (s)		13.0			13.5			8.7			5.7	
Confl. Peds. (#/hr)	200		152	152		200	666		207	207		666
Confl. Bikes (#/hr)			15						27			1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	5%	37%	0%	0%	0%	0%	0%	3%	4%	0%	0%	0%
Adj. Flow (vph)	194	658	0	0	0	0	0	490	110	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	194	658	0	0	0	0	0	600	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Minimum Split (s)	28.4	28.4						21.5				
Total Split (s)	29.0	29.0						31.0				
Total Split (%)	48.3%	48.3%						51.7%				
Maximum Green (s)	23.6	23.6						25.5				
Yellow Time (s)	3.3	3.3						3.3				
All-Red Time (s)	2.1	2.1						2.2				
Lost Time Adjust (s)	0.0	0.0						0.0				
Total Lost Time (s)	5.4	5.4						5.5				
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	15.0	15.0						8.0				
Flash Dont Walk (s)	8.0	8.0						8.0				
Pedestrian Calls (#/hr)	100	100						100				
Act Effct Green (s)	23.6	23.6						25.5				
Actuated g/C Ratio	0.39	0.39						0.42				
v/c Ratio	0.34	0.66						0.31				
Control Delay	11.9	17.0						11.1				
Queue Delay	0.0	0.0						0.0				
Total Delay	11.9	17.0						11.1				
LOS	B	B						B				
Approach Delay		15.9						11.1				
Approach LOS		B						B				
Queue Length 50th (m)	7.8	20.4						14.0				
Queue Length 95th (m)	21.5	35.6						20.8				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		155.9			163.0			96.3			55.0	
Turn Bay Length (m)	40.0											
Base Capacity (vph)	573	992						1922				
Starvation Cap Reductn	0	0						0				
Spillback Cap Reductn	0	0						0				
Storage Cap Reductn	0	0						0				
Reduced v/c Ratio	0.34	0.66						0.31				

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 15 (25%), Referenced to phase 2:EBTL and 6:, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 13.9		Intersection LOS: B	
Intersection Capacity Utilization 44.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 9: Metcalfe St & Slater St





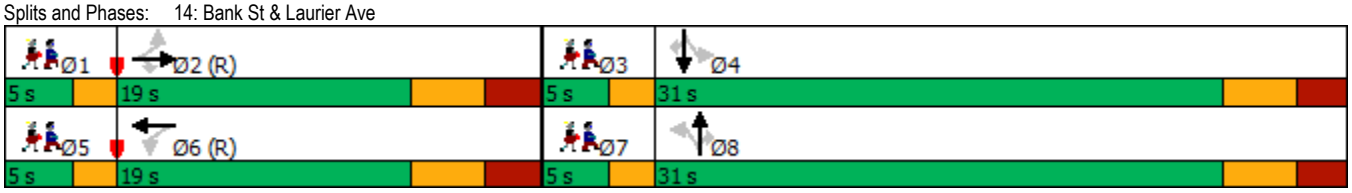
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	307	63	0	184	19	1	182	78	6	160	31
Future Volume (vph)	0	307	63	0	184	19	1	182	78	6	160	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		45.0	0.0		25.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.28		0.94			1.00	0.22		0.98	0.30
Frt			0.850		0.987				0.850			0.850
Flt Protected											0.998	
Satd. Flow (prot)	0	1767	1517	0	1647	0	0	1597	1419	0	1548	1199
Flt Permitted								0.999			0.989	
Satd. Flow (perm)	0	1767	420	0	1647	0	0	1592	306	0	1501	364
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		194.2			137.9			122.7			108.1	
Travel Time (s)		14.0			9.9			8.8			7.8	
Confl. Peds. (#/hr)	288		322	322		288	480		605	605		480
Confl. Bikes (#/hr)			176			115			79			9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	3%	2%	0%	2%	5%	0%	14%	9%	0%	18%	29%
Adj. Flow (vph)	0	341	70	0	204	21	1	202	87	7	178	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	341	70	0	225	0	0	203	87	0	185	34
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm		NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Minimum Split (s)	15.9	15.9	15.9	15.9	15.9		15.6	15.6	15.6	15.6	15.6	15.6
Total Split (s)	19.0	19.0	19.0	19.0	19.0		31.0	31.0	31.0	31.0	31.0	31.0
Total Split (%)	31.7%	31.7%	31.7%	31.7%	31.7%		51.7%	51.7%	51.7%	51.7%	51.7%	51.7%
Maximum Green (s)	13.1	13.1	13.1	13.1	13.1		25.4	25.4	25.4	25.4	25.4	25.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		5.9	5.9		5.9			5.6	5.6		5.6	5.6
Lead/Lag	Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	100	100	100	100	100		100	100	100	100	100	100
Act Effct Green (s)		13.1	13.1		13.1			25.4	25.4		25.4	25.4
Actuated g/C Ratio		0.22	0.22		0.22			0.42	0.42		0.42	0.42
v/c Ratio		0.89	0.77		0.63			0.30	0.67		0.29	0.22
Control Delay		50.9	76.1		30.4			13.0	45.6		15.9	18.5
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		50.9	76.1		30.4			13.0	45.6		15.9	18.5
LOS		D	E		C			B	D		B	B
Approach Delay		55.2			30.4			22.8			16.3	
Approach LOS		E			C			C			B	
Queue Length 50th (m)		36.5	7.2		22.5			14.0	7.4		15.4	2.8
Queue Length 95th (m)		#77.0	#26.8		#46.0			26.8	#28.5		25.9	9.6

Lane Group	Ø1	Ø3	Ø5	Ø7
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (m)				
Storage Lanes				
Taper Length (m)				
Lane Util. Factor				
Ped Bike Factor				
Frt				
Flt Protected				
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)				
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(m)				
Link Offset(m)				
Crosswalk Width(m)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (k/h)				
Turn Type				
Protected Phases	1	3	5	7
Permitted Phases				
Minimum Split (s)	5.0	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0	5.0
Total Split (%)	8%	8%	8%	8%
Maximum Green (s)	3.0	3.0	3.0	3.0
Yellow Time (s)	2.0	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Walk Time (s)	3.0	3.0	3.0	3.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0
Pedestrian Calls (#/hr)	100	100	100	100
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)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		170.2			113.9			98.7			84.1	
Turn Bay Length (m)			30.0						45.0			25.0
Base Capacity (vph)		385	91		359			673	129		635	154
Starvation Cap Reductn		0	0		0			0	0		0	0
Spillback Cap Reductn		0	0		0			0	0		0	0
Storage Cap Reductn		0	0		0			0	0		0	0
Reduced v/c Ratio		0.89	0.77		0.63			0.30	0.67		0.29	0.22

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 45 (75%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 34.7		Intersection LOS: C	
Intersection Capacity Utilization 56.1%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 14: Bank St & Laurier Ave



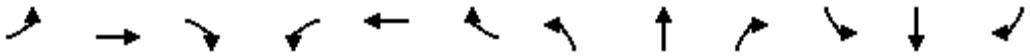
Lane Group	Ø1	Ø3	Ø5	Ø7
Internal Link Dist (m)				
Turn Bay Length (m)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	651	5	0	0	0	2
Future Volume (Veh/h)	651	5	0	0	0	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	723	6	0	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	47			134		
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			729		726	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223		219	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1098		613	887

Direction, Lane #	EB 1	EB 2	NB 1
Volume Total	482	247	2
Volume Left	0	0	0
Volume Right	0	6	2
cSH	1700	1700	887
Volume to Capacity	0.28	0.15	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.1
Lane LOS			A
Approach Delay (s)	0.0		9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

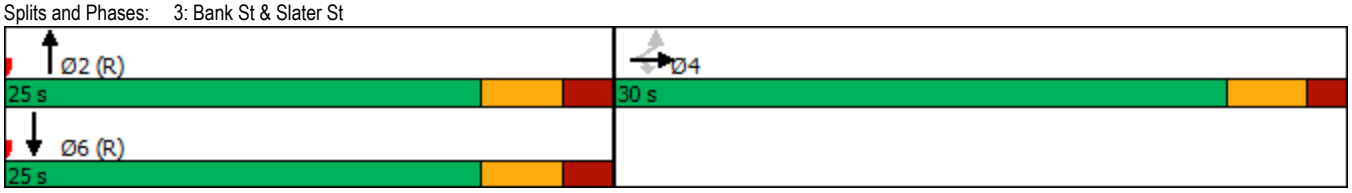


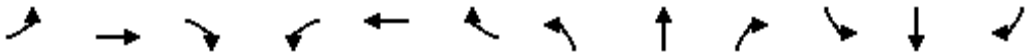
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	649	155	0	0	0	0	255	10	0	123	0
Future Volume (vph)	7	649	155	0	0	0	0	255	10	0	123	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		20.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00	0.58					0.99				
Frt			0.850					0.995				
Flt Protected		0.999										
Satd. Flow (prot)	0	2748	1532	0	0	0	0	1657	0	0	1444	0
Flt Permitted		0.999										
Satd. Flow (perm)	0	2743	885	0	0	0	0	1657	0	0	1444	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50					4				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.7			46.9			110.6			79.3	
Travel Time (s)		14.2			3.4			8.0			5.7	
Confl. Peds. (#/hr)	110		274	274		110	525		686	686		525
Confl. Bikes (#/hr)			28			2			25			12
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	26%	1%	0%	0%	0%	0%	8%	0%	0%	26%	0%
Adj. Flow (vph)	8	721	172	0	0	0	0	283	11	0	137	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	729	172	0	0	0	0	294	0	0	137	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4		4									
Minimum Split (s)	24.0	24.0	24.0					22.5			22.5	
Total Split (s)	30.0	30.0	30.0					25.0			25.0	
Total Split (%)	54.5%	54.5%	54.5%					45.5%			45.5%	
Maximum Green (s)	25.0	25.0	25.0					19.5			19.5	
Yellow Time (s)	3.3	3.3	3.3					3.3			3.3	
All-Red Time (s)	1.7	1.7	1.7					2.2			2.2	
Lost Time Adjust (s)		0.0	0.0					0.0			0.0	
Total Lost Time (s)		5.0	5.0					5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	10.0	10.0	10.0					7.0			7.0	
Flash Dont Walk (s)	9.0	9.0	9.0					10.0			10.0	
Pedestrian Calls (#/hr)	100	100	100					100			100	
Act Effct Green (s)		25.0	25.0					19.5			19.5	
Actuated g/C Ratio		0.45	0.45					0.35			0.35	
v/c Ratio		0.59	0.40					0.50			0.27	
Control Delay		13.5	10.5					19.3			14.5	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		13.5	10.5					19.3			14.5	
LOS		B	B					B			B	
Approach Delay		13.0						19.3			14.5	
Approach LOS		B						B			B	
Queue Length 50th (m)		26.5	7.2					29.2			9.5	
Queue Length 95th (m)		40.6	19.6					m45.9			20.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.7			22.9			86.6			55.3	
Turn Bay Length (m)			20.0									
Base Capacity (vph)		1246	429					590			511	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.59	0.40					0.50			0.27	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 19 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 14.5		Intersection LOS: B	
Intersection Capacity Utilization 46.4%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: Bank St & Slater St



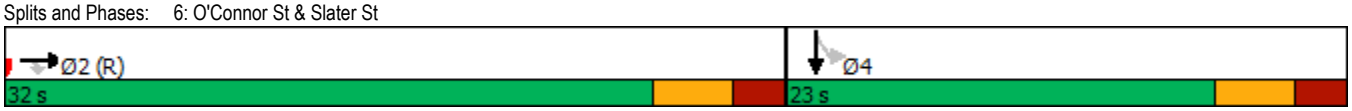


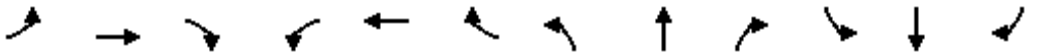
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	462	23	0	0	0	0	0	0	146	836	0
Future Volume (vph)	0	462	23	0	0	0	0	0	0	146	836	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor			0.81							0.86		
Frt			0.850									
Flt Protected										0.950		
Satd. Flow (prot)	0	2660	1547	0	0	0	0	0	0	1712	4871	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	2660	1252	0	0	0	0	0	0	1479	4871	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			50							162		
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.1			179.9			110.3			85.4	
Travel Time (s)		9.7			13.0			7.9			6.1	
Confl. Peds. (#/hr)	39		270	270		39	561		140	140		561
Confl. Bikes (#/hr)			12									3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	30%	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%
Adj. Flow (vph)	0	513	26	0	0	0	0	0	0	162	929	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	513	26	0	0	0	0	0	0	162	929	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Minimum Split (s)		30.5	30.5							22.5	22.5	
Total Split (s)		32.0	32.0							23.0	23.0	
Total Split (%)		58.2%	58.2%							41.8%	41.8%	
Maximum Green (s)		26.5	26.5							17.5	17.5	
Yellow Time (s)		3.3	3.3							3.3	3.3	
All-Red Time (s)		2.2	2.2							2.2	2.2	
Lost Time Adjust (s)		0.0	0.0							0.0	0.0	
Total Lost Time (s)		5.5	5.5							5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		15.0	15.0							7.0	7.0	
Flash Dont Walk (s)		10.0	10.0							10.0	10.0	
Pedestrian Calls (#/hr)		100	100							100	100	
Act Effct Green (s)		26.5	26.5							17.5	17.5	
Actuated g/C Ratio		0.48	0.48							0.32	0.32	
v/c Ratio		0.40	0.04							0.28	0.60	
Control Delay		22.9	10.3							4.4	17.8	
Queue Delay		0.0	0.0							0.0	0.0	
Total Delay		22.9	10.3							4.4	17.8	
LOS		C	B							A	B	
Approach Delay		22.3									15.8	
Approach LOS		C									B	
Queue Length 50th (m)		30.8	0.5							0.0	27.9	
Queue Length 95th (m)		44.2	m1.8							10.0	38.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		110.1			155.9			86.3			61.4	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1281	629							581	1549	
Starvation Cap Reductn		0	0							0	0	
Spillback Cap Reductn		0	0							0	0	
Storage Cap Reductn		0	0							0	0	
Reduced v/c Ratio		0.40	0.04							0.28	0.60	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 28 (51%), Referenced to phase 2:EBT and 6:, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 17.9		Intersection LOS: B	
Intersection Capacity Utilization 47.1%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 6: O'Connor St & Slater St



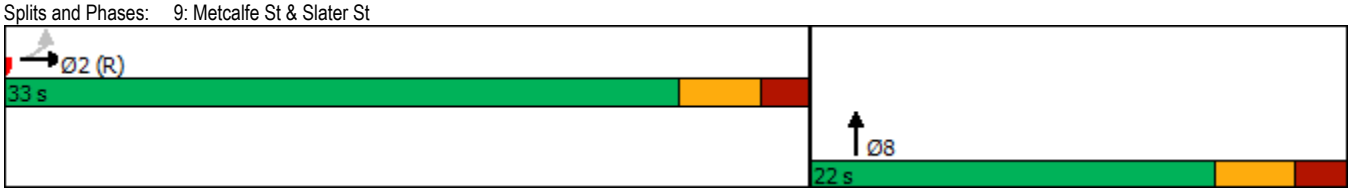


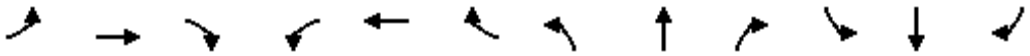
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	570	0	0	0	0	0	429	217	0	0	0
Future Volume (vph)	173	570	0	0	0	0	0	429	217	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor	0.87							0.89				
Frt								0.950				
Flt Protected	0.950											
Satd. Flow (prot)	1695	2660	0	0	0	0	0	4148	0	0	0	0
Flt Permitted	0.950											
Satd. Flow (perm)	1480	2660	0	0	0	0	0	4148	0	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	50							85				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		179.9			187.0			120.3			79.0	
Travel Time (s)		13.0			13.5			8.7			5.7	
Confl. Peds. (#/hr)	177		165	165		177	661		363	363		661
Confl. Bikes (#/hr)			18						17			3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	30%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Adj. Flow (vph)	192	633	0	0	0	0	0	477	241	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	633	0	0	0	0	0	718	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Minimum Split (s)	28.4	28.4						21.5				
Total Split (s)	33.0	33.0						22.0				
Total Split (%)	60.0%	60.0%						40.0%				
Maximum Green (s)	27.6	27.6						16.5				
Yellow Time (s)	3.3	3.3						3.3				
All-Red Time (s)	2.1	2.1						2.2				
Lost Time Adjust (s)	0.0	0.0						0.0				
Total Lost Time (s)	5.4	5.4						5.5				
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	15.0	15.0						8.0				
Flash Dont Walk (s)	8.0	8.0						8.0				
Pedestrian Calls (#/hr)	100	100						100				
Act Effct Green (s)	27.6	27.6						16.5				
Actuated g/C Ratio	0.50	0.50						0.30				
v/c Ratio	0.25	0.47						0.55				
Control Delay	4.9	9.7						16.0				
Queue Delay	0.0	0.0						0.0				
Total Delay	4.9	9.7						16.0				
LOS	A	A						B				
Approach Delay		8.6						16.0				
Approach LOS		A						B				
Queue Length 50th (m)	4.2	32.5						18.8				
Queue Length 95th (m)	12.2	45.7						28.4				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		155.9			163.0			96.3			55.0	
Turn Bay Length (m)	40.0											
Base Capacity (vph)	767	1334						1303				
Starvation Cap Reductn	0	0						0				
Spillback Cap Reductn	0	0						0				
Storage Cap Reductn	0	0						0				
Reduced v/c Ratio	0.25	0.47						0.55				

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 48 (87%), Referenced to phase 2:EBTL and 6:, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 47.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 9: Metcalfe St & Slater St





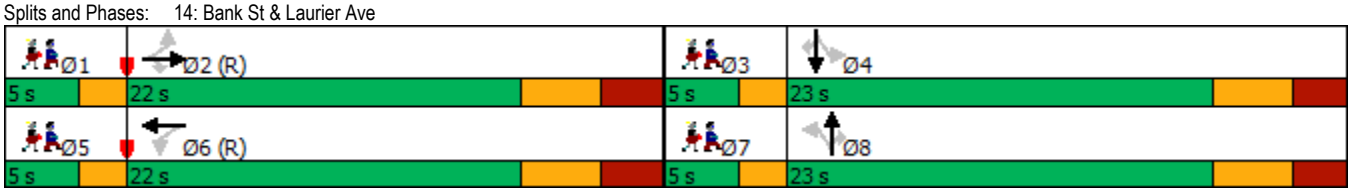
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	250	104	4	302	47	0	222	74	2	274	69
Future Volume (vph)	0	250	104	4	302	47	0	222	74	2	274	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		45.0	0.0		25.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.28		0.91				0.09		1.00	0.19
Frt			0.850		0.982				0.850			0.850
Flt Protected					0.999							
Satd. Flow (prot)	0	1802	1547	0	1619	0	0	1640	1532	0	1718	1322
Flt Permitted					0.996						0.998	
Satd. Flow (perm)	0	1802	435	0	1607	0	0	1640	145	0	1707	250
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.6			140.3			82.1			110.6	
Travel Time (s)		14.2			10.1			5.9			8.0	
Confl. Peds. (#/hr)	307		488	488		307	714		1278	1278		714
Confl. Bikes (#/hr)			105			124			31			58
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	11%	1%	0%	6%	17%
Adj. Flow (vph)	0	278	116	4	336	52	0	247	82	2	304	77
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	278	116	0	392	0	0	247	82	0	306	77
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm	Perm	NA			NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Minimum Split (s)	15.9	15.9	15.9	15.9	15.9		15.6	15.6	15.6	15.6	15.6	15.6
Total Split (s)	22.0	22.0	22.0	22.0	22.0		23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%		41.8%	41.8%	41.8%	41.8%	41.8%	41.8%
Maximum Green (s)	16.1	16.1	16.1	16.1	16.1		17.4	17.4	17.4	17.4	17.4	17.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		5.9	5.9		5.9			5.6	5.6		5.6	5.6
Lead/Lag	Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	100	100	100	100	100		100	100	100	100	100	100
Act Effct Green (s)		16.1	16.1		16.1			17.4	17.4		17.4	17.4
Actuated g/C Ratio		0.29	0.29		0.29			0.32	0.32		0.32	0.32
v/c Ratio		0.53	0.91		0.83			0.48	1.82		0.57	0.97
Control Delay		20.6	87.7		37.0			18.9	467.2		19.1	123.3
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		20.6	87.7		37.0			18.9	467.2		19.1	123.3
LOS		C	F		D			B	F		B	F
Approach Delay		40.4			37.0			130.6			40.0	
Approach LOS		D			D			F			D	
Queue Length 50th (m)		22.8	11.0		36.1			19.4	~12.7		23.3	7.3
Queue Length 95th (m)		41.7	#36.5		#76.5			36.5	#31.5		37.4	#29.6

Lane Group	Ø1	Ø3	Ø5	Ø7
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (m)				
Storage Lanes				
Taper Length (m)				
Lane Util. Factor				
Ped Bike Factor				
Frt				
Flt Protected				
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)				
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(m)				
Link Offset(m)				
Crosswalk Width(m)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (k/h)				
Turn Type				
Protected Phases	1	3	5	7
Permitted Phases				
Minimum Split (s)	5.0	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0	5.0
Total Split (%)	9%	9%	9%	9%
Maximum Green (s)	3.0	3.0	3.0	3.0
Yellow Time (s)	2.0	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Walk Time (s)	3.0	3.0	3.0	3.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0
Pedestrian Calls (#/hr)	100	100	100	100
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)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.6			116.3			58.1			86.6	
Turn Bay Length (m)			30.0						45.0			25.0
Base Capacity (vph)		527	127		470			518	45		540	79
Starvation Cap Reductn		0	0		0			0	0		0	0
Spillback Cap Reductn		0	0		0			0	0		0	0
Storage Cap Reductn		0	0		0			0	0		0	0
Reduced v/c Ratio		0.53	0.91		0.83			0.48	1.82		0.57	0.97

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 20 (36%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 1.82			
Intersection Signal Delay: 59.2		Intersection LOS: E	
Intersection Capacity Utilization 67.6%		ICU Level of Service C	
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: 14: Bank St & Laurier Ave



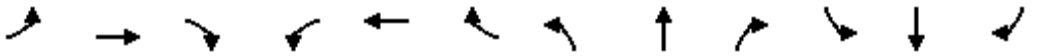
Lane Group	Ø1	Ø3	Ø5	Ø7
Internal Link Dist (m)				
Turn Bay Length (m)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	657	2	0	0	0	5
Future Volume (Veh/h)	657	2	0	0	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	730	2	0	0	0	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	47			134		
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			732		731	366
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			249		247	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1083		593	894

Direction, Lane #	EB 1	EB 2	NB 1
Volume Total	487	245	6
Volume Left	0	0	0
Volume Right	0	2	6
cSH	1700	1700	894
Volume to Capacity	0.29	0.14	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.0	0.0	9.1
Lane LOS			A
Approach Delay (s)	0.0		9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

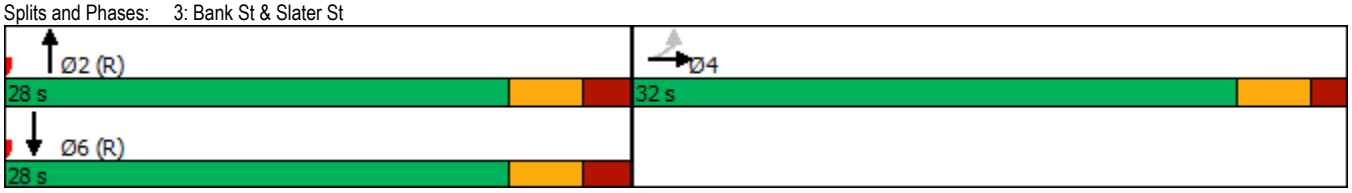


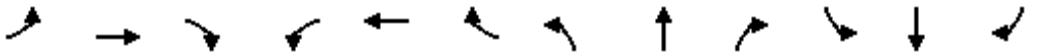
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	669	59	0	0	0	0	204	8	0	64	0
Future Volume (vph)	8	669	59	0	0	0	0	204	8	0	64	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		20.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.96						0.99				
Frt		0.988						0.995				
Flt Protected		0.999										
Satd. Flow (prot)	0	2584	0	0	0	0	0	1566	0	0	1291	0
Flt Permitted		0.999										
Satd. Flow (perm)	0	2571	0	0	0	0	0	1566	0	0	1291	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20						4				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.7			46.9			108.1			79.3	
Travel Time (s)		14.2			3.4			7.8			5.7	
Confl. Peds. (#/hr)	287		252	252		287	458		539	539		458
Confl. Bikes (#/hr)			17			7			80			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	30%	5%	0%	0%	0%	0%	14%	13%	0%	41%	0%
Adj. Flow (vph)	8	669	59	0	0	0	0	204	8	0	64	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	736	0	0	0	0	0	212	0	0	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4											
Minimum Split (s)	24.0	24.0						22.5			22.5	
Total Split (s)	32.0	32.0						28.0			28.0	
Total Split (%)	53.3%	53.3%						46.7%			46.7%	
Maximum Green (s)	27.0	27.0						22.5			22.5	
Yellow Time (s)	3.3	3.3						3.3			3.3	
All-Red Time (s)	1.7	1.7						2.2			2.2	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.0						5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	10.0	10.0						7.0			7.0	
Flash Dont Walk (s)	9.0	9.0						10.0			10.0	
Pedestrian Calls (#/hr)	100	100						100			100	
Act Effct Green (s)		27.0						22.5			22.5	
Actuated g/C Ratio		0.45						0.38			0.38	
v/c Ratio		0.63						0.36			0.13	
Control Delay		15.3						17.3			13.3	
Queue Delay		0.0						0.0			0.0	
Total Delay		15.3						17.3			13.3	
LOS		B						B			B	
Approach Delay		15.3						17.3			13.3	
Approach LOS		B						B			B	
Queue Length 50th (m)		29.8						22.0			4.5	
Queue Length 95th (m)		45.9						42.8			11.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.7			22.9			84.1			55.3	
Turn Bay Length (m)												
Base Capacity (vph)		1167						589			484	
Starvation Cap Reductn		0						0			0	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.63						0.36			0.13	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 35 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 15.6		Intersection LOS: B	
Intersection Capacity Utilization 48.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Bank St & Slater St



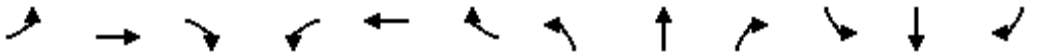


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	577	44	0	0	0	0	0	0	178	451	0
Future Volume (vph)	0	577	44	0	0	0	0	0	0	178	451	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00
Ped Bike Factor			0.87								0.93	
Frt			0.850									
Flt Protected											0.986	
Satd. Flow (prot)	0	2640	1097	0	0	0	0	0	0	0	4783	0
Flt Permitted											0.986	
Satd. Flow (perm)	0	2640	949	0	0	0	0	0	0	0	4460	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			45								96	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.1			179.9			110.3			85.4	
Travel Time (s)		9.7			13.0			7.9			6.1	
Confl. Peds. (#/hr)	147		173	173		147	679		225	225		679
Confl. Bikes (#/hr)			2									1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	31%	41%	0%	0%	0%	0%	0%	0%	1%	3%	0%
Adj. Flow (vph)	0	577	44	0	0	0	0	0	0	178	451	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	577	44	0	0	0	0	0	0	0	629	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Minimum Split (s)		30.5	30.5							22.5	22.5	
Total Split (s)		34.0	34.0							26.0	26.0	
Total Split (%)		56.7%	56.7%							43.3%	43.3%	
Maximum Green (s)		28.5	28.5							20.5	20.5	
Yellow Time (s)		3.3	3.3							3.3	3.3	
All-Red Time (s)		2.2	2.2							2.2	2.2	
Lost Time Adjust (s)		0.0	0.0								0.0	
Total Lost Time (s)		5.5	5.5								5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		15.0	15.0							7.0	7.0	
Flash Dont Walk (s)		10.0	10.0							10.0	10.0	
Pedestrian Calls (#/hr)		100	100							100	100	
Act Effct Green (s)		28.5	28.5								20.5	
Actuated g/C Ratio		0.48	0.48								0.34	
v/c Ratio		0.46	0.09								0.40	
Control Delay		3.6	0.5								13.5	
Queue Delay		0.0	0.0								0.0	
Total Delay		3.6	0.5								13.5	
LOS		A	A								B	
Approach Delay		3.4									13.5	
Approach LOS		A									B	
Queue Length 50th (m)		3.7	0.0								15.6	
Queue Length 95th (m)		5.0	m0.0								23.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		110.1			155.9			86.3			61.4	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1254	474								1587	
Starvation Cap Reductn		0	0								0	
Spillback Cap Reductn		0	0								0	
Storage Cap Reductn		0	0								0	
Reduced v/c Ratio		0.46	0.09								0.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 10 (17%), Referenced to phase 2:EBT and 6:, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 8.5		Intersection LOS: A	
Intersection Capacity Utilization 47.1%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 6: O'Connor St & Slater St

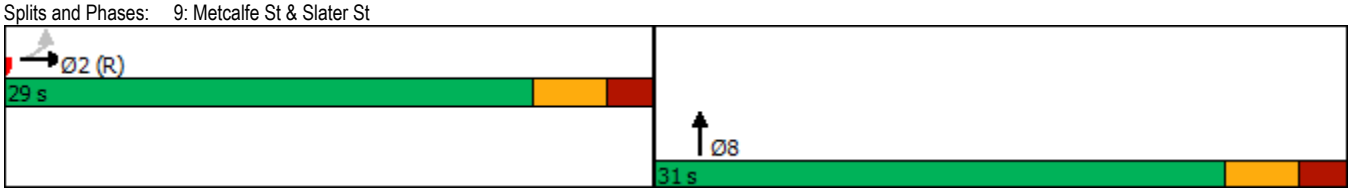


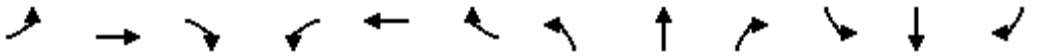
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	618	0	0	0	0	0	470	99	0	0	0
Future Volume (vph)	175	618	0	0	0	0	0	470	99	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor		0.97						0.96				
Frt								0.974				
Flt Protected		0.989										
Satd. Flow (prot)	0	2632	0	0	0	0	0	4487	0	0	0	0
Flt Permitted		0.989										
Satd. Flow (perm)	0	2541	0	0	0	0	0	4487	0	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45						47				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		179.9			187.0			120.3			79.0	
Travel Time (s)		13.0			13.5			8.7			5.7	
Confl. Peds. (#/hr)	200		152	152		200	666		207	207		666
Confl. Bikes (#/hr)			15						27			1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	37%	0%	0%	0%	0%	0%	3%	4%	0%	0%	0%
Adj. Flow (vph)	175	618	0	0	0	0	0	470	99	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	793	0	0	0	0	0	569	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Minimum Split (s)	28.4	28.4						21.5				
Total Split (s)	29.0	29.0						31.0				
Total Split (%)	48.3%	48.3%						51.7%				
Maximum Green (s)	23.6	23.6						25.5				
Yellow Time (s)	3.3	3.3						3.3				
All-Red Time (s)	2.1	2.1						2.2				
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.4						5.5				
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	15.0	15.0						8.0				
Flash Dont Walk (s)	8.0	8.0						8.0				
Pedestrian Calls (#/hr)	100	100						100				
Act Effct Green (s)		23.6						25.5				
Actuated g/C Ratio		0.39						0.42				
v/c Ratio		0.77						0.29				
Control Delay		19.6						10.8				
Queue Delay		0.0						0.0				
Total Delay		19.6						10.8				
LOS		B						B				
Approach Delay		19.6						10.8				
Approach LOS		B						B				
Queue Length 50th (m)		24.5						13.0				
Queue Length 95th (m)		#46.9						19.5				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		155.9			163.0			96.3			55.0	
Turn Bay Length (m)												
Base Capacity (vph)		1026						1934				
Starvation Cap Reductn		0						0				
Spillback Cap Reductn		0						0				
Storage Cap Reductn		0						0				
Reduced v/c Ratio		0.77						0.29				

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 15 (25%), Referenced to phase 2:EBTL and 6:, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 15.9		Intersection LOS: B	
Intersection Capacity Utilization 49.1%		ICU Level of Service A	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 9: Metcalfe St & Slater St





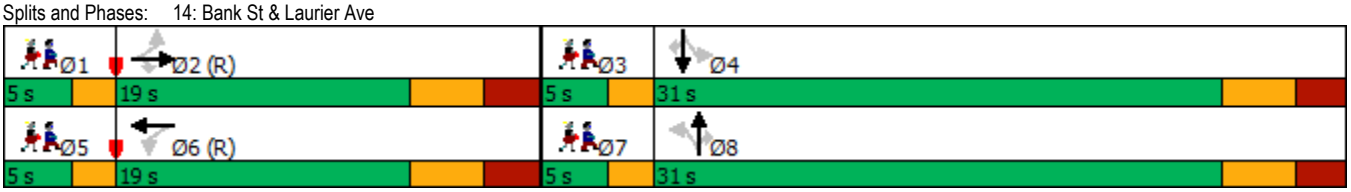
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	307	63	0	184	19	1	182	78	6	160	31
Future Volume (vph)	0	307	63	0	184	19	1	182	78	6	160	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		45.0	0.0		25.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.28		0.94			1.00	0.22		0.98	0.30
Frt			0.850		0.987				0.850			0.850
Flt Protected											0.998	
Satd. Flow (prot)	0	1767	1517	0	1647	0	0	1598	1419	0	1548	1199
Flt Permitted								0.999			0.990	
Satd. Flow (perm)	0	1767	420	0	1647	0	0	1591	306	0	1503	364
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		194.2			137.9			122.7			108.1	
Travel Time (s)		14.0			9.9			8.8			7.8	
Confl. Peds. (#/hr)	288		322	322		288	480		605	605		480
Confl. Bikes (#/hr)			176			115			79			9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	2%	0%	2%	5%	0%	14%	9%	0%	18%	29%
Adj. Flow (vph)	0	307	63	0	184	19	1	182	78	6	160	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	307	63	0	203	0	0	183	78	0	166	31
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm		NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Minimum Split (s)	15.9	15.9	15.9	15.9	15.9		15.6	15.6	15.6	15.6	15.6	15.6
Total Split (s)	19.0	19.0	19.0	19.0	19.0		31.0	31.0	31.0	31.0	31.0	31.0
Total Split (%)	31.7%	31.7%	31.7%	31.7%	31.7%		51.7%	51.7%	51.7%	51.7%	51.7%	51.7%
Maximum Green (s)	13.1	13.1	13.1	13.1	13.1		25.4	25.4	25.4	25.4	25.4	25.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		5.9	5.9		5.9			5.6	5.6		5.6	5.6
Lead/Lag	Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	100	100	100	100	100		100	100	100	100	100	100
Act Effct Green (s)		13.1	13.1		13.1			25.4	25.4		25.4	25.4
Actuated g/C Ratio		0.22	0.22		0.22			0.42	0.42		0.42	0.42
v/c Ratio		0.80	0.69		0.57			0.27	0.60		0.26	0.20
Control Delay		40.5	64.2		28.0			12.7	38.7		13.6	16.1
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		40.5	64.2		28.0			12.7	38.7		13.6	16.1
LOS		D	E		C			B	D		B	B
Approach Delay		44.5			28.0			20.5			14.0	
Approach LOS		D			C			C			B	
Queue Length 50th (m)		32.1	6.4		20.0			12.5	6.4		11.6	2.1
Queue Length 95th (m)		#67.2	#24.2		38.0			24.2	#25.4		m20.7	m5.8

Lane Group	Ø1	Ø3	Ø5	Ø7
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (m)				
Storage Lanes				
Taper Length (m)				
Lane Util. Factor				
Ped Bike Factor				
Frt				
Flt Protected				
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)				
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(m)				
Link Offset(m)				
Crosswalk Width(m)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (k/h)				
Turn Type				
Protected Phases	1	3	5	7
Permitted Phases				
Minimum Split (s)	5.0	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0	5.0
Total Split (%)	8%	8%	8%	8%
Maximum Green (s)	3.0	3.0	3.0	3.0
Yellow Time (s)	2.0	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Walk Time (s)	3.0	3.0	3.0	3.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0
Pedestrian Calls (#/hr)	100	100	100	100
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)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		170.2			113.9			98.7			84.1	
Turn Bay Length (m)			30.0						45.0			25.0
Base Capacity (vph)		385	91		359			673	129		636	154
Starvation Cap Reductn		0	0		0			0	0		0	0
Spillback Cap Reductn		0	0		0			0	0		0	0
Storage Cap Reductn		0	0		0			0	0		0	0
Reduced v/c Ratio		0.80	0.69		0.57			0.27	0.60		0.26	0.20

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 45 (75%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 29.3		Intersection LOS: C	
Intersection Capacity Utilization 56.1%		ICU Level of Service B	
Analysis Period (min) 15			
# 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: 14: Bank St & Laurier Ave



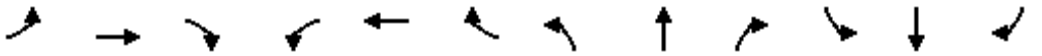
Lane Group	Ø1	Ø3	Ø5	Ø7
Internal Link Dist (m)				
Turn Bay Length (m)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	672	5	0	0	0	2
Future Volume (Veh/h)	672	5	0	0	0	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	672	5	0	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	47			134		
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			677		674	338
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			159		156	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1159		670	887

Direction, Lane #	EB 1	EB 2	NB 1
Volume Total	448	229	2
Volume Left	0	0	0
Volume Right	0	5	2
cSH	1700	1700	887
Volume to Capacity	0.26	0.13	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.1
Lane LOS			A
Approach Delay (s)	0.0		9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

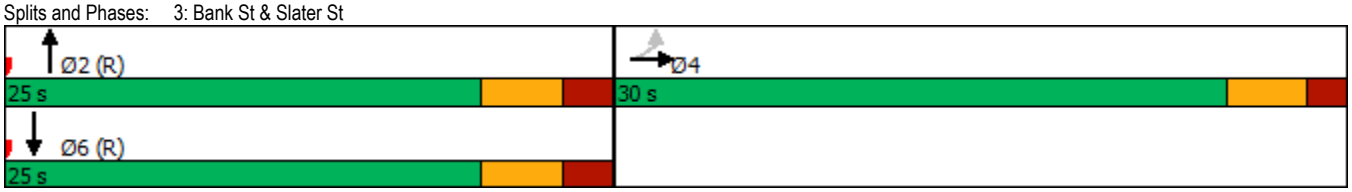


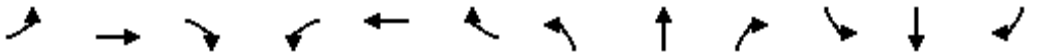
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	784	155	0	0	0	0	255	10	0	123	0
Future Volume (vph)	7	784	155	0	0	0	0	255	10	0	123	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		20.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.93						0.99				
Frt		0.975						0.995				
Flt Protected												
Satd. Flow (prot)	0	2578	0	0	0	0	0	1657	0	0	1444	0
Flt Permitted												
Satd. Flow (perm)	0	2575	0	0	0	0	0	1657	0	0	1444	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12						4				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.7			46.9			110.6			79.3	
Travel Time (s)		14.2			3.4			8.0			5.7	
Confl. Peds. (#/hr)	110		274	274		110	525		686	686		525
Confl. Bikes (#/hr)			28			2			25			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	26%	1%	0%	0%	0%	0%	8%	0%	0%	26%	0%
Adj. Flow (vph)	7	784	155	0	0	0	0	255	10	0	123	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	946	0	0	0	0	0	265	0	0	123	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4											
Minimum Split (s)	24.0	24.0						22.5			22.5	
Total Split (s)	30.0	30.0						25.0			25.0	
Total Split (%)	54.5%	54.5%						45.5%			45.5%	
Maximum Green (s)	25.0	25.0						19.5			19.5	
Yellow Time (s)	3.3	3.3						3.3			3.3	
All-Red Time (s)	1.7	1.7						2.2			2.2	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.0						5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	10.0	10.0						7.0			7.0	
Flash Dont Walk (s)	9.0	9.0						10.0			10.0	
Pedestrian Calls (#/hr)	100	100						100			100	
Act Effct Green (s)		25.0						19.5			19.5	
Actuated g/C Ratio		0.45						0.35			0.35	
v/c Ratio		0.80						0.45			0.24	
Control Delay		19.8						18.6			14.2	
Queue Delay		0.0						0.0			0.0	
Total Delay		19.8						18.6			14.2	
LOS		B						B			B	
Approach Delay		19.8						18.6			14.2	
Approach LOS		B						B			B	
Queue Length 50th (m)		39.3						25.9			8.4	
Queue Length 95th (m)		#66.1						m43.0			18.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.7			22.9			86.6			55.3	
Turn Bay Length (m)												
Base Capacity (vph)		1177						590			511	
Starvation Cap Reductn		0						0			0	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.80						0.45			0.24	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 19 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 57.0%		ICU Level of Service B	
Analysis Period (min) 15			
# 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: 3: Bank St & Slater St



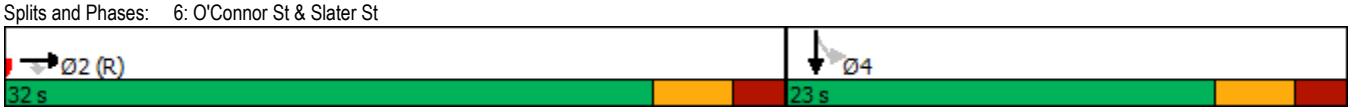


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	597	23	0	0	0	0	0	0	146	860	0
Future Volume (vph)	0	597	23	0	0	0	0	0	0	146	860	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00
Ped Bike Factor			0.81								0.98	
Frt			0.850									
Flt Protected											0.993	
Satd. Flow (prot)	0	2660	1547	0	0	0	0	0	0	0	4844	0
Flt Permitted											0.993	
Satd. Flow (perm)	0	2660	1252	0	0	0	0	0	0	0	4748	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			50								63	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.1			179.9			110.3			85.4	
Travel Time (s)		9.7			13.0			7.9			6.1	
Confl. Peds. (#/hr)	39		270	270		39	561		140	140		561
Confl. Bikes (#/hr)			12									3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	30%	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%
Adj. Flow (vph)	0	597	23	0	0	0	0	0	0	146	860	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	597	23	0	0	0	0	0	0	0	1006	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Minimum Split (s)		30.5	30.5							22.5	22.5	
Total Split (s)		32.0	32.0							23.0	23.0	
Total Split (%)		58.2%	58.2%							41.8%	41.8%	
Maximum Green (s)		26.5	26.5							17.5	17.5	
Yellow Time (s)		3.3	3.3							3.3	3.3	
All-Red Time (s)		2.2	2.2							2.2	2.2	
Lost Time Adjust (s)		0.0	0.0								0.0	
Total Lost Time (s)		5.5	5.5								5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		15.0	15.0							7.0	7.0	
Flash Dont Walk (s)		10.0	10.0							10.0	10.0	
Pedestrian Calls (#/hr)		100	100							100	100	
Act Effct Green (s)		26.5	26.5								17.5	
Actuated g/C Ratio		0.48	0.48								0.32	
v/c Ratio		0.47	0.04								0.65	
Control Delay		22.0	7.7								17.4	
Queue Delay		0.0	0.0								0.0	
Total Delay		22.0	7.7								17.4	
LOS		C	A								B	
Approach Delay		21.4									17.4	
Approach LOS		C									B	
Queue Length 50th (m)		35.9	0.3								28.7	
Queue Length 95th (m)		m44.8	m0.5								40.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		110.1			155.9			86.3			61.4	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1281	629								1553	
Starvation Cap Reductn		0	0								0	
Spillback Cap Reductn		0	0								0	
Storage Cap Reductn		0	0								0	
Reduced v/c Ratio		0.47	0.04								0.65	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 28 (51%), Referenced to phase 2:EBT and 6:, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 18.9		Intersection LOS: B	
Intersection Capacity Utilization 52.9%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 6: O'Connor St & Slater St

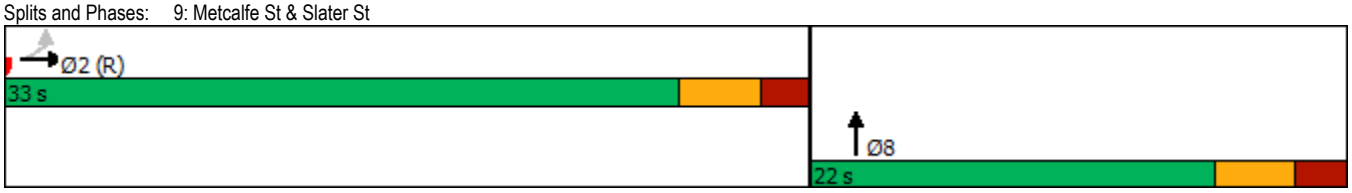


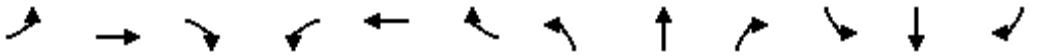
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	705	0	0	0	0	0	437	217	0	0	0
Future Volume (vph)	173	705	0	0	0	0	0	437	217	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor		0.97						0.89				
Frt								0.950				
Flt Protected		0.990										
Satd. Flow (prot)	0	2750	0	0	0	0	0	4153	0	0	0	0
Flt Permitted		0.990										
Satd. Flow (perm)	0	2681	0	0	0	0	0	4153	0	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50						70				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		179.9			187.0			120.3			79.0	
Travel Time (s)		13.0			13.5			8.7			5.7	
Confl. Peds. (#/hr)	177		165	165		177	661		363	363		661
Confl. Bikes (#/hr)			18						17			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	30%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Adj. Flow (vph)	173	705	0	0	0	0	0	437	217	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	878	0	0	0	0	0	654	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Minimum Split (s)	28.4	28.4						21.5				
Total Split (s)	33.0	33.0						22.0				
Total Split (%)	60.0%	60.0%						40.0%				
Maximum Green (s)	27.6	27.6						16.5				
Yellow Time (s)	3.3	3.3						3.3				
All-Red Time (s)	2.1	2.1						2.2				
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.4						5.5				
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	15.0	15.0						8.0				
Flash Dont Walk (s)	8.0	8.0						8.0				
Pedestrian Calls (#/hr)	100	100						100				
Act Effct Green (s)		27.6						16.5				
Actuated g/C Ratio		0.50						0.30				
v/c Ratio		0.64						0.51				
Control Delay		13.2						15.7				
Queue Delay		0.0						0.0				
Total Delay		13.2						15.7				
LOS		B						B				
Approach Delay		13.2						15.7				
Approach LOS		B						B				
Queue Length 50th (m)		47.1						17.1				
Queue Length 95th (m)		63.8						26.0				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		155.9			163.0			96.3			55.0	
Turn Bay Length (m)												
Base Capacity (vph)		1370						1294				
Starvation Cap Reductn		0						0				
Spillback Cap Reductn		0						0				
Storage Cap Reductn		0						0				
Reduced v/c Ratio		0.64						0.51				

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 48 (87%), Referenced to phase 2:EBTL and 6:, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 14.3		Intersection LOS: B	
Intersection Capacity Utilization 55.3%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 9: Metcalfe St & Slater St





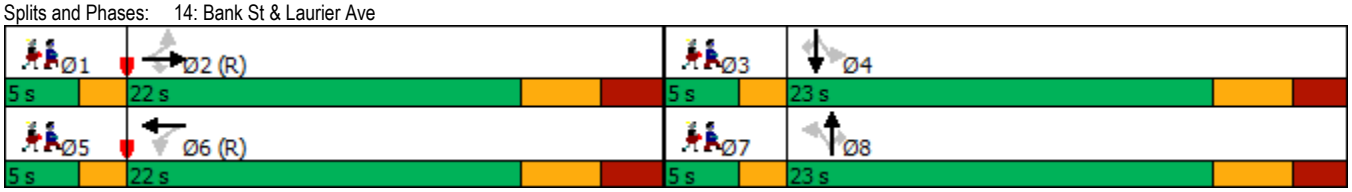
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	250	104	4	302	47	0	222	74	2	274	69
Future Volume (vph)	0	250	104	4	302	47	0	222	74	2	274	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		45.0	0.0		25.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.28		0.91				0.09		1.00	0.19
Frt			0.850		0.982				0.850			0.850
Flt Protected					0.999							
Satd. Flow (prot)	0	1802	1547	0	1618	0	0	1640	1532	0	1718	1322
Flt Permitted					0.996						0.998	
Satd. Flow (perm)	0	1802	435	0	1605	0	0	1640	145	0	1706	250
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.6			140.3			82.1			110.6	
Travel Time (s)		14.2			10.1			5.9			8.0	
Confl. Peds. (#/hr)	307		488	488		307	714		1278	1278		714
Confl. Bikes (#/hr)			105			124			31			58
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	11%	1%	0%	6%	17%
Adj. Flow (vph)	0	250	104	4	302	47	0	222	74	2	274	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	250	104	0	353	0	0	222	74	0	276	69
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm	Perm	NA			NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Minimum Split (s)	15.9	15.9	15.9	15.9	15.9		15.6	15.6	15.6	15.6	15.6	15.6
Total Split (s)	22.0	22.0	22.0	22.0	22.0		23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%		41.8%	41.8%	41.8%	41.8%	41.8%	41.8%
Maximum Green (s)	16.1	16.1	16.1	16.1	16.1		17.4	17.4	17.4	17.4	17.4	17.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		5.9	5.9		5.9			5.6	5.6		5.6	5.6
Lead/Lag	Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	100	100	100	100	100		100	100	100	100	100	100
Act Effct Green (s)		16.1	16.1		16.1			17.4	17.4		17.4	17.4
Actuated g/C Ratio		0.29	0.29		0.29			0.32	0.32		0.32	0.32
v/c Ratio		0.47	0.82		0.75			0.43	1.64		0.51	0.87
Control Delay		19.6	69.0		30.6			18.1	395.2		19.7	96.4
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		19.6	69.0		30.6			18.1	395.2		19.7	96.4
LOS		B	E		C			B	F		B	F
Approach Delay		34.1			30.6			112.3			35.1	
Approach LOS		C			C			F			D	
Queue Length 50th (m)		20.2	9.5		31.4			17.1	~11.0		21.4	5.4
Queue Length 95th (m)		37.4	#32.8		#66.4			32.8	#28.4		m34.0	m#19.4

Lane Group	Ø1	Ø3	Ø5	Ø7
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (m)				
Storage Lanes				
Taper Length (m)				
Lane Util. Factor				
Ped Bike Factor				
Frt				
Flt Protected				
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)				
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(m)				
Link Offset(m)				
Crosswalk Width(m)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (k/h)				
Turn Type				
Protected Phases	1	3	5	7
Permitted Phases				
Minimum Split (s)	5.0	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0	5.0
Total Split (%)	9%	9%	9%	9%
Maximum Green (s)	3.0	3.0	3.0	3.0
Yellow Time (s)	2.0	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Walk Time (s)	3.0	3.0	3.0	3.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0
Pedestrian Calls (#/hr)	100	100	100	100
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)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.6			116.3			58.1			86.6	
Turn Bay Length (m)			30.0						45.0			25.0
Base Capacity (vph)		527	127		469			518	45		539	79
Starvation Cap Reductn		0	0		0			0	0		0	0
Spillback Cap Reductn		0	0		0			0	0		0	0
Storage Cap Reductn		0	0		0			0	0		0	0
Reduced v/c Ratio		0.47	0.82		0.75			0.43	1.64		0.51	0.87

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 20 (36%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 1.64			
Intersection Signal Delay: 50.6		Intersection LOS: D	
Intersection Capacity Utilization 67.6%		ICU Level of Service C	
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: 14: Bank St & Laurier Ave



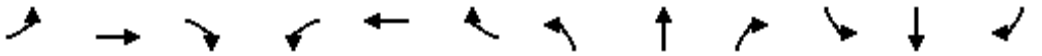
Lane Group	Ø1	Ø3	Ø5	Ø7
Internal Link Dist (m)				
Turn Bay Length (m)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	792	2	0	0	0	5
Future Volume (Veh/h)	792	2	0	0	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	792	2	0	0	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	47			134		
pX, platoon unblocked			0.75		0.75	0.75
vC, conflicting volume			794		793	397
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			48		46	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1164		716	810

Direction, Lane #	EB 1	EB 2	NB 1
Volume Total	528	266	5
Volume Left	0	0	0
Volume Right	0	2	5
cSH	1700	1700	810
Volume to Capacity	0.31	0.16	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.5
Lane LOS			A
Approach Delay (s)	0.0		9.5
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

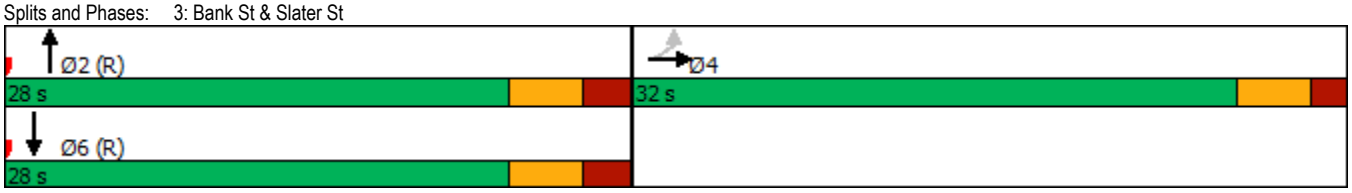


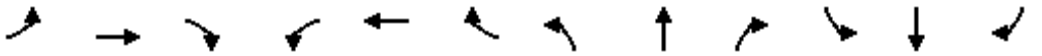
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	671	59	0	0	0	0	206	8	0	64	0
Future Volume (vph)	8	671	59	0	0	0	0	206	8	0	64	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		20.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.96						0.99				
Frt		0.988						0.995				
Flt Protected		0.999										
Satd. Flow (prot)	0	2584	0	0	0	0	0	1567	0	0	1291	0
Flt Permitted		0.999										
Satd. Flow (perm)	0	2571	0	0	0	0	0	1567	0	0	1291	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20						4				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.7			46.9			108.1			79.3	
Travel Time (s)		14.2			3.4			7.8			5.7	
Confl. Peds. (#/hr)	287		252	252		287	458		539	539		458
Confl. Bikes (#/hr)			17			7			80			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	30%	5%	0%	0%	0%	0%	14%	13%	0%	41%	0%
Adj. Flow (vph)	8	671	59	0	0	0	0	206	8	0	64	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	738	0	0	0	0	0	214	0	0	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4											
Minimum Split (s)	24.0	24.0						22.5			22.5	
Total Split (s)	32.0	32.0						28.0			28.0	
Total Split (%)	53.3%	53.3%						46.7%			46.7%	
Maximum Green (s)	27.0	27.0						22.5			22.5	
Yellow Time (s)	3.3	3.3						3.3			3.3	
All-Red Time (s)	1.7	1.7						2.2			2.2	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.0						5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	10.0	10.0						7.0			7.0	
Flash Dont Walk (s)	9.0	9.0						10.0			10.0	
Pedestrian Calls (#/hr)	100	100						100			100	
Act Effct Green (s)		27.0						22.5			22.5	
Actuated g/C Ratio		0.45						0.38			0.38	
v/c Ratio		0.63						0.36			0.13	
Control Delay		15.3						17.3			13.3	
Queue Delay		0.0						0.0			0.0	
Total Delay		15.3						17.3			13.3	
LOS		B						B			B	
Approach Delay		15.3						17.3			13.3	
Approach LOS		B						B			B	
Queue Length 50th (m)		30.0						22.2			4.5	
Queue Length 95th (m)		46.0						43.1			11.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.7			22.9			84.1			55.3	
Turn Bay Length (m)												
Base Capacity (vph)		1167						590			484	
Starvation Cap Reductn		0						0			0	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.63						0.36			0.13	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 35 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 15.6		Intersection LOS: B	
Intersection Capacity Utilization 48.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Bank St & Slater St





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	579	44	0	0	0	0	0	0	178	456	0
Future Volume (vph)	0	579	44	0	0	0	0	0	0	178	456	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00
Ped Bike Factor			0.87								0.93	
Frt			0.850									
Flt Protected											0.986	
Satd. Flow (prot)	0	2640	1097	0	0	0	0	0	0	0	4782	0
Flt Permitted											0.986	
Satd. Flow (perm)	0	2640	949	0	0	0	0	0	0	0	4463	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			45								95	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.1			179.9			110.3			85.4	
Travel Time (s)		9.7			13.0			7.9			6.1	
Confl. Peds. (#/hr)	147		173	173		147	679		225	225		679
Confl. Bikes (#/hr)			2									1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	31%	41%	0%	0%	0%	0%	0%	0%	1%	3%	0%
Adj. Flow (vph)	0	579	44	0	0	0	0	0	0	178	456	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	579	44	0	0	0	0	0	0	0	634	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Minimum Split (s)		30.5	30.5							22.5	22.5	
Total Split (s)		34.0	34.0							26.0	26.0	
Total Split (%)		56.7%	56.7%							43.3%	43.3%	
Maximum Green (s)		28.5	28.5							20.5	20.5	
Yellow Time (s)		3.3	3.3							3.3	3.3	
All-Red Time (s)		2.2	2.2							2.2	2.2	
Lost Time Adjust (s)		0.0	0.0								0.0	
Total Lost Time (s)		5.5	5.5								5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		15.0	15.0							7.0	7.0	
Flash Dont Walk (s)		10.0	10.0							10.0	10.0	
Pedestrian Calls (#/hr)		100	100							100	100	
Act Effct Green (s)		28.5	28.5								20.5	
Actuated g/C Ratio		0.48	0.48								0.34	
v/c Ratio		0.46	0.09								0.40	
Control Delay		3.6	0.5								13.5	
Queue Delay		0.0	0.0								0.0	
Total Delay		3.6	0.5								13.5	
LOS		A	A								B	
Approach Delay		3.4									13.5	
Approach LOS		A									B	
Queue Length 50th (m)		3.7	0.0								15.8	
Queue Length 95th (m)		5.1	m0.0								23.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		110.1			155.9			86.3			61.4	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1254	474								1587	
Starvation Cap Reductn		0	0								0	
Spillback Cap Reductn		0	0								0	
Storage Cap Reductn		0	0								0	
Reduced v/c Ratio		0.46	0.09								0.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 10 (17%), Referenced to phase 2:EBT and 6:, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 8.5		Intersection LOS: A	
Intersection Capacity Utilization 47.1%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

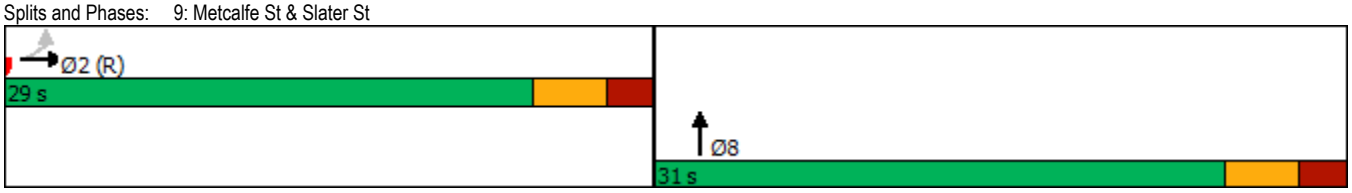
Splits and Phases: 6: O'Connor St & Slater St

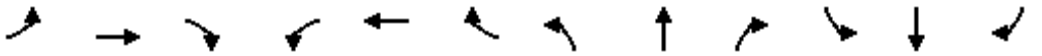
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	618	0	0	0	0	0	473	99	0	0	0
Future Volume (vph)	177	618	0	0	0	0	0	473	99	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor		0.97						0.96				
Frt								0.974				
Flt Protected		0.989										
Satd. Flow (prot)	0	2633	0	0	0	0	0	4489	0	0	0	0
Flt Permitted		0.989										
Satd. Flow (perm)	0	2541	0	0	0	0	0	4489	0	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45						47				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		179.9			187.0			120.3			79.0	
Travel Time (s)		13.0			13.5			8.7			5.7	
Confl. Peds. (#/hr)	200		152	152		200	666		207	207		666
Confl. Bikes (#/hr)			15						27			1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	37%	0%	0%	0%	0%	0%	3%	4%	0%	0%	0%
Adj. Flow (vph)	177	618	0	0	0	0	0	473	99	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	795	0	0	0	0	0	572	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Minimum Split (s)	28.4	28.4						21.5				
Total Split (s)	29.0	29.0						31.0				
Total Split (%)	48.3%	48.3%						51.7%				
Maximum Green (s)	23.6	23.6						25.5				
Yellow Time (s)	3.3	3.3						3.3				
All-Red Time (s)	2.1	2.1						2.2				
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.4						5.5				
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	15.0	15.0						8.0				
Flash Dont Walk (s)	8.0	8.0						8.0				
Pedestrian Calls (#/hr)	100	100						100				
Act Effct Green (s)		23.6						25.5				
Actuated g/C Ratio		0.39						0.42				
v/c Ratio		0.77						0.30				
Control Delay		19.7						10.9				
Queue Delay		0.0						0.0				
Total Delay		19.7						10.9				
LOS		B						B				
Approach Delay		19.7						10.9				
Approach LOS		B						B				
Queue Length 50th (m)		24.6						13.1				
Queue Length 95th (m)		#47.2						19.5				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		155.9			163.0			96.3			55.0	
Turn Bay Length (m)												
Base Capacity (vph)		1026						1934				
Starvation Cap Reductn		0						0				
Spillback Cap Reductn		0						0				
Storage Cap Reductn		0						0				
Reduced v/c Ratio		0.77						0.30				

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 15 (25%), Referenced to phase 2:EBTL and 6:, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 16.0		Intersection LOS: B	
Intersection Capacity Utilization 49.2%		ICU Level of Service A	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 9: Metcalfe St & Slater St





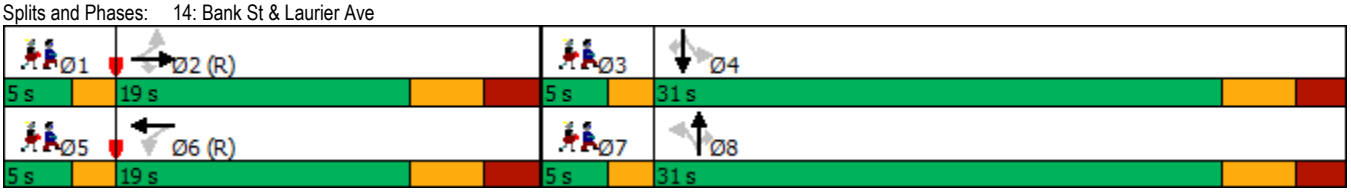
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	309	63	0	184	21	1	182	83	6	160	31
Future Volume (vph)	0	309	63	0	184	21	1	182	83	6	160	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		45.0	0.0		25.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.28		0.93			1.00	0.22		0.98	0.30
Frt			0.850		0.986				0.850			0.850
Flt Protected											0.998	
Satd. Flow (prot)	0	1767	1517	0	1635	0	0	1598	1419	0	1548	1199
Flt Permitted								0.999			0.990	
Satd. Flow (perm)	0	1767	420	0	1635	0	0	1591	306	0	1503	364
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		194.2			137.9			122.7			108.1	
Travel Time (s)		14.0			9.9			8.8			7.8	
Confl. Peds. (#/hr)	288		322	322		288	480		605	605		480
Confl. Bikes (#/hr)			176			115			79			9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	2%	0%	2%	5%	0%	14%	9%	0%	18%	29%
Adj. Flow (vph)	0	309	63	0	184	21	1	182	83	6	160	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	309	63	0	205	0	0	183	83	0	166	31
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm		NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Minimum Split (s)	15.9	15.9	15.9	15.9	15.9		15.6	15.6	15.6	15.6	15.6	15.6
Total Split (s)	19.0	19.0	19.0	19.0	19.0		31.0	31.0	31.0	31.0	31.0	31.0
Total Split (%)	31.7%	31.7%	31.7%	31.7%	31.7%		51.7%	51.7%	51.7%	51.7%	51.7%	51.7%
Maximum Green (s)	13.1	13.1	13.1	13.1	13.1		25.4	25.4	25.4	25.4	25.4	25.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		5.9	5.9		5.9			5.6	5.6		5.6	5.6
Lead/Lag	Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	100	100	100	100	100		100	100	100	100	100	100
Act Effct Green (s)		13.1	13.1		13.1			25.4	25.4		25.4	25.4
Actuated g/C Ratio		0.22	0.22		0.22			0.42	0.42		0.42	0.42
v/c Ratio		0.80	0.69		0.58			0.27	0.64		0.26	0.20
Control Delay		40.9	64.2		28.3			12.7	42.3		13.6	16.1
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		40.9	64.2		28.3			12.7	42.3		13.6	16.1
LOS		D	E		C			B	D		B	B
Approach Delay		44.9			28.3			21.9			14.0	
Approach LOS		D			C			C			B	
Queue Length 50th (m)		32.4	6.4		20.2			12.5	6.9		11.6	2.1
Queue Length 95th (m)		#68.0	#24.2		38.2			24.2	#27.0		m20.7	m5.8

Lane Group	Ø1	Ø3	Ø5	Ø7
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (m)				
Storage Lanes				
Taper Length (m)				
Lane Util. Factor				
Ped Bike Factor				
Frt				
Flt Protected				
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)				
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(m)				
Link Offset(m)				
Crosswalk Width(m)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (k/h)				
Turn Type				
Protected Phases	1	3	5	7
Permitted Phases				
Minimum Split (s)	5.0	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0	5.0
Total Split (%)	8%	8%	8%	8%
Maximum Green (s)	3.0	3.0	3.0	3.0
Yellow Time (s)	2.0	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Walk Time (s)	3.0	3.0	3.0	3.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0
Pedestrian Calls (#/hr)	100	100	100	100
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)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		170.2			113.9			98.7			84.1	
Turn Bay Length (m)			30.0						45.0			25.0
Base Capacity (vph)		385	91		356			673	129		636	154
Starvation Cap Reductn		0	0		0			0	0		0	0
Spillback Cap Reductn		0	0		0			0	0		0	0
Storage Cap Reductn		0	0		0			0	0		0	0
Reduced v/c Ratio		0.80	0.69		0.58			0.27	0.64		0.26	0.20

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 45 (75%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 29.9		Intersection LOS: C	
Intersection Capacity Utilization 56.6%		ICU Level of Service B	
Analysis Period (min) 15			
# 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: 14: Bank St & Laurier Ave



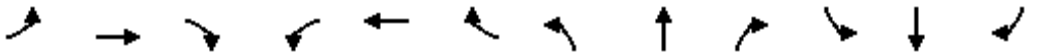
Lane Group	Ø1	Ø3	Ø5	Ø7
Internal Link Dist (m)				
Turn Bay Length (m)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	674	5	0	0	0	2
Future Volume (Veh/h)	674	5	0	0	0	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	674	5	0	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	47			134		
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			679		676	340
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			159		156	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1159		670	886

Direction, Lane #	EB 1	EB 2	NB 1
Volume Total	449	230	2
Volume Left	0	0	0
Volume Right	0	5	2
cSH	1700	1700	886
Volume to Capacity	0.26	0.14	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.1
Lane LOS			A
Approach Delay (s)	0.0		9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

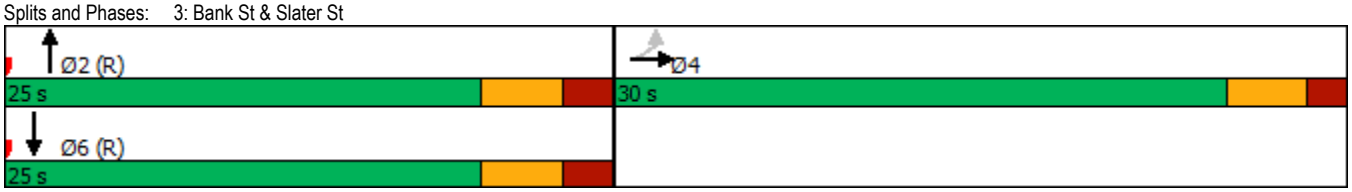


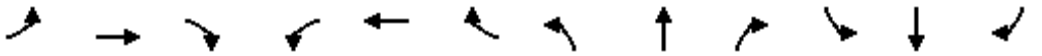
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	786	155	0	0	0	0	257	10	0	123	0
Future Volume (vph)	7	786	155	0	0	0	0	257	10	0	123	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		20.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.93						0.99				
Frt		0.975						0.995				
Flt Protected												
Satd. Flow (prot)	0	2579	0	0	0	0	0	1657	0	0	1444	0
Flt Permitted												
Satd. Flow (perm)	0	2576	0	0	0	0	0	1657	0	0	1444	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12						4				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.7			46.9			110.6			79.3	
Travel Time (s)		14.2			3.4			8.0			5.7	
Confl. Peds. (#/hr)	110		274	274		110	525		686	686		525
Confl. Bikes (#/hr)			28			2			25			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	26%	1%	0%	0%	0%	0%	8%	0%	0%	26%	0%
Adj. Flow (vph)	7	786	155	0	0	0	0	257	10	0	123	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	948	0	0	0	0	0	267	0	0	123	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4											
Minimum Split (s)	24.0	24.0						22.5			22.5	
Total Split (s)	30.0	30.0						25.0			25.0	
Total Split (%)	54.5%	54.5%						45.5%			45.5%	
Maximum Green (s)	25.0	25.0						19.5			19.5	
Yellow Time (s)	3.3	3.3						3.3			3.3	
All-Red Time (s)	1.7	1.7						2.2			2.2	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.0						5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	10.0	10.0						7.0			7.0	
Flash Dont Walk (s)	9.0	9.0						10.0			10.0	
Pedestrian Calls (#/hr)	100	100						100			100	
Act Effct Green (s)		25.0						19.5			19.5	
Actuated g/C Ratio		0.45						0.35			0.35	
v/c Ratio		0.81						0.45			0.24	
Control Delay		19.9						18.6			14.2	
Queue Delay		0.0						0.0			0.0	
Total Delay		19.9						18.6			14.2	
LOS		B						B			B	
Approach Delay		19.9						18.6			14.2	
Approach LOS		B						B			B	
Queue Length 50th (m)		39.4						26.0			8.4	
Queue Length 95th (m)		#66.6						m42.9			18.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.7			22.9			86.6			55.3	
Turn Bay Length (m)												
Base Capacity (vph)		1177						590			511	
Starvation Cap Reductn		0						0			0	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.81						0.45			0.24	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 19 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 19.1		Intersection LOS: B	
Intersection Capacity Utilization 57.2%		ICU Level of Service B	
Analysis Period (min) 15			
# 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: 3: Bank St & Slater St



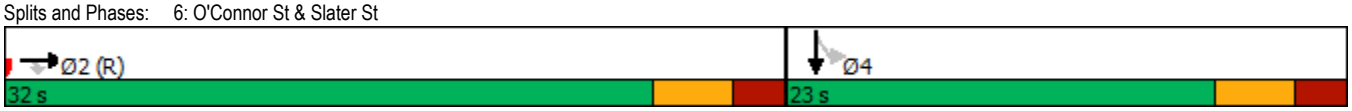


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	599	23	0	0	0	0	0	0	146	864	0
Future Volume (vph)	0	599	23	0	0	0	0	0	0	146	864	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00
Ped Bike Factor			0.81								0.98	
Frt			0.850									
Flt Protected											0.993	
Satd. Flow (prot)	0	2660	1547	0	0	0	0	0	0	0	4844	0
Flt Permitted											0.993	
Satd. Flow (perm)	0	2660	1252	0	0	0	0	0	0	0	4749	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)			50								63	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		134.1			179.9			110.3			85.4	
Travel Time (s)		9.7			13.0			7.9			6.1	
Confl. Peds. (#/hr)	39		270	270		39	561		140	140		561
Confl. Bikes (#/hr)			12									3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	30%	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%
Adj. Flow (vph)	0	599	23	0	0	0	0	0	0	146	864	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	599	23	0	0	0	0	0	0	0	1010	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Minimum Split (s)		30.5	30.5							22.5	22.5	
Total Split (s)		32.0	32.0							23.0	23.0	
Total Split (%)		58.2%	58.2%							41.8%	41.8%	
Maximum Green (s)		26.5	26.5							17.5	17.5	
Yellow Time (s)		3.3	3.3							3.3	3.3	
All-Red Time (s)		2.2	2.2							2.2	2.2	
Lost Time Adjust (s)		0.0	0.0								0.0	
Total Lost Time (s)		5.5	5.5								5.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		15.0	15.0							7.0	7.0	
Flash Dont Walk (s)		10.0	10.0							10.0	10.0	
Pedestrian Calls (#/hr)		100	100							100	100	
Act Effct Green (s)		26.5	26.5								17.5	
Actuated g/C Ratio		0.48	0.48								0.32	
v/c Ratio		0.47	0.04								0.65	
Control Delay		22.0	7.7								17.4	
Queue Delay		0.0	0.0								0.0	
Total Delay		22.0	7.7								17.4	
LOS		C	A								B	
Approach Delay		21.4									17.4	
Approach LOS		C									B	
Queue Length 50th (m)		36.0	0.3								28.9	
Queue Length 95th (m)		m44.9	m0.5								40.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		110.1			155.9			86.3			61.4	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1281	629								1554	
Starvation Cap Reductn		0	0								0	
Spillback Cap Reductn		0	0								0	
Storage Cap Reductn		0	0								0	
Reduced v/c Ratio		0.47	0.04								0.65	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 28 (51%), Referenced to phase 2:EBT and 6:, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 18.9		Intersection LOS: B	
Intersection Capacity Utilization 52.9%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 6: O'Connor St & Slater St

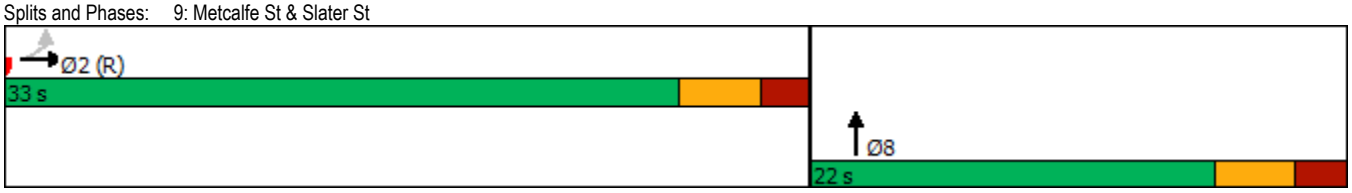


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	705	0	0	0	0	0	440	217	0	0	0
Future Volume (vph)	175	705	0	0	0	0	0	440	217	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	40.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00
Ped Bike Factor		0.97						0.89				
Frt								0.950				
Flt Protected		0.990										
Satd. Flow (prot)	0	2751	0	0	0	0	0	4155	0	0	0	0
Flt Permitted		0.990										
Satd. Flow (perm)	0	2682	0	0	0	0	0	4155	0	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50						69				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		179.9			187.0			120.3			79.0	
Travel Time (s)		13.0			13.5			8.7			5.7	
Confl. Peds. (#/hr)	177		165	165		177	661		363	363		661
Confl. Bikes (#/hr)			18						17			3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	30%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Adj. Flow (vph)	175	705	0	0	0	0	0	440	217	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	880	0	0	0	0	0	657	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Minimum Split (s)	28.4	28.4						21.5				
Total Split (s)	33.0	33.0						22.0				
Total Split (%)	60.0%	60.0%						40.0%				
Maximum Green (s)	27.6	27.6						16.5				
Yellow Time (s)	3.3	3.3						3.3				
All-Red Time (s)	2.1	2.1						2.2				
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.4						5.5				
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	15.0	15.0						8.0				
Flash Dont Walk (s)	8.0	8.0						8.0				
Pedestrian Calls (#/hr)	100	100						100				
Act Effct Green (s)		27.6						16.5				
Actuated g/C Ratio		0.50						0.30				
v/c Ratio		0.64						0.51				
Control Delay		13.2						15.8				
Queue Delay		0.0						0.0				
Total Delay		13.2						15.8				
LOS		B						B				
Approach Delay		13.2						15.8				
Approach LOS		B						B				
Queue Length 50th (m)		47.3						17.2				
Queue Length 95th (m)		64.1						26.1				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		155.9			163.0			96.3			55.0	
Turn Bay Length (m)												
Base Capacity (vph)		1370						1294				
Starvation Cap Reductn		0						0				
Spillback Cap Reductn		0						0				
Storage Cap Reductn		0						0				
Reduced v/c Ratio		0.64						0.51				

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 48 (87%), Referenced to phase 2:EBTL and 6:, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 14.3		Intersection LOS: B	
Intersection Capacity Utilization 55.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 9: Metcalfe St & Slater St



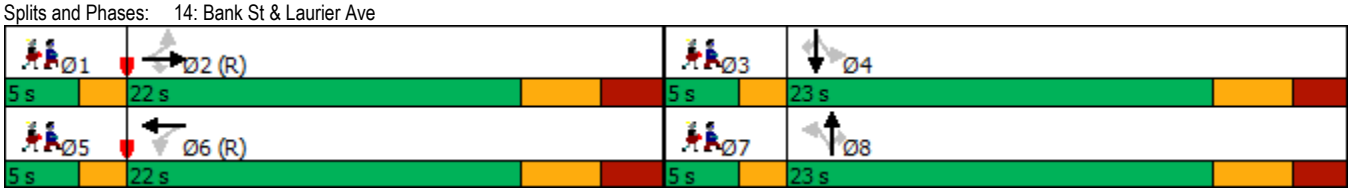
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	252	104	4	302	49	0	222	78	2	274	69
Future Volume (vph)	0	252	104	4	302	49	0	222	78	2	274	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		30.0	0.0		0.0	0.0		45.0	0.0		25.0
Storage Lanes	0		1	0		0	0		1	0		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.28		0.91				0.09		1.00	0.19
Frt			0.850		0.981				0.850			0.850
Flt Protected					0.999							
Satd. Flow (prot)	0	1802	1547	0	1611	0	0	1640	1532	0	1718	1322
Flt Permitted					0.996						0.998	
Satd. Flow (perm)	0	1802	435	0	1598	0	0	1640	145	0	1706	250
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		197.6			140.3			82.1			110.6	
Travel Time (s)		14.2			10.1			5.9			8.0	
Confl. Peds. (#/hr)	307		488	488		307	714		1278	1278		714
Confl. Bikes (#/hr)			105			124			31			58
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	11%	1%	0%	6%	17%
Adj. Flow (vph)	0	252	104	4	302	49	0	222	78	2	274	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	252	104	0	355	0	0	222	78	0	276	69
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type		NA	Perm	Perm	NA			NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Minimum Split (s)	15.9	15.9	15.9	15.9	15.9		15.6	15.6	15.6	15.6	15.6	15.6
Total Split (s)	22.0	22.0	22.0	22.0	22.0		23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%		41.8%	41.8%	41.8%	41.8%	41.8%	41.8%
Maximum Green (s)	16.1	16.1	16.1	16.1	16.1		17.4	17.4	17.4	17.4	17.4	17.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		5.9	5.9		5.9			5.6	5.6		5.6	5.6
Lead/Lag	Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	100	100	100	100	100		100	100	100	100	100	100
Act Effct Green (s)		16.1	16.1		16.1			17.4	17.4		17.4	17.4
Actuated g/C Ratio		0.29	0.29		0.29			0.32	0.32		0.32	0.32
v/c Ratio		0.48	0.82		0.76			0.43	1.73		0.51	0.87
Control Delay		19.7	69.0		31.1			18.1	430.9		19.7	96.4
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		19.7	69.0		31.1			18.1	430.9		19.7	96.4
LOS		B	E		C			B	F		B	F
Approach Delay		34.1			31.1			125.4			35.1	
Approach LOS		C			C			F			D	
Queue Length 50th (m)		20.3	9.5		31.7			17.1	~11.9		21.4	5.4
Queue Length 95th (m)		37.7	#32.8		#67.1			32.8	#30.0		m33.9	m#19.2

Lane Group	Ø1	Ø3	Ø5	Ø7
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (m)				
Storage Lanes				
Taper Length (m)				
Lane Util. Factor				
Ped Bike Factor				
Frt				
Flt Protected				
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)				
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(m)				
Link Offset(m)				
Crosswalk Width(m)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (k/h)				
Turn Type				
Protected Phases	1	3	5	7
Permitted Phases				
Minimum Split (s)	5.0	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0	5.0
Total Split (%)	9%	9%	9%	9%
Maximum Green (s)	3.0	3.0	3.0	3.0
Yellow Time (s)	2.0	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0	0.0
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Walk Time (s)	3.0	3.0	3.0	3.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0
Pedestrian Calls (#/hr)	100	100	100	100
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)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		173.6			116.3			58.1			86.6	
Turn Bay Length (m)			30.0						45.0			25.0
Base Capacity (vph)		527	127		467			518	45		539	79
Starvation Cap Reductn		0	0		0			0	0		0	0
Spillback Cap Reductn		0	0		0			0	0		0	0
Storage Cap Reductn		0	0		0			0	0		0	0
Reduced v/c Ratio		0.48	0.82		0.76			0.43	1.73		0.51	0.87

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 20 (36%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 1.73			
Intersection Signal Delay: 53.8		Intersection LOS: D	
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
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: 14: Bank St & Laurier Ave



Lane Group	Ø1	Ø3	Ø5	Ø7
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	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	794	2	0	0	0	5
Future Volume (Veh/h)	794	2	0	0	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	794	2	0	0	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	47			134		
pX, platoon unblocked			0.75		0.75	0.75
vC, conflicting volume			796		795	398
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			46		44	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1164		717	809

Direction, Lane #	EB 1	EB 2	NB 1
Volume Total	529	267	5
Volume Left	0	0	0
Volume Right	0	2	5
cSH	1700	1700	809
Volume to Capacity	0.31	0.16	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.5
Lane LOS			A
Approach Delay (s)	0.0		9.5
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		