

17 June 2019

OUR REF: 602835-03000

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

scott.bentley@zibi.ca

Attention: Scott Bentley

Dear Scott:

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

1. INTRODUCTION

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

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

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

2. PREVIOUS TIA SUBMISSION (4 SEPTEMBER 2015)

The original Transportation Impact Study prepared by Parsons included all development for Zibi Ontario Phase 1, including approximately 50,000 ft² retail, 38,000 ft² office, 315 residential units, and 7,000 ft² community space comprised of two sub-phases, namely:

- Phase 1a - Blocks 301 (interim parking), 208 and 205A (25,000 ft² office, 25,000 ft² retail and 67 residential units),
- Phase 1b - Blocks 207 and 206.

At the time, Block 207 was envisioned to consist of 40,000ft² office/retail, with an approximate equal split of office and retail space, while Block 206 would be predominantly a residential building.

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

The revised Site Plan for the subject Block 207 indicated a GFA of 70,209 ft² office/retail, which is approximately 50% greater than the size of land use assumed in the original submission. However, it is understood that the proposed split is 54,477 ft² office (floors 2-6), 6,928 ft² retail and 8,804 ft² restaurant (ground floor), which results in additional office space and reduced retail space than assumed in the original TIS. The updated total office space associated with Phase 1 is approximately 72,500 ft² (versus 38,000 ft² previously assumed), updated total retail space is approximately 28,300 ft² (versus 50,000 ft² previously assumed) and newly proposed 8,800 ft² of restaurant space. The number of residential units remains unchanged at approximately 300 units.

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

3. BLOCK 211 SITE PLAN SUBMISSION

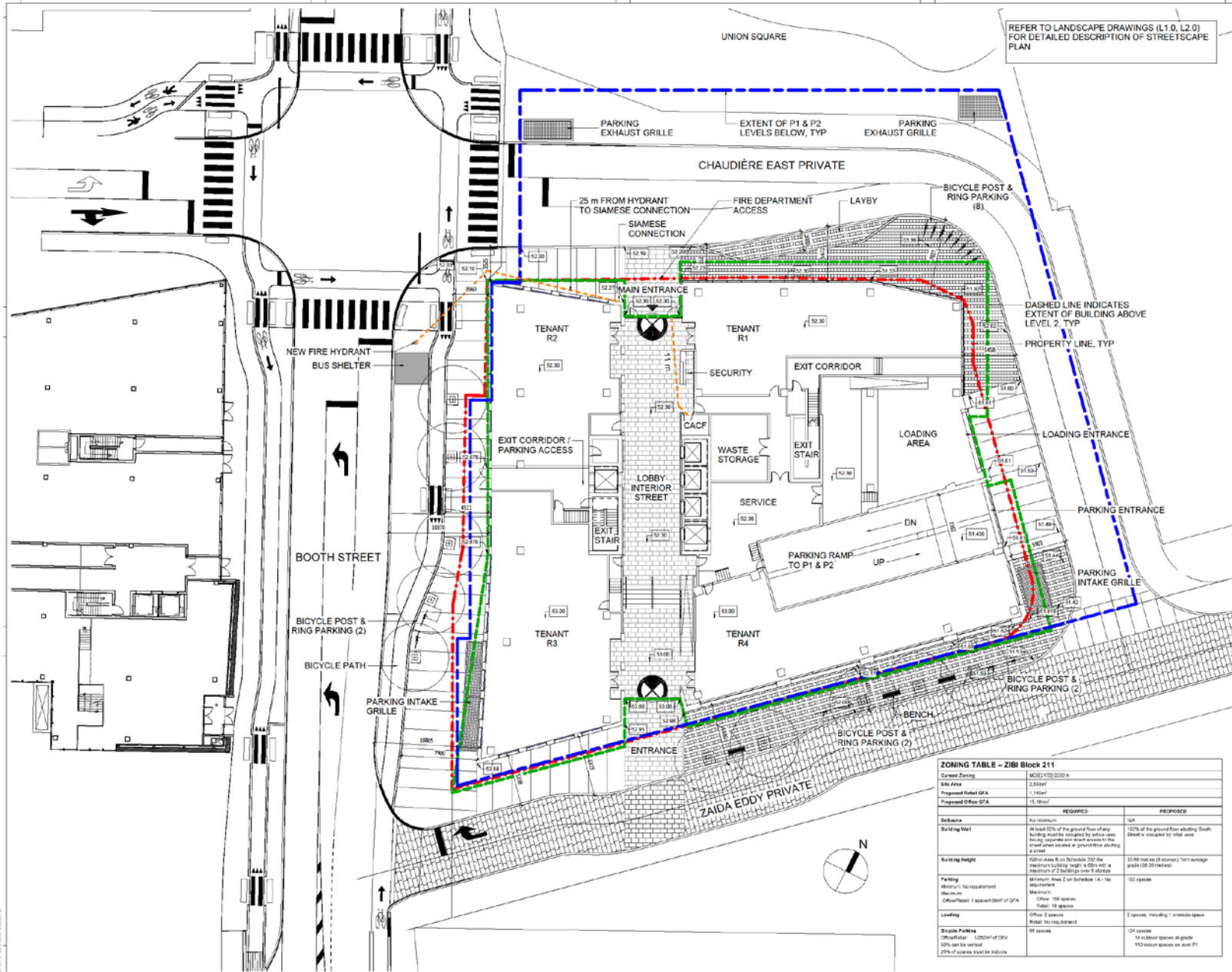
The current submission is for Block 211 which is located on the east side of Booth Street in the southeast quadrant of the Booth Street/Chaudière East intersection. In the previously approved plans, Block 211 was comprised of 60,166 ft² of residential condominium development (70 to 80 units). The current proposal/Site Plan for Block 211 as shown in Figure 2, is comprised of approximately 163,300 ft² (15,164 m²) of office with 12,270 ft² (1140 m²) of ground floor supporting retail accommodated in a 9 storey building with 2 levels of below grade parking. With regard to any projected change in block traffic generation, the approved residential use was projected to generate an approximate two-way total of 15 veh/h during the weekday morning and afternoon peak hours. As the proposed use is office with a negligible parking requirement, it's traffic generation will be different and needs to be quantified. It is assumed that the ground floor retail is service/support retail and not destination retail and as such will have no/negligible peak hour vehicle trips. It's trip generation will be predominately pedestrian oriented from the immediate neighborhood.

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

As noted, the approximately 175,500 ft² (16,305m²) office/retail proposal for Block 211 is for a tenant with a related By-law requirement for 0 parking spaces and a tenant requirement for 2 parking spaces. This parking requirement would obviously have a negligible traffic impact; however, service vehicle and drop-off/pick-up traffic would have to be accounted for.


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

Figure 2: Site Plan



ZONING TABLE - ZIBI Block 211

Current Zoning	MCO 4702 0320 N	
Site Area	2,034 m ²	
Proposed Decked OPA	1,180 m ²	
Proposed Office OPA	35,160 m ²	
	REQUIRED	PROPOSED
Setbacks	See minimum	See minimum
Building Foot	At least 50% of the ground floor of any building must be occupied by active use or well uses located at ground floor abutting a street.	70% of the ground floor abutting Booth Street is required for office area.
Building Height	Within Area B on Schedule 532 the maximum building height is 45m with a maximum of 2 buildings used in alternate.	33.6m max with 15 stories' turn coverage grade (0.25 meters).
Parking	Minimum: 1 per 100 sqm of OPA Office: 100 spaces Retail: 10 spaces	100 spaces
Loading	Office: 2 spaces Retail: No requirement	2 spaces, including 1 on-site space
Bicycle Parking	60 spaces	24 spaces 16 on-site spaces at grade 140 on-site spaces on level P1



REFER TO LANDSCAPE DRAWINGS (L1.0, L2.0) FOR DETAILED DESCRIPTION OF STREETSCAPE PLAN

PROJECT
CLIENT
407 PLAN

DATE
DRAWING TITLE

SCALE
SCALE 1:125
DATE: 06/27/19

DRAWING NO.
ZIBI BLOCK 211
A003

DESIGNED BY
CHECKED BY
DATE

PROJECT NO.
ZIBI BLOCK 211

DRAWING NO.
A003

REVISIONS

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

Table 1: Chaudière East: Parking Supply/Demand Estimate

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

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

4. PROJECTED BLOCK 211 VEHICLE TRIP GENERATION

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

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

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

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

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

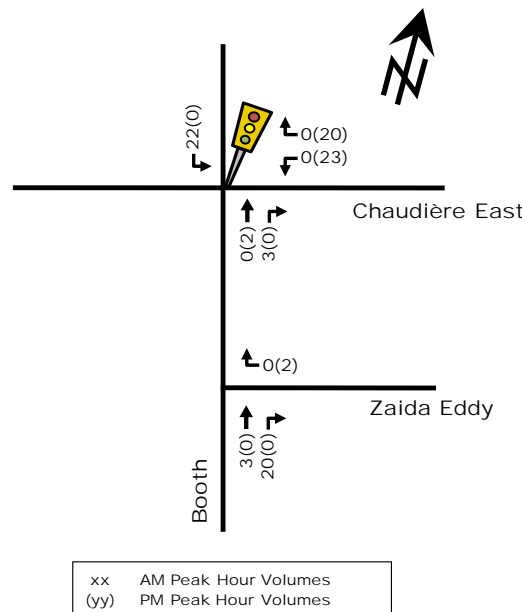
- 150 spaces x 90% functional capacity = 135 spaces.
- 135 spaces - 5 service vehicle spaces = 130 spaces
- 130 spaces x 0.35 peak hour factor = 45 veh/h inbound in the morning peak hour and outbound during the afternoon peak hour.
- The peak hour traffic generation in the opposite direction of peak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

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

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

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

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



5. TRAFFIC IMPACT ANALYSIS

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

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

Figure 4: Revised Full Zibi Development Total Projected Volumes

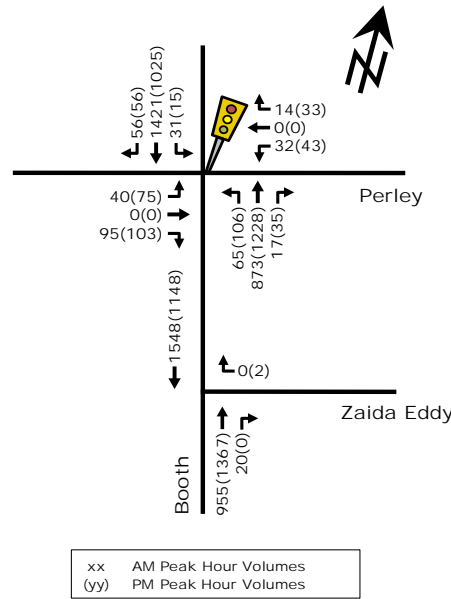


Table 2: Revised Full Zibi Development Projected Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Booth/Chaudière East						
No Background Traffic reduction	F(F)	1.17(1.01)	SBT(NBT)	67.6(34.5)	F(E)	1.12(0.96)
With 380 veh/h removed from southbound through traffic during the morning peak.	D(F)	0.87(1.01)	SBT(NBT)	15.7(34.5)	C(E)	0.79(0.96)
From the Dec 2015 TIA update	F(F)	1.17(1.01)	SBT(NBT)	68.2(34.1)	F(E)	1.12(0.97)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

6. MULTI-MODAL OVERVIEW

As a result of a recent consultation/design exercise, the adjacent Booth Street corridor has been designed as a “complete street” and is to be constructed as such in 2019. The corridor/cross-sections include City approved sidewalk widths, raised cycle tracks, and transit facilities as depicted in Attachment #1.

On site, as per Figure 2: Site Plan, there will be wide sidewalks on all sides of the Block 211 building, an interior north-south lobby through the building (at ground level and locked at night) and external bicycle racks, all to accommodate the walking and cycling needs of the buildings tenants and visitors.

With regard to the walk/bike/transit mode share, these are challenging to estimate given the approach used herein to estimate site-generated traffic. The best approach is to take the office use mode share from the TIA and apply it to the proposed new 175,000 ft² office building and reduce the auto drive component to match the peak hour vehicle trips calculated herein. The net difference is person trips will then be reallocated to the transit/walk/bike mode share. Table 3 depicts the peak hour person trips by mode, using the TIA mode shares. Table 4 depicts the peak hour person trips following adjustments of the mode shares to reflect Block 211’s estimated vehicle trip generation.

Table 3 : Block 211 Office Trip Generation using TIA Mode Shares

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	30%	129	35	164	53	136	189
Auto Passenger	5%	22	6	28	9	23	32
Transit	45%	193	51	244	78	203	281
Non-motorized	20%	85	23	108	35	90	125
Total Person Trips	100%	429	115	544	175	452	627
Total 'New' Office Auto Trips		129	35	164	53	136	189

Table 4: Block 211 Modal Share Adjusted Table 2 Volumes to Reflect this Report Vehicle Trip Generation

Travel Mode	Mode Share		AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
	AM Peak	PM Peak	In	Out	Total	In	Out	Total
Auto Driver	11%	10%	50	10	60	10	50	60
Auto Passenger	5%	5%	20	7	27	9	23	32
Transit	59%	60%	253	68	321	110	267	377
Non-motorized	25%	25%	106	30	136	47	111	158
Total Person Trips	100%	100%	429	115	544	174	453	627
Total 'New' Office Auto Trips			50	10	60	10	50	60

As can be seen from the Table 4 volumes, with the reduced and shared Block 211 parking supply, there will be an increase in the related transit/non-motorized person trips generated by the proposed 175,000 ft² office building. Peak hour transit person trips are estimated to be in the 325 to 375 range and peak hour walk/bike trips are estimated to be in the 130 to 160 range. These volumes will be accommodated via the pedestrian and transit facilities in the “soon to be constructed” complete street design for the Booth Street corridor. Both Ottawa and Gatineau’s relatively close rapid transit facilities will assist in providing the necessary transit capacity. As previously noted, Block 211 is proposed to have 110 bicycle parking spaces on the first parking level.

7. SITE PLAN OVERVIEW

Block 211 and the east sector of Zibi Ontario have two vehicular connections to Booth Street. As shown on Figure 2: Site Plan and the Attachment #1 drawings, the southerly connection, Zaida Eddy Private, will be a right-in/right-out only vehicular connection and designed/operated as a two-way woonerf with a width of 6.0 m. The northerly primary connection is the signalized Booth/Chaudière East intersection which has left turn lanes in all four approaches. This connection will be the primary route for service vehicles and for vehicles travelling to/from the parking garage. Its width is 6.0 m except on this approach to Booth Street where it widens to approximately 11 m.

To accommodate passenger drop-off/pick-ups two-vehicle lay-by is proposed on the south side of Chaudière East just east of the building’s main entrance. This lay-by is 2.0 m wide and 12.7m long.

Access to the proposed two-level garage is at the east end of the block adjacent to the loading area. The ramp is 7.2 m wide including a 0.6 m wide centre median. The ramp grade is 15% with 7.5% transition grades at the top and bottom of the ramp. With regard to the parking space and aisle dimensions, we are advised by the project architect that they meet By-Law requirements. The same applies for bicycle parking requirements.

The pedestrian facilities around and through the site are excellent. The northside pedestrian space ranges from 1.9 m (adjacent to Ray-by lane) to 7.7 m wide, the east side pedestrian space ranges from 3.5 to 5.7 m wide and the south side pedestrian space ranges from 4.7 m to 6.7 m wide. The south side widths are greatest as this link also extends east to serve future development blocks and park space located at the east end of the island. Two textured east-west pedestrian crosswalks are also proposed across the internal street between Block 211 and 212.

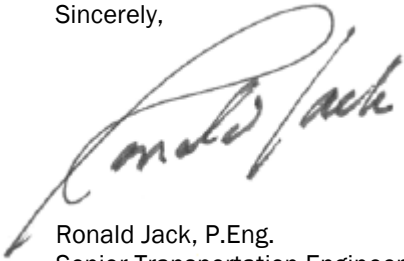
8. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing analysis, the findings, conclusions, and recommendations of this report are as follows:

- The current proposed Block 211 development is comprised of 175,500 ft² of office development as compared to the previous proposal for 60,166 ft² (70 to 80 unit) residential development;
- As the tenant and By-Law parking requirements are negligible, and as the site is constrained as to the number of parking space that can be provided, only approximately 150 spaces will be provided over two underground levels. The significant majority of these space will be to meet the future parking requirements of other adjacent development blocks. A total of 110 bicycle parking spaces are also proposed on the first parking level;
- Due to the limited need for Block 211 parking, an alternative approach to site traffic generation was undertaken. The approach used was based on parking supply and not trip rates per 1000 ft² of office as this traditional approach would result in an over estimation of vehicle trips;
- The Block 211 office use is projected to generate 60 veh/h two-way total during both peak periods, with this being a net increase of 45 veh/h compared to the previously assumed residential use. This additional peak hour traffic, when assigned to the two-site access/egress points has negligible impact on the operation of these two intersections;
- The resultant site-generated modal shares are 10% to 11% auto drivers, 49% to 50% transit and 35% “non-motorized”.
- With the combination of the Booth Street complete street design (to be constructed in 2019) and the proposed on-site pedestrian and cycling facilities which connect to Booth Street, the proposed Block 211 development is very well serviced from a multi-modal perspective; and
- The on-site details with respect to parking garage layout/design, ramp design, sidewalk width and street width are all acceptable and considered good design.

Based on the foregoing, the proposed Zibi Ontario Phase 1 development and specifically Block 211 continues to be recommended from a transportation perspective. If there are any questions, please contact the undersigned.

Sincerely,



Ronald Jack, P.Eng.
Senior Transportation Engineer

Attachments

Attachment #1 - Contract Drawings for Booth/Chaudière East and Booth/Head Intersections

WINDMILL DEVELOPMENT GROUP
 BOOTH STREET
 ROADWAY RECONSTRUCTION
 UNION BRIDGE TO MIDDLE STREET

Contract No. 602835 Draw No. 13
 Sheet 13 of 14

Asset No.
 Asset Group

PARSONS

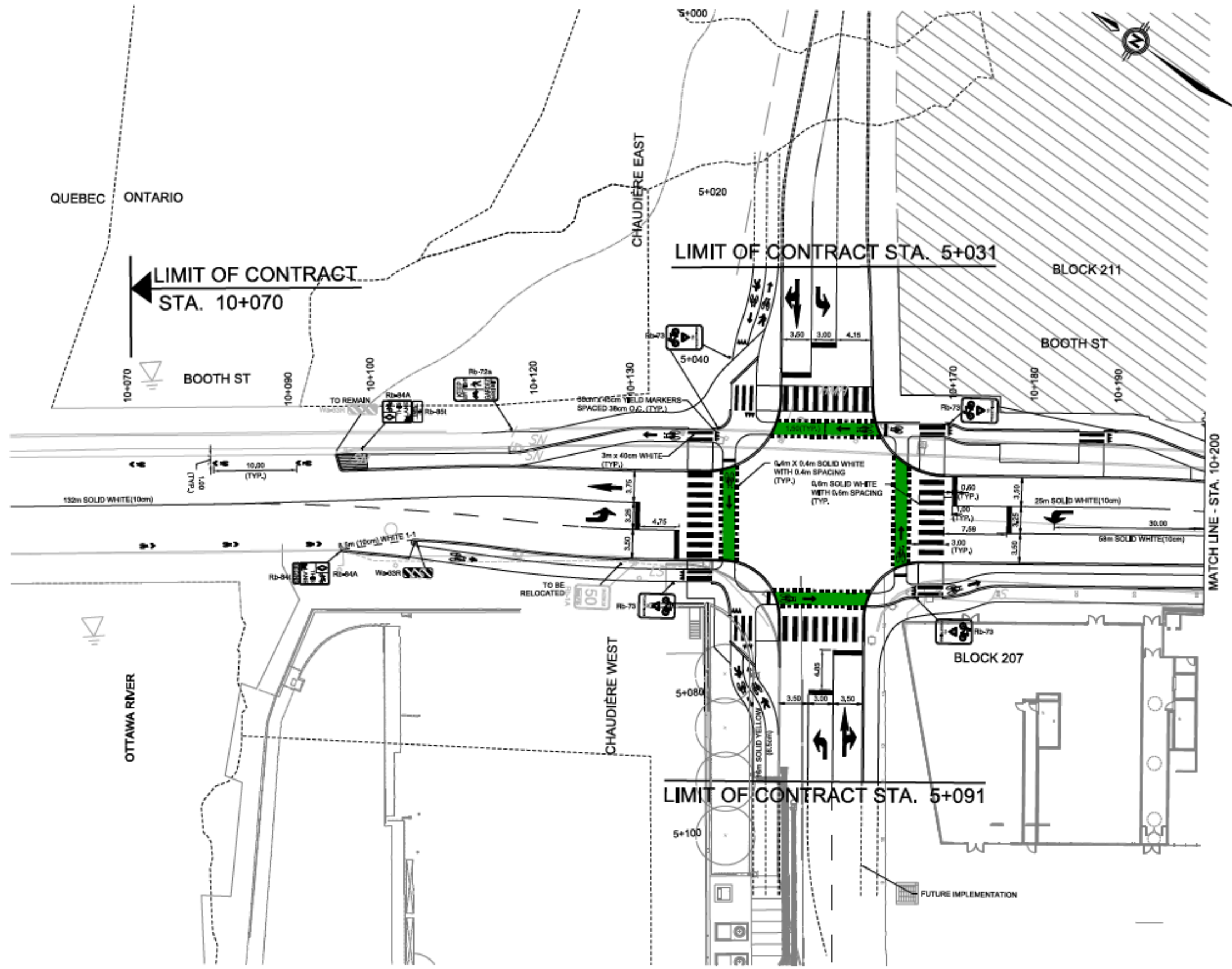
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Const. Inspector

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NOTE: The location of utility is approximate only, the exact location should be determined by consulting the marked utility files and utility companies concerned. The contractor shall provide the location of utilities and shall be responsible for adequate protection from damage.

No.	Description	By	CHK (DATE)
1	ISSUED FOR TENDER	JEF	01/08/10
2	ISSUED FOR DEVELOPMENT REVIEW	CR	10/05/10



QUEBEC ONTARIO

LIMIT OF CONTRACT
 STA. 10+070

LIMIT OF CONTRACT STA. 5+031

BLOCK 211

BOOTH ST

MATCH LINE - STA. 10+200

OTTAWA RIVER

CHAUDIÈRE WEST

LIMIT OF CONTRACT STA. 5+091

BLOCK 207

FUTURE IMPLEMENTATION

WINDMILL DEVELOPMENT GROUP
 BOOTH STREET
 ROADWAY RECONSTRUCTION
 UNION BRIDGE TO MIDDLE STREET

Contract No. 602835 Dep. No. 014
 Sheet 14 of 14

PAVEMENT MARKINGS AND SIGNAGE 2
 STA. 10+200 to LIMIT OF CONTRACT
 (FOR INFORMATION ONLY)

Asset No.
 Asset Group

PARSONS

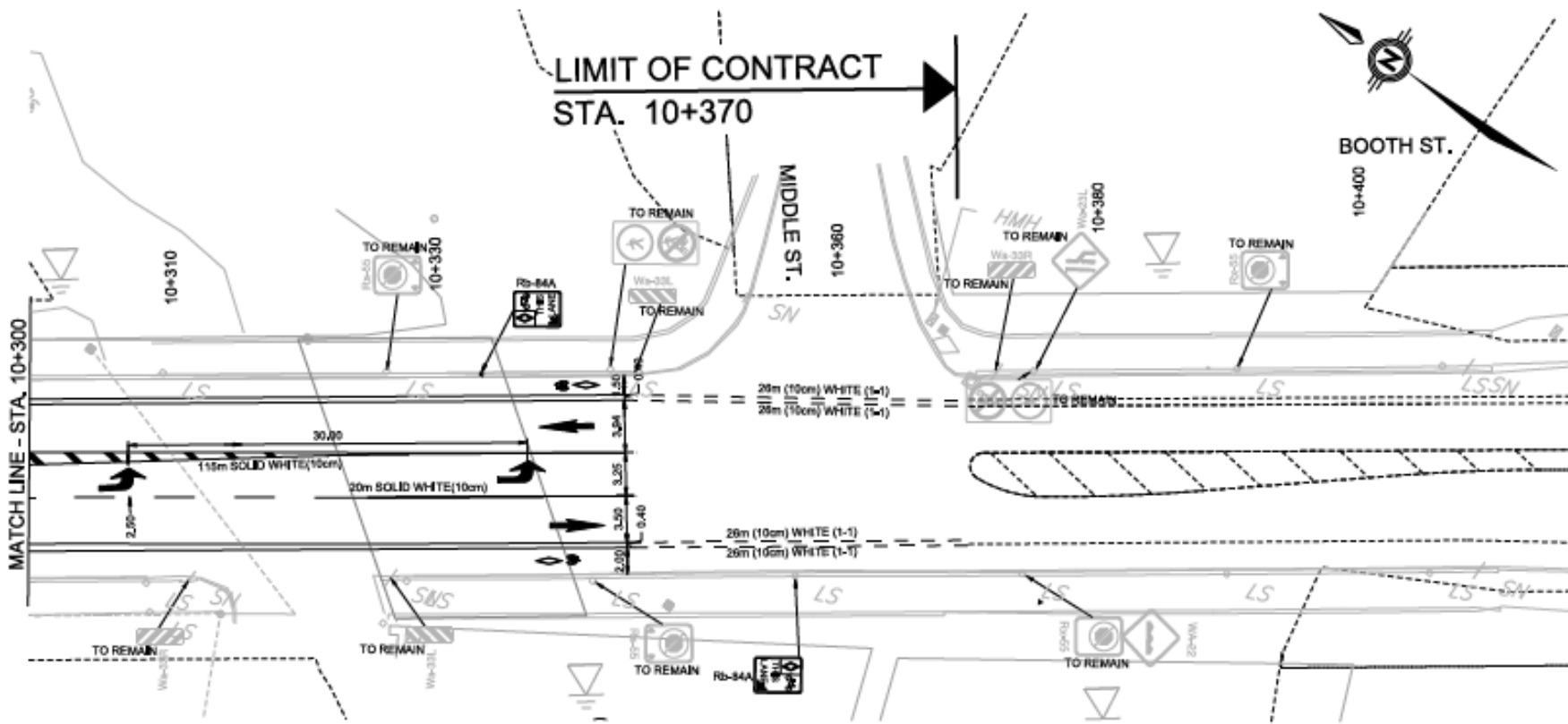
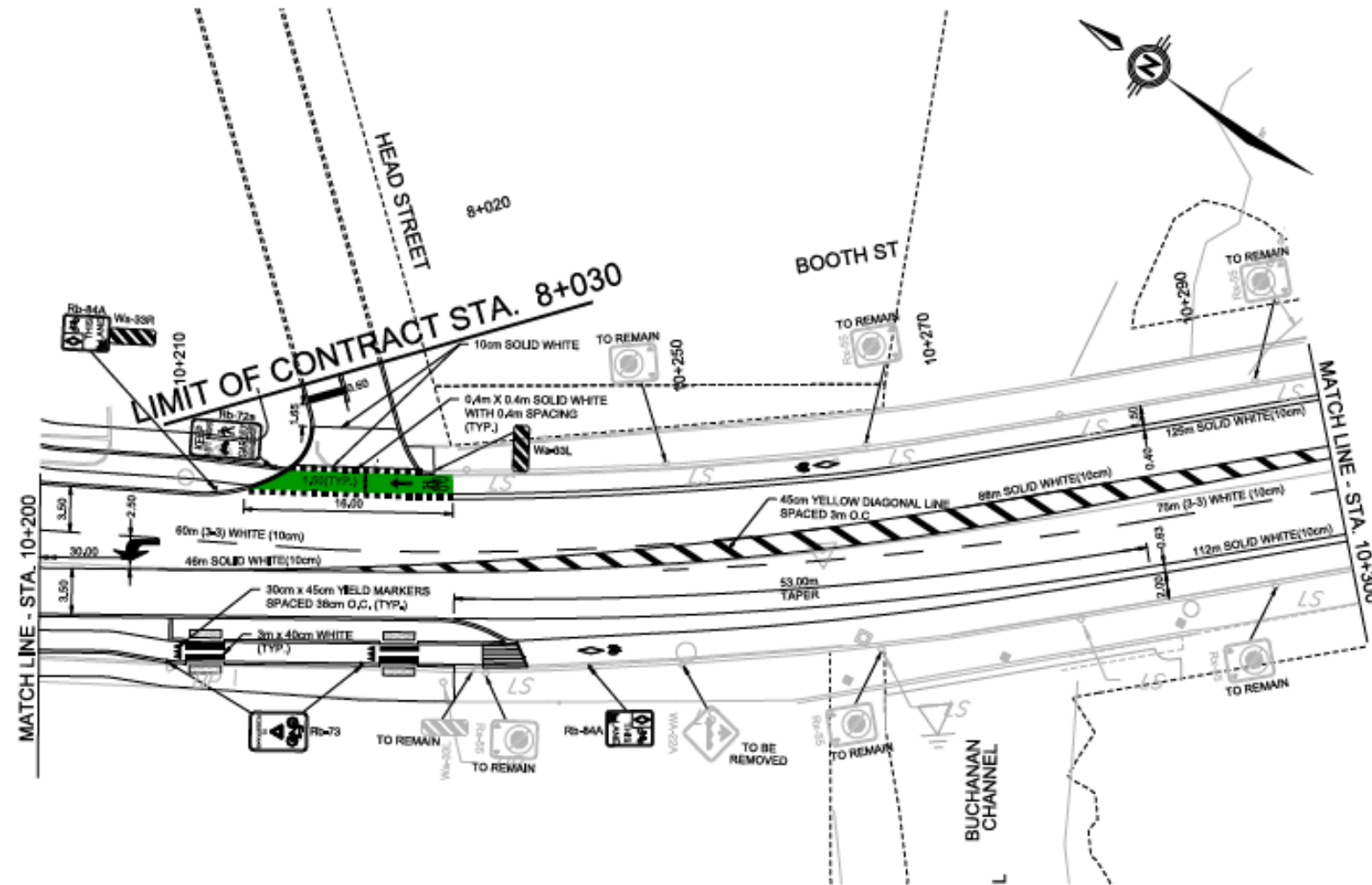
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 Date: DWG: CR
 Utility Ctr. No. Index No.

Coord. Inspector

Scale: HORIZONTAL
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NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the available authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

No.	Description	By	Date
1	ISSUED FOR TENDER	JAF	01/06/19
2	ISSUED FOR DEVELOPMENT REVIEW	CR	16/05/19



Attachment #2 - Zibi Ontario Parking Supply Update



ZIBI PARKING ESTIMATES

OTTAWA

	Residential Units	Retail GFA (m2)	Office GFA (m2)	Number of Parking Levels	Floor Plate Area (m2)	Confirmed Parking Count	Anticipated Supply	Notes
Chaudière West								
Blocks 201-202-203	355	954	-	2	5,143	246	-	Assumed parking efficiency of 0.375. The confirmed parking count is taken from the Hobin study of these blocks (Option 2, dated June 11, 2018).
Blocks 204A-204B	125	2,323	11,613	2	2,880		85	Assumed parking efficiency of 0.2 Stats based on GFA Table
Block 205A	71	768	-	2	-	71	-	Per approved plans
Block 301	-	-	-	2	-	135	-	Per approved plans
Block 205B	-	-	8,663	0	-	0	-	No parking per Rodney May 14/19 Stats from Jan 25/19 UDRP package
Block 206	178	291	754	2	2,917	94	-	Per May 1/19 concept
Block 207	-	-	6,522	0	-	68	-	Per submitted 207 plans
Block 208	-	100	1,298	0	-	0	-	Per approved plans
Albert Island								
Block 209	-	1,394	9,290	0	-	0	-	No parking per Rodney May 14/19 Stats from GFA table
Block 210A-210B	-	-	5,482	0	-	0	-	No parking per Rodney May 14/19 Stats from GFA table
Chaudière East								
Block 211	-	-	16,314	2	-	150	-	Approximate number from current 211 concept plans
Block 212	-	1,394	18,580	1	1,613		45	50% of block area
Block 213-214-215	245	372	-	2	3,990		221	Stats taken from GFA table and units assumed based on area of blocks (800sf/unit)
TOTAL	974	7,595	78,516			764	351	

	Provided/ Anticipated Parking	Anticipated Market Demand	By-law Requirement	Visitor Requirement
	246	213	0	30
	85	237	0	6
	71	64	0	6
	135	-	-	-
	0	65	0	0
	94	106	0	17
	68	49	0	0
	0	13	0	0
	0	122	0	0
	0	41	0	0
	150	122	0	0
	45	192	0	0
	221	136	0	23
TOTAL	1,115	1,361	-	82

MARKET DEMAND ASSUMPTIONS	
Residential	0.5 per unit
Retail	3.75 per 100sm
Office	0.75 per 100sm
Community	0.57 per 100sm
Hotel	0.5 per room
Parking Efficiency	0.375
Parking Space Area	13.52 sm

Attachment #3 – Synchro Analysis Results

Projected Total Site - AM
1: Booth & Site

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	40	0	32	0	65	873	31	1421
Future Volume (vph)	40	0	32	0	65	873	31	1421
Lane Group Flow (vph)	42	100	34	15	68	937	33	1555
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	25.0	25.0	25.0	25.0
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)	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6
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	5.9	5.9	5.9	5.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	13.2	13.2	13.2	13.2	94.9	94.9	94.9	94.9
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.79	0.79	0.79	0.79
v/c Ratio	0.33	0.52	0.29	0.05	1.15	0.70	0.09	1.17
Control Delay	54.9	29.1	53.9	0.3	188.5	10.2	4.3	101.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	54.9	29.1	53.9	0.3	188.5	10.5	4.3	101.9
LOS	D	C	D	A	F	B	A	F
Approach Delay		36.8		37.5		22.6		99.9
Approach LOS		D		D		C		F
Queue Length 50th (m)	9.6	7.7	7.7	0.0	-18.3	70.4	1.2	-426.7
Queue Length 95th (m)	19.8	23.7	17.1	0.0	#35.9	155.6	4.7	#536.6
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)	174	241	160	348	59	1336	350	1328
Starvation Cap Reductn	0	0	0	0	0	85	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	0.24	0.41	0.21	0.04	1.15	0.75	0.09	1.17

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: 1.17
 Intersection Signal Delay: 67.6
 Intersection Capacity Utilization 106.1%
 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



Projected Total Site - PM
1: Booth & Site

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	75	0	43	0	106	1228	15	1025
Future Volume (vph)	75	0	43	0	106	1228	15	1025
Lane Group Flow (vph)	79	108	45	35	112	1330	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	24.9	24.9	24.9	24.9
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)	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6
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	5.9	5.9	5.9	5.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.1	14.1	14.1	14.1	94.0	94.0	94.0	94.0
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.78	0.78	0.78	0.78
v/c Ratio	0.60	0.41	0.38	0.15	0.52	1.01	0.19	0.87
Control Delay	68.2	8.0	56.9	1.5	15.8	41.7	9.8	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0
Total Delay	68.2	8.0	56.9	1.5	15.8	49.8	9.8	19.0
LOS	E	A	E	A	B	D	A	B
Approach Delay		33.4		32.7		47.1		18.9
Approach LOS		C		C		D		B
Queue Length 50th (m)	18.0	0.0	10.0	0.0	7.8	-267.3	0.8	146.8
Queue Length 95th (m)	33.2	8.8	21.3	0.0	28.7	#423.3	4.1	#328.1
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)	168	301	151	263	216	1319	86	1310
Starvation Cap Reductn	0	0	0	0	0	33	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	0.47	0.36	0.30	0.13	0.52	1.03	0.19	0.87

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 34.5
 Intersection LOS: C
 Intersection Capacity Utilization 107.8%
 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: 1: Booth & Site



Projected Total Site, Reduced SBT - AM
1: Booth & Site

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	40	0	32	0	65	873	31	1041
Future Volume (vph)	40	0	32	0	65	873	31	1041
Lane Group Flow (vph)	42	100	34	15	68	937	33	1155
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	25.0	25.0	25.0	25.0
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)	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-1.9	-1.9	-1.9	-1.9
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	15.2	15.2	15.2	15.2	96.8	96.8	96.8	96.8
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.81	0.81	0.81	0.81
v/c Ratio	0.29	0.35	0.29	0.05	0.30	0.69	0.09	0.86
Control Delay	51.1	5.6	52.2	0.3	7.5	9.0	3.7	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	51.1	5.6	52.2	0.3	7.5	9.3	3.7	16.6
LOS	D	A	D	A	A	A	A	B
Approach Delay		19.1		36.3		9.2		16.3
Approach LOS		B		D		A		B
Queue Length 50th (m)	9.4	0.0	7.6	0.0	2.7	61.9	1.1	109.8
Queue Length 95th (m)	19.4	5.5	16.9	0.0	10.8	143.1	4.3	#329.7
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)	193	327	157	371	228	1363	359	1350
Starvation Cap Reductn	0	0	0	0	0	95	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	0.22	0.31	0.22	0.04	0.30	0.74	0.09	0.86

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: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 13.9
 Intersection Capacity Utilization 81.8%
 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



Projected Total Site, Reduced SBT - PM
 1: Booth & Site

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	75	0	43	0	106	1228	15	1025
Future Volume (vph)	75	0	43	0	106	1228	15	1025
Lane Group Flow (vph)	79	108	45	35	112	1330	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	24.9	24.9	24.9	24.9
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)	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6
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	5.9	5.9	5.9	5.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.1	14.1	14.1	14.1	94.0	94.0	94.0	94.0
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.78	0.78	0.78	0.78
v/c Ratio	0.60	0.41	0.38	0.15	0.52	1.01	0.19	0.87
Control Delay	68.2	8.0	56.9	1.5	15.8	41.7	9.8	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0
Total Delay	68.2	8.0	56.9	1.5	15.8	49.8	9.8	19.0
LOS	E	A	E	A	B	D	A	B
Approach Delay		33.4		32.7		47.1		18.9
Approach LOS		C		C		D		B
Queue Length 50th (m)	18.0	0.0	10.0	0.0	7.8	-267.3	0.8	146.8
Queue Length 95th (m)	33.2	8.8	21.3	0.0	28.7	#423.3	4.1	#328.1
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)	168	301	151	263	216	1319	86	1310
Starvation Cap Reductn	0	0	0	0	0	33	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	0.47	0.36	0.30	0.13	0.52	1.03	0.19	0.87

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 34.5
 Intersection LOS: C
 Intersection Capacity Utilization 107.8%
 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: 1: Booth & Site



Projected Total Site (Dec 2015) - AM

1: Booth & Site

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	40	0	32	0	65	873	9	1421
Future Volume (vph)	40	0	32	0	65	873	9	1421
Lane Group Flow (vph)	42	100	34	15	68	934	9	1555
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	25.0	25.0	25.0	25.0
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)	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6
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	5.9	5.9	5.9	5.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	13.2	13.2	13.2	13.2	94.9	94.9	94.9	94.9
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.79	0.79	0.79	0.79
v/c Ratio	0.33	0.52	0.29	0.05	1.15	0.70	0.03	1.17
Control Delay	54.9	29.1	53.9	0.3	188.5	10.1	3.8	101.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	54.9	29.1	53.9	0.3	188.5	10.4	3.8	101.9
LOS	D	C	D	A	F	B	A	F
Approach Delay		36.8		37.5		22.5		101.3
Approach LOS		D		D		C		F
Queue Length 50th (m)	9.6	7.7	7.7	0.0	-18.3	70.0	0.3	-426.7
Queue Length 95th (m)	19.8	23.7	17.1	0.0	#35.9	153.7	1.8	#536.6
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)	174	241	160	348	59	1337	350	1328
Starvation Cap Reductn	0	0	0	0	0	86	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	0.24	0.41	0.21	0.04	1.15	0.75	0.03	1.17

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: 1.17
 Intersection Signal Delay: 68.2
 Intersection LOS: E
 Intersection Capacity Utilization 106.1%
 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: 1: Booth & Site



Projected Total Site (Dec 2015) - PM

1: Booth & Site

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	75	0	20	0	106	1226	15	1025
Future 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	24.9	24.9	24.9	24.9
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)	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6
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	5.9	5.9	5.9	5.9
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.1	14.1	14.1	14.1	94.0	94.0	94.0	94.0
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.78	0.78	0.78	0.78
v/c Ratio	0.59	0.41	0.18	0.06	0.52	1.01	0.18	0.87
Control Delay	67.7	8.0	49.5	0.5	15.8	41.2	9.7	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	7.9	0.0	0.0
Total Delay	67.7	8.0	49.5	0.5	15.8	49.1	9.7	19.0
LOS	E	A	D	A	B	D	A	B
Approach Delay		33.2		29.9		46.5		18.9
Approach LOS		C		C		D		B
Queue Length 50th (m)	18.0	0.0	4.6	0.0	7.8	-260.2	0.8	146.1
Queue Length 95th (m)	33.2	8.8	12.0	0.0	28.7	#421.8	4.1	#328.1
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)	170	301	151	263	216	1319	87	1310
Starvation Cap Reductn	0	0	0	0	0	33	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	0.46	0.36	0.14	0.05	0.52	1.03	0.18	0.87

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 34.1
 Intersection LOS: C
 Intersection Capacity Utilization 107.7%
 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: 1: Booth & Site

