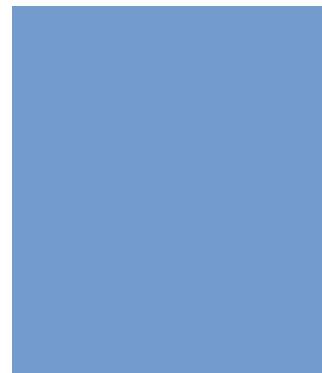


ZIBI ONTARIO: PHASE 1 A

TRANSPORTATION IMPACT STUDY



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Zibi Ontario: Phase 1A

Transportation Impact Study

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Executive Summary

The Transportation Impact Study herein has been prepared in support of the Site Plan Application for Phase I of the subject lands. However, as the site access to adjacent Booth Street will ultimately need to accommodate full development of the Chaudière and Albert Islands, and as reconstructed Booth Street will need to ultimately accommodate the City's future desires for vehicle, transit, bicycle and pedestrian traffic, the analysis and recommendations herein address full build-out conditions.

As agreed to with the City staff at the commencement of this study, the study area, with respect to traffic assignment and intersection impact analysis, is the Booth-Eddy Corridor from Rue Laurier south to Wellington Street. With regard to the recommended functional plan for Booth Street, it has been prepared for the section from the south end of the Chaudière Bridge to the rear signalized entrance to the Canadian War Museum. The recommended functional plan presented herein has been reviewed by, and has the tentative approval of the key relevant staff from the City of Ottawa. The limits of the functional plan extend beyond the Phase I development limits and allow for easy extension both north and south once the City of Ottawa, Gatineau and PWGSC decide what to do for the balance of the corridor. The limits of the functional plan allow the City to properly review the Phase I Site Plan and to impose the conditions of approval necessary to enable the preferred solution to be implemented.

The recommended Booth Street functional plan is a "complete" street accommodating the desired multi-model movements. It includes traffic lanes, cycle tracks and sidewalks in both directions, and appropriately located bus stops and platforms that give buses priority at these locations. With the proposed new cross-section, while the vehicle carrying capacity of the corridor may be reduced, its people carrying capacity will be increased. When the functional plan for Booth Street is combined with the on-site system of sidewalks, multi-use pathway, and share-use circulation road (woonerf), there will be a much higher priority placed on pedestrians, cyclists and transit which is much more sustainable and safer than existing conditions.

As noted herein and in the proceeding Multi-Modal Transportation Impact Study prepared in support of the site rezoning, the Booth-Eddy Corridor cannot accommodate all the future traffic demand that would want to use it if it were unconstrained. However, as it is constrained, we have identified how much future traffic would have to be removed from the corridor for its intersections to operate at acceptable levels of service. We have not identified where the surplus traffic would go, as it is not the purpose of this study to solve Ottawa and Gatineau interprovincial road capacity and transit challenges. These are/will be addressed in much broader studies undertaken by municipalities.

In summary, the proposed Phase I development is entirely compatible with all future development phases from a transportation perspective. On-site roads and sidewalks can be extended practically and efficiently, and its signalized intersection with Booth Street has the capacity to accommodate full site development. As well, the site intersection with Booth Street accommodates all required complete street elements and is totally integrated into the recommended functional plan for the Booth Street Corridor. As such, the Phase I Site Plan is recommended from a transportation perspective.

1. Introduction

Windmill Development's proposed redevelopment plans of the former Domtar lands now called Zibi, entails approximately 1M ft² of mixed-use development on the Ontario side of the provincial border and approximately 2M ft² of mixed-use development on the Quebec side. The Ontario portion of the redevelopment, located on Chaudière Island and Albert Island just south of the provincial boarder, is proposed to be developed in a number of phases.

Phase I of the development, shown in Figure 1: Site Context, is located on the west side of Booth Street, and will consist of approximate 50,000 ft² of retail, 38,000 ft² of office, a 7,000 ft² community centre, and approximately 315 residential units. Site access is proposed via one signalized full-movement connection to Booth Street. The Phase I Site Plan is provided as Figure 2.

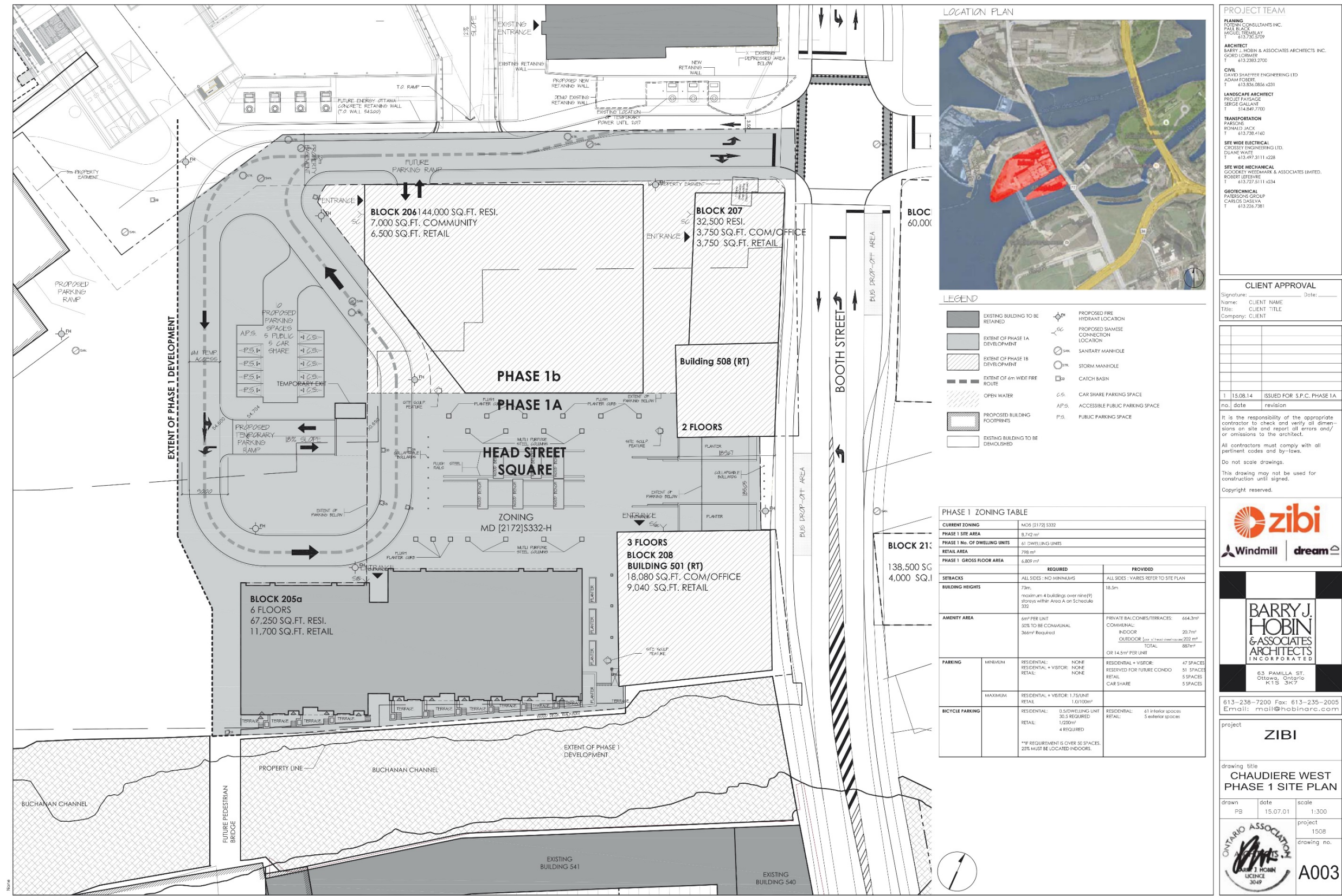
Further phases of the Chaudière Island development will consist of approximately 81,000 ft² of office, 50,000 ft² of retail, a hotel, and 1,100 residential units. As site access for all phases is proposed via one signalized four-legged connection to Booth Street, the trip-generation and analysis for the full-site development is included herein to assess the requirements for the proposed signalized access.

Figure 1: Site Context



This site is the first phase of the total Zibi project and was assessed in the Multi-Modal Transportation Impact Study (MMTIS) previously prepared by Parsons, dated April 2014. This study was prepared in support of the requested rezoning. As part of the Site Plan Approval process for phased development, the City of Ottawa now requires an additional submission of a formal Transportation Impact Assessment (TIA) consistent with their guidelines dated October 2006. With respect to these guidelines and for this level of development, a Transportation Impact Study (TIS) is considered the appropriate type of study.

Figure 2: Site Plan



The scope of this TIS was discussed, and agreed to, with City staff as follows. The study area extends only from the Eddy/Alexandre-Taché/Laurier intersection south to the Booth/Sir John A. Macdonald/Wellington intersection. It will include total Zibi development traffic as per the Multi-Modal Transportation Impact Study. It will include a functional plan for Booth Street from the Chaudière Bridge south to the War Museum access, and it will focus on the Phase I site intersection requirements.

2. Existing Transportation Conditions

2.1 Area Road Network

The Chaudière Crossing (Booth and Eddy Streets) is a north-south arterial roadway. Within the study area, the unposted speed limit is understood to be 50 km/h and the cross-section consists of two travel lanes in each direction, with auxiliary turn lanes provided at the Booth/Sir John A. Macdonald, the Booth/War Museum and the Eddy/Alexandre-Taché/Laurier intersections. In the middle of the corridor, the cross-section is reduced to two-lanes across the Chaudière Bridge.

The Chaudière Bridge is one of five interprovincial bridges within the National Capital Region linking Ontario and Quebec. These bridges combined are operating at, or close to capacity during peak periods, which is one of the reasons Ottawa, Gatineau, Ontario, Quebec and the NCC continue to undertake studies to determine the preferred location of the next interprovincial bridge. With the Ontario government's recent decision to not support the preferred location (Kettle Island) for the next interprovincial bridge, there is no short-term solution to the interprovincial road capacity issue and truck route issue. The City of Ottawa is currently undertaking the Feasibility Study for a Downtown Ottawa Tunnel. If the study determines there is a feasible alternate, this facility could be part of the solution to the interprovincial road capacity problem.

Of the five bridges, only the Macdonald Cartier Bridge and the Chaudière Bridge are designated truck routes. One of the reasons for building an additional bridge, or potentially a tunnel, is to remove some of the truck traffic from King Edward Avenue and Downtown Ottawa due to the obvious safety and social issues. If a new alternative route for trucks were provided, truck traffic could potentially be removed from the Booth-Eddy Corridor.

Sir John A. Macdonald Parkway/Wellington Street is an east-west arterial roadway. Within the study area, the posted speed limit is 60 km/h. The existing cross-section consists of two travel lanes in each direction, with a non-traversable center median and auxiliary turn lanes provided at signalized intersections.

Boulevard Alexandre-Taché/Rue Laurier is an east-west arterial roadway. The existing cross-section consists of two 50 km/h travel lanes in each direction, with a non-traversable center median and auxiliary turn lanes provided at signalized intersections.

2.2 Pedestrian/Cycling Network

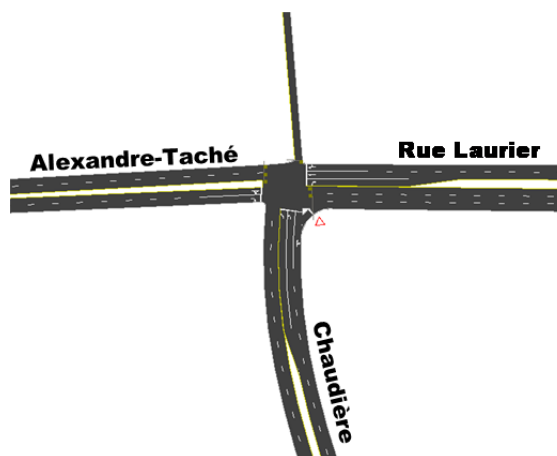
With regard to pedestrian/cycling facilities within the study area, sidewalks are currently provided along both sides of Booth Street from Wellington Street to the signalized Booth/Domtar intersection located on the Chaudière Island. North of the Booth/Domtar intersection a sidewalk exists only along the east side towards the signalized Laurier/Eddy intersection.

Along Rue Laurier/Boulevard Alexandre-Taché, sidewalks exist along the north side and a multi-use pathway exists along the south side. Along Wellington Street, sidewalks exist along both sides. The Trans Canada Trail, which is a multi-use pathway, also runs along the south shoreline of the Ottawa River.

2.3 Existing Study Area Intersections

Eddy/Alexandre-Taché/Laurier

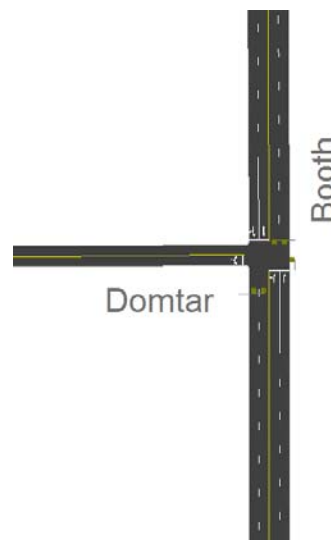
The Eddy/Alexandre-Taché/Laurier intersection is a signalized four-legged intersection. The eastbound approach consists of a single right-turn lane and a single shared through/right-turn lane (dual right-turn lanes). The westbound approach consists of a single left-turn lane, a single through lane and a share through/right-turn lane. The northbound approach consists of two left-turn lanes and a single through lane with a channelized right-turn. As shown, southbound traffic and the eastbound left-turn movement are not permitted at this location.



Domtar/Booth

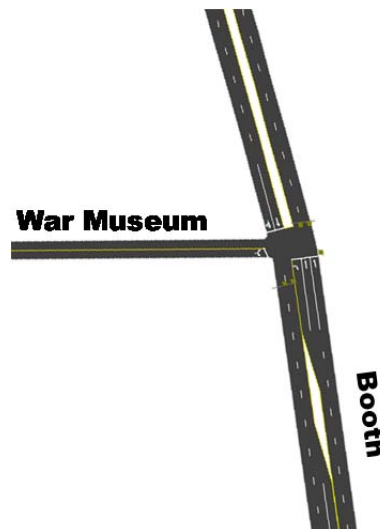
The primary Domtar/Booth intersection is a signalized 'T' intersection located on Chaudière Island. The eastbound approach consists of a single all-movement lane. The north/southbound approaches consist of a single shared through/right-turn lane and a single shared through/left-turn lane. All turning movements are permitted at this location.

There are two other Domtar 'T' intersections along the corridor, one to the north (former Wright Island) and one to the south (Middle Street) of the primary depicted intersection. Neither one has turn lanes and the northern one is traffic signal controlled.



Booth/War Museum

The War Booth/War Museum intersection is a signalized, 'T' intersection. The eastbound approach consists of a single all-movement lane. The northbound approach consists of a single left-turn lane and two through lanes. All turning movements are permitted at this location.



Booth/Sir John A. Macdonald

The Booth/Sir John A. Macdonald intersection is a signalized four-legged intersection. The eastbound approach consists two through lanes. The westbound approach consists of a single shared through/right-turn lane and a single through lane. The northbound approach consists of a single shared through/right-turn lane and a single through lane. The southbound approach consists of two through lanes, a single right-turn lane and a single left-turn lane. Eastbound right/left-turn and westbound/northbound left-turn movements are not permitted at this location.



2.4 Transit Network

Within the vicinity of the site, extensive bus service is available along Rue Laurier, Promenade du Portage and across the Chaudière Bridge. These services (summarized below) are provided by the City of Ottawa's OC Transpo and the City of Gatineau's STO.

OC Transpo Service

- Route #8 – All Day service
- Route #27 – Morning Peak
- Route #40 – Morning Peak
- Route #95 – Afternoon Peak (southbound only, across Chaudière Bridge)
- Route #96 – Afternoon Peak (southbound only, across Chaudière Bridge)
- Route #105 – Morning/Afternoon Peaks

STO Service

- | | |
|---------------------------------------|---------------------------------------|
| • Route #14 – Morning/Afternoon Peak | • Route #39 – All Day service |
| • Route #20 – Morning/Afternoon Peaks | • Route #40 – Morning/Afternoon Peaks |
| • Route #21 – All Day service | • Route #41 – Morning/Afternoon Peaks |

- Route #22 – Morning/Afternoon Peaks
- Route #24 – Morning/Afternoon Peaks
- Route #25 – Morning/Afternoon Peaks
- Route #26 – Morning/Afternoon Peaks
- Route #27 – Morning/Afternoon Peak
- Route #29 – Morning/Afternoon Peaks
- Route #33 – All Day Service
- Route #35 – All Day Service
- Route #36 – Mid-day Off-peak service
- Route #37 – All Day service
- Route #38 – 6AM – 7PM service
- Route #44 – Morning/Afternoon Peaks
- Route #45 – Morning/Afternoon Peaks
- Route #46 – Morning/Afternoon Peaks
- Route #47 – Morning/Afternoon Peaks
- Route #57 – All Day Service
- Route #59 – All Day service
- Route #100 – All Day Service
- Route #400 – All Day Service

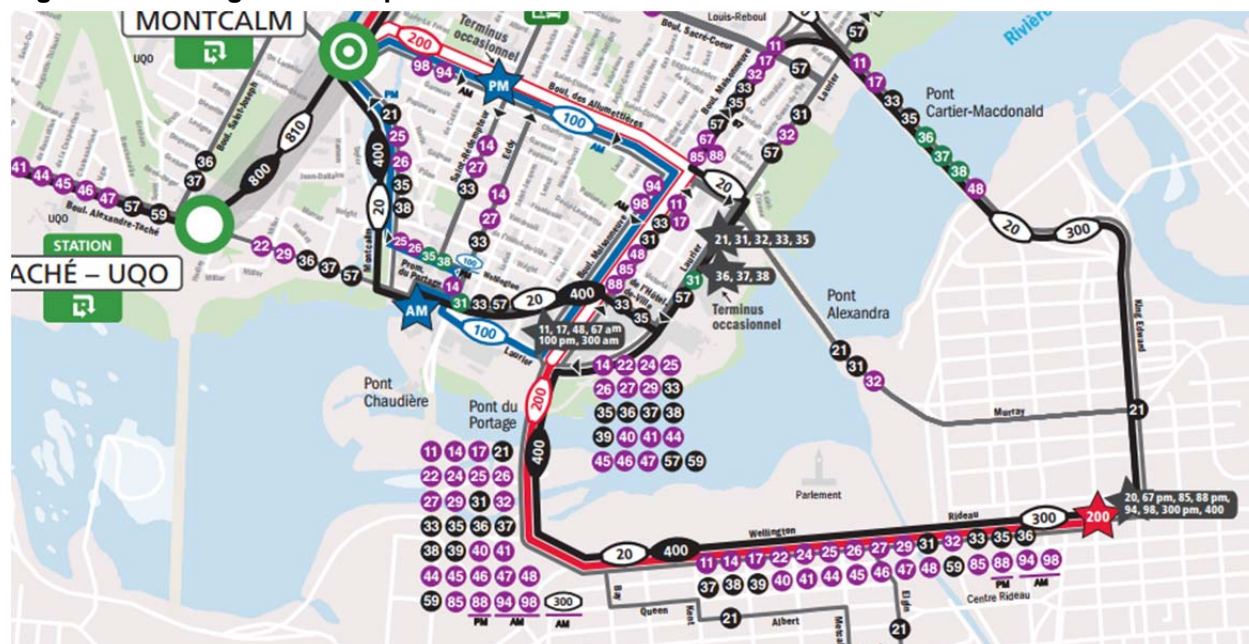
It is also noteworthy that existing and planned rapid transit service is in the vicinity of the site with Ottawa's current Transitway and planned LRT passing through the Booth Station to the south, and Gatineau's Rapibus passing in close proximity to the northwest.

Ultimately, there is a plan for the two rapid transit systems to connect at Bayview Station via the Lemieux Island Rail Bridge. There is also the possibility of a "downtown circulator" that would be a transit service, looping through the two downtowns. The existing transit maps for Ottawa and Gatineau are shown in Figures 3 and 4, respectively.

Figure 3: Existing Transit Map – OC Transpo



Figure 4: Existing Transit Map – STO



2.5 Existing Intersection Operations

Illustrated as Figure 5, are the most recent weekday morning and afternoon peak hour traffic volumes obtained from the Cities of Ottawa and Gatineau for the Booth/Sir John A. Macdonald, Booth/War Museum, and Eddy/Alexandre-Taché/Laurier intersections. These peak hour traffic volumes are included as Appendix A.

It is noteworthy that there is general consistency from intersection to intersection between the counts except for the southbound through movement at the Booth/War Museum intersection, which has unusually high peak hour volumes in the 1600 veh/h to 2000 veh/h range. These volumes appear to be about 500 veh/h higher than those at adjacent intersections and 2000 veh/h in the single lane Chaudière Bridge is not credible. As such, we are treating it as an anomaly and will assume moving forward that the corridor's maximum one direction existing capacity is approximately 1600 veh/h.

It is also noteworthy that existing conditions analysis has not been undertaken for the existing Booth Street/Chaudière Island signalized intersection. Except for the occasional vehicle, there are no/limited vehicle trips to/from the island at this location and it therefore operates at an excellent level of service.

Table 1 provides a summary of existing traffic operations at study area intersections based on the SYNCHRO (V8) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The subject intersections 'as a whole' were assessed based on a weighted v/c ratio and the Synchro model output of existing conditions is provided within Appendix B.

Figure 5: Existing Peak Hour Traffic Volumes (Balanced)

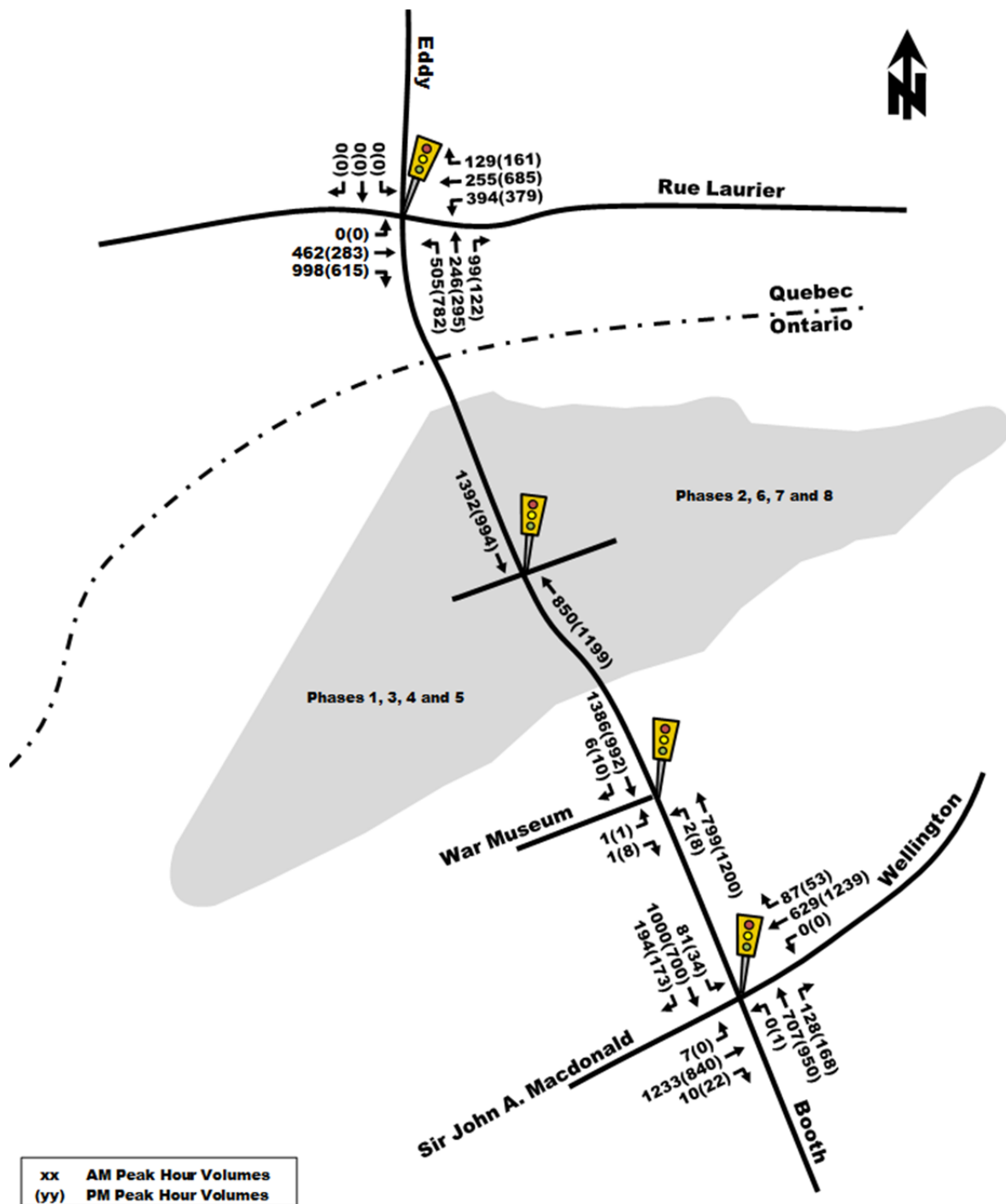


Table 1: Existing Intersection Performance

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
Booth/Sir John A. Macdonald	F(E)	1.03(0.95)	EBT(NBT)	38.7(35.6)	D(D)	0.85(0.89)
Booth/War Museum	A(A)	0.48(0.41)	SBT(NBT)	5.4(4.0)	A(A)	0.48(0.41)
Eddy/Alexandre-Taché/Laurier	F(E)	1.75(0.93)	WBL(WBL)	113.0(35.7)	E(C)	0.96(0.76)
<i>Note: Analysis of signalized intersections assumes a PHF of 0.895 and a saturation flow rate of 1800 veh/h/lane.</i>						

As noted in Table 1, all study area intersections 'as a whole' are currently operating at an acceptable LoS 'E' or better during both peak hours with respect to the City's operating standard of LoS 'E' or better within the urban core. It is noteworthy that there is very limited spare capacity at the Eddy/Alexandre-Taché/Laurier intersection during the morning peak hour as it is currently operating with a v/c of 0.96.

With regard to 'critical movements', the Booth/Sir John A. Macdonald has a failing (LoS 'F') eastbound through movement during the morning peak hour and the northbound through movement is operating at capacity (LoS 'E') during the afternoon peak hour. At the Eddy/Laurier/Alexandre-Taché intersection, the westbound left-turn movement during both peak hours is operating at or above capacity (LoS 'E' or 'F'). The Booth/War Museum intersection is operating at an excellent LoS 'A' during peak hours.

Mitigative measures to improve existing intersection operations at these locations include signal timing optimization at the Booth/Sir John A. Macdonald and Eddy/Alexandre-Taché/Laurier intersections during the weekday peak hours. Given these mitigative measures, the critical movements at the Booth/Sir John A. Macdonald intersection are projected to operate at an acceptable LoS 'E' or better during both the morning and afternoon peak hours. The critical movements at the Eddy/Alexandre-Taché/Laurier intersection are projected to operate at an acceptable LoS 'E' during the afternoon peak hour, however, signal timing optimization at this location during the morning peak hour results in a critical movement performance of LoS 'F' (v/c = 1.37). The signal timing optimization is included in the ensuring analysis.

There is limited opportunity to improve operations at the study area intersections with regards to roadway geometry. A reduction of vehicle volumes would help improve the intersection's operation during peak hours which will be explored further on in this report.

3. Proposed Complete Street Functional Plan for Booth Street

As mentioned in the MMTIS, with the planned Zibi development there will be a very significant increase in pedestrian and bicycle activity along and across the corridor as residents move between neighbourhoods, as tourists walk/cycle to the islands and as others walk/cycle along the length of the corridor. Even without the subject redevelopment, it is the desire and intent of both the Cities of Gatineau and Ottawa to increase these more sustainable travel modes along the corridor.

As the current cross-section of Booth and Eddy cannot adequately accommodate projected increases in pedestrian and bicycle travel, and as the current cross-section and traffic volume are not compatible

with achieving a safe and sustainable community/development, it has been acknowledged that changes to the functional cross-section of the corridor are required.

Following significant input and numerous reviews by the City of Ottawa staff, agreement was reached on lane widths, length of turn lanes, bicycle accommodation, sidewalk width, and bus shelter location relative to cycle tracks on the section of Booth Street from the south end of the Chaudière Bridge to the War Museum's signalized rear entry. The functional plan was limited to these boundaries as the City of Gatineau is addressing their own cross-sectional preferences north of the Chaudière Bridge. The Chaudière Bridge is in federal ownership not City ownership, and they have no current plans to modify their crossing. However, recommendations are provided herein on how to modify operation on the bridge to be compatible with the complete street vision for the corridor.

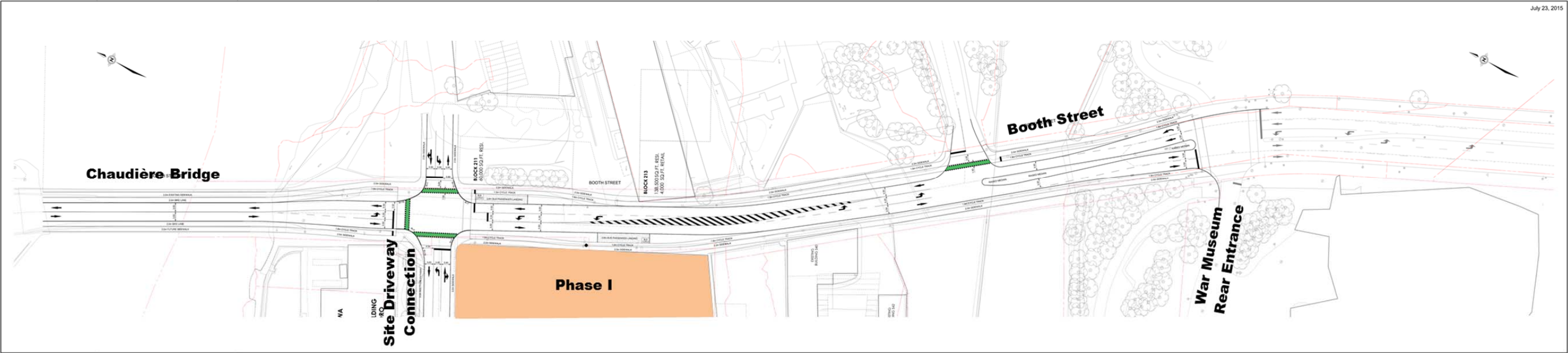
The current functional plan that reflects this consensus is depicted in Figure 6. Key components include:

- One through lane per direction at 3.5 m wide;
- Turn lanes where required at 3.25 m wide;
- 2.0 m wide sidewalks on both sides;
- 1.8 m wide cycle track in both directions, except in bus stop areas where 1.5 m is sufficient;
- 3.6 m deep x 20 m long bus passenger loading, which includes bus shelter;
- Bus platform and shelter located between road curb and cycle track;
- Over the existing Chaudière Bridge, the existing pavement width, using all the available space results in a 3.5 m wide travel lane and a 2.0 m wide bicycle lane per direction. Once off the bridge (to the south) these transition to the above-noted facilities and dimensions. The bridge currently has a 2.0 m wide sidewalk on its east side and nothing on its west side;
- At the south end of the signalized War Museum's rear entrance the proposed two lane cross-section transitions to the existing four-lane cross-section;
- At the Booth/Phase I, signalized driveway intersection, left-turn lanes are proposed in all four directions. Within Phase I the elements of the site driveway are:
 - 2.0 m wide sidewalk on the south side;
 - 3.5 m wide shared through/right-turn lane;
 - 3.0 m wide left-turn lane;
 - 3.5 m wide inbound lane; and
 - 3.0 m wide MUP on the north side.
- Turn radii designed to efficiently accommodate HSU's (fire and garbage trucks) within their lanes, while minimizing pedestrian crossing distances.

It is noteworthy that with regard to bus stop locations, options were considered that had them located in bus bays and also had the northbound bus stop located on the far side of the Phase 1 signaled intersection. Following review by City Traffic and Transit Operations staff, the decision was not to provide bus bays, to provide the northbound bus stop on the near side of the intersection, and to align the cycle track so that it goes behind the bus shelter and bus loading zone.

Subsequent intersection capacity analysis provided herein is based on the existing roadway geometry beyond the site and the future proposed roadway geometry adjacent to Phase I, as described above and as depicted on the proposed functional plan in Figure 6.

Figure 6: Booth Street Complete Street Functional Plan



4. Travel Demand Forecast

4.1 Other Planned/Potential Development in the Vicinity of the Study Area

As outlined in the MMTIS, Zibi is not the only site in this area of Gatineau and Ottawa that has development/redevelopment potential. The following Table 2 summarizes future development sites identified by the Cities of Gatineau and Ottawa, as well their assumed development yield. Also included in this table are the assumptions used to estimate vehicle trips and the resultant peak hour vehicle trips. These being approximately 1000 veh/h two-way total during both peak hours for the Gatineau sites, and approximately 1300 veh/h two-way total during both peak hours for the Ottawa sites. Combining both provinces, the two-way peak hour total is approximately 2200 veh/h to 2400 veh/h.

Table 2: Potential Local Area Development - Peak Hour Traffic Projections

Address	Proposed Project	Dwelling Units	Commercial Floor Area (m ²) or No. of Jobs	Parking Spots	Estimated Two-way Trip Generation (veh/h)	
					AM Peak	PM Peak
Gatineau						
Fonderie	Mix Uses	1000	TBD	TBD	150	181
Morin	Parking	-	-	208	139	130
Morin	-	250	-	TBD	50	59
50 Montcalm	Office Building	-	4,350	348	51	68
71 Wellington	Mix Uses	320	TBD	350	60	72
71 Wellington	Mix Uses	640	TBD	550	105	126
119 Wellington	Mix Uses	137	400	110	39	52
15 Leduc	Parking	-	-	250	174	156
8 Leduc	Mix Uses	35	TBD	11	11	12
150 Wellington	Mix Uses	205	1,860	266	58	82
130 Laval	Residential	21	-	TBD	8	8
161 Notre-Dame-de-l'île	Residential	24	-	20	9	9
41 Victoria	Office Building	-	11,150	250	102	98
190 Papineau	Residential	16	-	4	6	7
Gatineau Total Projected Site Trip Generation (rounded)					960	1060
Ottawa						
LeBreton Flats	Mixed Use	3,399	2896 jobs	TBD	691	757
Bayview Yard	Office	-	300 jobs	TBD	56	57
City Centre	Mixed Use	960	2988 jobs	TBD	510	499
Ottawa Total Projected Site Trip Generation (rounded)					1260	1320
Assumptions:	ITE Residential Condominium/Townhouse rate for all dwelling units ITE Park & Ride rate for all municipal parking lots Quebec Lands Modal Share: <ul style="list-style-type: none">• 35% Drivers• 10% Passengers• 35% Transit• 20% Non-motorized Ontario Lands Modal Share: <ul style="list-style-type: none">• 25% Drivers• 10% Passengers• 45% Transit• 20% Non-motorized					

The scope of this transportation study does not allow for a site-by-site assignment of peak hour generated traffic from each of these sites to study area roads and intersections. There is also no definitive timing for this level of development in total. As per the MMTIS, the potential peak hour traffic from these development sites that would potentially cross the border into the other province is summarized in Table 3.

Table 3: Estimated Range of Cross-Border Vehicle Trips form other Potential Area Developments

Cross Border Trips as % of Total Site Traffic	Two-Way Vehicles/Hour (veh/h)		
	To/From Quebec Sites	To/From Ontario Sites	TOTAL
5%	50	65	115
10%	100	130	230
15%	150	195	345
20%	200	260	460
25%	250	325	575

It is our opinion that the level of additional peak hour cross-border traffic assignment, should these sites ever be fully developed, is likely in the 10% to 20% range, and as such would total between the 200 veh/h to 400 veh/h range two-way total. Depending on the location of the other trip end, this traffic would want to use one of the existing five interprovincial bridges, with the Chaudière, Portage and Alexandria Bridges likely carrying the majority, if capacity was available.

4.2 Background Traffic Projections

Due to the existing at-capacity conditions of some of the study area intersections and the capacity limits on the existing bridges, there is no value in incorporating background traffic projections in addition to the traffic projections from the Zibi lands. As noted in Section 4.1, traffic generation from other potential development within the broader area in both Ottawa and Gatineau has been identified, but a site-by-site assignment of this traffic was not undertaken as this is well beyond the scope of this study. However, its potential added traffic assignment to the interprovincial crossings, if capacity were available, has been estimated.

As outlined in the original MMTIS, and noted herein, the intersection performance for the majority of study area intersections are currently operating, or projected to operate, at or near capacity (LoS 'E'). As such, background traffic was removed from the Laurier-Alexandre-Taché and Booth-Eddy Street Corridors for the most congested intersections to operate at a v/c of 1.0 or better while accommodating all of projected Zibi development traffic. This reduction in background traffic would be required over the next 15 to 20 years (estimated build-out of the Zibi lands). In the previously prepared MMTIS, the following reductions in vehicle traffic were estimated:

Booth-Eddy Street Corridor

- Morning Peak Hour → Remove 230 veh/h southbound; and
- Afternoon Peak Hour → Remove 375 veh/h northbound.

Based on more recent City traffic counts and updated SYNCHRO analysis these volumes have now changed. It is estimated that the morning peak hour reduction would need to be approximately 380 veh/h (an additional 150 veh/h removed from the Booth-Eddy Corridor) in the southbound direction. The afternoon peak hour reduction outlined in the MMTIS is required based on the proposed future roadway geometry at the Eddy/Alexandre-Taché/Laurier intersection. However, based on the existing roadway

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

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

4.3 Site Trip Generation

4.3.1 PHASE I

Appropriate trip generation rates for the proposed Phase I development consisting of approximate 50,000 ft² of retail, 38,000 ft² of office, a 7,000 ft² community centre, and 315 residential units¹ were obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, which are summarized in Table 4.

Table 4: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Condominiums	ITE 230	$T = 0.44(du);$ $\ln(T) = 0.80 \ln(du) + 0.26$	$T = 0.52(du);$ $\ln(T) = 0.82 \ln(du) + 0.32$
Office	ITE 720	$T = 2.39(X);$	$T = 2.74(X);$ $\ln(T) = 0.90 \ln(X) + 1.53$
Specialty Retail Centre	ITE 826	$T = 1.36(X);$ $T = 1.20(X) + 10.74$	$T = 2.71(X);$ $T = 2.40(X) + 21.48$
Recreational Community Centre	ITE 495	$T = 2.05(X);$	$T = 2.74(X);$
Notes: T = Average Vehicle Trip Ends X = 1000 ft ² Gross Floor Area du = dwelling units Specialty Retail AM Peak is assumed to be 50% of the PM Peak			

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

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

¹ The residential units were calculated based on the assumption of approximately 850 ft² per unit. The total GFA of the residential area proposed for Phase I is 267,784 ft², which equates to approximately 315 units.

Table 5: Modified Person Trip Generation

Land Use	Area	AM Peak (persons/h)			PM Peak (persons/h)		
		In	Out	Total	In	Out	Total
Condominiums	315 du	28	140	168	134	66	200
Office	38,000 ft ²	93	25	118	44	115	159
Specialty Retail Centre	49,908 ft ²	51	41	92	80	104	184
Recreational Community Centre	7,000 ft ²	12	7	19	12	13	25
Total Person Trips		184	213	397	270	298	568
<i>Note: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%</i>							

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

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

Table 6: Condominium Site Trip Generation

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

Table 7: Office Site Trip Generation

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

Table 8: Specialty Retail Centre Site Trip Generation

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

Table 9: Recreational Community Centre Site Trip Generation

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

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

Table 10: Total Phase I Site Vehicle Trip Generation

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

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

4.3.2 PHASE 2 TO 8

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

be redone at a later date. The current phasing plan is included as Appendix K. Currently, the proposed Phases 3, 4 and 5 west of Booth Street will consist of approximately 760 dwelling units², 81,000 ft² of office and 45,300 ft² of retail. Phases 2, 6, 7 and 8 east of Booth Street currently proposed to have approximately 350 dwelling units, 4,000 ft² of retail and an approximate 100 room hotel. The trip generation method outlined for Phase 1 was also applied to all other phases, and the resultant projected new auto trips are summarized in Table 11.

Table 11: Phases 2 to 8 Site Trip Generation

Land Use	Area	AM Peak (veh/h)			PM Peak (veh/h)		
		In	Out	Total	In	Out	Total
Condominiums	1,106 du	23	109	132	106	52	158
Office	81,000 ft ²	60	16	76	27	68	95
Specialty Retail Centre	49,300 ft ²	13	10	23	19	24	43
Hotel	100 rooms	14	11	25	14	14	28
Retail Pass-By (30%)		-4	-4	-8	-6	-6	-12
Multi-Purpose Trips (10%)		-10	-14	-24	-15	-16	-31
Total 'New' Auto Trips		96	128	224	145	136	281

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

4.4 Vehicle Traffic Distribution and Assignment

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

Residential

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

Office/Retail

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

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

² The residential units were calculated based on the assumption of approximately 850 ft² per unit. The total GFA of the residential area proposed for Phases II and III is 938,500 ft², which equates to approximately 1106 units.

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

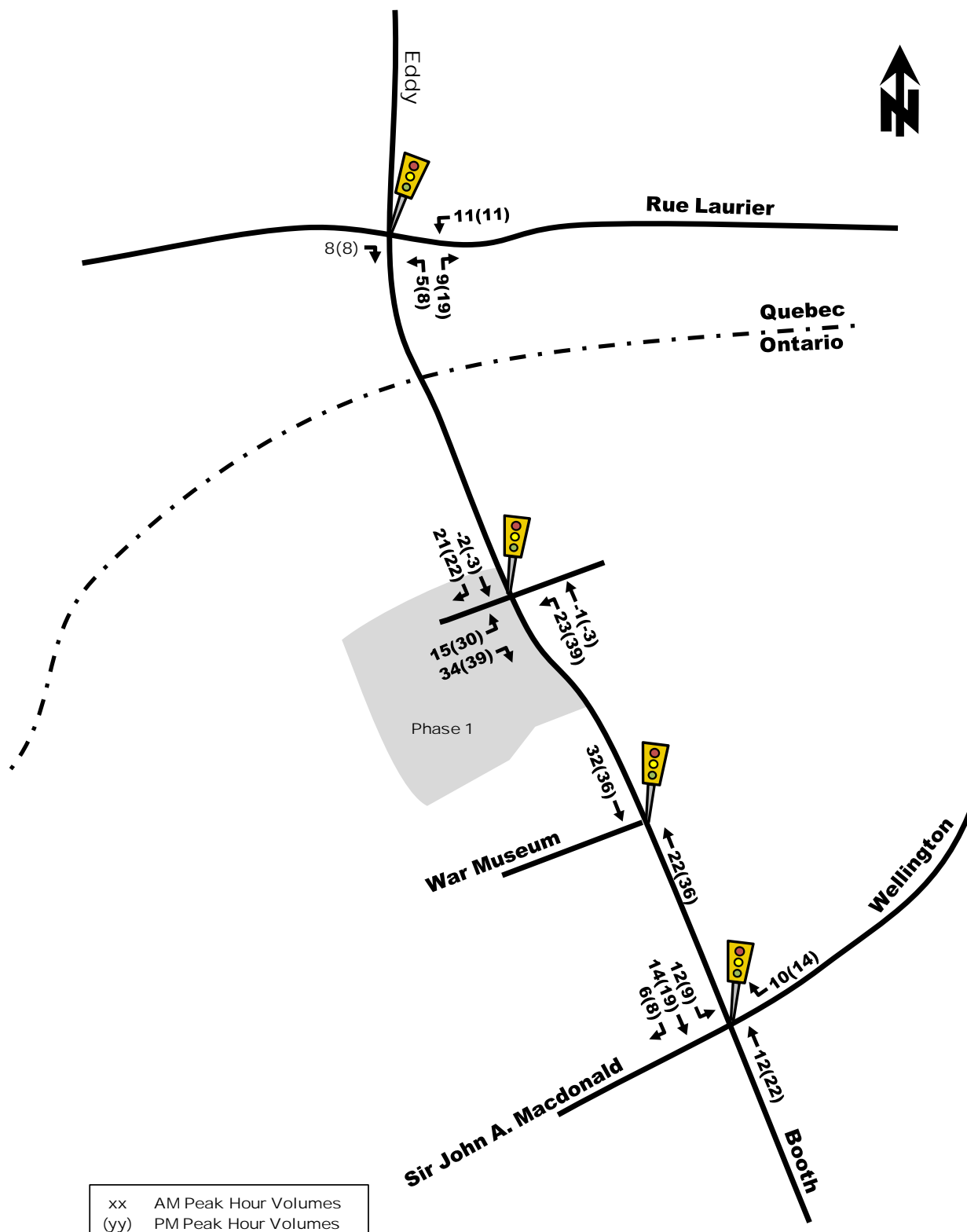
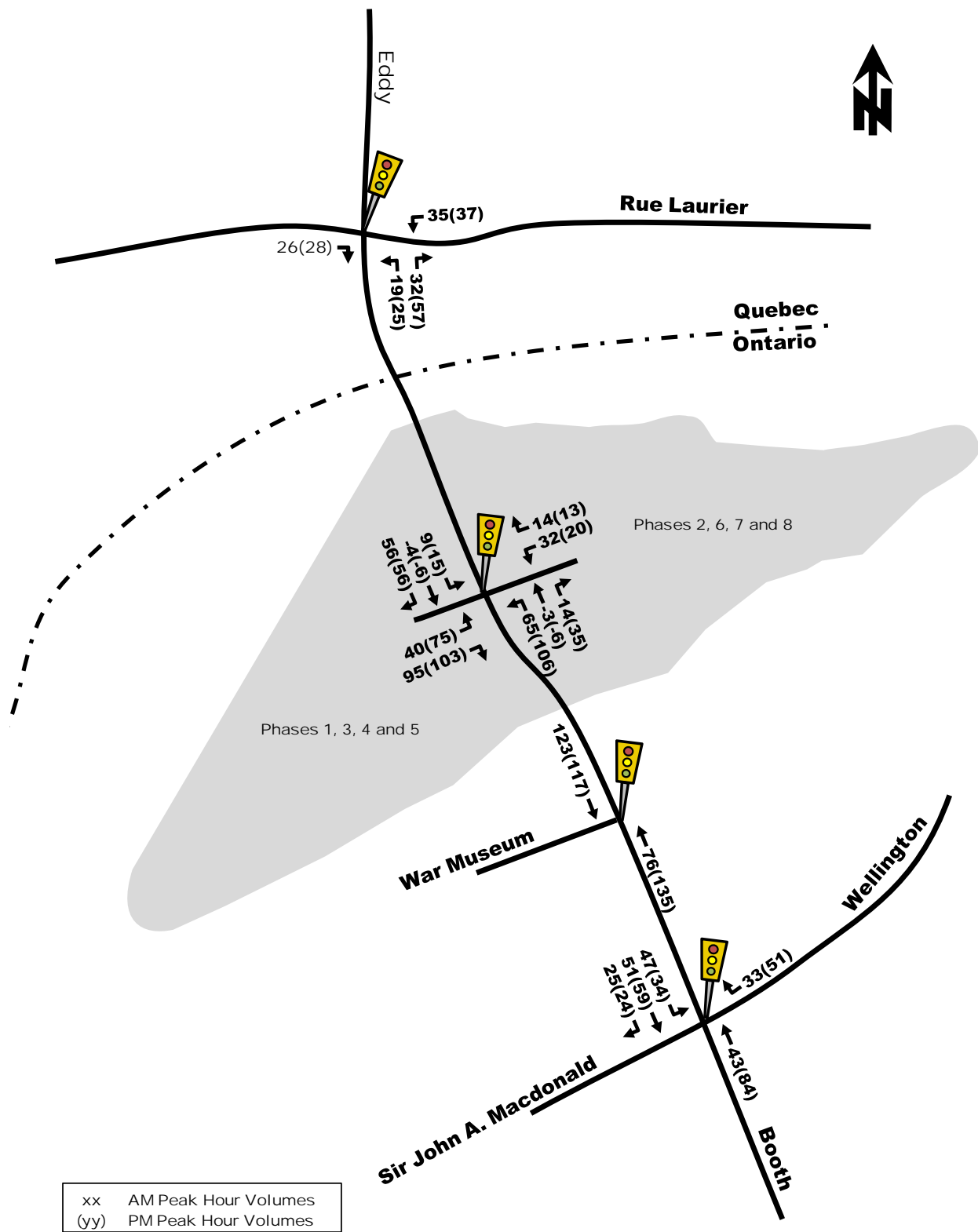


Figure 8: Phases 1 to 8 Site-Generated Traffic Volumes (New and Pass-by)



5. Traffic Impact Analysis

For the purpose of this study, the traffic impact will be assessed for four scenarios as follows:

- Scenario 1: Phase I development;
- Scenario 2: Full Site development (Phases 1 to 8);
- Scenario 3: Full Zibi development (Phases 1 to 8 plus Gatineau Zibi Lands developments); and
- Scenario 4: Full Zibi development with reduced “through traffic” volumes in the Booth-Eddy Corridor.

As mentioned previously, changes to the Booth-Eddy Corridor cross-section are planned as part of the overall Zibi development. For all four of the above scenarios, the proposed Figure 6 roadway geometry will be assumed for the site driveway connection to Booth Street and for the section of Booth Street adjacent to the site, and the existing roadway geometry will be assumed for the other study area intersections (Booth/Sir John A. Macdonald, Booth/War Museum access, and Eddy/Alexandre-Taché/Laurier).

5.1 Scenario 1: Projected Conditions at Phase I Development

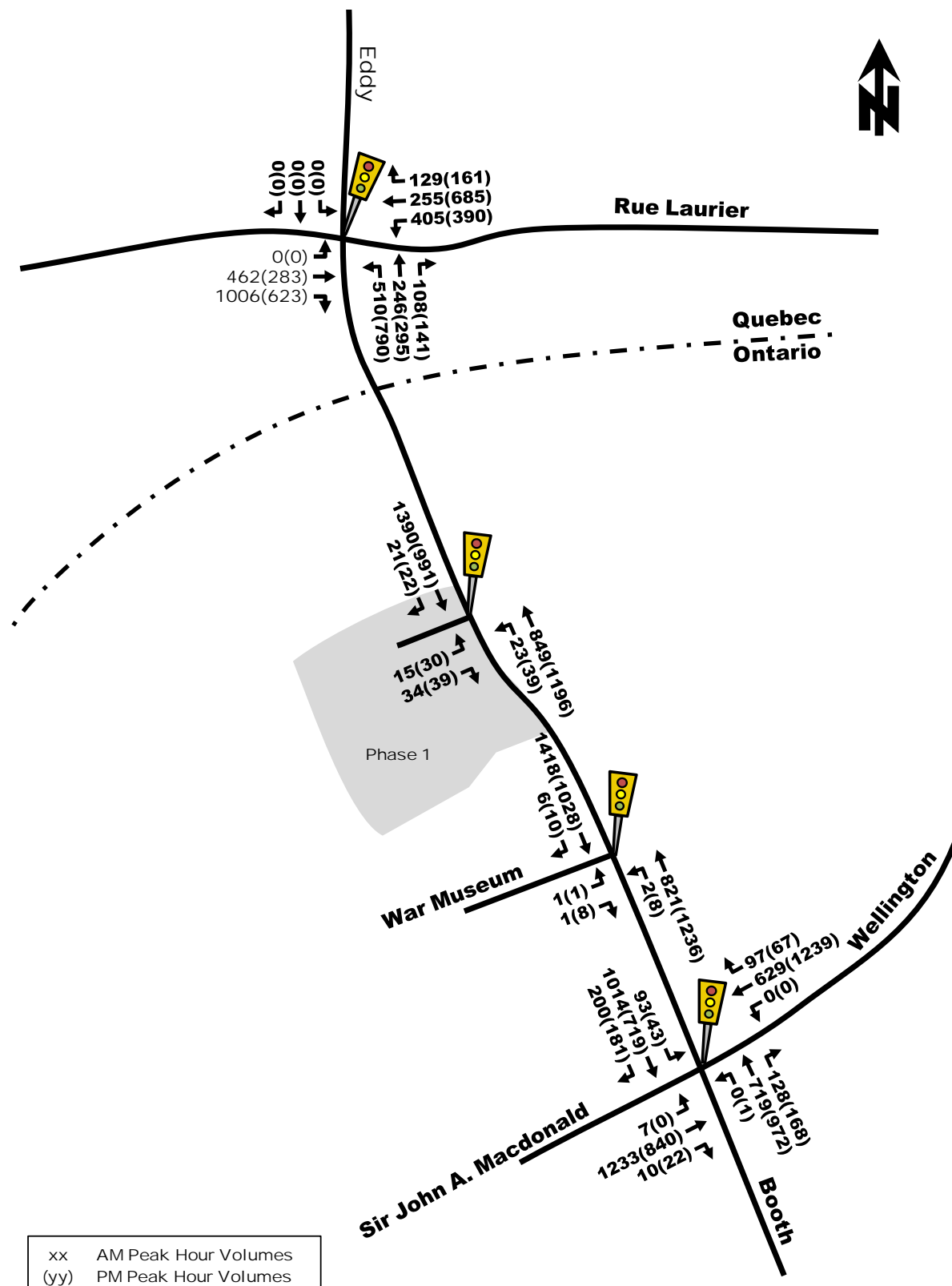
The total projected Phase I peak hour traffic volumes for the study area intersections were derived by superimposing ‘new’ and ‘pass-by’ site-generated traffic for Phase I (Figure 7) onto existing volumes (Figure 1). The resultant volumes are depicted on Figure 9.

Table 12 provides a summary of projected performances of study area intersections with Phase I site occupancy, the proposed roadway geometry at the site access, and the existing geometry at all other study area intersections. As the majority of study area intersections are currently operating at or close to capacity, the existing signal timing was optimized to improve intersection performance. The SYNCHRO model output of Phase I projected conditions is provided within Appendix C.

Table 12: Phase 1 Projected Intersection Performance

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
Booth/Sir John A Macdonald/Wellington	D(E)	0.87(0.93)	EBT(WBT)	31.0(37.3)	D(E)	0.84(0.92)
Booth/War Museum	A(A)	0.49(0.43)	SBT(NBT)	3.9(3.6)	A(A)	0.49(0.43)
Booth/Site	E(D)	0.98(0.88)	SBT(NBT)	22.9(14.6)	E(D)	0.95(0.86)
Eddy/Alexandre-Taché/Laurier	F(E)	1.40(0.94)	WBL(WBL)	111.0(37.3)	D(C)	0.88(0.79)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

Figure 9: Phase I Total Projected Volumes



As shown in Table 12, study area intersections 'as a whole' are projected to operate at capacity (LoS 'E') or better, which is considered acceptable for signalized intersections within the urban core. It is noteworthy that the projected conditions include the signal timing adjustments outlined in Section 2.5.

With regard to the 'critical movements' at study area intersections, they are projected to operate at LoS 'E' or better, with the exception of the westbound left-turn movement at the Eddy/Alexandre-Taché/Laurier intersection during the morning peak hour, which is projected to operate at LoS 'F'.

These results include signal timing optimization to improve the performance of the overall intersection and the critical movements at existing study area intersections. As mentioned previously, there is limited opportunity to improve operations at these intersections apart from 'removing' vehicle volume during peak hours. This scenario is included below and outlined in Section 4.2 Background Traffic.

5.2 Scenario 2: Projected Conditions at Full-Site Development (Phases 1 to 8)

The total projected full-site development peak hour traffic volumes for the study area intersections were derived by superimposing 'new' and 'pass-by' site-generated traffic for Phases 1 to 8 (Figure 8) onto existing volumes (Figure 1). The resultant volumes are depicted on Figure 10.

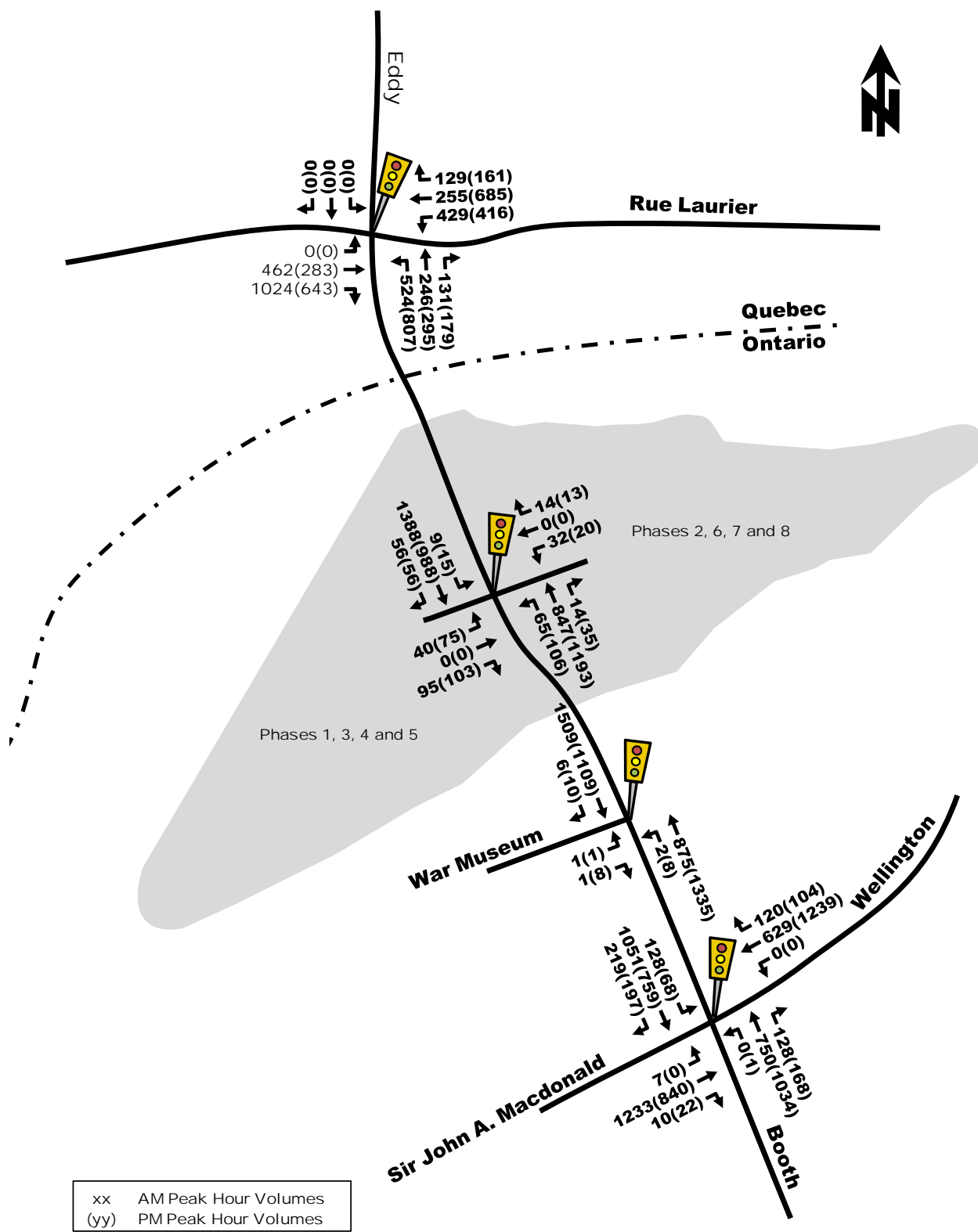
The following Table 13 provides a summary of projected performances of study area intersections with full-site development (Phases 1 to 8), the proposed roadway geometry at the site access and the existing geometry at all other study area intersections. Similar to Table 12, the existing signal timing was optimized to improve intersection performance. The SYNCHRO model output of full-site development (Phases 1 to 8) projected conditions is provided within Appendix D.

Table 13: Full-Site Development Projected Intersection Performance

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
Booth/Sir John A Macdonald/Wellington	D(E)	0.89(0.97)	EBT(WBT)	32.9(39.7)	D(E)	0.87(0.95)
Booth/War Museum	A(A)	0.52(0.46)	SBT(NBT)	4.3(3.9)	A(A)	0.52(0.46)
Booth/Site	F(E)	1.15(0.93)	NBL(NBT)	39.0(18.7)	F(D)	1.01(0.88)
Eddy/Alexandre-Taché/Laurier	F(E)	1.48(0.98)	WBL(EBR)	119.8(40.4)	E(D)	0.92(0.89)

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.

Figure 10: Full-Site Development Total Projected Volumes



As shown in Table 13, the Booth/Site intersection, is projected to operate at LoS 'F' during the morning peak hour. This is because of heavy southbound through traffic along the Booth-Eddy Corridor preventing northbound left-turners from accessing the site. All other intersections "as a whole" are projected to operate at or close to capacity (LoS 'E' or LoS 'D') or better which is considered acceptable within the downtown core.

With regard to the 'critical movements' at study area intersections, given the signal timing optimization, they are projected to operate at LoS 'E' or better, with the exception of the northbound left-turn movement at the Booth/Site intersection and the westbound left-turn movement at the Eddy/Alexandre-Taché/Laurier intersection, which are projected to fail (LoS 'F') during the morning peak hour.

These results include signal timing optimization to improve the performance of critical movements at study area intersections. As mentioned previously, there is limited opportunity to improve operations at these intersections apart from 'removing' vehicle volume during peak hours, which is included in Section 5.4.

5.3 Scenario 3: Projected Conditions at Full Zibi Development

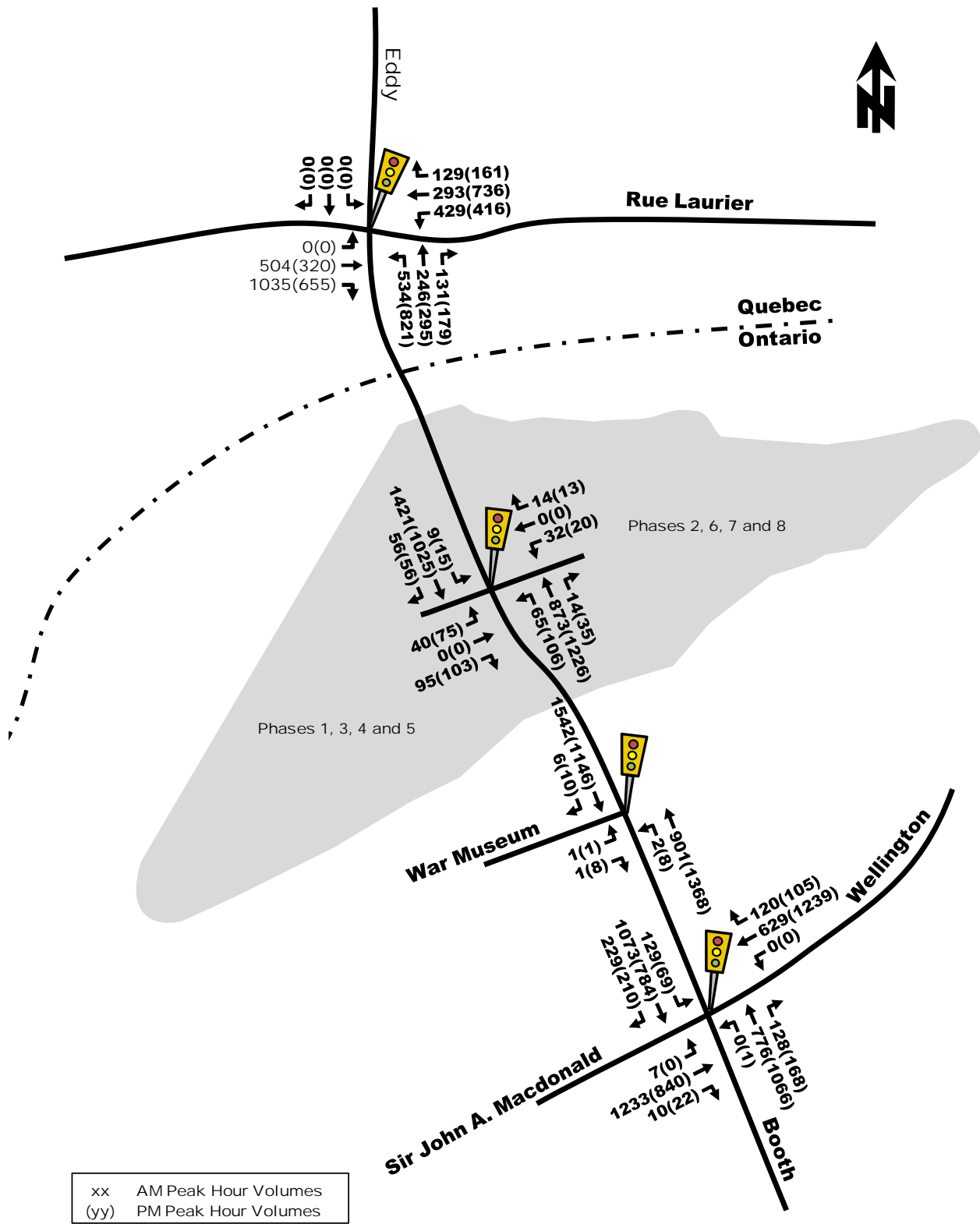
The total projected peak hour traffic volumes projected for the entire Zibi development build-out for the study area intersections were derived by superimposing 'new' and 'pass-by' site-generated traffic for Phases 1 to 8 (Figure 8), and the site-traffic generated by the Gatineau portion of the Zibi development (included in the MMTIS and herein as Appendix E) onto existing volumes (Figure 1). The resultant volumes are depicted on Figure 11.

The following Table 14 provides a summary of projected performances of study area intersections with full Zibi development (Ottawa and Gatineau Sites), the proposed roadway geometry at the site access and the existing geometry at all other study area intersections. Similar to Tables 12 and 13, the existing signal timing was optimized to improve intersection performance. The SYNCHRO model output of full Zibi development projected conditions is provided within Appendix F.

Table 14: Full Zibi Development Projected Intersection Performance

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
Booth/Sir John A Macdonald/Wellington	D(E)	0.90(0.97)	EBT(WBT)	33.1(40.8)	D(E)	0.88(0.96)
Booth/War Museum	A(A)	0.53(0.47)	SBT(NBT)	4.4(4.2)	A(A)	0.53(0.47)
Booth/Site	F(E)	1.15(0.96)	NBL(NBT)	46.6(21.4)	F(E)	1.03(0.91)
Eddy/Alexandre-Taché/Laurier	F(E)	1.48(1.00)	WBL(EBR)	121.1(42.4)	E(E)	0.94(0.92)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

Figure 11: Full Zibi Development Total Projected Volumes



As shown in Table 14, study area intersections 'as a whole' are projected to operate at capacity (LoS 'E') or better, with the exception of the Booth/Site intersection, which is projected to operate at LoS 'F' during the morning peak hour.

With regard to the 'critical movements' at study area intersections, they are projected to operate at LoS 'E' or better, with the exception of the northbound left-turn movement at the Booth/Site intersection and the westbound left-turn movement at the Eddy/Alexandre-Taché/Laurier intersection, which are projected to fail (LoS 'F') during the morning peak hour.

5.4 Scenario 4: Projected Conditions at Full Zibi Development - Reduced Vehicle Volumes

As mentioned previously, the initial MMTIS for Zibi outlined that a portion of the existing traffic along the Booth-Eddy Corridor would have to be "removed" for the study area intersections to operate at capacity (LoS 'E') or better. The following analysis includes the total Zibi development traffic (Figure 11) with the vehicle volumes outlined in Section 4.2 removed from the Booth-Eddy Corridor. The total revised vehicle volume reduction consists of 380 veh/h in the southbound direction along the Booth-Eddy Corridor during the morning peak hour only. The resultant volumes are depicted on Figure 12.

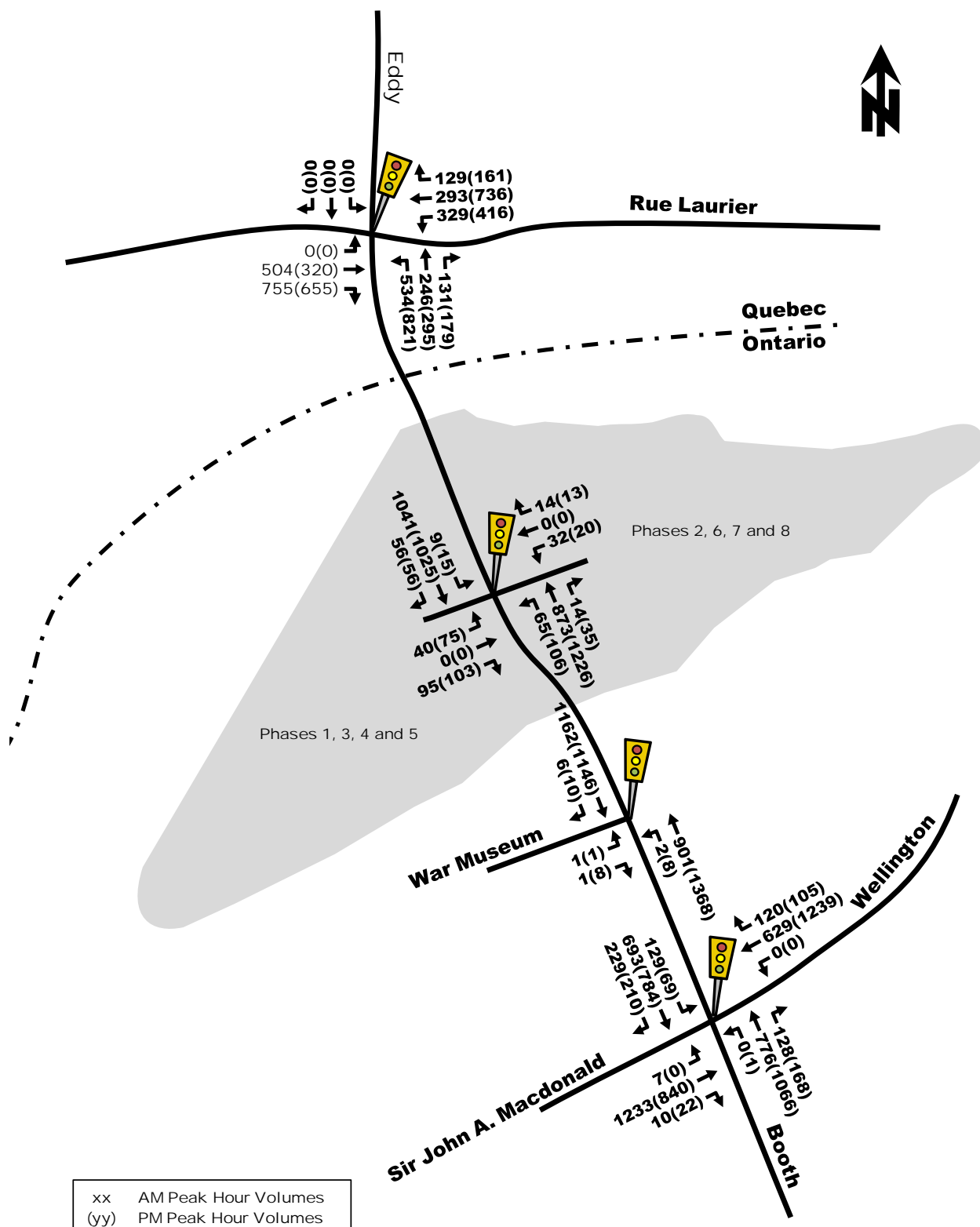
The following Table 15 provides a summary of projected performances of study area intersections with full Zibi development (Ottawa and Gatineau Sites) and "removed through traffic volumes", the proposed roadway geometry at the site access and the existing geometry at all other study area intersections. The existing signal timing was optimized to improve intersection performance. The SYNCHRO model output of full Zibi development projected conditions with removed traffic volumes is provided within Appendix G.

Table 15: Projected Full Zibi Development Intersection Performance – Volume Reduction

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
Booth/Sir John A Macdonald/Wellington	D(E)	0.90(0.97)	EBT(WBT)	33.7(40.9)	D(E)	0.88(0.96)
Booth/War Museum	A(A)	0.40(0.47)	SBT(NBT)	4.2(3.9)	A(A)	0.40(0.47)
Booth/Site	D(E)	0.82(0.97)	SBT(NBT)	12.5(20.7)	C(E)	0.75(0.93)
Eddy/Alexandre-Taché/Laurier	E(E)	1.00(1.00)	EBR(EBR)	45.8(38.5)	D(E)	0.83(0.92)
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 15, with the estimated through traffic volume reductions (380 veh/h southbound during the morning peak hour), and signal timing optimization, all study area intersections 'as a whole' are projected to operate at capacity (LoS 'E') or better, which is considered acceptable within the urban core.

Figure 12: Full Zibi Development Total Projected Volumes with Removed Through Traffic Volumes



With regard to the 'critical movements' at study area intersections, they are projected to operate at an acceptable LoS 'E' or better during both peak hours.

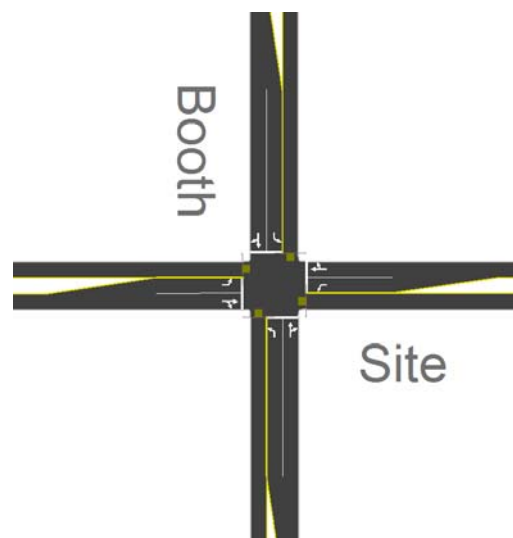
5.5 Site Access Requirements

The proposed access, located at the north end of the Chaudière Island, is the only proposed point of access and egress to the east and west sides of the Chaudière Island. Signal warrant analysis was performed based on the full Zibi development traffic volumes (Figure 12) and is included as Appendix J. Based on the projected volumes, traffic signalization is not warranted (58%), however, signalization is recommended to accommodate pedestrian crossing movements and to provide the needed gaps in the Booth Street traffic flow to enable site-generated traffic to safely enter/exit the site.

Given the total projected volumes associated with all three phases of the proposed development, the following intersection configuration at the site driveway connection to Booth Street is recommended:

Booth/Site

- Northbound Approach:
 - Single left-turn lane – Approximately 40 m in length; and
 - Shared through/right-turn lane.
- Southbound Approach:
 - Single left-turn lane – Approximately 20 m in length (constrained by bridge); and
 - Shared through/right-turn lane.
- Eastbound and Westbound Approaches:
 - Single left-turn lane; and
 - Shared through/right-turn lane.



It is noteworthy that the eastbound left-turn lane is not warranted from a level of service perspective, however, it is recommended to reduce delay when exiting the site and the extra driveway width is needed to accommodate the turn requirements of the occasional tractor trailer truck to/from Energy Ottawa (Appendix H). As the majority of traffic exiting Phase 1, 3, 4 and 5 (west of Booth Street) is destined to Ottawa (eastbound right-turn), one left-turn vehicle would block all right-turns which otherwise could turn right-on-red when the adjacent signal to the north provided gaps in the southbound traffic flow. As this is the only driveway connection to the Chaudière Island development, it was considered important to provide this flexibility in driveway cross-section.

With regard to large single unit delivery trucks or garbage trucks, their turn templates are shown in Appendix I. As noted, the proposed intersection design and lane widths allows these movements to stay within their lane when turning into and out of the site without crossing over into adjacent or opposing lanes.

5.6 Projected Amount of Required Peak Hour Traffic Displacement

With regard to the Booth-Eddy Corridor, with the additional green time required to accommodate the projected site-generated traffic at the proposed signalized intersections along the corridor, and with the

revised plan and cross-sections as outlined in Section 3, its ability to accommodate interprovincial through traffic during peak hours will decrease. As summarized in the MMTIS the Chaudière Corridor's resultant north-south capacity is estimated to be in the 1200 veh/h to 1400 veh/h range per direction, compared to the corridor's current capacity of approximately 1600 veh/h per direction.

As previously noted, the unconstrained peak hour traffic demand for the Chaudière corridor cannot be accommodated. Of the total projected vehicles, approximately 380 veh/h southbound and during the morning peak hour, would have to be accommodated elsewhere. Options to address this longer-term corridor vehicle capacity deficiency include:

- Increased use of all non-auto modes of travel;
- Change in time of travel to make use of the available corridor capacity outside of the peak hours;
- Change of residence or employment address over time to eliminate the need to travel across the Ontario-Quebec border; and
- Provide a new interprovincial bridge resulting in a redistribution of traffic on each existing bridge thereby freeing up capacity in the central area bridges, including the Chaudière Bridge for more localized traffic.

6. On-Site Transportation-Related Considerations

6.1 On-Site Street Network

The proposed Chaudière West Master Plan (Phases 1, 3, 4 and 5) has one section of two-way roadway that provides access to/from Booth Street with a one-way loop connection at its west end that will provide access to the centrally located buildings on the Island. As outlined in the MMTIS, it is a key objective to give priority to pedestrian and bicycle circulation on site and to minimize the priority of the motorized vehicle.

As depicted in Figure 2, the only Phase 1 site driveway connection to Booth Street is 3 lanes wide for a distance of approximately 20 m. West of this point it tapers down to two lanes to serve the Energy Ottawa site and the Phases 1, 3, 4 and 5 below grade parking garage. There will be a 2.4 m wide sidewalk on the south side and a 3.0 m wide MUP on the north side. West, beyond this point, the on-site road is a one-way loop.

As per the Chaudière West Master Plan, included as Appendix L, the ultimate one-way loop will be 6.0 m wide and operate counter-clockwise. An additional 3.5 m on either side will be provided for pedestrians, streetscaping, and trees. The full corridor width will accommodate a woonerf-type facility with no raised curbs separating the vehicle portion from the pedestrian portion. The 6.0 m width as shown, can accommodate fire trucks and large single unit trucks, but not tractor trailers. Bicycles will share this route with vehicles.

For Phase I, as depicted in Figure 2, the one-way loop will be truncated and not proceed as far west as the ultimate loop. It too will be 6.0 m wide and operate counter-clockwise. As shown, the below grade garage will have temporary access to this interim one-way loop. The loop can accommodate fire trucks, but we are also advised that fire access will also be provided across Head Street Square directly from Booth Street.

6.2 On-Site Pedestrian or Bicycle Circulation

Sidewalks are proposed on both sides of the one-way vehicle circulation loop and on the south side of the two-way connecting link to Booth Street. Pedestrians will also be able to traverse Head Street Square as an additional connection to Booth Street.

As the proposed southbound bus stop is located where Head Street Square intersects with Booth Street, and as the proposed northbound bus stop is at the Site Driveway/Booth intersection (see Figure 6), the on-site pedestrian system is directly connected to the Booth Street sidewalks at the adjacent bus stop.

As previously noted, the Chaudière Bridge has a sidewalk on the east side. The desire is to add a sidewalk to the west side of the bridge to ensure pedestrian network continuity along the Booth/Eddy Corridor, however this will require participation of PWGSC and likely structural modifications.

With regard to on-site cycling, cyclists will share the 6.0 m wide one-way weeroad with slow moving vehicles and once they reach the site driveway connection to Booth Street, there is a proposed 3.0 m wide multi-use pathway (MUP) on the north side. This MUP will connect to the proposed cycle track on Booth Street south of the intersection and to the proposed bicycle lanes on the Chaudière Bridge. At the southwest end of Chaudière Island there is a bridge that connects south to Albert Island and then further south to the south shore of the Ottawa River. This facility provides a direct connection from the City-wide MUP that runs along the John A. MacDonald Parkway to the site driveway connection to Booth Street. This link will provide an alternative pedestrian/cycle route to the Booth Street Corridor between Wellington Street and the site.

6.3 On-Site Parking

A total of 108 parking spaces are proposed to serve the Phase I development, comprised of 98 underground, 5 on the surface and 5 “shared car spaces” on the surface. As the site is located in Area A on Schedule 1, west of the Rideau Canal, there is no minimum parking requirement, (but there is a maximum) and as such, the proposed total parking supply meets the City’s By-Law requirements.

For Phase I parking, temporary access/egress is proposed from the interim one-way loop. The ramp grade is currently shown at 18%. For this grade, heating of the exposed portion is required and transition grades are required at the top and bottom of the ramp. Ultimately, the parking garage ramp will be to the two-way driveway connection to Booth Street, and located opposite the Energy Ottawa connection, as shown in Figure 2. With regard to the layout/design of the garage as shown in Appendix M, the By-Law requirements are met with regards to parking space and circulation aisle dimensions.

Based on the assumptions for the total proposed amount of residential units for Phase I, the total amount of bicycle parking required for the estimated 315 dwelling units is 158 bicycle parking spaces, which should be located in well-lit areas close to main building entrances. A minimum of 19 bicycle parking spaces should be provided for the retail component of the site and a minimum of 14 bicycle parking spaces should be provided for the office and community centre components of the site.

7. Transportation Demand Management (TDM)

Relevant Transportation Demand Management (TDM) strategies are an integral part of a planned development in order to address and support the City’s policies with regard to sustainability and TDM. A successfully planned development will have the infrastructure and incentives in place to reduce off-site

travel, and for travel that is off-site to maximize walking, cycling, transit, and thereby minimizing vehicular travel. For this particular site, numerous TDM measures are planned to be implemented that will achieve these objectives. Proposed are:

- a mixed-use development that retains people on site;
- Provide an on-site framework of small blocks with frequent intersections to encourage safe and efficient walking;
- a connected system of sidewalks, multi-use pathways, and bicycle lanes/tracks that will accommodate all types of local and commuter cycling needs;
- an on-site system of pedestrian streets and woonerfs that accommodate cars and service vehicles, but that give priority to pedestrian and bicycle circulation;
- an abundance of visible, safe and secure bicycle parking for both residents and visitors;
- parking minimums for development and encourage shared-use of parking between buildings and between lands uses, and also encourage walking, cycling as transit;
- appropriate car sharing programs/facilities to reduce auto ownership and attract residents who do not own a vehicle; and
- Provide information/material to future residents and employees that make them aware of, and educates them about, sustainability objectives of the redeveloped lands.

Of particular note with regard to TDM and sustainability it is the proposed complete street design for Booth Street adjacent to the site. As shown in Figure 6, the combination of reduced number of traffic lanes, buses stopping in the traffic lane, continuous sidewalks, cycle tracks, and shelters/loading areas located adjacent to the curbs all place a greater emphasis in safety while accommodating increased transit, bicycle and pedestrian travel along the corridor and to/from adjacent development. While the resultant cross-section may reduce the vehicle capacity of the corridor, the proposed new functional plan significantly increases the people moving capacity of the corridor.

8. Findings, Conclusions and Recommendations

Based on the foregoing analysis of the proposed development, the following transportation-related conclusions are offered:

STUDY AREA

- As agreed to with City staff at the commencement of this study, the study area is the Booth-Eddy Corridor from Rue Laurier south to Wellington Street.

EXISTING CONDITIONS

- The study area intersections adjacent to the site are currently operating 'as a whole' with an overall LoS 'E' or better during the weekday morning and afternoon peak hours. This is considered acceptable according to the City of Ottawa's operating standards of LoS 'E' or better within the urban core;
- With regard to 'critical movements' at study area intersections, they are noted as operating at an acceptable LoS 'E' or better during the peak hours, with the exception of the 'critical movements' at the Booth/Sir John A. Macdonald intersection (eastbound through in the morning and

northbound through in the afternoon) and at the Eddy/Alexandre-Taché/Laurier intersection (westbound left in both peak hours), which are operating above capacity (LoS 'F');

- Mitigative measures to improve operations at these intersections include signal timing optimization, however some movements will continue to fail; and
- There is currently no specific bicycle accommodation along the Booth-Eddy Corridor and the sidewalk system is not continuous on both sides.

BOOTH STREET FUNCTIONAL PLAN

- Following meetings with, and input from, City of Ottawa traffic and transit operations staff, a new functional plan has been tentatively agreed to for Booth Street from the south end to the Chaudière Bridge to the rear signalized entrance to the Canadian War Museum. The resultant "complete street" design provides the required pedestrian, cyclist and transit facilities to more safely maximize the people carrying capacity of these travel modes adjacent to Phase I, II and III of the subject development lands. This plan also accommodates the access/egress requirements to the initial Phase I development, as well as for the ensuing Phases II and III. While signalization of this intersection with Booth Street does not meet warrants, it is recommended for Phase I development to safely accommodate vehicle or pedestrian activity at this location.

PROJECTED CONDITIONS

- Due to the existing near or at-capacity conditions of some of the study area intersections and the capacity limits on the existing bridges, background traffic growth projections were not undertaken. However, in addition to the traffic projections from the full Zibi developed, we did estimate traffic generation from other area development. These other developments are estimated to increase travel demand along the five interprovincial crossings by approximately 200 to 400 veh/h two-way during the peak hours;
- Based on a combination of the planned improvements to the adjacent Booth Street corridor, the mixed-use nature of the development and the proposed parking supply, Phase I development is projected to generate between 90 veh/h to 120 veh/h two-way total during peak hours. Phases 2 to 8 combined are projected to generate an additional 225 veh/h to 280 veh/h. All phases combined are projected to generate 315 veh/h to 400 veh/h two-way total during the weekday and afternoon peak hours respectively. Transit ridership for Phase I is estimated to be 160 to 210 persons per hour two-way total. For Phases 1 to 8 combined transit ridership it is estimated to be 580 to 735 persons per hour two-way total;
- At Phase I occupancy all study area intersections are projected to operate at Level of Service E, or better, which is considered acceptable within the urban core. With regards to "critical movements" the westbound left-turn at the Eddy/Alexander Taché/Rue Laurier intersection is projected to fail during the morning peak hour;
- At full development of Phases 1 to 8 and also the Gatineau portion of the Zibi lands, but without removing any existing background traffic, the Booth/Site Driveway intersection is projected to fail during the morning peak hour because of the high volume of southbound through traffic on Booth Street. With regard to "critical movements" at the other intersections, the westbound left-turn at

the Eddy/Alexandre Taché/Rue Laurier intersection would continue to fail during the morning peak hours; and

- For all study area intersections to operate at an acceptable level of service, some amount of background traffic will have to be diverted from the Booth-Eddy Corridor. At full development of Phases 1 to 8, it is estimated that 380 veh/h of southbound vehicles would have to be removed during the morning peak hour. With this, in addition to optimized signal timing and designing the Booth/Site Driveway intersection as depicted in Figure 6, all study area intersections and critical movements are projected to operate at LoS E or better. Options to address the issue of projected traffic demand in the Booth-Eddy Corridor being greater than the available capacity, include:
 - Increased use of all non-auto modes of travel;
 - Change in time of travel to make use of the available corridor capacity outside of the peak hours;
 - Change of residence or employment address over time to eliminate the need to travel across the Ontario-Quebec border; and
 - Provide a new interprovincial bridge resulting in a redistribution of traffic on each existing bridge thereby freeing up capacity in the central area bridges, including the Chaudière Bridge for more localized traffic.

SITE DRIVEWAY/BOOTH INTERSECTION

- To accommodate the combination of site-generated traffic and truck turn requirements, the recommended components of this intersection, as depicted in Figure 6, are:
 - Northbound Approach:
 - Single left-turn lane – Approximately 40 m in length; and
 - Shared through/right-turn lane.
 - Southbound Approach:
 - Single left-turn lane – Approximately 20 m in length (constrained by bridge); and
 - Shared through/right-turn lane.
 - Eastbound and Westbound Approaches:
 - Single left-turn lane; and
 - Shared through/right-turn lane.

SITE PLAN

- The proposed Chaudière West Master Plan (Phases 1, 3, 4 and 5) site has one section of two-way roadway that provides access to/from Booth Street with a one-way loop connection at its west end that will provide access to the centrally located buildings on the Island. A key objective to give priority to pedestrian and bicycle circulation on site and to minimize the priority of the motorized vehicle;
- The only Phase 1 site driveway connection to Booth Street is 3 lanes wide for a distance of approximately 20 m. West of this point it tapers down to two lanes to serve the Energy Ottawa site and the Phase 1 below grade parking garage. There will be a 2.4 m wide sidewalk on the

south side and a 3.0 m wide MUP on the north side. West, beyond this point, the on-site road is a one-way loop;

- The ultimate on-site one-way loop will be 6.0 m wide and operate counter-clockwise. An additional 3.5 m on either side will be provided for pedestrians, streetscaping, trees and occasional loading areas. The full corridor width will accommodate a woonerf-type facility with no raised curbs separating the vehicle portion from the pedestrian portion. The 6.0 m width as shown, can accommodate fire trucks and large single unit trucks, but not tractor trailers. Bicycles will share this route with vehicles;
- For Phase 1, the one-way loop will be truncated and not proceed as far west as the ultimate loop. It too will be 6.0 m wide and operate counter-clockwise. As shown, the below grade garage will have temporary access to this interim one-way loop. The loop can accommodate fire trucks, but we are also advised that fire access will also be provided across Head Street Square directly from Booth Street; and
- The proposed amount of parking is relatively low which will encourage active modes and transit ridership to/from the site. The layout of the Phase I parking garage is considered efficient and acceptable and the dimensions of aisles and parking spaces meet By-Law requirements.

TRANSPORTATION DEMAND MANAGEMENT

- In keeping with the proposed development's overall theme of sustainability, the identified Transportation Demand Management (TDM) strategies are an integral part of the planned development. The combination of the recommended "complete street" design for the adjacent section of Booth Street and the proposed on-site "woonerf" shared street approach will also give much greater priority to pedestrians and cyclists, and less priority to motorized vehicles. While the recommended plan for Booth Street may reduce the corridor's vehicle capacity, it will significantly increase the people moving capacity of the corridor. In total, the recommended on-site and off-site transportation designs, combined with the highlighted TDM strategies, will result in a very successful and sustainable multi-modal plan.

Based on the foregoing, the proposed development fits well into the context of the surrounding area, and its location and design serves to promote use of walking, cycling, and transit modes, thus supporting City of Ottawa policies, goals and objectives with respect to redevelopment, intensification and modal share.

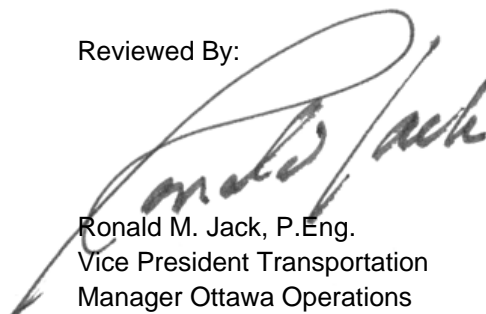
Therefore, the proposed Phase I Chaudière Island mixed-use development is recommended from a transportation perspective.

Prepared By:



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Vice President Transportation
Manager Ottawa Operations



Appendix A

Existing Peak Hour Traffic Volumes

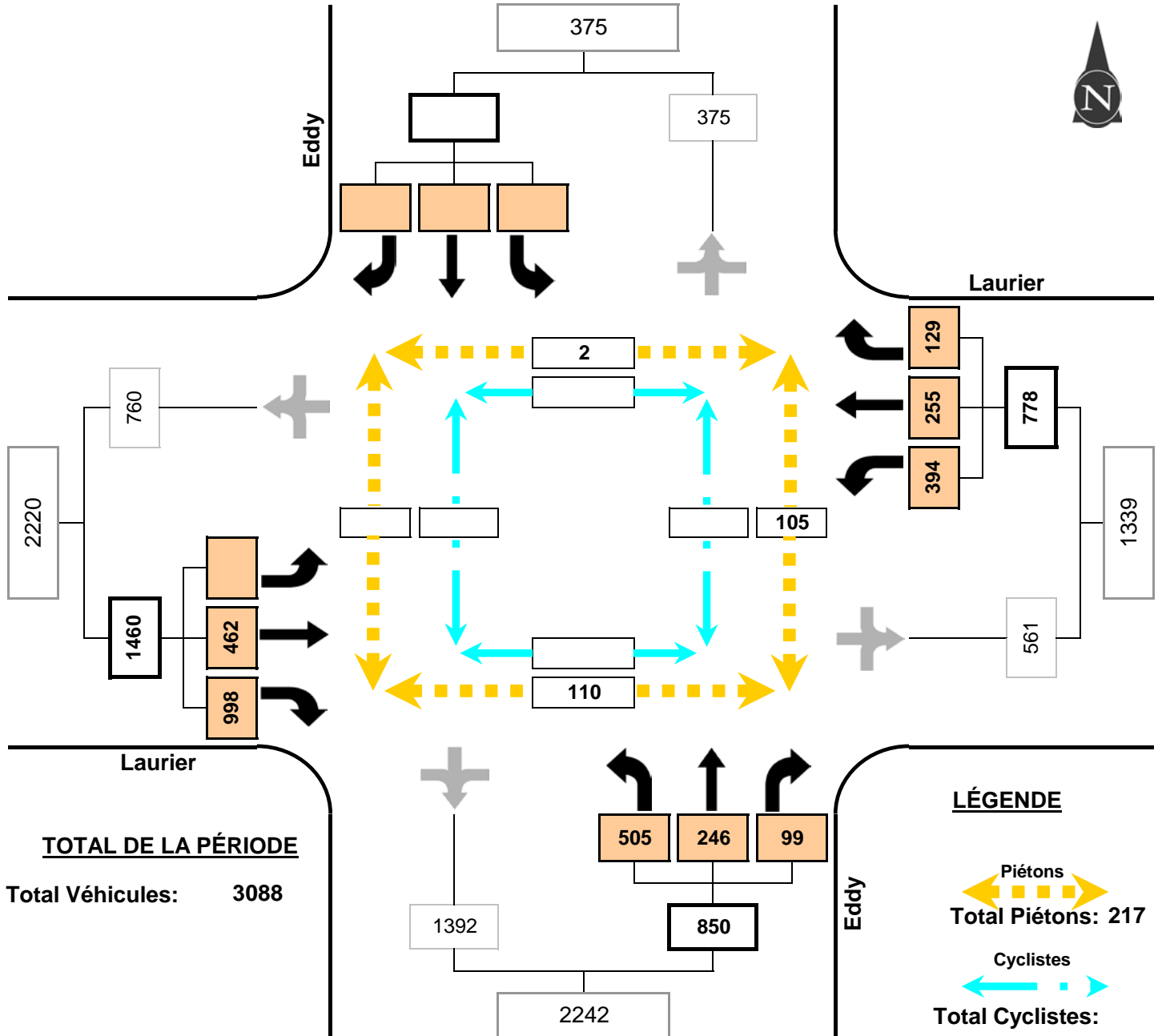
Laurier & Eddy

Date du comptage: 8 octobre 2014

Période: 08:00 à 09:00

Jour: mercredi

AM



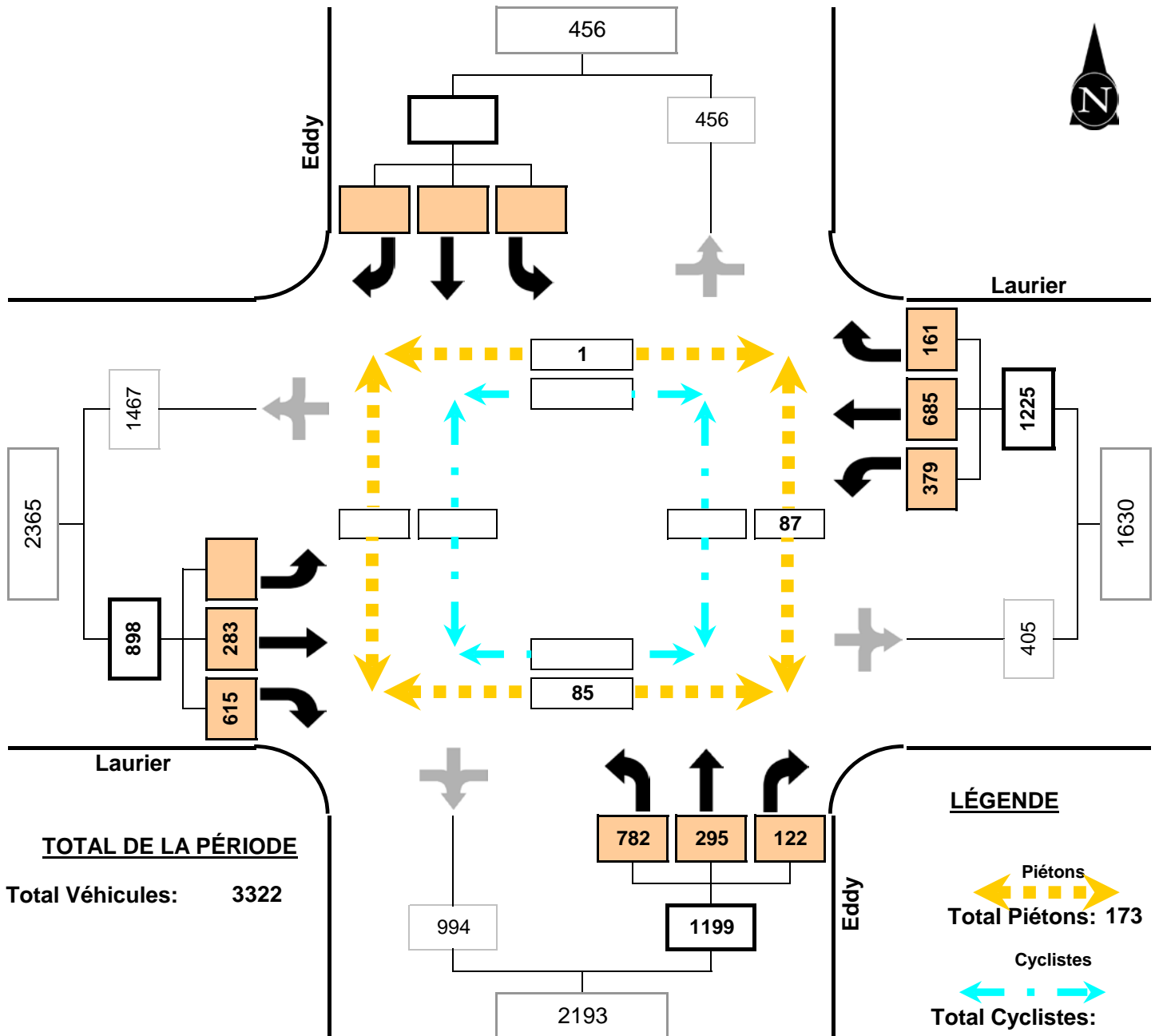
Laurier & Eddy

Date du comptage: 8 octobre 2014

Période: 15:30 à 16:30

Jour: mercredi

PM



BOOTH ST and WAR MUSEUM

(ULRS Listing BOOTH & WAR MUSE)

Survey Date: Thursday 18 July 2013

Conditions: DRY

Start Time: 0700

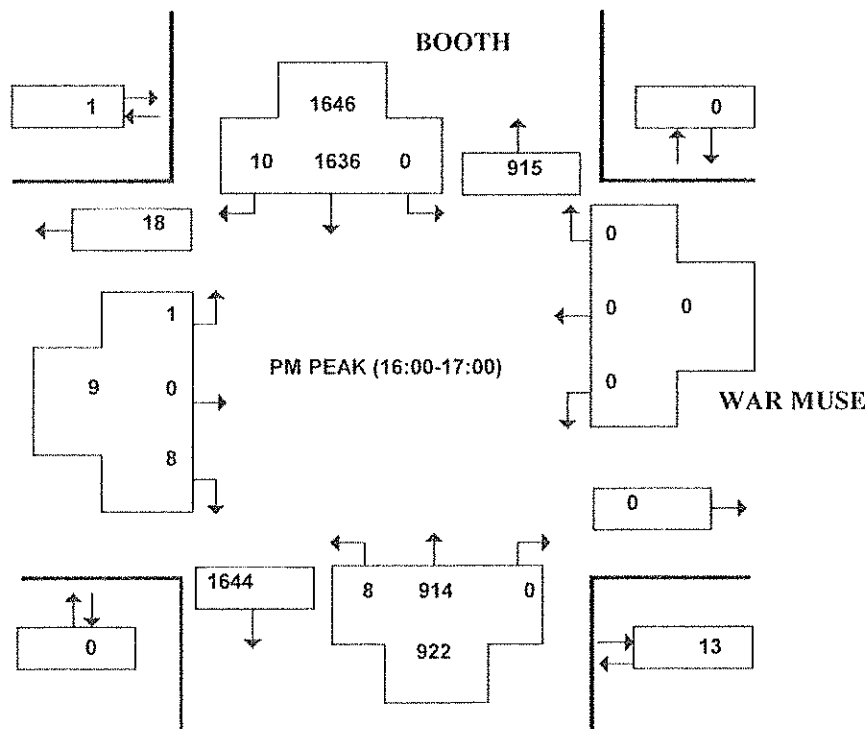
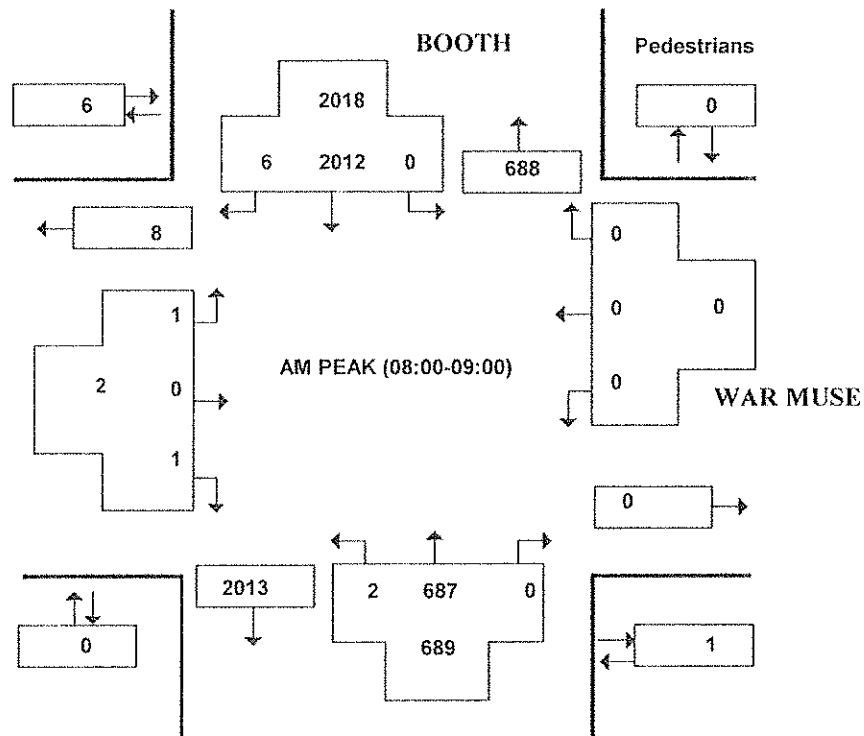
Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 0 Westbound: 0

AADT Factor

Thursday in July is

9



BOOTH ST and WELLINGTON ST /OT. R.

(ULRS Listing BOOTH & WELLINGT)

Survey Date: Friday 10 May 2013

Conditions: dry

Start Time: 0700

Total Observed U-Turns

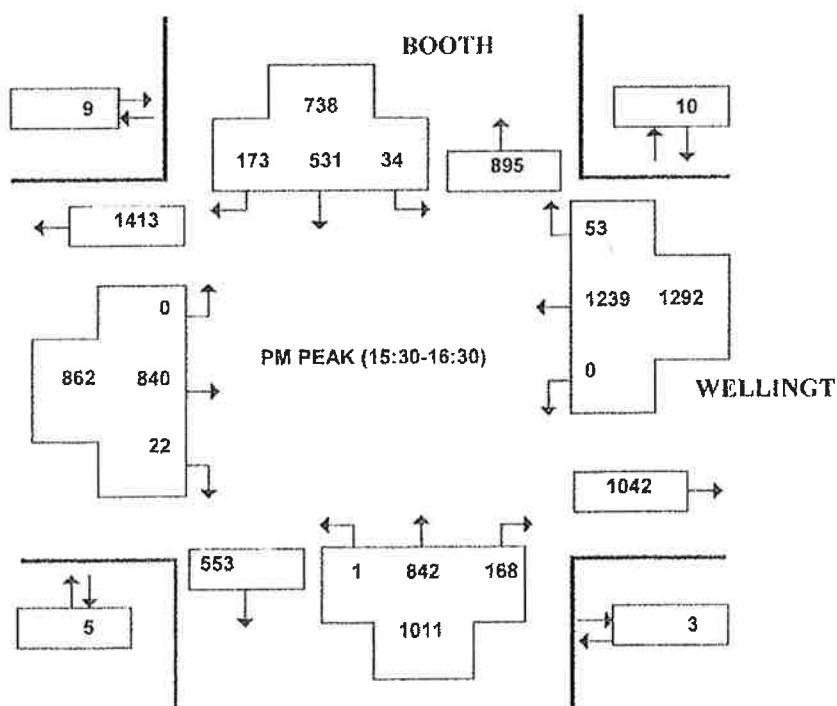
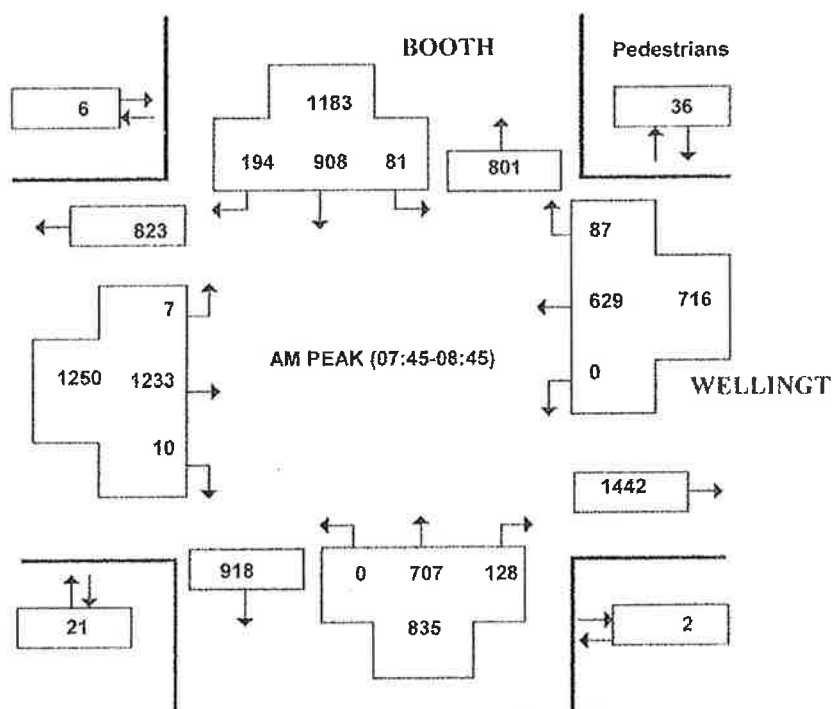
Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor

Friday in May is

8



Appendix B

SYNCHRO Analysis: Existing Conditions

Existing AM

2: Booth & Sir John A Macdonald/Wellington



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑	↗	↑↑	↖	↑↑	↗
Volume (vph)	7	1233	629	87	707	81	1000	194
Lane Group Flow (vph)	0	1316	662	92	879	85	1053	204
Turn Type	Perm	NA	NA	Perm	NA	pm+pt	NA	Perm
Protected Phases		4	8		2	1	6	
Permitted Phases	4			8		6		6
Detector Phase	4	4	8	8	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.4	29.7	11.0	29.7	29.7
Total Split (s)	54.0	54.0	54.0	54.0	55.0	11.0	66.0	66.0
Total Split (%)	45.0%	45.0%	45.0%	45.0%	45.8%	9.2%	55.0%	55.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	3.4	2.7	3.4	3.4
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.4	6.4	6.4	6.7	6.0	6.7	6.7
Lead/Lag					Lag	Lead		
Lead-Lag Optimize?					Yes	Yes		
Recall Mode	Max	Max	Max	Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)		47.6	47.6	47.6	50.5	60.0	59.3	59.3
Actuated g/C Ratio		0.40	0.40	0.40	0.42	0.50	0.49	0.49
v/c Ratio		1.03	0.49	0.14	0.63	0.39	0.63	0.26
Control Delay		69.3	28.7	5.8	29.8	21.0	24.3	9.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		69.3	28.7	5.8	29.8	21.0	24.3	9.3
LOS		E	C	A	C	C	C	A
Approach Delay		69.3	25.9		29.8		21.8	
Approach LOS		E	C		C		C	
Queue Length 50th (m)		~174.6	60.7	0.6	85.4	10.2	92.8	11.0
Queue Length 95th (m)		#217.4	77.9	10.6	107.4	19.1	109.5	30.5
Internal Link Dist (m)		498.9	255.4		446.0		219.0	
Turn Bay Length (m)				10.0		135.0		50.0
Base Capacity (vph)		1277	1344	642	1391	220	1675	774
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		1.03	0.49	0.14	0.63	0.39	0.63	0.26

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 38.7

Intersection LOS: D

Intersection Capacity Utilization 97.4%

ICU Level of Service F

Analysis Period (min) 15

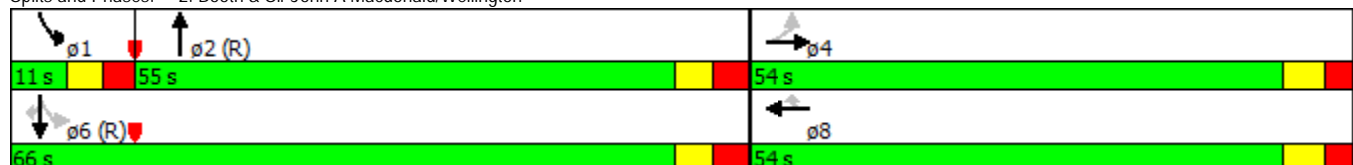
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington













Existing AM
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	2	799	1386
Lane Group Flow (vph)	2	2	841	1465
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	24.0	36.0	36.0	36.0
Total Split (%)	40.0%	60.0%	60.0%	60.0%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.01	0.01	0.27	0.48
Control Delay	15.0	7.0	6.2	4.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.0	7.0	6.2	4.9
LOS	B	A	A	A
Approach Delay	15.0		6.2	4.9
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	1.3	m0.6	119.7	#96.8
Internal Link Dist (m)	114.6		219.0	812.2
Turn Bay Length (m)		30.0		
Base Capacity (vph)	492	253	3060	3057
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	0.00	0.01	0.27	0.48

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 47 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.48
 Intersection Signal Delay: 5.4
 Intersection Capacity Utilization 58.5%
 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: Booth & War Museum

		
		
36 s	24 s	
		
		
36 s		

Existing AM

4: Booth/Eddy & Alexandre-Taché/Laurier

	→	↘	↙	←	↖	↑	↗		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	ø2	ø3
Lane Configurations	↑	↗	↖	↑	↖	↑	↗		
Volume (vph)	462	998	394	255	505	246	99		
Lane Group Flow (vph)	486	1051	415	404	532	259	104		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	27.0	22.0
Total Split (s)			19.0	72.0	28.0	28.0	28.0	31.0	22.0
Total Split (%)			19.0%	72.0%	28.0%	28.0%	28.0%	31%	22%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	48.0	54.7	14.0	67.0	23.0	23.0	23.0		
Actuated g/C Ratio	0.48	0.55	0.14	0.67	0.23	0.23	0.23		
v/c Ratio	0.57	1.27	1.75	0.18	0.70	0.63	0.28		
Control Delay	21.8	154.1	383.5	4.2	41.2	42.6	9.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	21.8	154.1	383.5	4.2	41.2	42.6	9.5		
LOS	C	F	F	A	D	D	A		
Approach Delay	112.3			196.4		37.9			
Approach LOS	F			F		D			
Queue Length 50th (m)	64.9	~260.1	~120.2	8.7	49.0	45.4	0.9		
Queue Length 95th (m)	95.5	#334.3	#176.6	14.0	66.8	71.4	14.0		
Internal Link Dist (m)	122.2			243.7		812.2			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	850	829	237	2202	756	410	377		
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	0.57	1.27	1.75	0.18	0.70	0.63	0.28		

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 70 (70%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.75

Intersection Signal Delay: 113.0

Intersection LOS: F

Intersection Capacity Utilization 98.2%

ICU Level of Service F

Analysis Period (min) 15

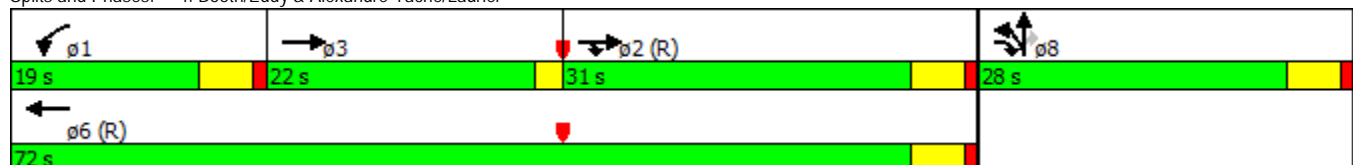
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier



Existing PM

2: Booth & Sir John A Macdonald/Wellington

	→	←	↖	↗	↑	↘	↓	↙
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↕↕	↕↕	↗		↕↕	↗	↕↕	↗
Volume (vph)	840	1239	53	1	950	34	700	173
Lane Group Flow (vph)	907	1304	56	0	1178	36	737	182
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	4	8			2	1	6	
Permitted Phases			8	2		6		6
Detector Phase	4	8	8	2	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.7	29.7	11.0	29.7	29.7
Total Split (s)	60.0	60.0	60.0	49.0	49.0	11.0	60.0	60.0
Total Split (%)	50.0%	50.0%	50.0%	40.8%	40.8%	9.2%	50.0%	50.0%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	3.4	3.4	2.7	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4		6.7	6.0	6.7	6.7
Lead/Lag				Lag	Lag	Lead		
Lead-Lag Optimize?				Yes	Yes	Yes		
Recall Mode	Max	Max	Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	53.6	53.6	53.6		46.7	54.0	53.3	53.3
Actuated g/C Ratio	0.45	0.45	0.45		0.39	0.45	0.44	0.44
v/c Ratio	0.60	0.86	0.08		0.95	0.28	0.49	0.27
Control Delay	27.1	37.0	1.6		52.6	25.0	23.8	17.2
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	27.1	37.0	1.6		52.6	25.0	23.8	17.2
LOS	C	D	A		D	C	C	B
Approach Delay	27.1	35.6			52.6		22.6	
Approach LOS	C	D			D		C	
Queue Length 50th (m)	82.9	142.3	0.0		~157.6	4.7	63.5	21.6
Queue Length 95th (m)	103.4	173.4	3.0		#199.5	13.5	74.2	39.3
Internal Link Dist (m)	498.9	255.4			446.0		219.0	
Turn Bay Length (m)			10.0			135.0		50.0
Base Capacity (vph)	1509	1514	708		1237	129	1505	677
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	0.60	0.86	0.08		0.95	0.28	0.49	0.27

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 35.6

Intersection LOS: D

Intersection Capacity Utilization 105.4%

ICU Level of Service G

Analysis Period (min) 15

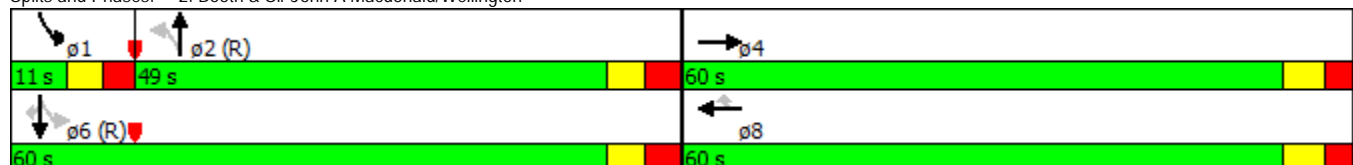
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



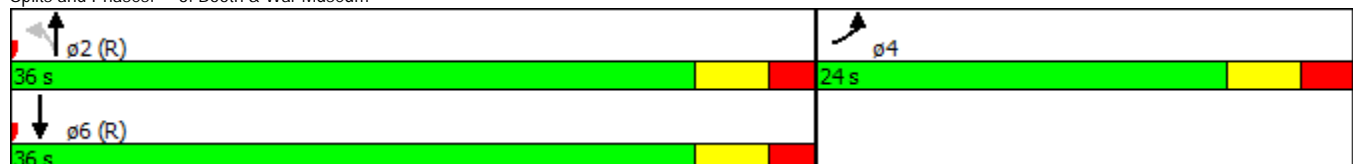
Existing PM
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	8	1200	992
Lane Group Flow (vph)	9	8	1263	1055
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	24.0	36.0	36.0	36.0
Total Split (%)	40.0%	60.0%	60.0%	60.0%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.03	0.02	0.41	0.35
Control Delay	11.2	5.5	4.4	3.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.2	5.5	4.4	3.4
LOS	B	A	A	A
Approach Delay	11.2		4.4	3.4
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	2.6	m1.5	m89.7	56.0
Internal Link Dist (m)	114.6		219.0	812.2
Turn Bay Length (m)		30.0		
Base Capacity (vph)	470	427	3060	3054
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	0.02	0.02	0.41	0.35

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 10 (17%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.41
 Intersection Signal Delay: 4.0
 Intersection Capacity Utilization 55.0%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Booth & War Museum



Existing PM

4: Booth/Eddy & Alexandre-Taché/Laurier

	→	↘	↙	←	↖	↑	↗		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	ø2	ø3
Lane Configurations	↑	↗	↙	↑↗	↖↗	↑	↗		
Volume (vph)	283	615	379	685	782	295	122		
Lane Group Flow (vph)	298	647	399	890	823	311	128		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	1.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	11.0	22.0
Total Split (s)			34.0	67.0	43.0	43.0	43.0	11.0	22.0
Total Split (%)			30.9%	60.9%	39.1%	39.1%	39.1%	10%	20%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead					Lag	
Lead-Lag Optimize?			Yes					Yes	
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	29.0	51.6	28.0	62.0	38.0	38.0	38.0		
Actuated g/C Ratio	0.26	0.47	0.25	0.56	0.35	0.35	0.35		
v/c Ratio	0.63	0.91	0.93	0.47	0.73	0.50	0.26		
Control Delay	43.4	47.2	69.0	14.6	35.9	32.1	10.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	43.4	47.2	69.0	14.6	35.9	32.1	10.9		
LOS	D	D	E	B	D	C	B		
Approach Delay	46.0			31.4		32.4			
Approach LOS	D			C		C			
Queue Length 50th (m)	57.4	131.1	82.7	53.8	78.8	52.5	5.6		
Queue Length 95th (m)	86.5	#205.6	#136.4	69.0	100.8	78.7	19.2		
Internal Link Dist (m)	122.2			243.7		812.2			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	458	710	446	1875	1135	616	485		
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	0.65	0.91	0.89	0.47	0.73	0.50	0.26		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 31 (28%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 35.7

Intersection LOS: D

Intersection Capacity Utilization 73.9%

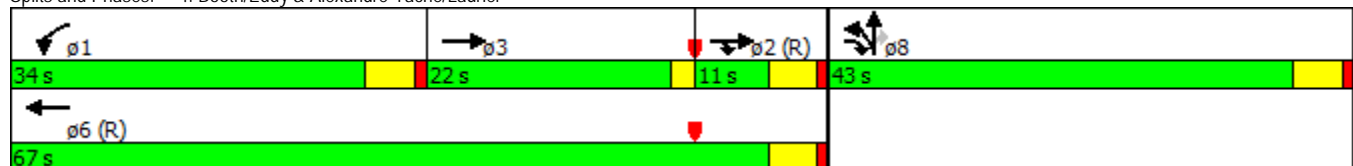
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier













Appendix C

SYNCHRO Analysis: Projected Phase I Conditions

Projected Phase I - AM Modified

1: Booth & Site

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Volume (vph)	15	34	23	849	1390
Lane Group Flow (vph)	16	36	24	894	1485
Turn Type	Prot	Perm	Perm	NA	NA
Protected Phases	4			2	6
Permitted Phases		4	2		
Detector Phase	4	4	2	2	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	96.0	96.0	96.0
Total Split (%)	20.0%	20.0%	80.0%	80.0%	80.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	10.0	102.4	102.4	102.4
Actuated g/C Ratio	0.08	0.08	0.85	0.85	0.85
v/c Ratio	0.11	0.23	0.40	0.59	0.98
Control Delay	53.0	19.6	31.3	10.2	30.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	53.0	19.6	31.3	10.2	30.2
LOS	D	B	C	B	C
Approach Delay	29.9			10.7	30.2
Approach LOS	C			B	C
Queue Length 50th (m)	3.6	0.0	0.3	89.3	~371.4
Queue Length 95th (m)	10.6	10.2	#11.3	62.6	#453.1
Internal Link Dist (m)	75.1			200.9	355.6
Turn Bay Length (m)	25.0		40.0		
Base Capacity (vph)	254	258	60	1522	1519
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.06	0.14	0.40	0.59	0.98

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 22 (18%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 22.9

Intersection LOS: C

Intersection Capacity Utilization 96.9%

ICU Level of Service F

Analysis Period (min) 15



~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.
















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Booth & Site

			
ø2 (R)		ø4	
96 s		24 s	
			
ø6 (R)			
96 s			

Projected Phase I - AM Modified
2: Booth & Sir John A Macdonald/Wellington

								
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	7	1233	629	97	719	93	1014	200
Lane Group Flow (vph)	0	1316	662	102	892	98	1067	211
Turn Type	Perm	NA	NA	Perm	NA	pm+pt	NA	Perm
Protected Phases		4	8		2	1	6	
Permitted Phases	4			8		6		6
Detector Phase	4	4	8	8	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.4	29.7	11.0	29.7	29.7
Total Split (s)	63.0	63.0	63.0	63.0	46.0	11.0	57.0	57.0
Total Split (%)	52.5%	52.5%	52.5%	52.5%	38.3%	9.2%	47.5%	47.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	3.4	2.7	3.4	3.4
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.4	6.4	6.4	6.7	6.0	6.7	6.7
Lead/Lag					Lag	Lead		
Lead-Lag Optimize?					Yes	Yes		
Recall Mode	Max	Max	Max	Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)		56.6	56.6	56.6	39.3	51.0	50.3	50.3
Actuated g/C Ratio		0.47	0.47	0.47	0.33	0.42	0.42	0.42
v/c Ratio		0.87	0.41	0.14	0.82	0.64	0.75	0.30
Control Delay		35.7	21.8	5.3	43.8	37.0	26.8	7.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		35.7	21.8	5.3	43.8	37.0	26.8	7.8
LOS		D	C	A	D	D	C	A
Approach Delay		35.7	19.6		43.8		24.6	
Approach LOS		D	B		D		C	
Queue Length 50th (m)		141.8	52.4	1.7	99.5	11.2	99.0	10.3
Queue Length 95th (m)		174.5	67.4	11.1	124.8	#32.4	113.2	32.4
Internal Link Dist (m)		498.9	255.4		446.0		219.0	
Turn Bay Length (m)				10.0		135.0		50.0
Base Capacity (vph)		1519	1598	746	1085	154	1420	693
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		0.87	0.41	0.14	0.82	0.64	0.75	0.30

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 112 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 31.0

Intersection LOS: C

Intersection Capacity Utilization 97.7%

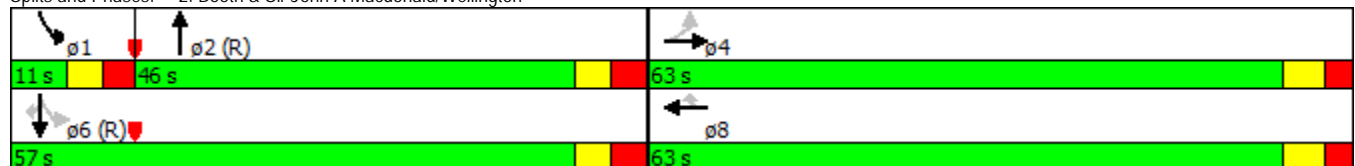
ICU Level of Service F

Analysis Period (min) 15









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



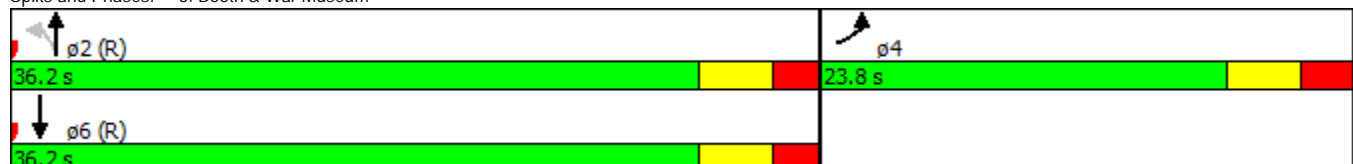
Projected Phase I - AM Modified
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	2	821	1418
Lane Group Flow (vph)	2	2	864	1499
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.8	36.2	36.2	36.2
Total Split (%)	39.7%	60.3%	60.3%	60.3%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.01	0.01	0.28	0.49
Control Delay	15.0	7.5	4.1	3.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.0	7.5	4.1	3.8
LOS	B	A	A	A
Approach Delay	15.0		4.1	3.8
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	1.3	m0.5	77.6	m100.6
Internal Link Dist (m)	114.6		219.0	64.1
Turn Bay Length (m)		30.0		
Base Capacity (vph)	487	242	3060	3057
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	0.00	0.01	0.28	0.49

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 55 (92%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.49
 Intersection Signal Delay: 3.9
 Intersection Capacity Utilization 59.5%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Booth & War Museum



Projected Phase I - AM Modified
4: Booth/Eddy & Alexandre-Taché/Laurier

								ø2	ø3
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR		
Lane Configurations									
Volume (vph)	462	1006	405	255	510	246	108		
Lane Group Flow (vph)	486	1059	426	404	537	259	114		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	27.0	22.0
Total Split (s)			23.0	72.0	28.0	28.0	28.0	27.0	22.0
Total Split (%)			23.0%	72.0%	28.0%	28.0%	28.0%	27%	22%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	44.0	50.5	18.0	67.0	23.0	23.0	23.0		
Actuated g/C Ratio	0.44	0.50	0.18	0.67	0.23	0.23	0.23		
v/c Ratio	0.62	1.38	1.40	0.18	0.71	0.63	0.30		
Control Delay	25.8	205.5	230.7	4.2	41.4	42.6	11.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	25.8	205.5	230.7	4.2	41.4	42.6	11.1		
LOS	C	F	F	A	D	D	B		
Approach Delay	149.0			120.4		38.0			
Approach LOS	F			F		D			
Queue Length 50th (m)	70.5	~275.7	~110.9	8.7	49.5	45.4	2.4		
Queue Length 95th (m)	103.8	#349.9	#168.1	14.0	67.3	71.4	16.1		
Internal Link Dist (m)	122.2			243.7		129.9			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	775	766	305	2202	756	410	377		
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	0.63	1.38	1.40	0.18	0.71	0.63	0.30		

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.40

Intersection Signal Delay: 111.0

Intersection LOS: F

Intersection Capacity Utilization 99.4%

ICU Level of Service F

Analysis Period (min) 15

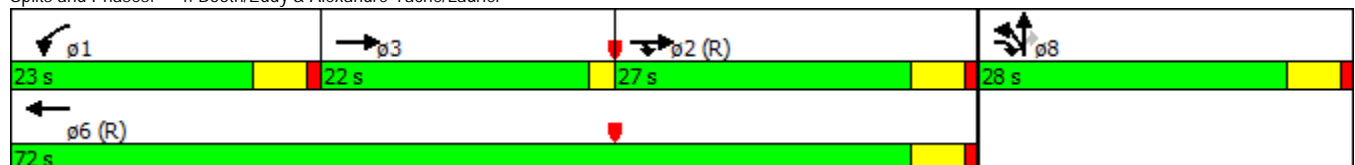
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.











Queue shown is maximum after two cycles.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier



Projected Phase I - PM Modified

1: Booth & Site

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Volume (vph)	30	39	39	1196	991
Lane Group Flow (vph)	32	41	41	1259	1066
Turn Type	Prot	Perm	Perm	NA	NA
Protected Phases	4			2	6
Permitted Phases		4	2		
Detector Phase	4	4	2	2	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	66.0	66.0	66.0
Total Split (%)	26.7%	26.7%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	10.0	72.4	72.4	72.4
Actuated g/C Ratio	0.11	0.11	0.80	0.80	0.80
v/c Ratio	0.17	0.20	0.15	0.88	0.74
Control Delay	38.7	14.6	4.5	17.9	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	14.6	4.5	17.9	10.3
LOS	D	B	A	B	B
Approach Delay	25.2			17.5	10.3
Approach LOS	C			B	B
Queue Length 50th (m)	5.1	0.0	1.6	145.3	89.5
Queue Length 95th (m)	13.5	9.1	4.6	#287.4	148.0
Internal Link Dist (m)	96.6			189.8	348.5
Turn Bay Length (m)	25.0		40.0		
Base Capacity (vph)	339	336	273	1434	1431
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.09	0.12	0.15	0.88	0.74

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 14.6

Intersection LOS: B

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Booth & Site

																																																																																																																																																																																																																																																																												
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Projected Phase I - PM Modified
2: Booth & Sir John A Macdonald/Wellington

	→	←	↖	↗	↑	↘	↓	↙
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑	↗		↑↑	↘	↑↑	↗
Volume (vph)	840	1239	67	1	972	43	719	181
Lane Group Flow (vph)	907	1304	71	0	1201	45	757	191
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	4	8			2	1	6	
Permitted Phases			8	2		6		6
Detector Phase	4	8	8	2	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.7	29.7	11.0	29.7	29.7
Total Split (s)	56.0	56.0	56.0	53.0	53.0	11.0	64.0	64.0
Total Split (%)	46.7%	46.7%	46.7%	44.2%	44.2%	9.2%	53.3%	53.3%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	3.4	3.4	2.7	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4		6.7	6.0	6.7	6.7
Lead/Lag				Lag	Lag	Lead		
Lead-Lag Optimize?				Yes	Yes	Yes		
Recall Mode	Max	Max	Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	49.6	49.6	49.6		48.5	58.0	57.3	57.3
Actuated g/C Ratio	0.41	0.41	0.41		0.40	0.48	0.48	0.48
v/c Ratio	0.65	0.93	0.11		0.93	0.35	0.47	0.26
Control Delay	30.8	46.4	3.3		48.4	26.3	21.4	15.6
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	30.8	46.4	3.3		48.4	26.3	21.4	15.6
LOS	C	D	A		D	C	C	B
Approach Delay	30.8	44.2			48.4		20.5	
Approach LOS	C	D			D		C	
Queue Length 50th (m)	88.4	151.7	0.0		143.5	5.5	61.4	21.5
Queue Length 95th (m)	110.3	#197.3	6.2		#191.8	15.9	78.0	40.4
Internal Link Dist (m)	498.9	255.4			446.0		219.0	
Turn Bay Length (m)			10.0			135.0		50.0
Base Capacity (vph)	1396	1401	662		1285	129	1618	726
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	0.65	0.93	0.11		0.93	0.35	0.47	0.26

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 37.3

Intersection LOS: D

Intersection Capacity Utilization 106.0%

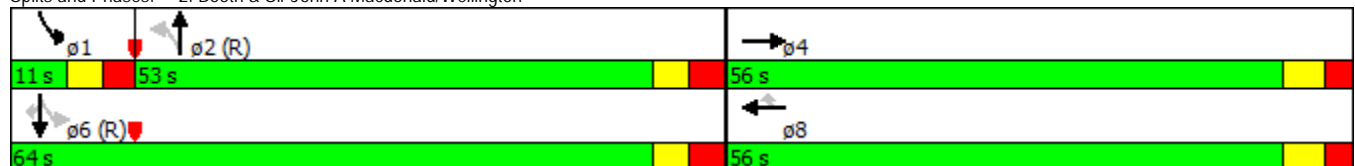
ICU Level of Service G

Analysis Period (min) 15









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



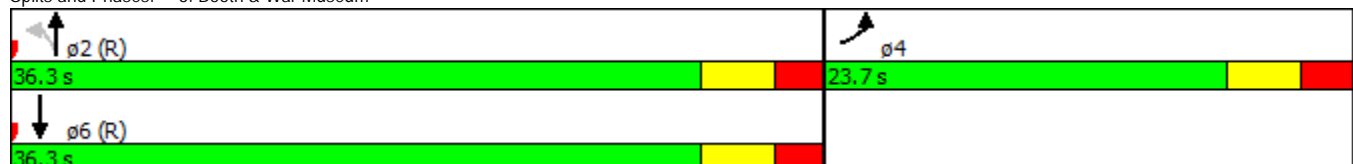
Projected Phase I - PM Modified
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	8	1236	1028
Lane Group Flow (vph)	9	8	1301	1093
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.7	36.3	36.3	36.3
Total Split (%)	39.5%	60.5%	60.5%	60.5%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.03	0.02	0.43	0.36
Control Delay	11.2	5.0	3.7	3.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.2	5.0	3.7	3.5
LOS	B	A	A	A
Approach Delay	11.2		3.7	3.5
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	2.6	m1.5	m86.3	58.7
Internal Link Dist (m)	114.6		219.0	68.7
Turn Bay Length (m)		30.0		
Base Capacity (vph)	463	407	3060	3054
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	0.02	0.02	0.43	0.36

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 12 (20%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.43
 Intersection Signal Delay: 3.6
 Intersection Capacity Utilization 56.1%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Booth & War Museum



Projected Phase I - PM Modified
4: Booth/Eddy & Alexandre-Taché/Laurier

	→	↘	↙	←	↖	↑	↗		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	ø2	ø3
Lane Configurations	↑	↗	↖	↑↘	↖↗	↑	↗		
Volume (vph)	283	623	390	685	790	295	141		
Lane Group Flow (vph)	298	656	411	890	832	311	148		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	1.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	11.0	22.0
Total Split (s)			34.0	70.0	40.0	40.0	40.0	14.0	22.0
Total Split (%)			30.9%	63.6%	36.4%	36.4%	36.4%	13%	20%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	31.7	51.4	28.3	65.0	35.0	35.0	35.0		
Actuated g/C Ratio	0.29	0.47	0.26	0.59	0.32	0.32	0.32		
v/c Ratio	0.58	0.93	0.94	0.45	0.80	0.55	0.33		
Control Delay	39.2	49.6	72.1	12.7	40.9	35.4	14.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	39.2	49.6	72.1	12.7	40.9	35.4	14.3		
LOS	D	D	E	B	D	D	B		
Approach Delay	46.4			31.5		36.6			
Approach LOS	D			C		D			
Queue Length 50th (m)	55.1	134.3	86.0	49.8	83.7	54.9	9.0		
Queue Length 95th (m)	83.1	#210.1	#142.7	63.8	106.8	82.3	25.1		
Internal Link Dist (m)	122.2			243.7		148.7			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	503	708	446	1965	1046	567	454		
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	0.59	0.93	0.92	0.45	0.80	0.55	0.33		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 37.3

Intersection LOS: D

Intersection Capacity Utilization 74.8%

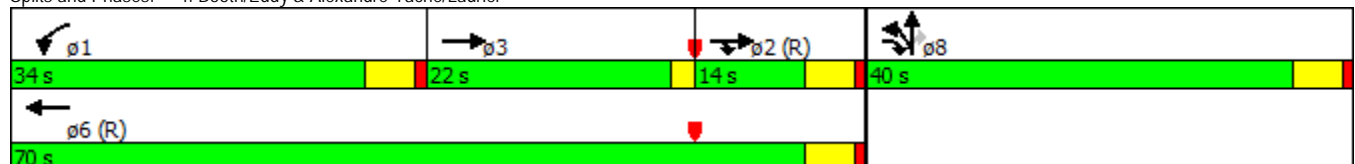
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier



















Appendix D

SYNCHRO Analysis: Projected Full Site Build-Out Conditions

Projected Phases 1 to 8 - AM

1: Booth & Site

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	0	32	0	65	847	9	1388
Lane Group Flow (vph)	42	100	34	15	68	907	9	1520
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	24.0	24.0	96.0	96.0	96.0	96.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.8	10.8	10.8	10.8	98.2	98.2	98.2	98.2
Actuated g/C Ratio	0.09	0.09	0.09	0.09	0.82	0.82	0.82	0.82
v/c Ratio	0.35	0.47	0.34	0.04	1.15	0.62	0.02	1.05
Control Delay	59.4	22.6	60.1	0.2	189.9	10.3	2.4	50.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.4	22.6	60.1	0.2	189.9	10.4	2.4	50.0
LOS	E	C	E	A	F	B	A	D
Approach Delay		33.5		41.8		22.9		49.8
Approach LOS		C		D		C		D
Queue Length 50th (m)	9.5	3.8	7.7	0.0	~19.2	85.6	0.3	~386.3
Queue Length 95th (m)	20.6	19.9	17.9	0.0	#50.1	60.0	1.3	#479.9
Internal Link Dist (m)		75.1		86.5		200.9		355.6
Turn Bay Length (m)	25.0		25.0		40.0		25.0	
Base Capacity (vph)	205	304	174	430	59	1457	398	1452
Starvation Cap Reductn	0	0	0	0	0	22	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.33	0.20	0.03	1.15	0.63	0.02	1.05

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 22 (18%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.15

Intersection Signal Delay: 39.0

Intersection LOS: D

Intersection Capacity Utilization 98.9%

ICU Level of Service F

Analysis Period (min) 15








~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
















Queue shown is maximum after two cycles.

Splits and Phases: 1: Booth & Site

					
					
96 s			24 s		
96 s			24 s		

Projected Phases 1 to 8 - AM

2: Booth & Sir John A Macdonald/Wellington

								
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	7	1233	629	120	750	128	1051	219
Lane Group Flow (vph)	0	1316	662	126	924	135	1106	231
Turn Type	Perm	NA	NA	Perm	NA	pm+pt	NA	Perm
Protected Phases		4	8		2	1	6	
Permitted Phases	4			8		6		6
Detector Phase	4	4	8	8	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.4	29.7	11.0	29.7	29.7
Total Split (s)	61.4	61.4	61.4	61.4	45.6	13.0	58.6	58.6
Total Split (%)	51.2%	51.2%	51.2%	51.2%	38.0%	10.8%	48.8%	48.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	3.4	2.7	3.4	3.4
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.4	6.4	6.4	6.7	6.0	6.7	6.7
Lead/Lag					Lag	Lead		
Lead-Lag Optimize?					Yes	Yes		
Recall Mode	Max	Max	Max	Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)		55.0	55.0	55.0	38.9	52.6	51.9	51.9
Actuated g/C Ratio		0.46	0.46	0.46	0.32	0.44	0.43	0.43
v/c Ratio		0.89	0.43	0.17	0.86	0.79	0.75	0.32
Control Delay		38.8	23.0	7.4	46.7	49.4	26.5	7.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		38.8	23.0	7.4	46.7	49.4	26.5	7.3
LOS		D	C	A	D	D	C	A
Approach Delay		38.8	20.5		46.7		25.6	
Approach LOS		D	C		D		C	
Queue Length 50th (m)		145.7	53.9	4.9	105.2	16.4	104.5	9.9
Queue Length 95th (m)		#180.0	69.2	15.7	#132.1	#46.4	118.0	35.9
Internal Link Dist (m)		498.9	255.4		446.0		219.0	
Turn Bay Length (m)				10.0		135.0		50.0
Base Capacity (vph)		1476	1553	728	1075	171	1466	716
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	0.43	0.17	0.86	0.79	0.75	0.32

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 112 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 32.9

Intersection LOS: C

Intersection Capacity Utilization 98.6%

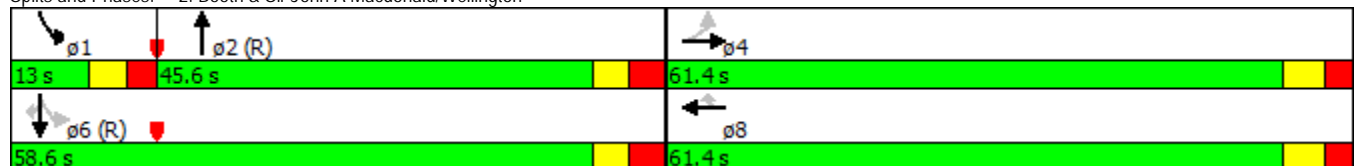
ICU Level of Service F

Analysis Period (min) 15









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



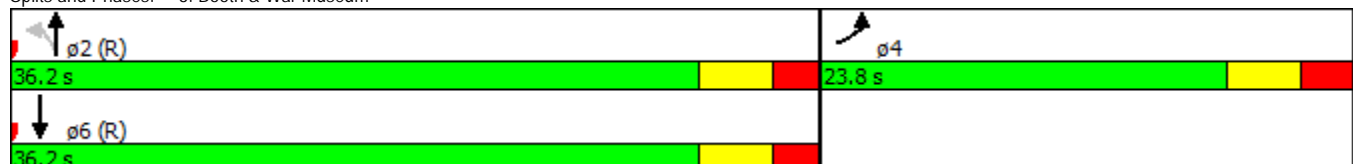
Projected Phases 1 to 8 - AM
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	2	875	1509
Lane Group Flow (vph)	2	2	921	1594
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.8	36.2	36.2	36.2
Total Split (%)	39.7%	60.3%	60.3%	60.3%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.01	0.01	0.30	0.52
Control Delay	15.0	7.5	4.1	4.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.0	7.5	4.1	4.5
LOS	B	A	A	A
Approach Delay	15.0		4.1	4.5
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	1.3	m0.5	m82.0	m99.5
Internal Link Dist (m)	114.6		219.0	64.1
Turn Bay Length (m)		30.0		
Base Capacity (vph)	487	213	3060	3057
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	0.00	0.01	0.30	0.52

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 55 (92%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 4.3
 Intersection Capacity Utilization 62.1%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Booth & War Museum



Projected Phases 1 to 8 - AM
4: Booth/Eddy & Alexandre-Taché/Laurier

								ø2	ø3
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR		
Lane Configurations									
Volume (vph)	462	1024	429	255	524	246	131		
Lane Group Flow (vph)	486	1078	452	404	552	259	138		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	27.0	22.0
Total Split (s)			23.0	72.0	28.0	28.0	28.0	27.0	22.0
Total Split (%)			23.0%	72.0%	28.0%	28.0%	28.0%	27%	22%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	44.0	50.5	18.0	67.0	23.0	23.0	23.0		
Actuated g/C Ratio	0.44	0.50	0.18	0.67	0.23	0.23	0.23		
v/c Ratio	0.62	1.41	1.48	0.18	0.73	0.63	0.37		
Control Delay	25.8	216.2	265.6	4.2	42.2	42.6	14.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	25.8	216.2	265.6	4.2	42.2	42.6	14.4		
LOS	C	F	F	A	D	D	B		
Approach Delay	157.1			142.2		38.3			
Approach LOS	F			F		D			
Queue Length 50th (m)	70.5	~283.4	~121.5	8.7	51.2	45.4	6.2		
Queue Length 95th (m)	103.8	#358.0	#179.8	14.0	69.4	71.4	22.3		
Internal Link Dist (m)	122.2			243.7		129.9			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	775	766	305	2202	756	410	377		
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	0.63	1.41	1.48	0.18	0.73	0.63	0.37		

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.48

Intersection Signal Delay: 119.8

Intersection LOS: F

Intersection Capacity Utilization 101.9%

ICU Level of Service G

Analysis Period (min) 15

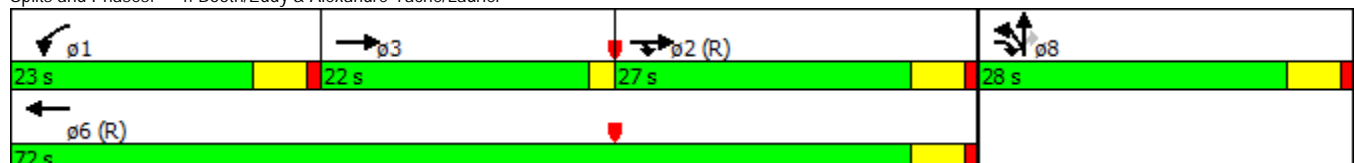
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier



Projected Phases 1 to 8 - PM

1: Booth & Site

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	75	0	20	0	106	1193	15	988
Lane Group Flow (vph)	79	108	21	14	112	1293	16	1099
Turn Type	Split	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4!	4		8!		2		6
Permitted Phases			8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	24.0	24.0	76.0	76.0	76.0	76.0
Total Split (%)	24.0%	24.0%	24.0%	24.0%	76.0%	76.0%	76.0%	76.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	11.1	11.1	11.1	11.1	77.9	77.9	77.9	77.9
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.78	0.78	0.78	0.78
v/c Ratio	0.42	0.35	0.16	0.05	0.47	0.93	0.15	0.80
Control Delay	48.2	5.3	42.3	0.4	11.9	23.8	6.5	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	5.3	42.3	0.4	11.9	23.8	6.5	12.5
LOS	D	A	D	A	B	C	A	B
Approach Delay		23.4		25.5		22.9		12.4
Approach LOS		C		C		C		B
Queue Length 50th (m)	14.7	0.0	3.8	0.0	5.6	150.1	0.6	91.2
Queue Length 95th (m)	27.8	5.7	10.5	0.0	21.0	#331.6	3.1	185.3
Internal Link Dist (m)		96.6		74.5		189.8		348.5
Turn Bay Length (m)	25.0		25.0		40.0		25.0	
Base Capacity (vph)	313	408	223	364	239	1385	109	1380
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.26	0.09	0.04	0.47	0.93	0.15	0.80

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 18.7

Intersection LOS: B

Intersection Capacity Utilization 101.7%

ICU Level of Service G






Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.
















! Phase conflict between lane groups.

Splits and Phases: 1: Booth & Site

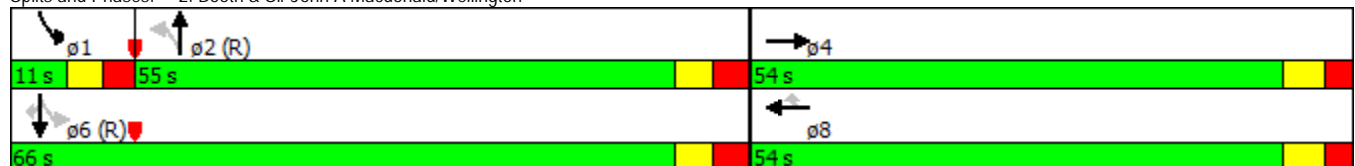
			
			
76 s			24 s
			
76 s			24 s

Projected Phases 1 to 8 - PM









2: Booth & Sir John A Macdonald/Wellington

								
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	840	1239	104	1	1034	68	759	197
Lane Group Flow (vph)	907	1304	109	0	1266	72	799	207
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	4	8			2	1	6	
Permitted Phases			8	2		6		6
Detector Phase	4	8	8	2	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.7	29.7	11.0	29.7	29.7
Total Split (s)	54.0	54.0	54.0	55.0	55.0	11.0	66.0	66.0
Total Split (%)	45.0%	45.0%	45.0%	45.8%	45.8%	9.2%	55.0%	55.0%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	3.4	3.4	2.7	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4		6.7	6.0	6.7	6.7
Lead/Lag				Lag	Lag	Lead		
Lead-Lag Optimize?				Yes	Yes	Yes		
Recall Mode	Max	Max	Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	47.6	47.6	47.6		50.5	60.0	59.3	59.3
Actuated g/C Ratio	0.40	0.40	0.40		0.42	0.50	0.49	0.49
v/c Ratio	0.68	0.97	0.17		0.95	0.56	0.48	0.28
Control Delay	32.9	54.3	7.6		48.7	37.5	20.3	15.0
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	32.9	54.3	7.6		48.7	37.5	20.3	15.0
LOS	C	D	A		D	D	C	B
Approach Delay	32.9	50.7			48.7		20.4	
Approach LOS	C	D			D		C	
Queue Length 50th (m)	91.2	156.4	3.0		151.8	8.6	63.6	23.2
Queue Length 95th (m)	113.7	#204.6	14.3		#202.2	#25.9	79.8	42.8
Internal Link Dist (m)	498.9	255.4			446.0		219.0	
Turn Bay Length (m)			10.0			135.0		50.0
Base Capacity (vph)	1340	1344	639		1339	129	1675	750
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	0.68	0.97	0.17		0.95	0.56	0.48	0.28
Intersection Summary								
Cycle Length: 120								
Actuated Cycle Length: 120								
Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBTL, Start of Green								
Natural Cycle: 110								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 0.97								
Intersection Signal Delay: 39.7					Intersection LOS: D			
Intersection Capacity Utilization 107.8%					ICU Level of Service G			
Analysis Period (min) 15								
# 95th percentile volume exceeds capacity, queue may be longer.								
Queue shown is maximum after two cycles.								

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



Projected Phases 1 to 8 - PM
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	8	1335	1109
Lane Group Flow (vph)	9	8	1405	1178
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.7	36.3	36.3	36.3
Total Split (%)	39.5%	60.5%	60.5%	60.5%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.03	0.02	0.46	0.39
Control Delay	11.2	4.9	4.1	3.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.2	4.9	4.1	3.7
LOS	B	A	A	A
Approach Delay	11.2		4.1	3.7
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	2.6	m1.5	m98.3	65.7
Internal Link Dist (m)	114.6		219.0	68.7
Turn Bay Length (m)		30.0		
Base Capacity (vph)	463	367	3060	3057
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	0.02	0.02	0.46	0.39

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 12 (20%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.46

Intersection Signal Delay: 3.9

Intersection LOS: A

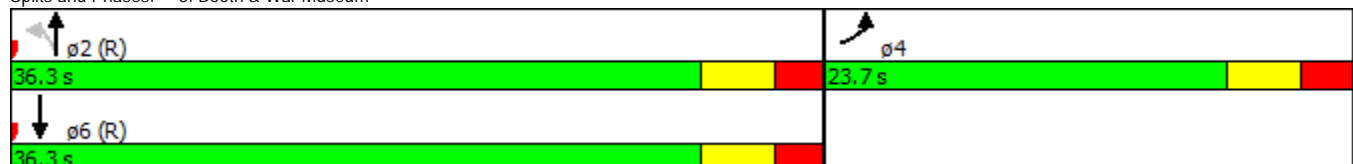
Intersection Capacity Utilization 59.0%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 3: Booth & War Museum



Projected Phases 1 to 8 - PM
4: Booth/Eddy & Alexandre-Taché/Laurier

	→	↘	↙	←	↖	↑	↗		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	ø2	ø3
Lane Configurations	↑	↗	↙	↑↘	↖↗	↑	↗		
Volume (vph)	283	643	416	685	807	295	179		
Lane Group Flow (vph)	298	677	438	890	849	311	188		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	1.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	11.0	22.0
Total Split (s)			35.0	70.0	40.0	40.0	40.0	13.0	22.0
Total Split (%)			31.8%	63.6%	36.4%	36.4%	36.4%	12%	20%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	30.4	50.0	29.6	65.0	35.0	35.0	35.0		
Actuated g/C Ratio	0.28	0.45	0.27	0.59	0.32	0.32	0.32		
v/c Ratio	0.61	0.98	0.96	0.45	0.81	0.55	0.41		
Control Delay	40.9	61.8	73.6	12.7	41.8	35.4	18.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	40.9	61.8	73.6	12.7	41.8	35.4	18.3		
LOS	D	E	E	B	D	D	B		
Approach Delay	55.4			32.8		37.0			
Approach LOS	E			C		D			
Queue Length 50th (m)	55.9	~154.9	92.2	49.8	85.9	54.9	15.7		
Queue Length 95th (m)	84.2	#223.4	#152.6	63.8	109.7	82.3	35.7		
Internal Link Dist (m)	122.2			243.7		148.7			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	481	688	462	1965	1046	567	454		
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	0.62	0.98	0.95	0.45	0.81	0.55	0.41		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 40.4

Intersection LOS: D

Intersection Capacity Utilization 76.9%

ICU Level of Service D

Analysis Period (min) 15

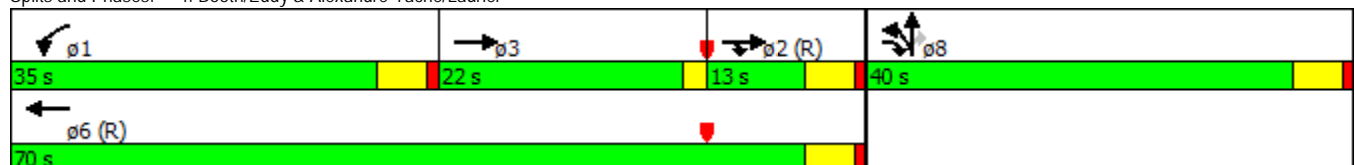
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

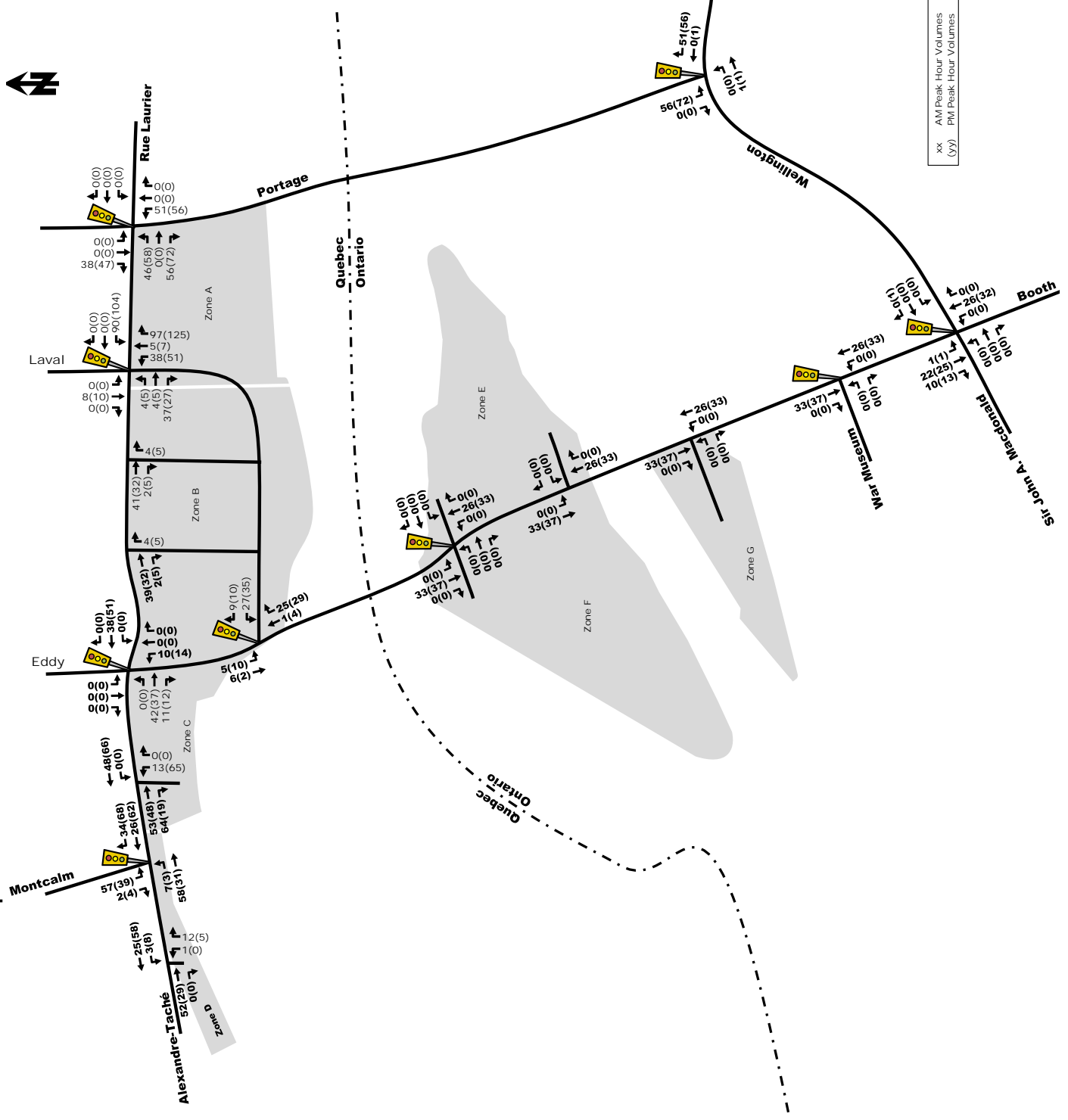
Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier



Appendix E

Gatineau-Zibi Site-Generated Traffic Volumes (from MMTIS)

Figure: Gatineau Portion of Zibi Development



















Appendix F






SYNCHRO Analysis: Projected Full Zibi Build-Out Conditions

Projected Total Site - AM

1: Booth & Site
















								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	0	32	0	65	873	9	1421
Lane Group Flow (vph)	42	100	34	15	68	934	9	1555
Turn Type	Split	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4!	4		8!		2		6
Permitted Phases			8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	24.0	24.0	96.0	96.0	96.0	96.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.7	10.7	10.7	10.7	97.3	97.3	97.3	97.3
Actuated g/C Ratio	0.09	0.09	0.09	0.09	0.81	0.81	0.81	0.81
v/c Ratio	0.28	0.49	0.32	0.04	1.15	0.65	0.02	1.08
Control Delay	55.7	25.3	59.6	0.3	195.4	11.2	2.6	62.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.7	25.3	59.6	0.3	195.4	11.3	2.6	62.8
LOS	E	C	E	A	F	B	A	E
Approach Delay		34.3		41.5		23.8		62.5
Approach LOS		C		D		C		E
Queue Length 50th (m)	9.5	5.1	7.7	0.0	~19.3	90.1	0.3	~407.4
Queue Length 95th (m)	20.3	21.5	17.8	0.0	#50.3	62.7	1.4	#500.3
Internal Link Dist (m)		75.1		86.5		200.9		355.6
Turn Bay Length (m)	25.0		25.0		40.0		25.0	
Base Capacity (vph)	254	293	178	414	59	1444	376	1439
Starvation Cap Reductn	0	0	0	0	0	18	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.34	0.19	0.04	1.15	0.65	0.02	1.08
Intersection Summary								
Cycle Length: 120								
Actuated Cycle Length: 120								
Offset: 22 (18%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green								
Natural Cycle: 120								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 1.15								
Intersection Signal Delay: 46.6								
Intersection Capacity Utilization 101.5%								
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.								
! Phase conflict between lane groups.								

Splits and Phases: 1: Booth & Site

		
ø2 (R)		ø4
96 s		24 s
		
ø6 (R)		ø8
96 s		24 s

Projected Total Site - AM

2: Booth & Sir John A Macdonald/Wellington

								
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	7	1233	629	120	776	129	1073	229
Lane Group Flow (vph)	0	1316	662	126	952	136	1129	241
Turn Type	Perm	NA	NA	Perm	NA	pm+pt	NA	Perm
Protected Phases		4	8		2	1	6	
Permitted Phases	4			8		6		6
Detector Phase	4	4	8	8	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.4	29.7	11.0	29.7	29.7
Total Split (s)	61.0	61.0	61.0	61.0	47.0	12.0	59.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	50.8%	39.2%	10.0%	49.2%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	3.4	2.7	3.4	3.4
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.4	6.4	6.4	6.7	6.0	6.7	6.7
Lead/Lag					Lag	Lead		
Lead-Lag Optimize?					Yes	Yes		
Recall Mode	Max	Max	Max	Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)		54.6	54.6	54.6	40.3	53.0	52.3	52.3
Actuated g/C Ratio		0.46	0.46	0.46	0.34	0.44	0.44	0.44
v/c Ratio		0.90	0.43	0.17	0.85	0.86	0.76	0.34
Control Delay		39.7	23.2	7.5	45.3	61.3	25.8	7.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		39.7	23.2	7.5	45.3	61.3	25.8	7.7
LOS		D	C	A	D	E	C	A
Approach Delay		39.7	20.7		45.3		26.1	
Approach LOS		D	C		D		C	
Queue Length 50th (m)		146.7	54.3	4.9	107.7	16.5	107.3	11.7
Queue Length 95th (m)		#183.8	69.7	15.8	134.4	#49.8	116.4	36.5
Internal Link Dist (m)		498.9	255.4		446.0		219.0	
Turn Bay Length (m)				10.0		135.0		50.0
Base Capacity (vph)		1465	1542	723	1115	158	1477	719
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		0.90	0.43	0.17	0.85	0.86	0.76	0.34

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 112 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 33.1

Intersection LOS: C

Intersection Capacity Utilization 99.3%

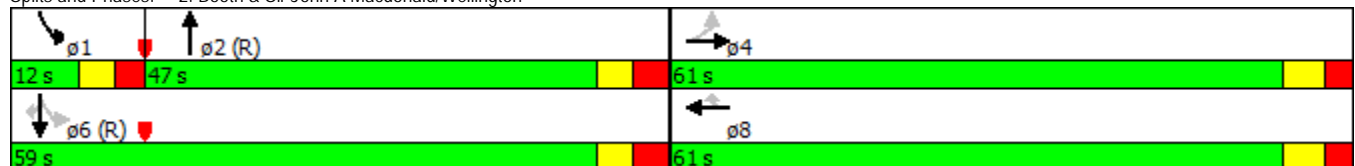
ICU Level of Service F

Analysis Period (min) 15









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



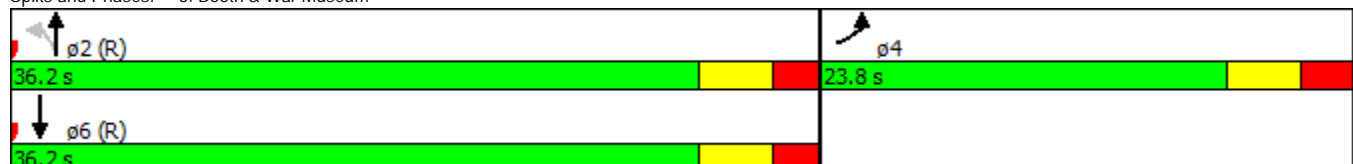
Projected Total Site - AM
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	2	901	1542
Lane Group Flow (vph)	2	2	948	1629
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.8	36.2	36.2	36.2
Total Split (%)	39.7%	60.3%	60.3%	60.3%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.01	0.01	0.31	0.53
Control Delay	15.0	7.0	4.2	4.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.0	7.0	4.2	4.5
LOS	B	A	A	A
Approach Delay	15.0		4.2	4.5
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	1.3	m0.5	86.2	m98.4
Internal Link Dist (m)	114.6		219.0	64.1
Turn Bay Length (m)		30.0		
Base Capacity (vph)	487	201	3060	3057
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	0.00	0.01	0.31	0.53

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 55 (92%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.53
 Intersection Signal Delay: 4.4
 Intersection Capacity Utilization 63.1%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Booth & War Museum



Projected Total Site - AM

4: Booth/Eddy & Alexandre-Taché/Laurier

								ø2	ø3
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR		
Lane Configurations									
Volume (vph)	504	1035	429	293	534	246	131		
Lane Group Flow (vph)	531	1089	452	444	562	259	138		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	27.0	22.0
Total Split (s)			23.0	72.0	28.0	28.0	28.0	27.0	22.0
Total Split (%)			23.0%	72.0%	28.0%	28.0%	28.0%	27%	22%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	44.0	50.1	18.0	67.0	23.0	23.0	23.0		
Actuated g/C Ratio	0.44	0.50	0.18	0.67	0.23	0.23	0.23		
v/c Ratio	0.68	1.43	1.48	0.20	0.74	0.63	0.37		
Control Delay	27.7	227.0	265.6	4.5	42.7	42.6	14.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	27.7	227.0	265.6	4.5	42.7	42.6	14.4		
LOS	C	F	F	A	D	D	B		
Approach Delay	161.6			136.2		38.6			
Approach LOS	F			F		D			
Queue Length 50th (m)	79.9	~287.8	~121.5	10.2	52.3	45.4	6.2		
Queue Length 95th (m)	116.6	#362.9	#179.8	15.7	70.7	71.4	22.3		
Internal Link Dist (m)	122.2			243.7		129.9			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	769	760	305	2211	756	410	377		
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	0.69	1.43	1.48	0.20	0.74	0.63	0.37		

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.48

Intersection Signal Delay: 121.1

Intersection LOS: F

Intersection Capacity Utilization 102.7%

ICU Level of Service G

Analysis Period (min) 15

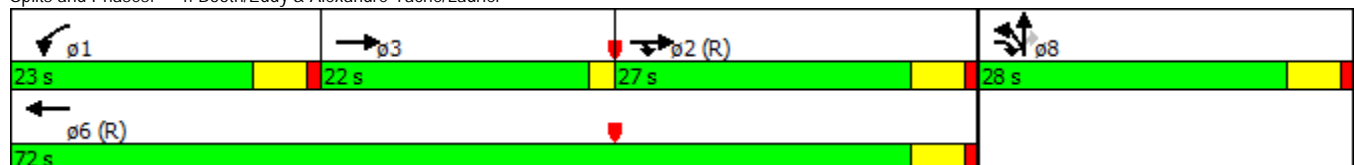
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier



Projected Total Site - PM

1: Booth & Site

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	75	0	20	0	106	1226	15	1025
Lane Group Flow (vph)	79	108	21	14	112	1328	16	1138
Turn Type	Split	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4!	4		8!		2		6
Permitted Phases			8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	24.0	24.0	76.0	76.0	76.0	76.0
Total Split (%)	24.0%	24.0%	24.0%	24.0%	76.0%	76.0%	76.0%	76.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	11.1	11.1	11.1	11.1	77.9	77.9	77.9	77.9
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.78	0.78	0.78	0.78
v/c Ratio	0.42	0.36	0.16	0.06	0.52	0.96	0.19	0.82
Control Delay	48.2	6.5	42.3	0.4	15.2	28.0	9.5	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	6.5	42.3	0.4	15.2	28.0	9.5	14.0
LOS	D	A	D	A	B	C	A	B
Approach Delay		24.1		25.5		27.0		13.9
Approach LOS		C		C		C		B
Queue Length 50th (m)	14.7	0.0	3.8	0.0	6.0	166.0	0.6	100.5
Queue Length 95th (m)	27.8	7.8	10.5	0.0	26.4	#346.6	3.8	209.1
Internal Link Dist (m)		96.6		74.5		189.8		348.5
Turn Bay Length (m)	25.0		25.0		40.0		25.0	
Base Capacity (vph)	313	398	223	358	214	1385	83	1380
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.27	0.09	0.04	0.52	0.96	0.19	0.82
Intersection Summary								
Cycle Length: 100								
Actuated Cycle Length: 100								
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green								
Natural Cycle: 110								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 0.96								
Intersection Signal Delay: 21.4					Intersection LOS: C			
Intersection Capacity Utilization 103.5%					ICU Level of Service G			
Analysis Period (min) 15								
# 95th percentile volume exceeds capacity, queue may be longer.								
Queue shown is maximum after two cycles.								
! Phase conflict between lane groups.								

Splits and Phases: 1: Booth & Site

		
ø2 (R)		ø4
76 s		24 s
		
ø6 (R)		ø8
76 s		24 s

Projected Total Site - PM

2: Booth & Sir John A Macdonald/Wellington

	→	←	↖	↗	↑	↘	↓	↙
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↕↕	↕↕	↗		↕↕	↘	↕↕	↗
Volume (vph)	840	1239	105	1	1066	69	784	210
Lane Group Flow (vph)	907	1304	111	0	1300	73	825	221
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	4	8			2	1	6	
Permitted Phases			8	2		6		6
Detector Phase	4	8	8	2	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.7	29.7	11.0	29.7	29.7
Total Split (s)	54.0	54.0	54.0	55.0	55.0	11.0	66.0	66.0
Total Split (%)	45.0%	45.0%	45.0%	45.8%	45.8%	9.2%	55.0%	55.0%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	3.4	3.4	2.7	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4		6.7	6.0	6.7	6.7
Lead/Lag				Lag	Lag	Lead		
Lead-Lag Optimize?				Yes	Yes	Yes		
Recall Mode	Max	Max	Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	47.6	47.6	47.6		50.5	60.0	59.3	59.3
Actuated g/C Ratio	0.40	0.40	0.40		0.42	0.50	0.49	0.49
v/c Ratio	0.68	0.97	0.17		0.97	0.57	0.49	0.29
Control Delay	32.9	54.3	7.8		52.8	37.7	20.7	15.6
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	32.9	54.3	7.8		52.8	37.7	20.7	15.6
LOS	C	D	A		D	D	C	B
Approach Delay	32.9	50.6			52.8		20.8	
Approach LOS	C	D			D		C	
Queue Length 50th (m)	91.2	156.4	3.3		~162.6	8.7	66.3	25.4
Queue Length 95th (m)	113.7	#204.6	14.6		#211.2	#26.5	83.4	47.0
Internal Link Dist (m)	498.9	255.4			446.0		219.0	
Turn Bay Length (m)			10.0			135.0		50.0
Base Capacity (vph)	1340	1344	639		1341	129	1675	750
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	0.68	0.97	0.17		0.97	0.57	0.49	0.29

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 40.8

Intersection LOS: D

Intersection Capacity Utilization 108.7%

ICU Level of Service G

Analysis Period (min) 15

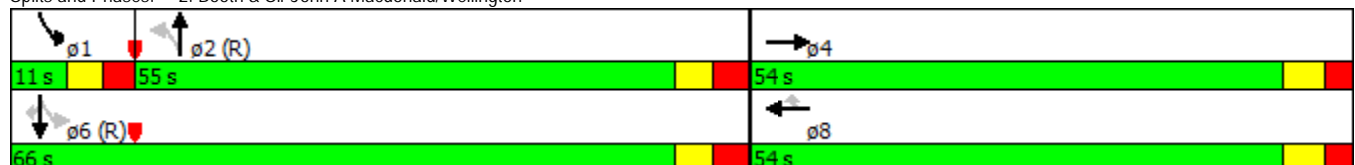
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



Projected Total Site - PM
3: Booth & War Museum

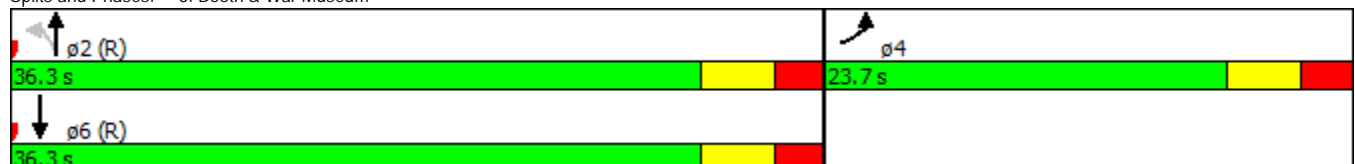
				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	8	1368	1146
Lane Group Flow (vph)	9	8	1440	1217
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.7	36.3	36.3	36.3
Total Split (%)	39.5%	60.5%	60.5%	60.5%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.03	0.02	0.47	0.40
Control Delay	11.2	5.1	4.5	3.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.2	5.1	4.5	3.8
LOS	B	A	A	A
Approach Delay	11.2		4.5	3.8
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	2.6	m1.3	m98.8	69.0
Internal Link Dist (m)	114.6		219.0	68.7
Turn Bay Length (m)		30.0		
Base Capacity (vph)	463	349	3060	3057
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	0.02	0.02	0.47	0.40

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 12 (20%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.47
 Intersection Signal Delay: 4.2
 Intersection Capacity Utilization 59.9%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 3: Booth & War Museum



Projected Total Site - PM

4: Booth/Eddy & Alexandre-Taché/Laurier

	→	↘	↙	←	↖	↑	↗		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	ø2	ø3
Lane Configurations	↑	↗	↖	↑↘	↖↗	↑	↗		
Volume (vph)	320	655	416	736	821	295	179		
Lane Group Flow (vph)	337	689	438	944	864	311	188		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	1.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	11.0	22.0
Total Split (s)			34.0	71.0	39.0	39.0	39.0	15.0	22.0
Total Split (%)			30.9%	64.5%	35.5%	35.5%	35.5%	14%	20%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	32.0	49.9	29.0	66.0	34.0	34.0	34.0		
Actuated g/C Ratio	0.29	0.45	0.26	0.60	0.31	0.31	0.31		
v/c Ratio	0.65	1.00	0.98	0.47	0.85	0.56	0.42		
Control Delay	41.0	66.2	79.6	12.6	45.0	36.6	18.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	41.0	66.2	79.6	12.6	45.0	36.6	18.9		
LOS	D	E	E	B	D	D	B		
Approach Delay	57.9			33.8		39.5			
Approach LOS	E			C		D			
Queue Length 50th (m)	63.2	~157.2	93.5	52.9	89.2	55.7	15.9		
Queue Length 95th (m)	94.1	#225.7	#156.1	67.5	#115.5	83.5	36.2		
Internal Link Dist (m)	122.2			243.7		148.7			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	517	688	446	1996	1016	551	444		
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	0.65	1.00	0.98	0.47	0.85	0.56	0.42		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 42.4

Intersection LOS: D

Intersection Capacity Utilization 79.3%

ICU Level of Service D

Analysis Period (min) 15

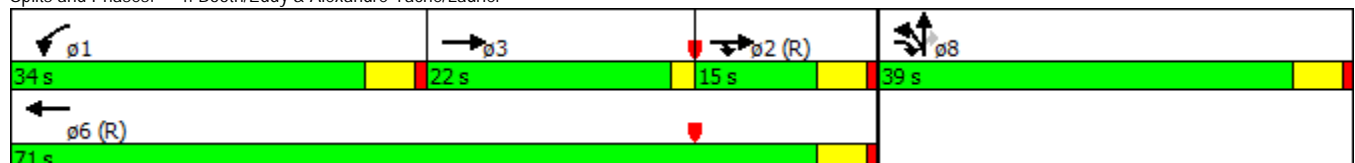
~ Volume exceeds capacity, queue is theoretically infinite.

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: 4: Booth/Eddy & Alexandre-Taché/Laurier



















Appendix G

SYNCHRO Analysis: Projected Full Zibi Build-Out Conditions with Reduced Through
Traffic Volumes

Projected Total Site - AM Reduced Volumes
















1: Booth & Site

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	0	32	0	65	873	9	1041
Lane Group Flow (vph)	42	100	34	15	68	934	9	1155
Turn Type	Split	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4!	4		8!		2		6
Permitted Phases			8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	24.0	24.0	66.0	66.0	66.0	66.0
Total Split (%)	26.7%	26.7%	26.7%	26.7%	73.3%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.4	10.4	10.4	10.4	72.0	72.0	72.0	72.0
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.80	0.80	0.80	0.80
v/c Ratio	0.22	0.42	0.27	0.05	0.33	0.66	0.03	0.82
Control Delay	38.8	13.5	41.9	0.4	9.0	8.2	3.2	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	13.5	41.9	0.4	9.0	8.2	3.2	14.4
LOS	D	B	D	A	A	A	A	B
Approach Delay		21.0		29.2		8.3		14.3
Approach LOS		C		C		A		B
Queue Length 50th (m)	6.7	0.0	5.5	0.0	3.1	66.5	0.3	113.2
Queue Length 95th (m)	15.8	13.5	14.2	0.0	11.3	116.4	1.5	#258.9
Internal Link Dist (m)		75.1		86.5		200.9		355.6
Turn Bay Length (m)	25.0		25.0		40.0		25.0	
Base Capacity (vph)	339	341	220	377	209	1422	353	1407
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.29	0.15	0.04	0.33	0.66	0.03	0.82
Intersection Summary								
Cycle Length: 90								
Actuated Cycle Length: 90								
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green								
Natural Cycle: 90								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 0.82								
Intersection Signal Delay: 12.5					Intersection LOS: B			
Intersection Capacity Utilization 85.7%					ICU Level of Service E			
Analysis Period (min) 15								
# 95th percentile volume exceeds capacity, queue may be longer.								
Queue shown is maximum after two cycles.								
! Phase conflict between lane groups.								

Splits and Phases: 1: Booth & Site

									
66 s						24 s			
									
66 s						24 s			

Projected Total Site - AM Reduced Volumes
2: Booth & Sir John A Macdonald/Wellington

								
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	7	1233	629	120	776	129	693	229
Lane Group Flow (vph)	0	1316	662	126	952	136	729	241
Turn Type	Perm	NA	NA	Perm	NA	pm+pt	NA	Perm
Protected Phases		4	8		2	1	6	
Permitted Phases	4			8		6		6
Detector Phase	4	4	8	8	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.4	29.7	11.0	29.7	29.7
Total Split (s)	61.0	61.0	61.0	61.0	47.0	12.0	59.0	59.0
Total Split (%)	50.8%	50.8%	50.8%	50.8%	39.2%	10.0%	49.2%	49.2%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	3.4	2.7	3.4	3.4
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.4	6.4	6.4	6.7	6.0	6.7	6.7
Lead/Lag					Lag	Lead		
Lead-Lag Optimize?					Yes	Yes		
Recall Mode	Max	Max	Max	Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)		54.6	54.6	54.6	40.3	53.0	52.3	52.3
Actuated g/C Ratio		0.46	0.46	0.46	0.34	0.44	0.44	0.44
v/c Ratio		0.90	0.43	0.17	0.85	0.86	0.49	0.34
Control Delay		39.7	23.2	7.5	45.3	67.9	23.8	8.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		39.7	23.2	7.5	45.3	67.9	23.8	8.3
LOS		D	C	A	D	E	C	A
Approach Delay		39.7	20.7		45.3		25.9	
Approach LOS		D	C		D		C	
Queue Length 50th (m)		146.7	54.3	4.9	107.7	19.1	63.6	11.8
Queue Length 95th (m)		#183.8	69.7	15.8	134.4	#50.9	66.8	33.3
Internal Link Dist (m)		498.9	255.4		446.0		219.0	
Turn Bay Length (m)				10.0		135.0		50.0
Base Capacity (vph)		1465	1542	723	1115	158	1477	719
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		0.90	0.43	0.17	0.85	0.86	0.49	0.34

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 57 (48%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 33.7

Intersection LOS: C

Intersection Capacity Utilization 99.3%

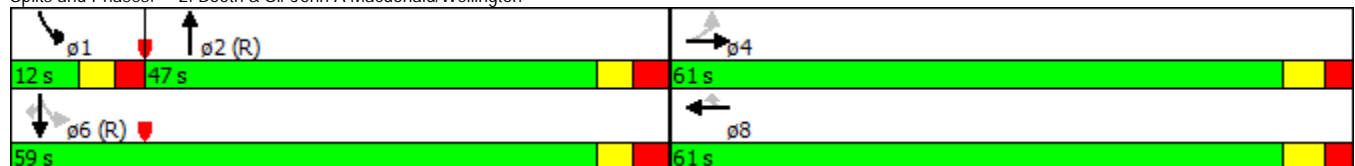
ICU Level of Service F

Analysis Period (min) 15









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



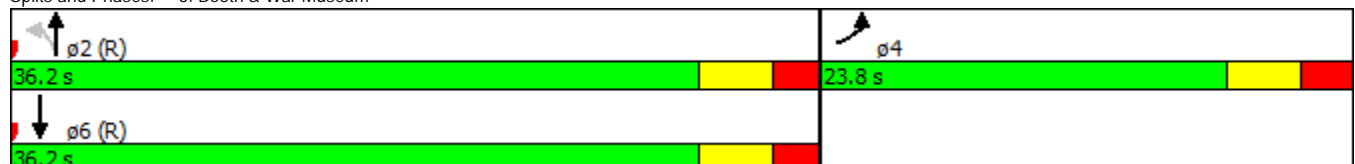
Projected Total Site - AM Reduced Volumes
3: Booth & War Museum

				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	2	901	1162
Lane Group Flow (vph)	2	2	948	1229
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.8	36.2	36.2	36.2
Total Split (%)	39.7%	60.3%	60.3%	60.3%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.01	0.01	0.31	0.40
Control Delay	15.0	7.0	4.7	3.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.0	7.0	4.7	3.8
LOS	B	A	A	A
Approach Delay	15.0		4.7	3.8
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	1.3	m0.5	98.8	70.1
Internal Link Dist (m)	114.6		219.0	64.1
Turn Bay Length (m)		30.0		
Base Capacity (vph)	475	342	3060	3056
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	0.00	0.01	0.31	0.40

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 56 (93%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.40
 Intersection Signal Delay: 4.2
 Intersection Capacity Utilization 57.2%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Booth & War Museum



Projected Total Site - AM Reduced Volumes

4: Booth/Eddy & Alexandre-Taché/Laurier

	→	↘	↙	←	↖	↑	↗		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	ø2	ø3
Lane Configurations	↑	↗	↖	↑	↖	↑	↗		
Volume (vph)	504	755	329	293	534	246	131		
Lane Group Flow (vph)	531	795	346	444	562	259	138		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	6.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	27.0	22.0
Total Split (s)			30.0	80.0	40.0	40.0	40.0	28.0	22.0
Total Split (%)			25.0%	66.7%	33.3%	33.3%	33.3%	23%	18%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	45.0	63.0	25.0	75.0	35.0	35.0	35.0		
Actuated g/C Ratio	0.38	0.52	0.21	0.62	0.29	0.29	0.29		
v/c Ratio	0.79	1.00	0.98	0.22	0.59	0.50	0.32		
Control Delay	43.6	60.8	90.9	7.4	39.3	39.2	16.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	43.6	60.8	90.9	7.4	39.3	39.2	16.5		
LOS	D	E	F	A	D	D	B		
Approach Delay	53.9			44.0		36.0			
Approach LOS	D			D		D			
Queue Length 50th (m)	110.2	180.0	81.7	16.1	58.2	50.5	9.8		
Queue Length 95th (m)	154.5	#267.4	#140.4	23.3	76.2	76.3	26.6		
Internal Link Dist (m)	122.2			243.7		129.9			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	669	796	353	2062	959	520	431		
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	0.79	1.00	0.98	0.22	0.59	0.50	0.32		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 45.8

Intersection LOS: D

Intersection Capacity Utilization 78.5%

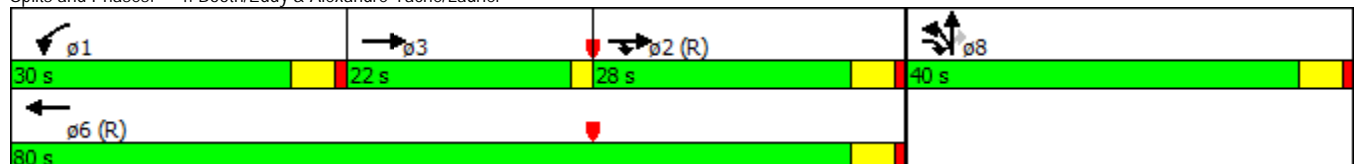
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

















Queue shown is maximum after two cycles.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier



Projected Total Site - PM Reduced Volumes

1: Booth & Site

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	75	0	20	0	106	1226	15	1025
Lane Group Flow (vph)	79	108	21	14	112	1328	16	1138
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (s)	24.0	24.0	24.0	24.0	86.0	86.0	86.0	86.0
Total Split (%)	21.8%	21.8%	21.8%	21.8%	78.2%	78.2%	78.2%	78.2%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	13.5	13.5	13.5	13.5	85.5	85.5	85.5	85.5
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.78	0.78	0.78	0.78
v/c Ratio	0.57	0.40	0.17	0.06	0.54	0.97	0.20	0.83
Control Delay	60.9	9.2	44.6	0.5	17.3	30.5	1.9	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0
Total Delay	60.9	9.2	44.6	0.5	17.3	33.9	1.9	4.0
LOS	E	A	D	A	B	C	A	A
Approach Delay		31.0		27.0		32.6		3.9
Approach LOS		C		C		C		A
Queue Length 50th (m)	16.3	0.0	4.1	0.0	7.3	201.0	0.0	0.8
Queue Length 95th (m)	30.5	10.4	11.1	0.0	32.8	#385.0	m0.0	m1.0
Internal Link Dist (m)		96.6		74.5		189.8		348.5
Turn Bay Length (m)	25.0		25.0		40.0		25.0	
Base Capacity (vph)	190	319	170	284	209	1376	79	1365
Starvation Cap Reductn	0	0	0	0	0	31	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.34	0.12	0.05	0.54	0.99	0.20	0.83

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 43 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 20.7

Intersection LOS: C

Intersection Capacity Utilization 106.8%

ICU Level of Service G

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Booth & Site

					
ø2 (R)					ø4
86 s					24 s
					
ø6 (R)					ø8
86 s					24 s

Projected Total Site - PM Reduced Volumes
2: Booth & Sir John A Macdonald/Wellington

	→	←	↖	↗	↑	↘	↓	↙
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↕↕	↕↕	↗		↕↕	↘	↕↕	↗
Volume (vph)	840	1239	105	1	1066	69	784	210
Lane Group Flow (vph)	907	1304	111	0	1300	73	825	221
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	4	8			2	1	6	
Permitted Phases			8	2		6		6
Detector Phase	4	8	8	2	2	1	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	29.4	29.4	29.4	29.7	29.7	11.0	29.7	29.7
Total Split (s)	54.0	54.0	54.0	55.0	55.0	11.0	66.0	66.0
Total Split (%)	45.0%	45.0%	45.0%	45.8%	45.8%	9.2%	55.0%	55.0%
Yellow Time (s)	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	3.4	3.4	2.7	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4		6.7	6.0	6.7	6.7
Lead/Lag				Lag	Lag	Lead		
Lead-Lag Optimize?				Yes	Yes	Yes		
Recall Mode	Max	Max	Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	47.6	47.6	47.6		50.5	60.0	59.3	59.3
Actuated g/C Ratio	0.40	0.40	0.40		0.42	0.50	0.49	0.49
v/c Ratio	0.68	0.97	0.17		0.97	0.57	0.49	0.29
Control Delay	32.9	54.3	7.8		52.8	37.8	21.3	16.2
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	32.9	54.3	7.8		52.8	37.8	21.3	16.2
LOS	C	D	A		D	D	C	B
Approach Delay	32.9	50.6			52.8		21.4	
Approach LOS	C	D			D		C	
Queue Length 50th (m)	91.2	156.4	3.3		~162.6	8.7	66.3	25.4
Queue Length 95th (m)	113.7	#204.6	14.6		#211.2	#25.4	90.5	50.2
Internal Link Dist (m)	498.9	255.4			446.0		219.0	
Turn Bay Length (m)			10.0			135.0		50.0
Base Capacity (vph)	1340	1344	639		1341	129	1675	750
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	0.68	0.97	0.17		0.97	0.57	0.49	0.29

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 58 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 40.9

Intersection LOS: D

Intersection Capacity Utilization 108.7%

ICU Level of Service G

Analysis Period (min) 15

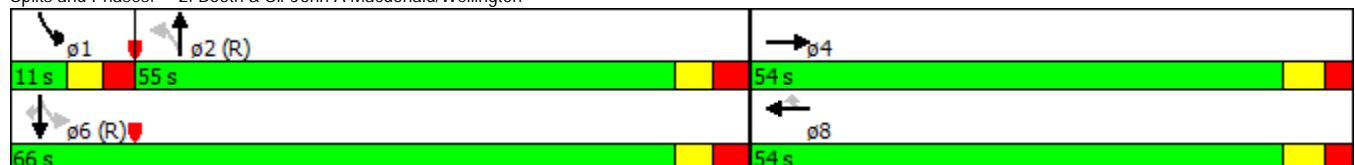
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.









95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Booth & Sir John A Macdonald/Wellington



Projected Total Site - PM Reduced Volumes
3: Booth & War Museum

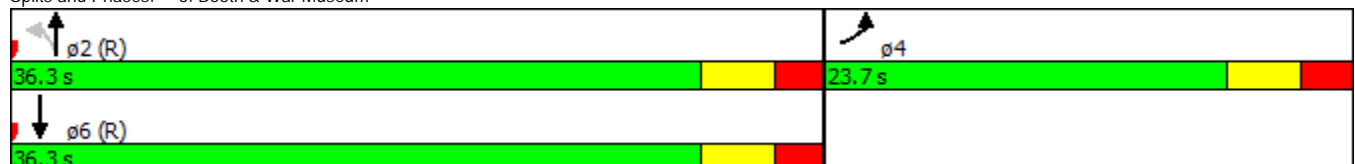
				
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	1	8	1368	1146
Lane Group Flow (vph)	9	8	1440	1217
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	23.7	30.5	30.5	30.5
Total Split (s)	23.7	36.3	36.3	36.3
Total Split (%)	39.5%	60.5%	60.5%	60.5%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.6	54.2	54.2	54.2
Actuated g/C Ratio	0.19	0.90	0.90	0.90
v/c Ratio	0.03	0.02	0.47	0.40
Control Delay	11.2	4.9	3.9	3.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.2	4.9	3.9	3.8
LOS	B	A	A	A
Approach Delay	11.2		3.9	3.8
Approach LOS	B		A	A
Queue Length 50th (m)	0.1	0.0	0.0	0.0
Queue Length 95th (m)	2.6	m1.1	m88.4	69.1
Internal Link Dist (m)	114.6		219.0	68.7
Turn Bay Length (m)		30.0		
Base Capacity (vph)	448	347	3060	3055
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	0.02	0.02	0.47	0.40

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 12 (20%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.47
 Intersection Signal Delay: 3.9
 Intersection Capacity Utilization 63.0%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 3: Booth & War Museum



Projected Total Site - PM Reduced Volumes
4: Booth/Eddy & Alexandre-Taché/Laurier

	→	↘	↙	←	↖	↑	↗		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	ø2	ø3
Lane Configurations	↑	↗	↙	↑↘	↖↗	↑	↗		
Volume (vph)	320	655	416	736	821	295	179		
Lane Group Flow (vph)	337	689	438	944	864	311	188		
Turn Type	NA	custom	Prot	NA	Split	NA	Perm		
Protected Phases	2 3	8 2	1	6	8	8		2	3
Permitted Phases							8		
Detector Phase	2 3	8 2	1	6	8	8	8		
Switch Phase									
Minimum Initial (s)			5.0	5.0	5.0	5.0	5.0	6.0	1.0
Minimum Split (s)			10.0	23.0	28.0	28.0	28.0	11.0	22.0
Total Split (s)			34.0	71.0	39.0	39.0	39.0	15.0	22.0
Total Split (%)			30.9%	64.5%	35.5%	35.5%	35.5%	14%	20%
Yellow Time (s)			4.0	4.0	4.0	4.0	4.0	4.0	2.0
All-Red Time (s)			1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)			5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lead						Lag
Lead-Lag Optimize?			Yes						Yes
Recall Mode			None	C-Max	None	None	None	C-Max	None
Act Effct Green (s)	32.0	49.9	29.0	66.0	34.0	34.0	34.0		
Actuated g/C Ratio	0.29	0.45	0.26	0.60	0.31	0.31	0.31		
v/c Ratio	0.65	1.00	0.98	0.47	0.85	0.56	0.42		
Control Delay	41.0	66.2	79.6	12.6	32.9	26.8	11.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	41.0	66.2	79.6	12.6	32.9	26.8	11.4		
LOS	D	E	E	B	C	C	B		
Approach Delay	57.9			33.8		28.6			
Approach LOS	E			C		C			
Queue Length 50th (m)	63.2	~157.2	93.5	52.9	88.7	53.2	14.9		
Queue Length 95th (m)	94.1	#225.7	#156.1	67.5	m89.3	m53.5	m15.2		
Internal Link Dist (m)	122.2			243.7		148.7			
Turn Bay Length (m)			50.0		60.0		15.0		
Base Capacity (vph)	517	688	446	1996	1016	551	444		
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	0.65	1.00	0.98	0.47	0.85	0.56	0.42		

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 38.5

Intersection LOS: D

Intersection Capacity Utilization 79.3%

ICU Level of Service D

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.

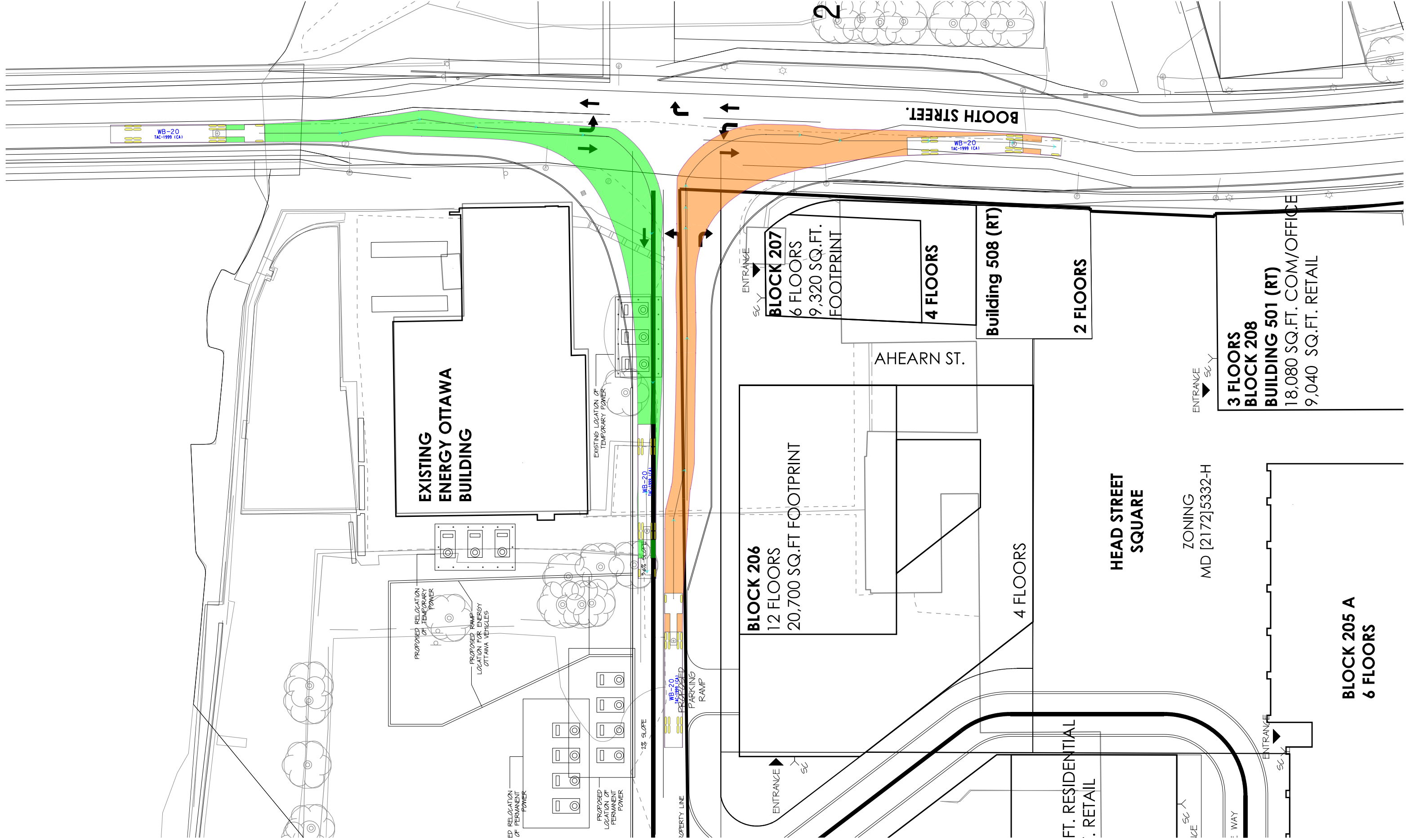
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Booth/Eddy & Alexandre-Taché/Laurier

↙ ø1	→ ø3	↘ ø2 (R)	↗ ø8
34 s	22 s	15 s	39 s
← ø6 (R)			
71 s			

Appendix H

Energy Ottawa Tractor Trailer (WB-20) Turn Path



Appendix I

MSU/Garbage Truck Turn Path

**EXISTING
ENERGY OTTAWA
BUILDING**

EXISTING LOCATION OF
TEMPORARY POWER

OPEN

MSU
TAC-1999 (CA)

MSU
TAC-1999 (CA)

MSU
TAC-1999 (CA)

MSU
TAC-1999 (CA)

ENTRANCE

SC Y

BLOCK 207
6 FLOORS
9,320 SQ.FT.
FOOTPRINT

4 FLOORS

Building 508 (RT)

AHEARN ST.

BOOTH STREET.

Appendix J

Signal Warrant Analysis – Booth/Site Driveway

Booth/Site - (peak hour signal warrant)

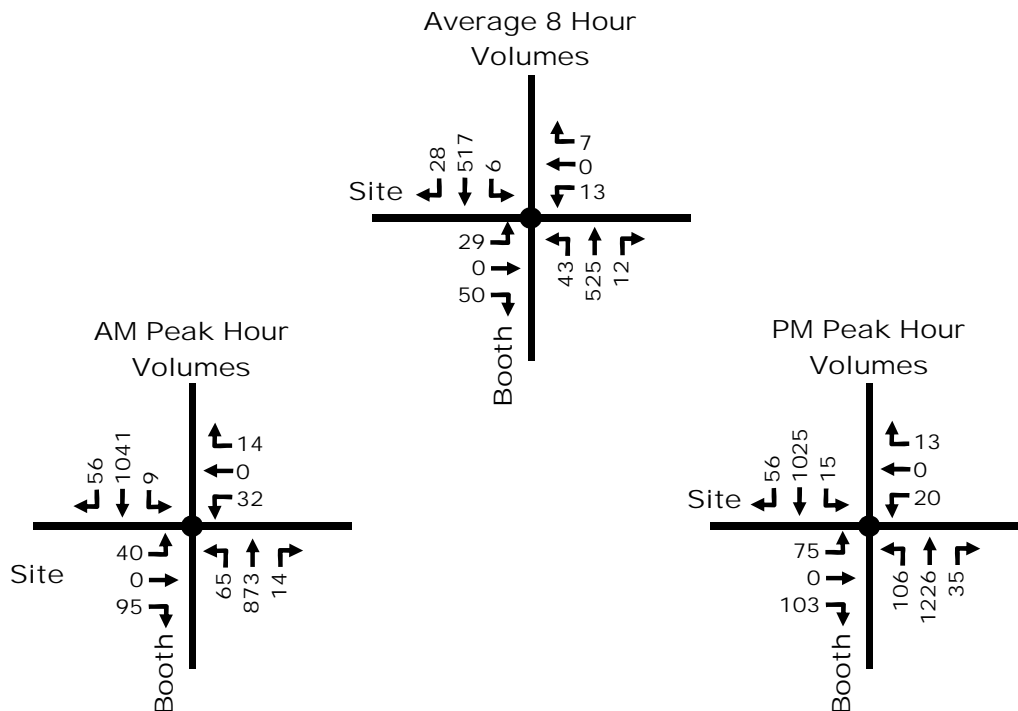
Signal Warrant		Description		Minimum Requirement for Two-Lane Roadways	Compliance		
				Restricted Flow - Operating Speed Less Than 70 km/h	Sectional %	Entire %	Warrant
Intersection	1. Minimum Vehicular Volume	(1) A	Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of on Average Day, and	720	171%	58%	58% No
		(4) B	Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	170	58%		
	2. Delay to Cross Traffic	(1) A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	720	157%	56%	
		(2) B	Combined Vehicle and Pedestrian Volume <u>Crossing</u> the Major Street for Each of the Same 8 Hours	75	56%		

Notes

- 1 Vehicle Volume Warrants (1A), (2A) and (5B) for Roadways Having Two or More Moving Lanes in one Direction Should Be 25% Higher Than Values Given Above
- 2 For Definition of Crossing Volume Refer to Note 4 on the Signal Warrant Analysis Form B2.03.08
- 3 The Lowest Sectional Percentage Governs the Entire Warrant
- 4 For "T" Intersections the Warrant Values for Minor Street Should be Increased by 50% (Warrant 1B only)

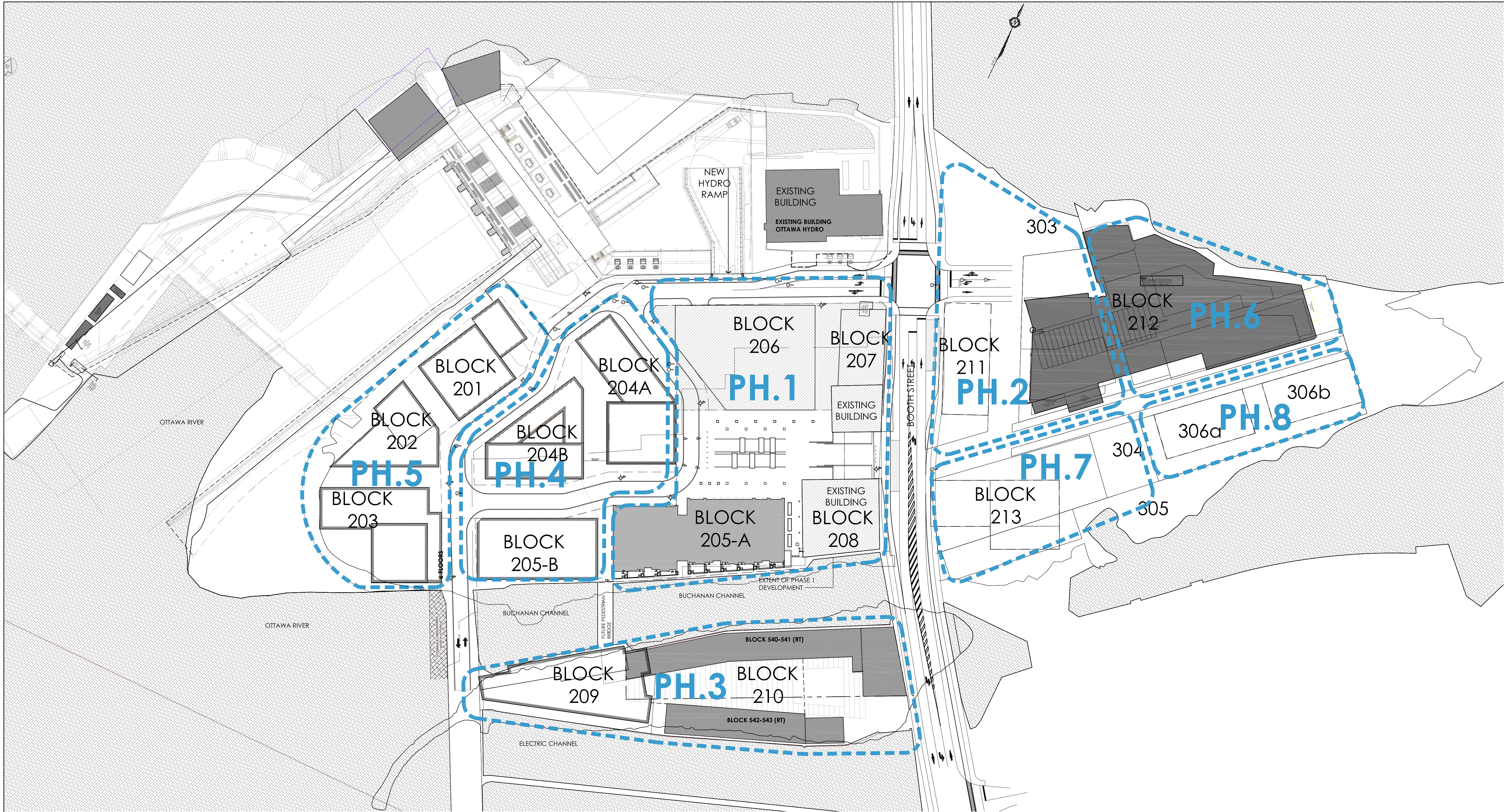
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No

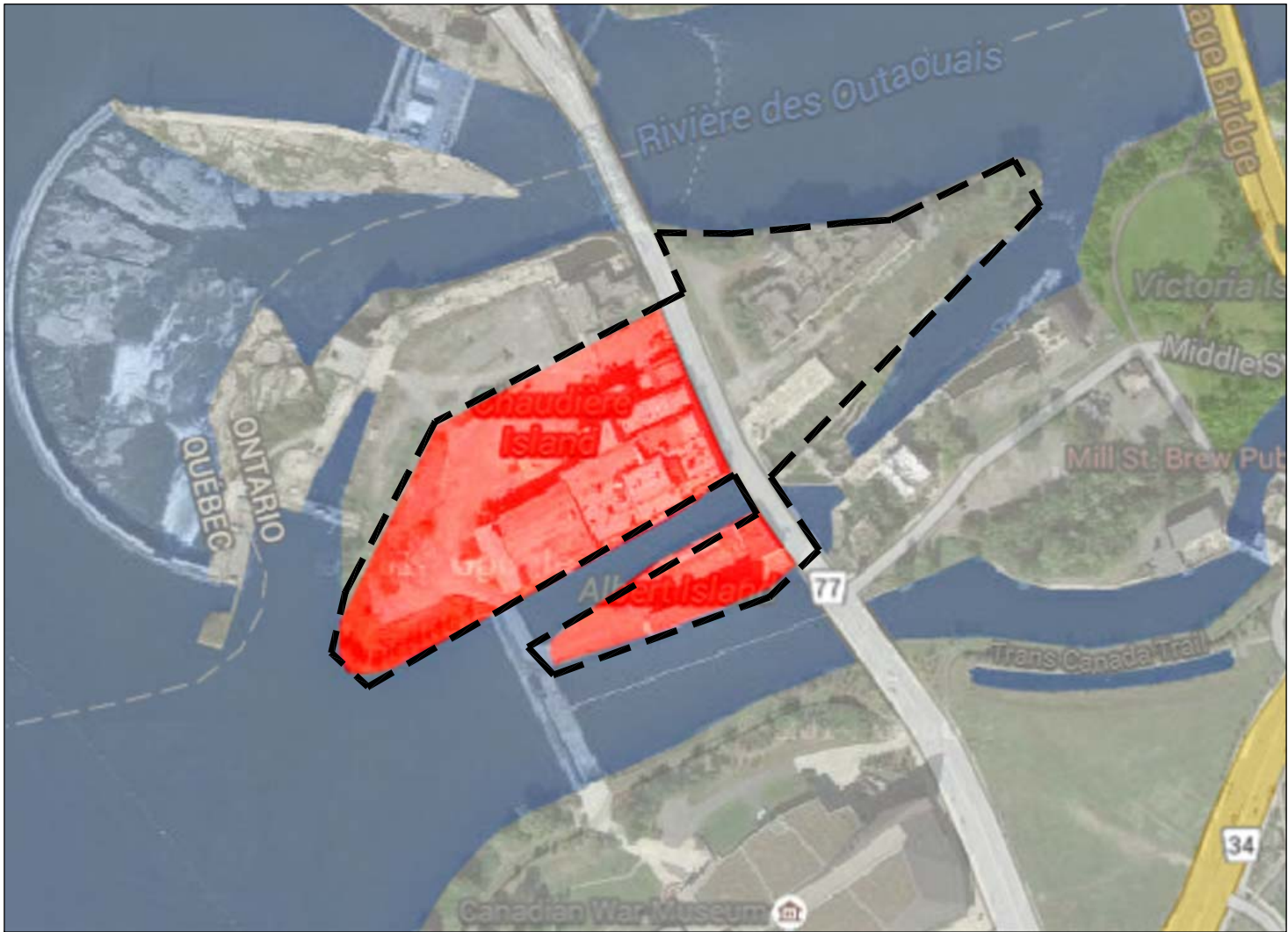


Appendix K

Phasing Plan



ZIBI - ONTARIO LANDS SITE PLAN



LOCATION PLAN

PROJECT TEAM

PLANNING
FOTENI CONSULTANTS INC.
PAUL BLACK
T 613.730.5709

ARCHITECT
BARRY J. HOBIN & ASSOCIATES ARCHITECTS INC.
GORD LORIMER
T 613.2385.2700

CIVIL
DAVID SHAEFFER ENGINEERING LTD
ADAM FOBERT
T 613.836.0856 x231

LANDSCAPE ARCHITECT
PROJET PAYSAGE
SERGE GALLANT
T 514.849.7700

TRANSPORTATION
PARSONS
RONALD JACK
T 613.738.4160

SITE WIDE ELECTRICAL
CROSSEY ENGINEERING LTD.
DUANE WAITE
T 613.497.3111 x228

SITE WIDE MECHANICAL
GOODKEY WEEDMARK & ASSOCIATES LIMITED.
ROBERT LEFEVRE
T 613.727.5111 x234

GEOTECHNICAL
PATERSONS GROUP
CARLOS DASILVA
T 613.226.7381

CLIENT APPROVAL

Signature: _____ Date: _____
Name: CLIENT NAME
Title: CLIENT TITLE
Company: CLIENT

1	15.08.14	ISSUED FOR S.P.C. PHASE 1A
no.	date	revision

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

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613-238-7200 Fax: 613-235-2005
Email: mail@hobinarc.com

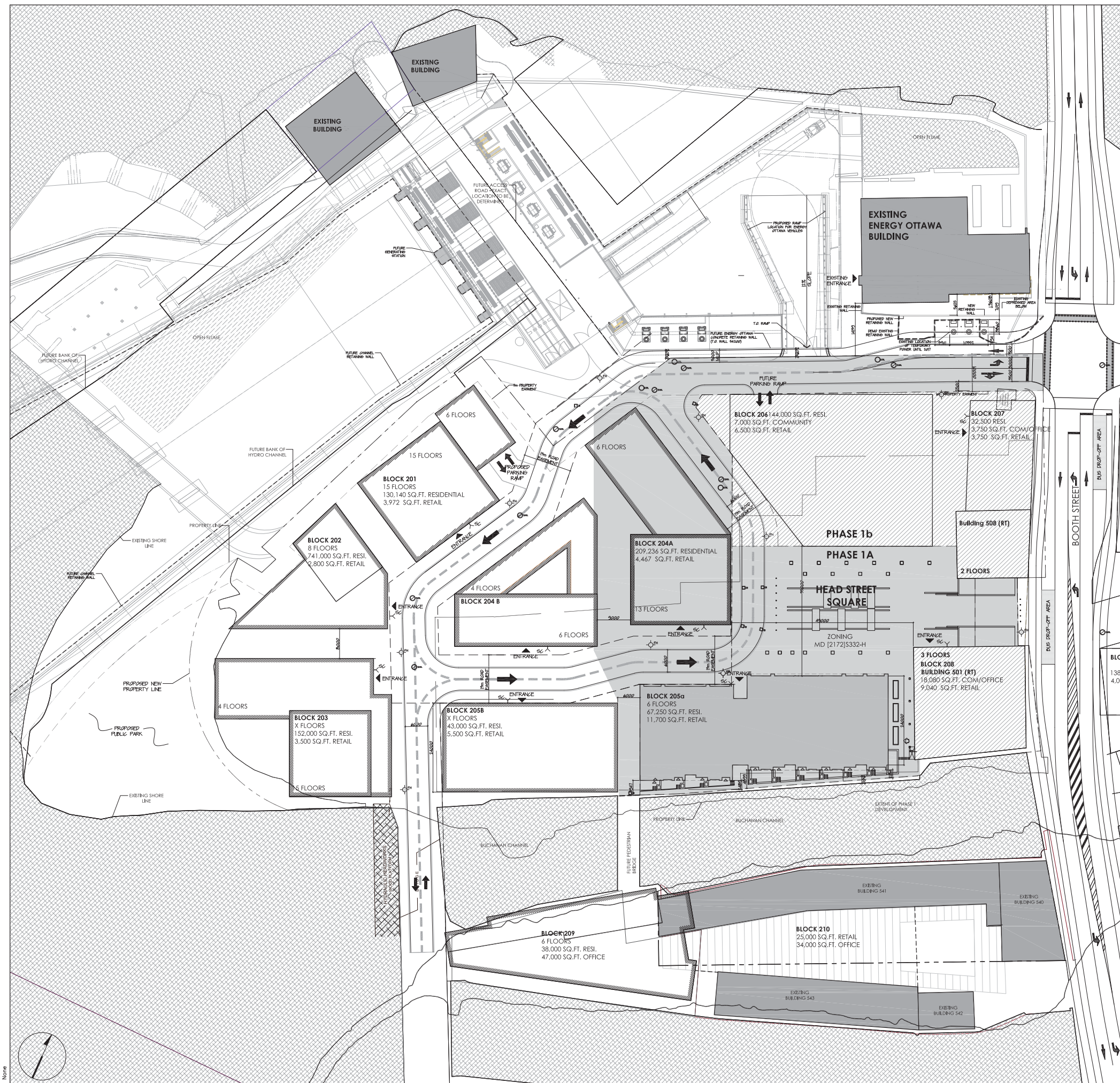
project	ZIBI	
drawing title	MASTER PLAN ONTARIO LANDS	
drawn	date	scale
PB	15.07.01	1:500
project	1508	
drawing no.	A001	



PLOT DATE:









Appendix L

Chaudière West Master Plan



LOCATION PLAN

LEGEND

- | | |
|---|--|
|  | PROPOSED FIRE
HYDRANT LOCATION |
|  | PROPOSED SIAMESE
CONNECTION
LOCATION |
|  | SANITARY MANHOLE |
|  | STORM MANHOLE |
|  | CATCH BASIN |
|  | CAR SHARE PARKING SPACE |
|  | ACCESSIBLE PUBLIC PARKING SPACE |
|  | PUBLIC PARKING SPACE |

PROJECT TEAM

CLIENT APPROVAL

1	15.08.14	ISSUED FOR S.P.C. PHASE 1A
no.	date	revision



613-238-7200 Fax: 613-235-2005
Email: mail@hobinarc.com

PLOT DATE: _____

Appendix M

Phase 1 Parking Garage
