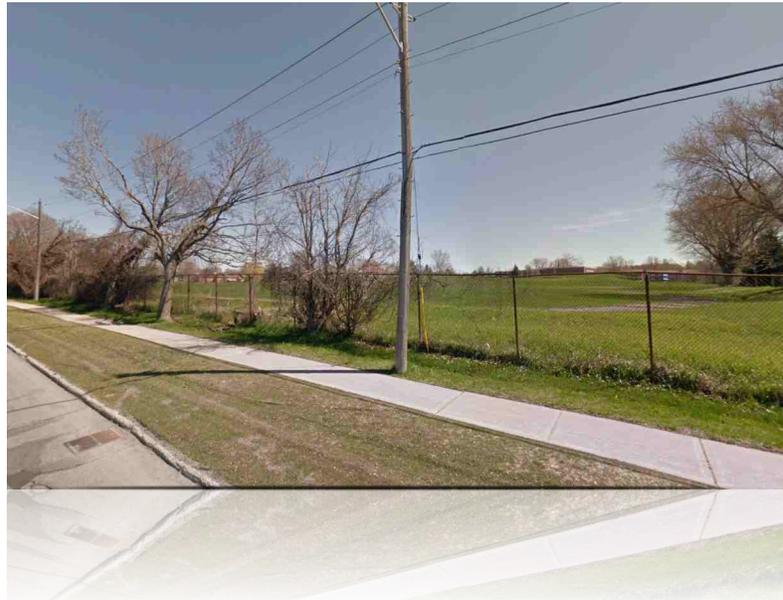
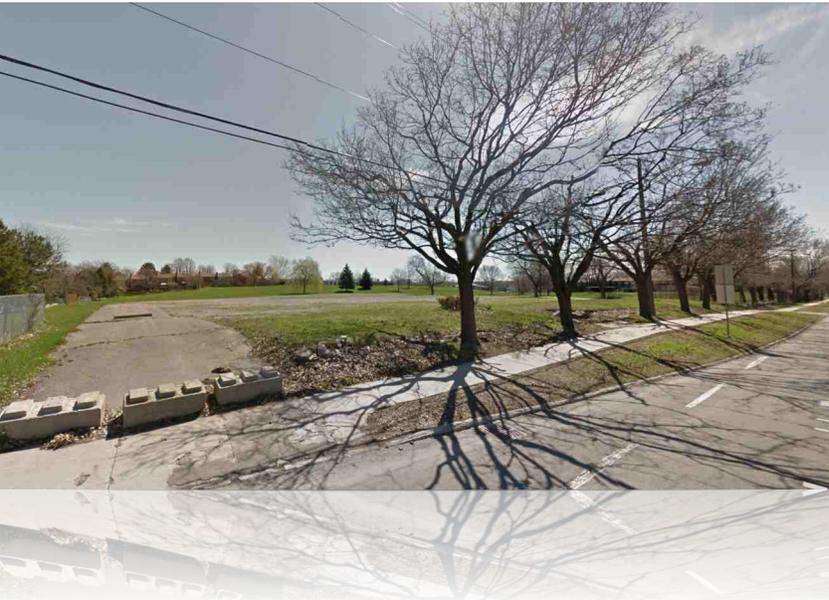




# 3071 RIVERSIDE DRIVE

Community Transportation Study/  
Transportation Impact Study

April 2017



## 3071 Riverside Drive

### Community Transportation Study/ Transportation Impact Study

prepared for:  
Canoe Bay Retirement Community  
51 Cortleigh Drive  
Ottawa, ON K2J 3Z8

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April 24, 2017

476207 - 01000

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# Community Transportation Study/Transportation Impact Study

## 1. INTRODUCTION

From the information provided, a residential development consisting of approximately 62 townhouses/flats, 40 apartments, 522 senior/retirement apartments, approximately 1,800 m<sup>2</sup> of ground floor retail, and a day care facility are being proposed on the property municipally known as 3071 Riverside Drive. The proposed site is located east of Riverside Drive and just south of Mooney’s Bay Place. Site access is proposed via two unsignalized right-in/right-out driveway connections to Riverside Drive, a new full-movement signalized intersection to Riverside Drive, and a full movement driveway connection to Springland Drive (for the day care facility, only). The local context of the site is provided as Figure 1 and the proposed Site Plan is provided as Figure 2.

Figure 1: Local Context



As part of the rezoning and Site Plan Application process, the City of Ottawa requires a submission of a formal Transportation Impact Assessment (TIA) consistent with their guidelines dated October 2006. With respect to these guidelines and for a rezoning/Site Plan application, a combined Community Transportation Study/Transportation Impact Study (CTS/TIS) is considered the appropriate type of study.

For the purpose of this assessment, horizon years will be analyzed for the year 2019 representing full occupancy, and at the year 2024, which is 5-years beyond full build-out. The study area will consist of the signalized Riverside/Mooney’s Bay, Riverside/Walkley, and Walkley/Springland intersections.

**SITE STATISTICS:**

SITE AREA:	43,155 m <sup>2</sup> (10.66 ACRES)
PUBLIC PARK:	6,060 m <sup>2</sup> (14.1%) (1.50 ACRES)
TOTAL LANDSCAPED OPEN AREA:	18,760 m <sup>2</sup> (43.5%)
BUILDING FOOTPRINT:	10,645 m <sup>2</sup> (24.7%)
DRIVEWAYS:	7,620 m <sup>2</sup> (17.7%)

**BUILDING STATISTICS:**

TYPE 'A' (TOWNHOUSES):	26
TYPE 'B' (FLATS):	36
TYPE 'C' (APARTMENTS):	14
2 LEVEL:	26
COMMERCIAL AREA: 1800s m <sup>2</sup>	
TYPE 'D' (RETIREMENT):	249
STUDIO:	28
1 BEDROOM:	28
TYPE 'E' (SENIORS APARTMENTS):	83
1 BEDROOM:	64
2 BEDROOM:	247
<b>TOTAL:</b>	<b>628</b>

**PARKING STATISTICS:**

TYPE 'A' (X1 0/UNIT):	26
RECD VISITOR:	0
PROVIDED:	26
TYPE 'B' (X1 2/UNIT):	43
RECD RES:	0
RECD VISITOR:	0
PROVIDED:	43
TYPE 'C' (X1 2/UNIT):	48
RECD RES:	0
RECD VISITOR:	0
PROVIDED:	48
COMMERCIAL (3.4/100m <sup>2</sup> ):	61
RECD VISITOR:	61
PROVIDED:	61
TYPE 'D' (X0 25/UNIT):	69
RECD VISITOR:	0
RECD PERSONAL SERVICE:	15
PROVIDED:	84
TYPE 'E' (X0 25/UNIT):	62
RECD RES:	0
RECD VISITOR:	15
RECD PERSONAL SERVICE:	156
PROVIDED:	176
TYPE 'F' (DAYCARE):	10
RECD VISITOR:	10
PROVIDED:	10
<b>TOTAL REQUIRED:</b>	<b>355</b>
<b>PROVIDED:</b>	<b>422</b>
TOTAL COVERED BLD A:	29
TOTAL COVERED BLD B:	36
TOTAL COVERED BLD C:	36
TOTAL UPGROUND BLD D & E:	239
TOTAL SURFACE PARKING:	73
<b>TOTAL PROVIDED PARKING:</b>	<b>422</b>



**CANOE BAY COMMUNITY**  
3071 RIVERSIDE DRIVE OTTAWA ONTARIO

**CONCEPT PLAN**  
**SITE PLAN**  
PLOT DATE: Friday, April 21, 2017

SCALE: 1:1250  
ISSUED FOR: ZONING

ria/architecture



**Figure 2: Proposed Site Plan**

## 2. EXISTING CONDITIONS

### 2.1. AREA ROAD NETWORK

---

**Riverside Drive** is a north-south arterial, which extends from River Road in the south (where it continues as Limebank Road) to Tremblay Road in the north (where it continues as Vanier Parkway). Within the study area, Riverside Drive has a four-lane divided cross section with auxiliary turn lanes provided at major intersections. The posted speed limit within the study area is 60 km/h.

**Walkley Road** is an east-west arterial, which extends from Riverside Drive in the west to Ramsayville Road in the east. Within the study area, Walkley Road has a four-lane undivided cross section with auxiliary turn lanes provided at major intersections. The posted speed limit is 50 km/h.

**Springland Drive** is a collector roadway with a two-lane cross-section. The posted speed limit is 40 km/h.

**Mooney's Bay Place** is a local roadway with a two-lane cross-section. On-street parking is permitted on both sides of the roadway and the posted speed limit is 40 km/h.

### 2.2. PEDESTRIAN/CYCLING NETWORK

---

Sidewalk facilities in the vicinity of the site are provided along both sides of Riverside Road, Mooney's Bay Place, Springland Drive, and Walkley Road. Bicycle facilities are currently provided in the form of a multi-use off-road pathway on Riverside Drive along the west side of the road. Springland Drive is noted as a 'suggested route' from Otterson Drive to Flannery Drive.

According to the City's Cycling Plan, Riverside Road and Walkley Road are all classified as "Spine Routes" and Springland Road from Walkley Road to Flannery Drive is classified as a "Local Route". Bicycle lanes are planned as a Phase 2 City project along Walkley Road from Riverside Drive to the Transitway.

### 2.3. TRANSIT NETWORK

---

Transit service within the vicinity of the site is currently provided by OC Transpo Local Route #87 which provides frequent all-day service and by OC Transpo Connexion Route #290 which provides services during the morning and afternoon peak hours, only. Bus stops for Route #87 are located along Riverside Drive at the Riverside/Mooney's Bay and Riverside/Walkley intersections, approximately 100 to 200 m from the proposed development. Bus stops for Route #290 are located along Springfield Drive at Walton Court approximately 50 metres south of the proposed day care facility.

Rapid transit service (in the form of BRT) is also provided via Walkley Station, located approximately 2 kilometres east of the proposed development, which provides convenient access to multiple routes along the Transitway.

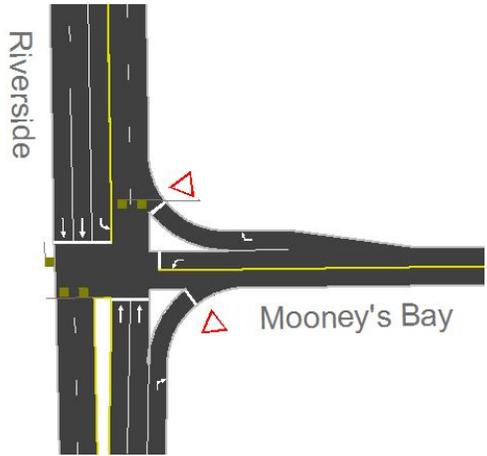
Figure 3: Area Transit Network



**2.4. EXISTING STUDY AREA INTERSECTIONS**

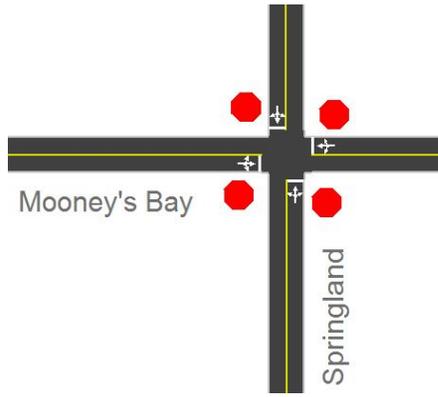
**Riverside/Mooney's Bay**

The Riverside/Mooney's Bay intersection is a signalized 'T' intersection. The westbound approach consists of a left-turn lane and a single, channelized right-turn lane. The northbound approach consists of two through lanes and a channelized right lane. The southbound approach consists of two through lanes and a single left-turn lane. There is a "no right-turn" restriction during the morning peak period in the northbound direction (turning onto Mooney's Bay Place). All other movements are permitted at this location.



**Mooney's Bay/Springland**

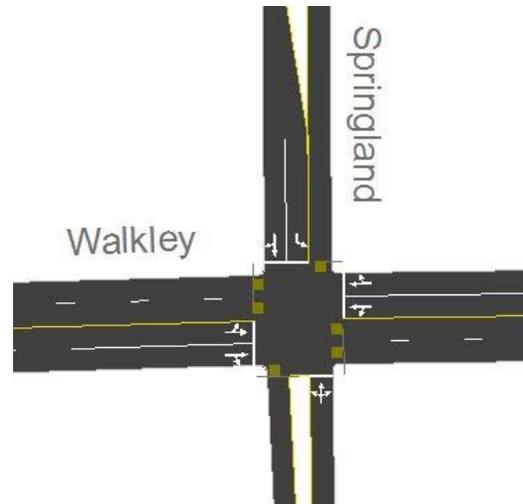
The Mooney's Bay/Springland intersection is an unsignalized four-legged intersection with STOP control on all approaches. A single lane approach is provided for each leg of this intersection with all movements permitted.



# PARSONS

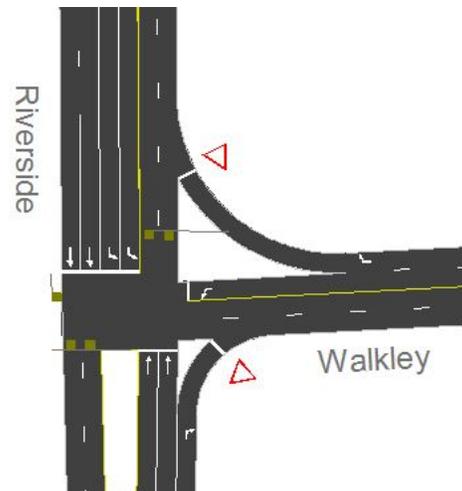
## Springland/Walkley

The Springland/Walkley intersection is a signalized four-legged intersection. The east and westbound approaches both consist of a shared through/right-turn lane and a shared through/left-turn lane. The northbound approach consists of a single left-turn lane and a shared through/right-turn lane. The southbound approach consists of a single full-movement lane. There is a “no right-turn” restriction during the morning peak hour in the westbound direction (turning onto Springland Drive). All other movements are permitted at this location.



## Walkley/Riverside

The Walkley/Riverside intersection is a signalized 'T' intersection. The westbound approach consists of a single left-turn lane and a single channelized right-turn lane. The northbound approach consists of two through lanes and a single channelized right-turn lane. The southbound approach consists of two through lanes and dual left-turn lanes. Signal heads are provided for cyclists on the eastbound approach. All movements are permitted at this location.

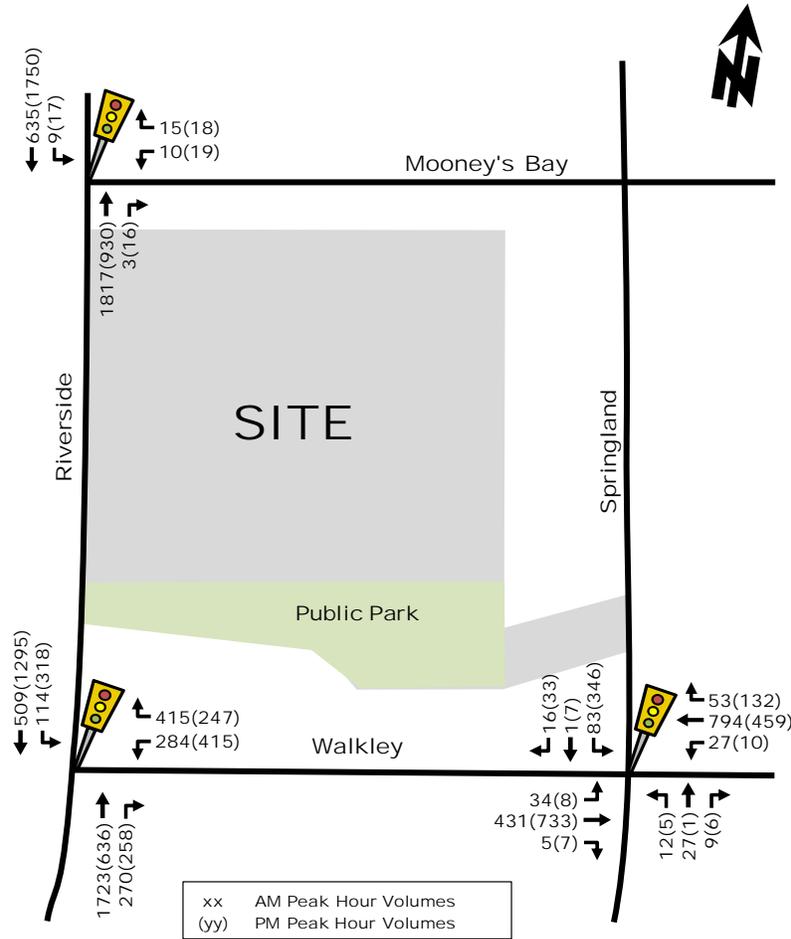


## 2.5. EXISTING INTERSECTION OPERATIONS

Illustrated as Figure 4, are the most recent weekday morning and afternoon peak hour traffic volumes obtained from the City of Ottawa for the Riverside/Walkley, Riverside/Mooney's Bay, and Walkley/Springland intersections. Peak hour traffic volumes are included as Appendix A.

It is noteworthy that the westbound right-turn movement at the Walkley/Springland intersection is prohibited during the morning peak period. However, based on the provided traffic count data, approximately 80 vehicles perform this movement between the posted restricted hours of 7AM to 9AM. The northbound right-turn movement at the Riverside/Mooney's Bay intersection is also prohibited during the morning peak period. Based on the traffic count, approximately 10 vehicles perform this movement between 7AM and 9AM. It is understood that these right-turn restrictions are provided to help minimize 'cut-through' traffic on Springland Drive.

Figure 4: Existing Peak Hour Traffic Volumes



The following Table 1 provides a summary of existing traffic operations at study area intersections based on the SYNCHRO (V9) 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. The SYNCHRO model output of existing conditions is provided within Appendix B.

Table 1: Existing Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection ‘as a whole’		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Riverside/Mooney's Bay	B(B)	0.65(0.62)	NBT(SBT)	4.4(4.8)	B(B)	0.64(0.61)
Otterson/Springland/Walkley	A(D)	0.43(0.83)	WBT(SBL)	8.9(17.1)	A(A)	0.36(0.53)
Riverside/Walkley	E(D)	0.95(0.87)	NBT(WBL)	29.2(29.6)	E(C)	0.91(0.72)

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 1, the signalized Riverside/Mooney’s Bay and Walkley/Springland study area intersections ‘as a whole’ are currently operating at an excellent LoS ‘B’ or better during both peak hours, with respect to the City of Ottawa operating standards of LoS ‘D’ or better (v/c ≤ 0.90). The Riverside/Walkley intersection is currently operating at capacity (LoS ‘E’) during the weekday morning peak hour and operating at an acceptable LoS ‘C’ during the afternoon peak hour.

With regard to 'critical movements' at study area intersections, the northbound through movement at the Riverside/Walkley intersection is currently operating at capacity (LoS 'E') during the weekday morning peak hour. All other 'critical movements' at study area intersections are currently operating at an acceptable LoS 'D' or better during peak hours.

There is a significant volume of southbound left-turning vehicles at the Walkley/Springland intersection during the afternoon peak hour (approximately 350 veh/h). The analysis indicates that this movement operates at an LoS 'D' and the 95<sup>th</sup> percentile queue is noted to be approximately 70 m and may not clear the intersection in one signal cycle. The average queue length is noted to be 40 m.

Queues in the northbound direction at the Walkley/Riverside intersection are approximately 200 to 280 m long during the morning peak hour and the 95<sup>th</sup> percentile queue may not clear the intersection in one signal cycle. Similarly, during the afternoon peak hour, in the southbound direction along Riverside Drive, the 95<sup>th</sup> percentile queues are approximately 150 to 200 m long.

## 2.6. EXISTING ROAD SAFETY CONDITIONS

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Collision history for study area roads (2013 to 2015, inclusive) was obtained from the City of Ottawa and most collisions (85%) involved only property damage, indicating low impact speeds, and 11% involved personal injuries. 2% of accidents were identified as "non-reportable", indicating the total damage to a vehicle was less than \$1,000. There was one fatal accident involving a pedestrian along Riverside Drive in 2015.

The primary causes of collisions cited by police include; rear end (50%), sideswipe (17%), and single vehicle (9%) type collisions.

A standard unit of measure for assessing collisions at an intersection is based on the number collisions per million entering vehicles (MEV). At intersections within the study area, reported collisions have historically take place at a rate of:

- 0.13/MEV at the Riverside/Mooney's Bay intersection; and
- 0.70/MEV at the Riverside/Walkley intersection.

It is noteworthy that a fatal accident involving a pedestrian and a pick-up truck occurred along Riverside Drive between Mooney's Bay Place and Walkley Road in July 2015. Within the provided data, between 2013 and 2015, no collisions were reported at the Walkley/Springland intersection. The source collision data as provided by the City of Ottawa and related analysis is provided as Appendix C.

## 2.7. SCREENLINE OPERATIONS

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The relevant screenlines located north and south of the proposed development are:

- SL 13 – CNR East with stations at Riverside Drive, Airport Parkway, Bank Street, Conroy Road, Hawthorne Road, and McCarthy Road
  - Located south of the site; and
- SL 19 – Rideau River with stations at Billings Bridge (Bank Street), George Dunbar Bridge (Bronson Avenue), and George McIlwraith Bridge (Smyth Road)
  - Located north of the site.

The 2013 Screenline count data was obtained from the City of Ottawa and is included in Appendix D. The existing performance of the relevant study area screenlines is summarized below in Table 2.

Table 2: Existing Screenline Performance

Screenline	Peak Directional Demand <sup>1</sup> (PCU) <sup>2</sup>		Directional Capacity <sup>3</sup> (PCU)	v/c	
	AM Peak	PM Peak		AM Peak	PM Peak
CNR East (SL #13)	8,472	10,405	10,400	0.81 (LoS 'D')	1.00 (LoS 'E')
Rideau River (SL#19)	3,852	4,875	5,670	0.68 (LoS 'B')	0.86 (LoS 'D')

1. 2013 volumes obtained from the City of Ottawa  
 2. PCU (Passenger Car Units) were assumed to be the sum of autos and 2 x heavy vehicles  
 3. Directional capacities were obtained from the City's 2008 Transportation Master Plan – Road Infrastructure Needs Study

As shown in Table 2, SL 13 is currently operating at capacity (v/c = 1.00) and SL 19 is operating at an acceptable LoS 'D' (v/c = 0.86) during the afternoon peak hour. It can be seen that there is limited available spare capacity across these two screenlines. The planned Airport Parkway widening will help alleviate some of the capacity constraints along Screenline 13.

### 3. DEMAND FORECASTING

#### 3.1. PLANNED STUDY AREA TRANSPORTATION NETWORK CHANGES

A notable transportation network change within vicinity of the proposed development is the planned widening of the Airport Parkway from 2 lanes to 4 lanes from Leirim Road to just south of Flannery Road. The section north of Hunt Club Road is identified as a Phase 1 City project to be completed by 2020 to 2021 and the section south of Hunt Club Road is identified as a Phase 3 City project to be completed by 2031. This planned widening will accommodate traffic traveling to/from the planned future development within the vicinity of the airport and further south. Given Riverside Drive is a major north-south arterial, similar to Airport Parkway, this widening will increase the overall north-south capacity for vehicles.

Identified on the 'Network Concept' map within the TMP is the widening of Riverside Drive from 4-lanes to 6-lanes between River Road and Hunt Club Road. Transit priority measures (in the form of transit signal priority and queue jump lanes) are identified on the 'Transit Network Concept' map along Riverside Drive between Hunt Club Road and Heron Road. As these City projects are not identified within the 'Affordable Network', they will likely be planned/implemented post 2031.

#### 3.2. OTHER AREA DEVELOPMENT AND BACKGROUND TRAFFIC GROWTH

There is significant growth expected within the Riverside South community. Some trip generated by the future development within this community will likely use Riverside Drive to travel to/from the north. The Airport Parkway will also provide access to/from the north for this community.

Given the significant growth expected within the Riverside South community, the traffic along Riverside Drive is expected to increase at a constant rate. Given the high vehicle volumes currently experienced along Riverside Drive, a 1% traffic growth rate per annum was assumed for the 2019 and 2024 Horizon years. The projected background traffic volumes for the Horizon years is illustrated as Figure 5 for 2019 and Figure 6 for 2024.

Figure 5: Projected 2019 Baseline Traffic Volumes

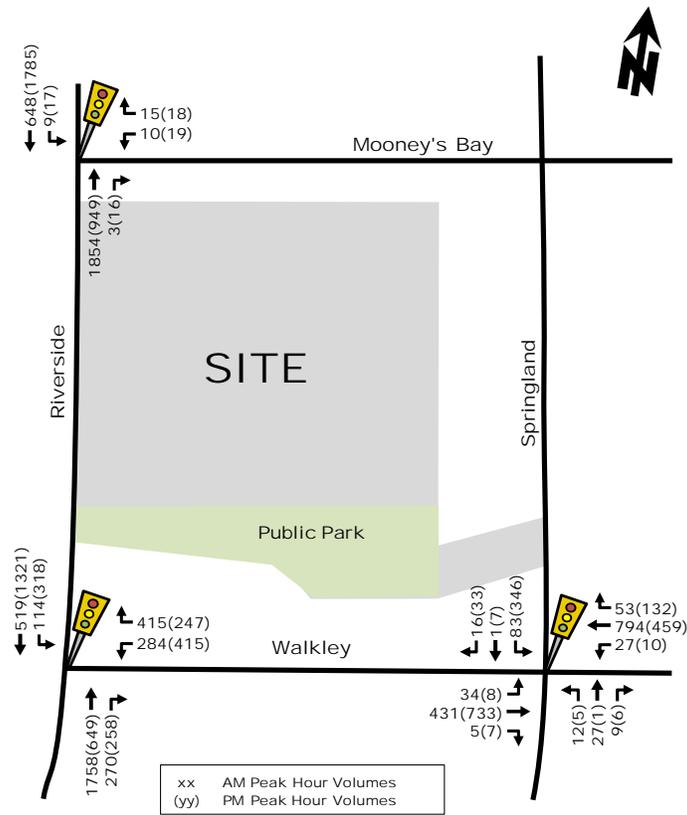
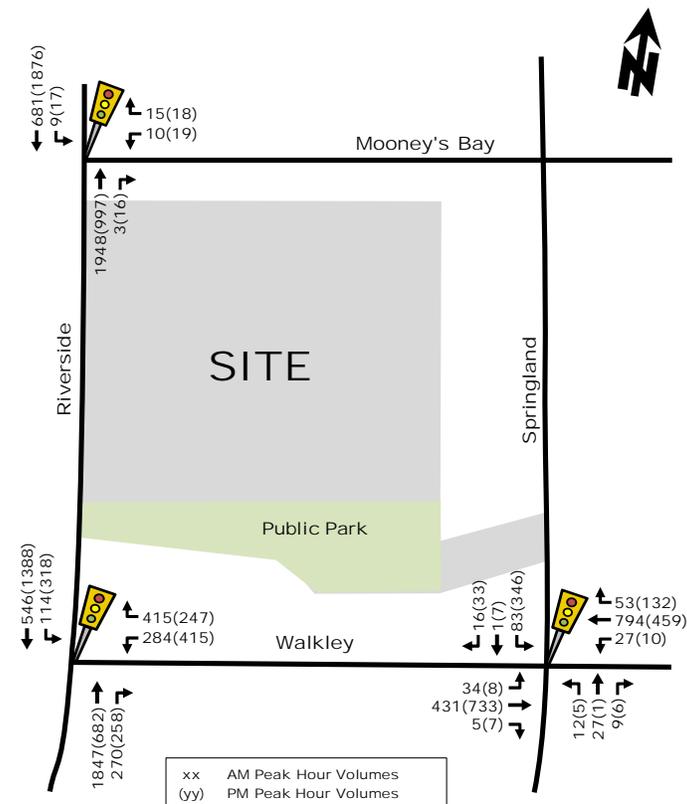


Figure 6: Projected 2024 Baseline Traffic Volumes



**3.3. SITE TRIP GENERATION**

Appropriate trip generation rates for the proposed development consisting of 62 townhomes/flats, 40 low-rise apartments, 247 senior apartments, a 275 unit retirement residence, approximately 1,800 m<sup>2</sup> (19,375 ft<sup>2</sup>) of ground floor retail and a 10 employee day care facility were obtained from the 9<sup>th</sup> Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, which are summarized in Table 3.

Table 3: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Residential Townhomes/Condominiums	ITE 230	$T = 0.44(du);$ $\ln(T) = 0.80 \ln(du) + 0.26$	$T = 0.52(du);$ $\ln(T) = 0.82 \ln(du) + 0.32$
Low-Rise Apartments	ITE 221	$T = 0.46(du);$ $\ln(T) = 0.82 \ln(du) + 0.23$	$T = 0.58(du);$ $\ln(T) = 0.88 \ln(du) + 0.16$
Senior Adult Housing - Attached	ITE 252	$T = 0.20(du);$ $T = 0.20(du) - 0.13$	$T = 0.25(du);$ $T = 0.24(du) + 1.64$
Retirement Community	ITE 255	$T = 0.14(du);$ $\ln(T) = 0.85 \ln(du) - 0.82$	$T = 0.16(du);$ $\ln(T) = 0.89 \ln(du) - 0.99$
Specialty Retail Centre	ITE 826	$T = 1.36(X);$ $T = 1.20(X) + 10.74$	$T = 2.71(X);$ $T = 2.40(X) + 21.48$
Day Care Facility	ITE 565	$T = 4.85(emp)$	$T = 4.73(emp)$
<i>Notes: T = Average Vehicle Trip Ends  X = 1000 ft<sup>2</sup> Gross Floor Area  du = dwelling units  emp = employee  Specialty Retail AM Peak is assumed to be 50% of the PM Peak</i>			

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 4.

Table 4: Modified Person Trip Generation

Land Use	Area	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Condos/Townhomes	62 du	7	39	46	35	18	53
Low-Rise Apartments	40 du	7	27	34	25	14	39
Senior Adult Housing	247 du	21	43	64	42	37	79
Retirement Community	275 du	44	24	68	28	44	72
Specialty Retail Centre	19,375 ft <sup>2</sup>	24	20	44	38	50	88
Day Care Facility	10 employees	33	30	63	28	33	61
<b>Total Person Trips</b>		<b>136</b>	<b>183</b>	<b>319</b>	<b>196</b>	<b>196</b>	<b>392</b>
<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 4 for the proposed site were then reduced by modal share values, including a reduction for 'pass-by' trips based on the site's location and proximity to adjacent communities, employment, other shopping uses and transit availability. Modal share and 'pass-by' values for residential, specialty retail and day care land uses within the proposed development are summarized in Tables 5, 6, and 7, respectively, with the total site-generated vehicle traffic summarized in Table 8.

Table 5: Residential Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	55%	45	75	120	74	64	138
Auto Passenger	15%	14	22	36	20	19	39
Transit	20%	14	25	39	25	21	46
Non-motorized	10%	6	11	17	11	9	20
Total Person Trips	100%	79	133	212	130	113	243
<b>Total 'New' Auto Trips</b>		<b>45</b>	<b>75</b>	<b>120</b>	<b>74</b>	<b>64</b>	<b>138</b>

Table 6: Specialty Retail Centre Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	55%	14	11	25	21	28	49
Auto Passenger	15%	4	3	7	6	7	13
Transit	20%	4	4	8	8	10	18
Non-motorized	10%	2	2	4	3	5	8
Total Person Trips	100%	24	20	44	38	50	88
Less Retail 30% Pass-By		-4	-4	-8	-7	-7	-14
<b>Total 'New' Auto Trips</b>		<b>10</b>	<b>7</b>	<b>17</b>	<b>14</b>	<b>21</b>	<b>35</b>

Table 7: Day Care Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	55%	19	17	36	16	19	35
Auto Passenger	15%	5	4	9	5	5	10
Transit	20%	6	6	12	5	6	11
Non-motorized	10%	3	3	6	2	3	5
Total Person Trips	100%	33	30	63	28	33	61
<b>Total 'New' Auto Trips</b>		<b>19</b>	<b>17</b>	<b>36</b>	<b>16</b>	<b>19</b>	<b>35</b>

The following Table 8 provides a summary of potential two-way vehicle trips to/from the proposed development.

Table 8: Total Site Vehicle Trip Generation

Land Use	AM Peak (veh/h)			PM Peak (veh/h)		
	In	Out	Total	In	Out	Total
Residential	45	75	120	74	64	138
Specialty Retail Centre	14	11	25	21	28	49
Day Care Facility	19	17	36	16	19	35
Retail Pass-By (30%)	-4	-4	-8	-7	-7	-14
<b>Total 'New' Auto Trips</b>	<b>74</b>	<b>99</b>	<b>173</b>	<b>104</b>	<b>104</b>	<b>208</b>

As shown in Table 8, the resulting number of potential 'new' two-way vehicle trips for the proposed development is approximately 175 and 210 veh/h during the weekday morning and afternoon peak hours, respectively.

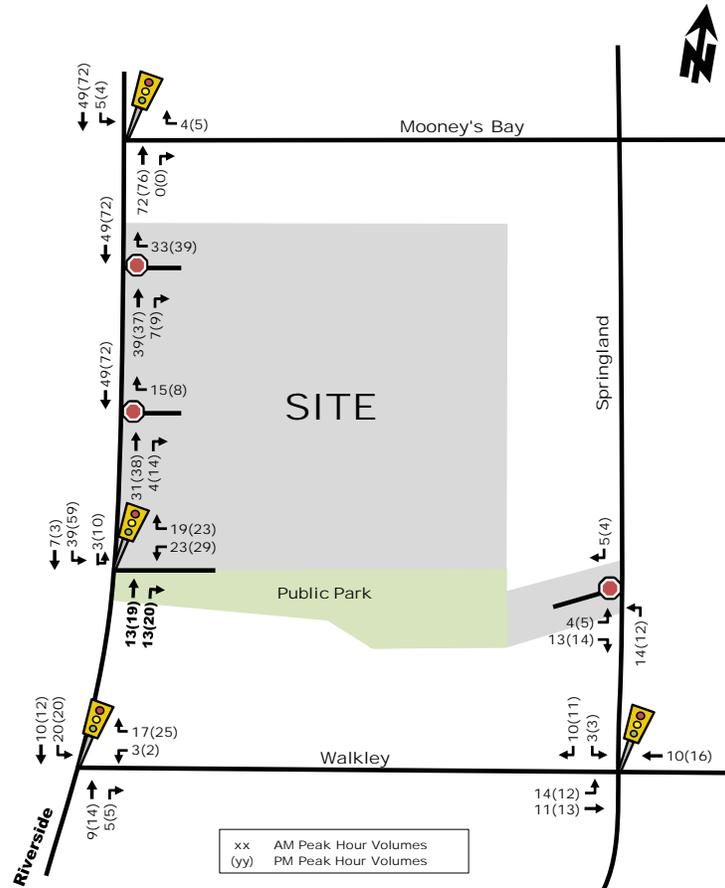
**3.4. VEHICLE TRAFFIC DISTRIBUTION AND ASSIGNMENT**

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

- 70% to/from the north via Riverside Drive;
  - 15% to/from the south via Riverside Drive; and
  - 15% to/from the east via Walkley Road.
- 100%

Based on these distributions, 'new' and 'pass-by' site-generated trips were assigned to study area intersections, which are illustrated as Figure 7.

Figure 7: 'New' and 'Pass-by' Site-Generated Traffic Volumes

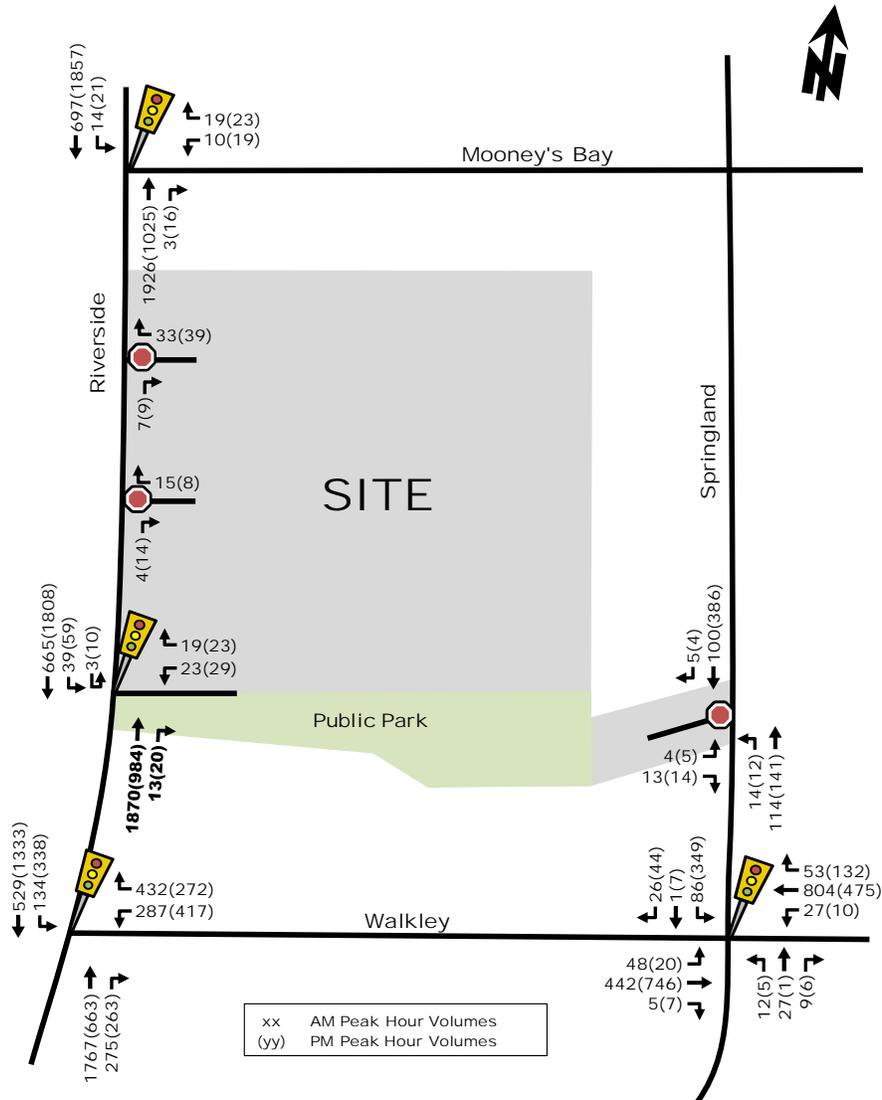


## 4. FUTURE TRAFFIC OPERATIONS

### 4.1. PROJECTED 2019 CONDITIONS AT FULL SITE DEVELOPMENT

The total projected 2019 volumes associated with the proposed development were derived by superimposing 'new' and 'pass-by' site-generated traffic volumes (Figure 7) onto projected 2019 background traffic volumes (Figure 5). The resulting total projected 2019 volumes are illustrated as Figure 8.

Figure 8: Total Projected 2019 Peak Hour Traffic Volumes



The following Table 9 provides a projected performance summary for study area intersections, based on total projected 2019 traffic volumes. The detailed SYNCHRO model output of projected 2019 conditions is provided within Appendix E.

Table 9: Projected 2019 Performance of Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Riverside/Mooney's Bay	B(B)	0.69(0.66)	NBT(SBT)	4.2(5.0)	B(B)	0.68(0.65)
Walkley/Springland	A(D)	0.44(0.83)	WBT(SBL)	9.1(17.4)	A(A)	0.37(0.55)
Riverside/Walkley	E(D)	0.98(0.89)	NBT(WBL)	32.1(30.4)	E(C)	0.94(0.74)
Riverside/Signalized Site	B(B)	0.69(0.66)	NBT(SBT)	3.5(5.7)	B(B)	0.67(0.65)
Riverside/Site N	B(B)	10.2(11.4)	WBR(WBR)	0.1(0.2)	-	-
Riverside/Underground Parking	B(B)	11.0(10.9)	WBR(WBR)	0.1(0.0)	-	-
Springland/Site	A(B)	9.1(11.3)	EBL(EBL)	1.1(0.6)	-	-

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 9, the signalized study area intersections 'as a whole' continue to operate similar to the existing conditions. The Riverside/Mooney's Bay and Walkley/Springland intersections are projected to operate at acceptable levels of service LoS 'B' or better and the Riverside/Walkley intersection is projected to operate at capacity (LoS 'E') during the morning peak hour.

The 'critical movements' are projected to operate with an acceptable level of service during both peak hours, with the exception of the critical northbound through movement at the Riverside/Walkley, which is projected to operate at capacity (LoS 'E'). The westbound left-turn movement at the Riverside/Walkley intersection is projected to operate close to capacity (v/c = 0.89) during the afternoon peak hour.

North and southbound queues along Riverside Drive are projected to be approximately 225 to 290 m long, which is similar to the existing condition. As Riverside Drive currently operates close to or at capacity with long queues in the peak direction, the 1% growth rate that was applied to Riverside Drive will slightly increase projected queues and delays.

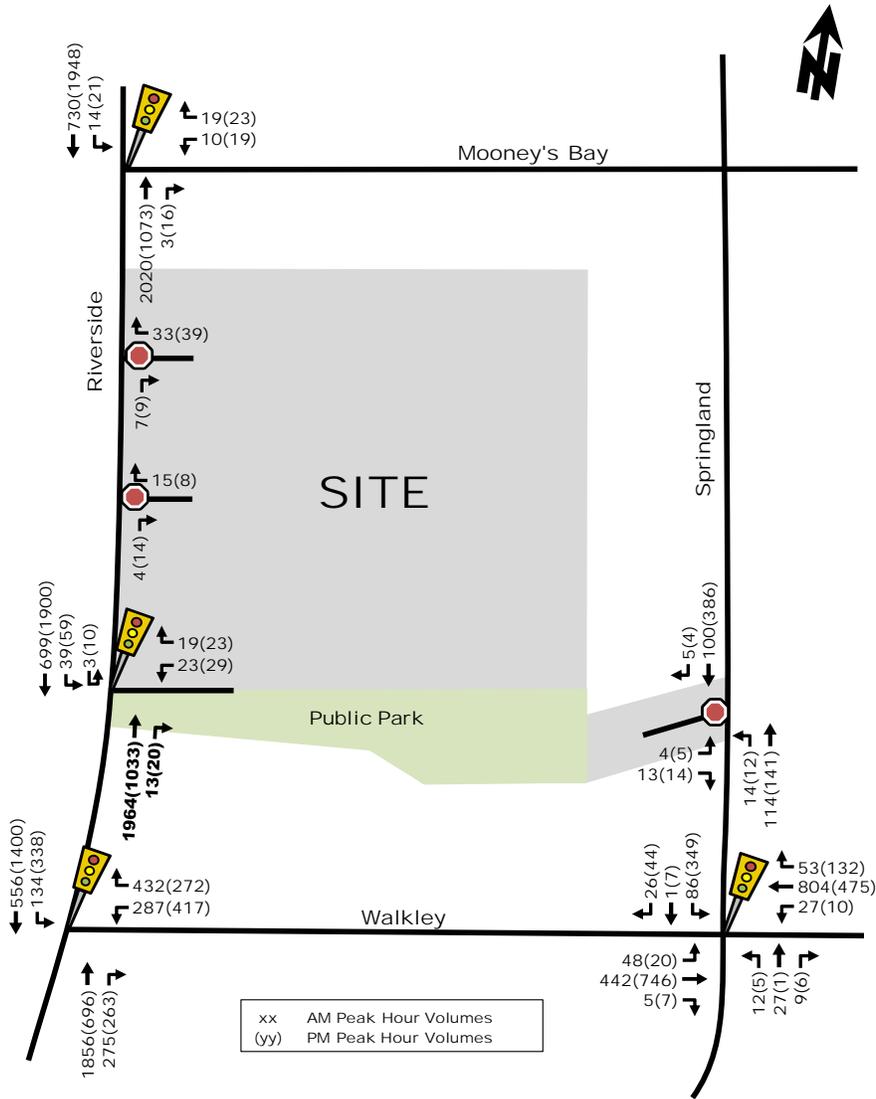
The proposed new signalized site driveway connection to Riverside Drive is projected to operate at an acceptable LoS 'B' during both peak hours. Based on the projected traffic volumes, a signal at this location is not warranted. Signal warrant analysis is included as Appendix F and shows a 17% warrant. However, through discussions with the City and based on analysis of alternative vehicle access, a signal is proposed along Riverside Drive to provide access directly to the residential development. This minimizes additional traffic along local roads such as Springland Drive and Mooney's Bay Place. Additionally, unsignalized full-movement access to Riverside Drive at this location is unfeasible given the high traffic volumes along Riverside Drive and the existing median.

The right-in/right-out driveway connections to Riverside Drive are projected to operate with acceptable delays of approximately 10 to 12 seconds and minimal queues on-site. The full-movement driveway connection along Springland Drive is projected to operate with acceptable delays of approximately 10 seconds on-site. As mentioned previously, the southbound left-turn queue at the Walkley/Springland intersection currently queues back approximately 70 m. This is not expected to impact the site driveway as the site driveway is located approximately 90 m north of the Walkley/Springland intersection.

**4.2. PROJECTED 2024 CONDITIONS AT FIVE YEARS BEYOND SITE BUILD-OUT**

The total projected 2024 volumes associated with the proposed development were derived by superimposing 'new' and 'pass-by' site-generated volumes (Figure 7) onto projected 2024 baseline traffic volumes (Figure 6). The resulting total projected 2024 volumes are illustrated as Figure 9.

Figure 9: Total Projected 2024 Peak Hour Traffic Volumes



The following Table 10 provides a projected performance summary for study area intersections, based on total projected 2024 traffic volumes (5-years beyond full site build-out). The detailed SYNCHRO model output of projected 2024 conditions is provided within Appendix G.

Table 10: Projected 2024 Performance of Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Riverside/Mooney's Bay	C(B)	0.72(0.69)	NBT(SBT)	4.7(5.5)	C(B)	0.71(0.68)
Walkley/Springland	A(D)	0.44(0.83)	WBT(SBL)	9.1(17.4)	A(A)	0.37(0.55)
Riverside/Walkley	F(D)	1.03(0.89)	NBT(WBL)	38.9(31.3)	E(C)	0.98(0.77)
Riverside/Signalized Site	C(B)	0.73(0.70)	NBT(SBT)	4.6(5.8)	C(B)	0.71(0.69)
Riverside/Site N	C(B)	24.6(11.5)	WBR(WBR)	0.3(0.1)	-	-
Riverside/Underground Parking	C(B)	24.1(11.1)	WBR(WBR)	0.1(0.0)	-	-
Springland/Site	A(B)	9.1(11.3)	EBL(EBL)	1.1(0.6)	-	-

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 10, with the continued 1% traffic growth along Riverside Drive, the Riverside/Walkley intersection is projected to operate at capacity (LoS 'E') during the morning peak hour. All other study area intersections 'as a whole' are projected to operate at an acceptable LoS 'C' or better during peak hours.

With regard to the 'critical movements' at study area intersections, the northbound through movement at the Riverside/Walkley intersection is projected to operate above capacity (LoS 'F') during the morning peak hour. All other critical movements are projected to operate at an acceptable LoS 'D' or better during the morning and afternoon peak hours with respect to the City of Ottawa operating standards of LoS 'D' or better (v/c ≤ 0.90).

The widening of the Airport Parkway may help alleviate some of the north-south traffic congestion along Riverside Drive.

**4.3. NEIGHBOURHOOD IMPACTS**

We have been advised that there are issues with 'cut-through' traffic on Springland Drive. This cut-through traffic is related, in part, to traffic operations of the Airport Parkway and the absence of an off-ramp connection from the north at Walkley Road. As part of the Airport Parkway Widening EA, the City is currently working with Parsons and area residents to provide a southbound off-ramp to Walkley Road from the Airport Parkway. If/when implemented, this connection will alter traffic patterns in the area and reduce existing 'cut-through' traffic along Springland Drive. This southbound off-ramp would be a feature of Phase 1 of the Airport Parkway widening, which is expected to be completed in approximately 4 to 5 years (2020/2021).

Based on the location of the proposed development and its proposed signalized and unsignalized connections to an arterial road, there is a negligible amount of site-generated traffic projected on local streets within the vicinity of the subject site. The proposed development is projected to generate approximately 1 new vehicle every 2 minutes (on average) during the peak hours on Springland Drive to access the day care facility, which will have minimal impact on the performance of this local roadway. There is an existing 'no-right-turn' restriction from Walkley Road onto Springland Drive during the morning peak hour, to help prevent 'cut-through' traffic on Springland Drive. Traffic generated by the day care facility is not considered 'cut-through' traffic, however this traffic will not be able to legally make this turn. It is possible some patrons and/or employees of the day care may ignore this restriction and turn right off of Walkley Road onto Springland Drive, however, the majority of trips are expected to come from Riverside Drive and turn left onto Springland Drive.

With respect to neighbourhood transit, the site is projected to generate an approximate total of 60 and 80 'new' two-way person transit trips during the weekday morning and afternoon peak hours, respectively. This amount of person traffic can be accommodated by existing transit facilities.

## 5. TRANSPORTATION DEMAND MANAGEMENT

Depending on the nature of a development, Transportation Demand Management (TDM) strategies have the potential to be an integral part of a planned development in order to address and support the City's policies with regard to TDM. For this particular site, its proximity to the existing transit service is considered very advantageous in lessening the reliance on the private automobile. A number of other TDM measures could also be considered, including:

- Improving the quality and safety of pedestrian facilities, such as enhanced sidewalks/lighting;
- Provide change area/shower facilities for any on-site employees; and
- Provide appropriate car sharing programs/facilities to reduce auto ownership and attract residents who do not own a vehicle.
- Carpool incentives (e.g. reserved preferred parking for carpooling residents and carpool drop-off areas);
- Providing preferential parking for hybrid vehicles that are less harmful to the environment; and
- Provide an on-site transit information booth to direct visitors and encourage residents to utilize transit;

TDM strategies are important in encouraging active modes of transportation to/from the site, further lessening the reliance on the private automobile. For this particular site, an active mode pathway is planned to connect the development to Mooney's Bay Place and the proposed signalized intersection will allow safe crossing for cyclists and pedestrians across Riverside Drive.

## 6. SITE PLAN REVIEW

This section provides an overview of site access, parking requirements, pedestrian circulation and transit accessibility. The proposed Site Plan was previously illustrated as Figure 2.

### *Parking*

A total of 73 surface parking spaces, 62 covered parking spaces and 287 underground parking spaces are proposed to serve the subject development. This amount of parking is sufficient with respect to the City's Zoning By-Law requirements for Area C, identified in Schedule 1A of the City's Zoning By-Law. The proposed parking space dimensions are noted as 5.2 m in length and 2.6 m in width. Parking for the townhouses/flats is provided as covered parking, underground parking is provided for the apartments with access to/from Riverside Drive and underground parking is provided for the retirement facility with access to/from the private on-site roadway.

### *Site Circulation*

With regard to on-site circulation, there are two main driveways to the private on-site roadway that connect to Riverside Drive. An additional driveway connection to Riverside Drive provides access to the underground parking garage for the apartments in Building C. The underground parking garage for the senior residence/apartment has access to/from the private on-site roadway. The day care facility has its own parking lot that only connects to Springland Drive. The proposed site and parking lots are laid out effectively, such that two-way traffic can be efficiently accommodated. The proposed drive aisles are noted as 6.7 m to 7.0 m in width, with the exception of the drive aisle ramps providing access to the parking garages, the drive aisles within the parking garage, and the day care facility parking lot which are noted as 6.0 to 6.5 m wide.

The ramp providing access to the lower level parking garage along Riverside Drive should have a 2% grade (or less) for 6m from the property line to meet the City's Private Approach By-Law requirements.

### *Access Requirements*

Based on the location of the site and the potential access locations to the development, a signalized full-movement access is proposed at the south end of the site. This signal is located approximately 230 m south of the Riverside/Mooney's Bay intersection and approximately 200 m north of the Riverside/Walkley intersection. The

# PARSONS

intersection is proposed with a southbound left-turn lane. Based on the projected site-generated traffic volumes, the left-turn lane storage requirement is 35 m. A single full movement lane is proposed for the egress of the site, which is sufficient based on the amount of traffic leaving the site.

Signal warrant analysis was performed for this proposed access and the signal is not warranted based on volumes (17%). Given the location of the site, the options for vehicle access are limited to right-in/right-out on Riverside Drive and full movement access to Springland Drive via the parcel of land at the south end of the site. Given the 'cut-through' traffic concerns on Springland Drive and the high vehicle volumes along Riverside Drive, a signalized access to this site is recommended. As this is an unwarranted signalized access, the proponent will be responsible for the cost of the signal.

Providing a signalized intersection at this location promotes active modes by providing a safe crossing for pedestrians and cyclists. There is an existing MUP along the west side of Riverside Drive directly adjacent to the signalized intersection.

There are two additional driveway connections located along Riverside Drive. Both are proposed as right-in/right-out connections. According to the Private Approach By-Law, given the amount of site frontage (approximately 200 m) the total number of private approaches permitted to the property is two. However, the right-in/right-out driveway connection to the underground parking garage (48 parking spaces) is expected to have very low traffic volumes (approximately 20 veh/h during the peak hours). We are advised that because of grading issues, the location of the underground right-in/right-out driveway to Riverside Drive is ideal. Alternative designs of the site were assessed with the driveway connection located on-site, however, this presented grading issues. Given the low traffic volumes projected to access/egress the site at this 48 parking space garage, all three driveway connections to Riverside Drive are recommended. The locations and widths of the driveways all meet the City's Private Approach By-Law requirements.

At the signalized access and the northern right-in/right-out access, there are 7 and 10 on-street parking spaces proposed to serve the retail portion of the development. These parking spaces reduce the throat length of the driveways, however the parking spaces are required to meet the City's By-Law requirements for the minimum amount of parking. Providing an appropriate throat length for these driveways, will require the removal or reduction of parking spaces from these drive aisles. This may result in the need for a By-Law variance for the reduced number of parking spaces.

The day care facility driveway is located along Springland Drive approximately 90 m north of Walkley Road, which meets the City's Private Approach By-Law requirements.

## *Pedestrians/Transit*

To connect pedestrians to transit service and other nearby employment, shopping and recreation opportunities, sidewalks are provided along both sides of Riverside Road, Mooney's Bay Place, Springland Drive, and Walkley Road. A MUP is provided along the west side of Riverside Drive and the proposed signalized intersection access to the development will provide safe crossing for pedestrians.

OC Transpo bus stops for Routes #87 and 290 are located along Riverside Drive, approximately 100 to 200 m north and south of the development and along Springland Drive approximately 50 m south of the proposed day care facility.

## *Bicycles*

A total of 200 underground bicycle parking spaces are proposed to serve the retirement/seniors development, which is sufficient with respect to the City's By-Law requirements for the proposed site. 20 bicycle parking spaces should be provided for the apartment units and approximately 10 surface bicycle parking, located in well-lit areas, close to main building entrances, should be provided for the retail portion of the site. Where garages and/or carports are provided, no bicycle parking is required.

## 7. FINDINGS AND RECOMMENDATIONS

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

### EXISTING CONDITIONS

- The study area intersections adjacent to the site are currently operating ‘as a whole’ with an overall LoS ‘D’ or better during the weekday morning and afternoon peak hours;
- With regard to ‘critical movements’ at study area intersections, they are noted as operating at an acceptable LoS ‘D’ or better during the peak hours, with the exception of the northbound through movement at the Riverside/Walkley intersection during the morning peak hour;
- Queues in the northbound and southbound direction at the Walkley/Riverside intersection are approximately 150 to 275 m long during peak hours and the 95<sup>th</sup> percentile queue may not clear the intersection in one signal cycle;
- Based on the available data, there does not appear to be any safety issues at the signalized study area intersections adjacent to the proposed site, however, there was a fatal collision involving a pedestrian along Riverside Drive mid-block in 2015;
- The existing Screenlines #13 and #19, within the vicinity of the site, are operating at or close to capacity during the weekday peak hours. The planned Airport Parkway widening will help alleviate some of the capacity constraints along Screenline 13;

### PROJECTED CONDITIONS

- Given the significant growth expected within the Riverside South community, the traffic along Riverside Drive is expected to increase at a constant rate. Given the high vehicle volumes currently experienced along Riverside Drive, a 1% traffic growth rate per annum was assumed for the 2019 and 2024 Horizon years;
- The proposed development is projected to generate ‘new’ two-way vehicle volumes of approximately 175 and 210 veh/h during the weekday morning and afternoon peak hours, respectively;
- At full occupancy (year 2019), study area intersections ‘as a whole’ are projected to operate at an acceptable LoS ‘D’ or better with the exception of the Walkley/Riverside intersection during the morning peak hour;
- At full occupancy (year 2019), the ‘critical movements’ are projected to operate at acceptable levels of service during both peak hours with the exception of the northbound through movement at the Riverside/Walkley intersection;
- North and southbound queues along Riverside Drive are projected to be approximately 200 to 285 m long, which is similar to the existing condition. With a 1% growth rate along Riverside Drive applied for this analysis, the queues and delays are expected to slightly increase for through traffic;
- Site driveway connections to Riverside Drive and Springland Drive, including the proposed signalized access on Riverside Drive, are expected to operate with acceptable delays and queues;
- At 5-years beyond site build-out, study area intersections ‘as a whole’ are projected to operate at an acceptable LoS ‘D’ or better with the exception of the Riverside/Walkley intersection during the afternoon peak hour;

# PARSONS

- We are advised that there are concerns with 'cut-through' traffic along Springland Drive. There are currently right-turn restrictions within the network to help minimize the 'cut-through' traffic. Given the proposed accesses to/from the site, a minimal amount of traffic is projected to travel along Springland Drive (approximately 30 veh/h during peak hours). Some employees/patrons of the day-care may violate the 'no-right-turn' restriction at the Walkley/Springland intersection, however, the majority of traffic is expected to access the day care via Riverside Drive and turn left onto Springland Drive;

## SITE PLAN

- Traffic signal control is recommended at the full movement site driveway connection to Riverside Drive based on discussions with City Staff and analysis of alternative vehicle access. Providing a signal at this location minimizes additional traffic along local roads such as Springland Drive and Mooney's Bay Place. Additionally, unsignalized full-movement access to Riverside Drive at this location is unfeasible given the high traffic volumes along Riverside Drive and the existing median;
- Based on the projected traffic volumes, the proposed Riverside/Site signalized access is unwarranted and as such, the proponent will be responsible for the cost of the signal;
- Drive aisle widths are noted to be 6.0 to 7.0 m and the ramp providing access to the apartment building parking garage should have a 2% grade or less for 6m from the property line;
- Given the site's frontage, the Private Approach By Law permits for 2 two-way driveways to the site, however, three driveways are proposed along Riverside Drive. Given the grading issues with the apartment building underground parking lot access and the low number of vehicles projected to access this 48 parking space lot, the additional driveway along Riverside Drive will operate acceptably. In addition, the spacing of each driveway meets the Private Approach By-Law;
- Proposed on-street parking is provided adjacent to the northern site access to Riverside Drive and the signalized site access to Riverside Drive, reducing the throat length of these driveways. Providing an appropriate throat length for these driveways, will require the removal or reduction of parking spaces from these drive aisles. This may result in the need for a By-Law variance for the reduced number of parking spaces; and
- The proposed vehicle parking supply and dimensioning is noted as being sufficient with respect to the City's By-Law requirements.

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 3071 Riverside Drive residential development is recommended from a transportation perspective.

Prepared By:



André Jane Sponder, B.A.Sc.  
Engineering Associate, Transportation

Reviewed By:



Christopher Gordon, P.Eng.  
Senior Project Manager



# Appendix A

Current Peak Hour Traffic Volumes

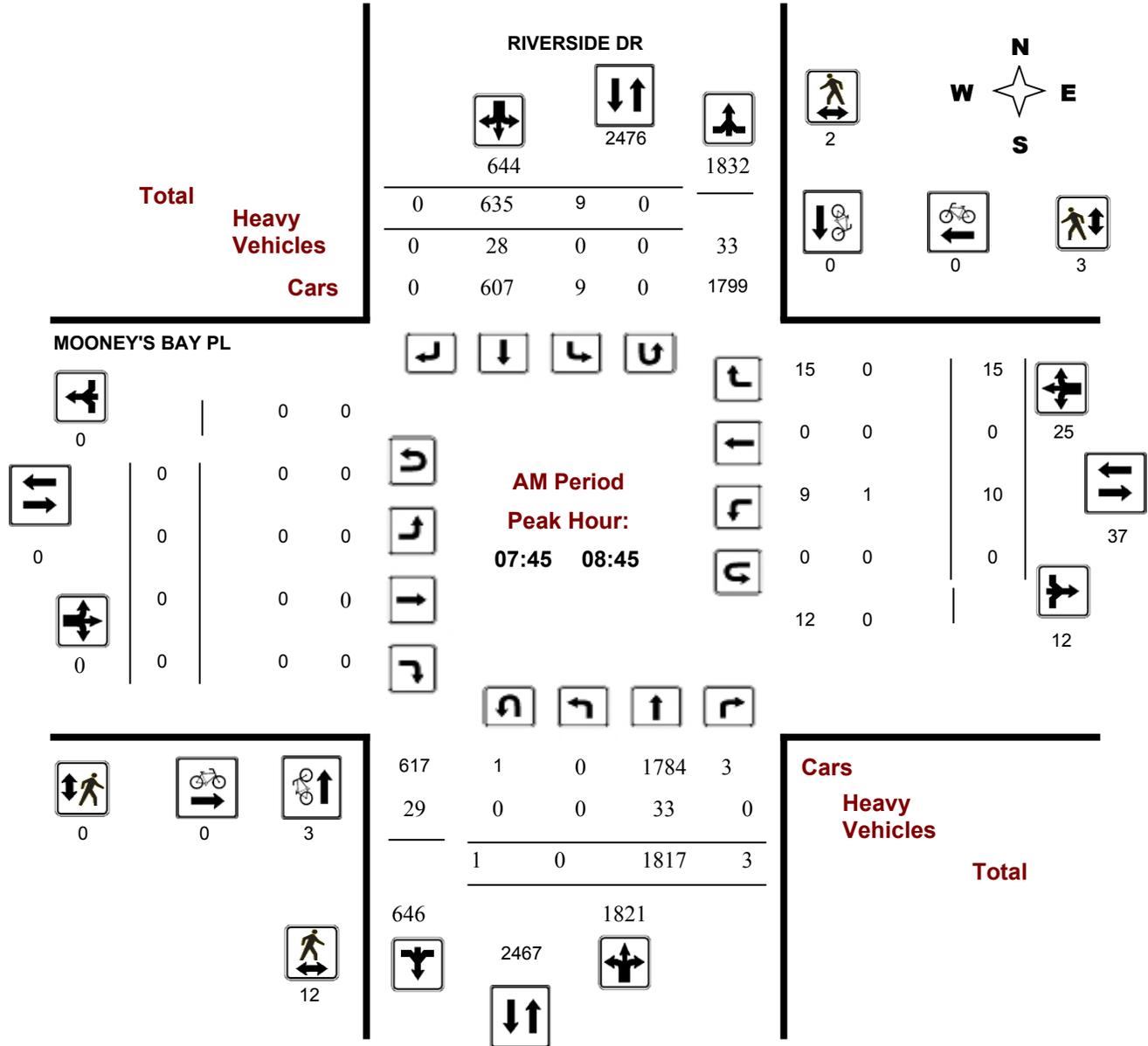
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**Survey Date:** Wednesday, August 24, 2016

**Start Time:** 07:00

**WO No:** 36226

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

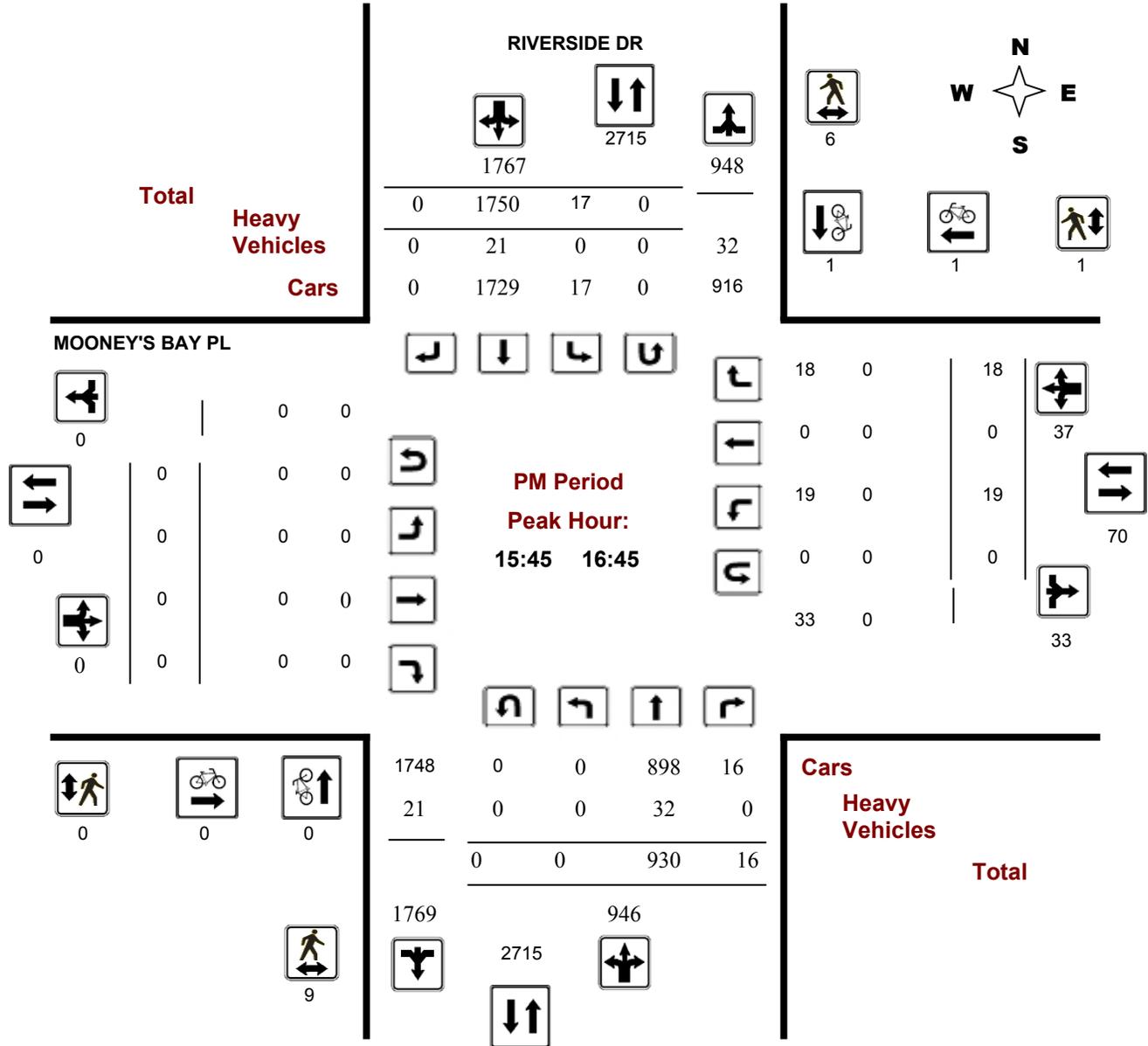
### MOONEY'S BAY PL @ RIVERSIDE DR

**Survey Date:** Wednesday, August 24, 2016

**Start Time:** 07:00

**WO No:** 36226

**Device:** Miovision



**Comments**





# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

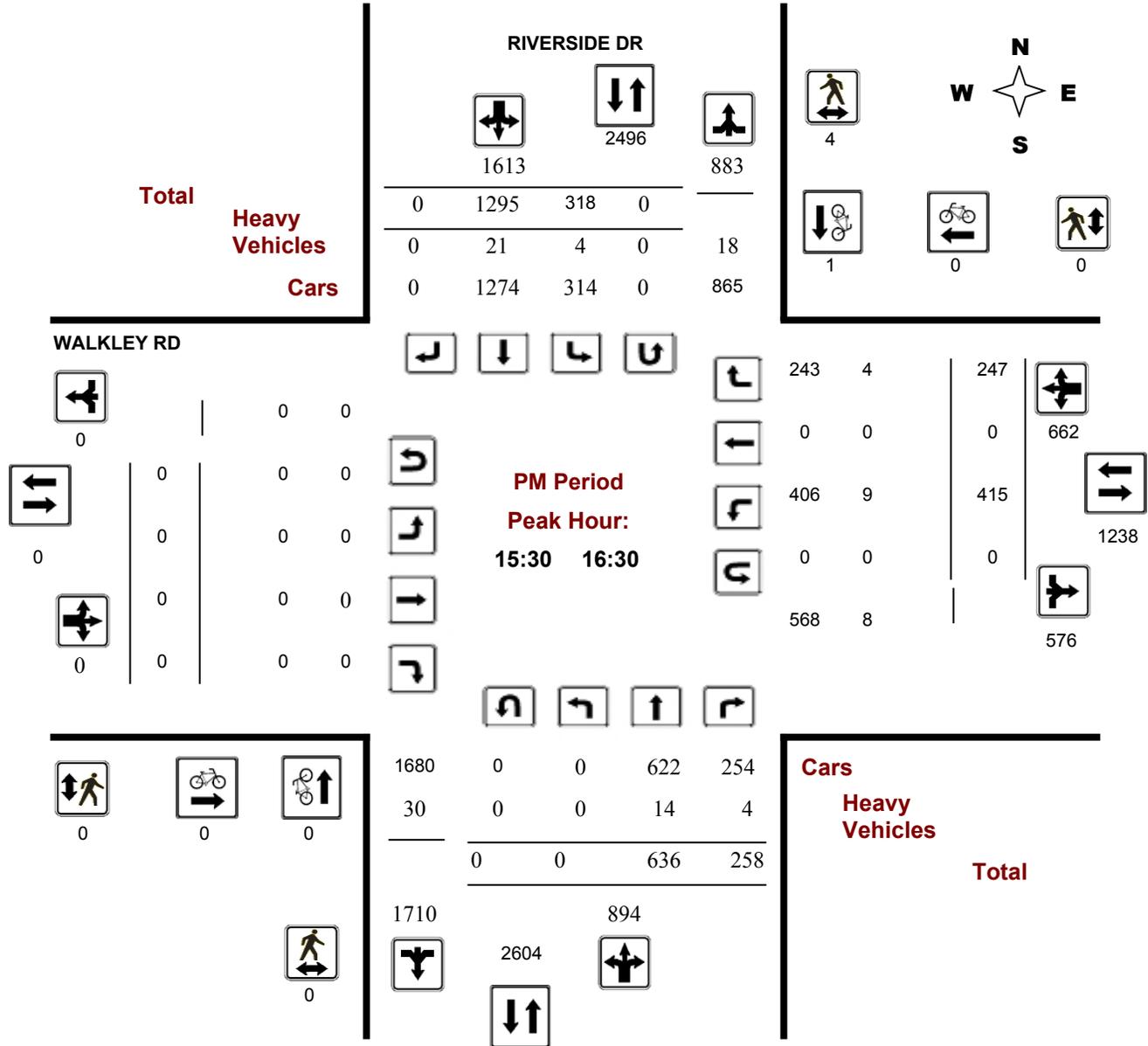
### RIVERSIDE DR @ WALKLEY RD

**Survey Date:** Friday, January 29, 2016

**Start Time:** 07:00

**WO No:** 35687

**Device:** Miovision



**Comments**

## Turning Movement Count - Full Study Peak Hour Diagram

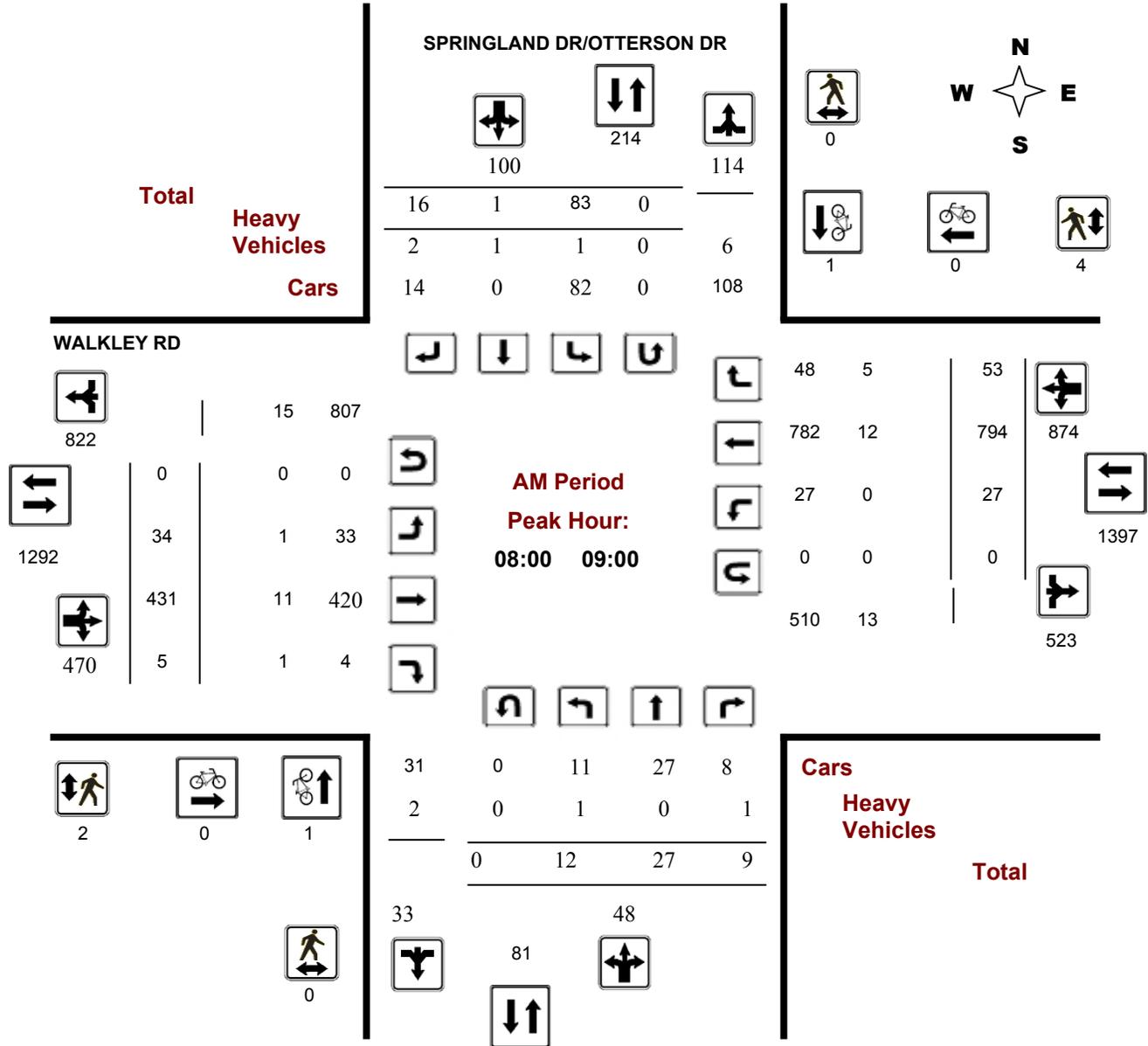
### WALKLEY RD @ SPRINGLAND DR/OTTERSON DR

**Survey Date:** Wednesday, November 16, 2016

**Start Time:** 07:00

**WO No:** 36491

**Device:** Miovision



## Turning Movement Count - Full Study Peak Hour Diagram

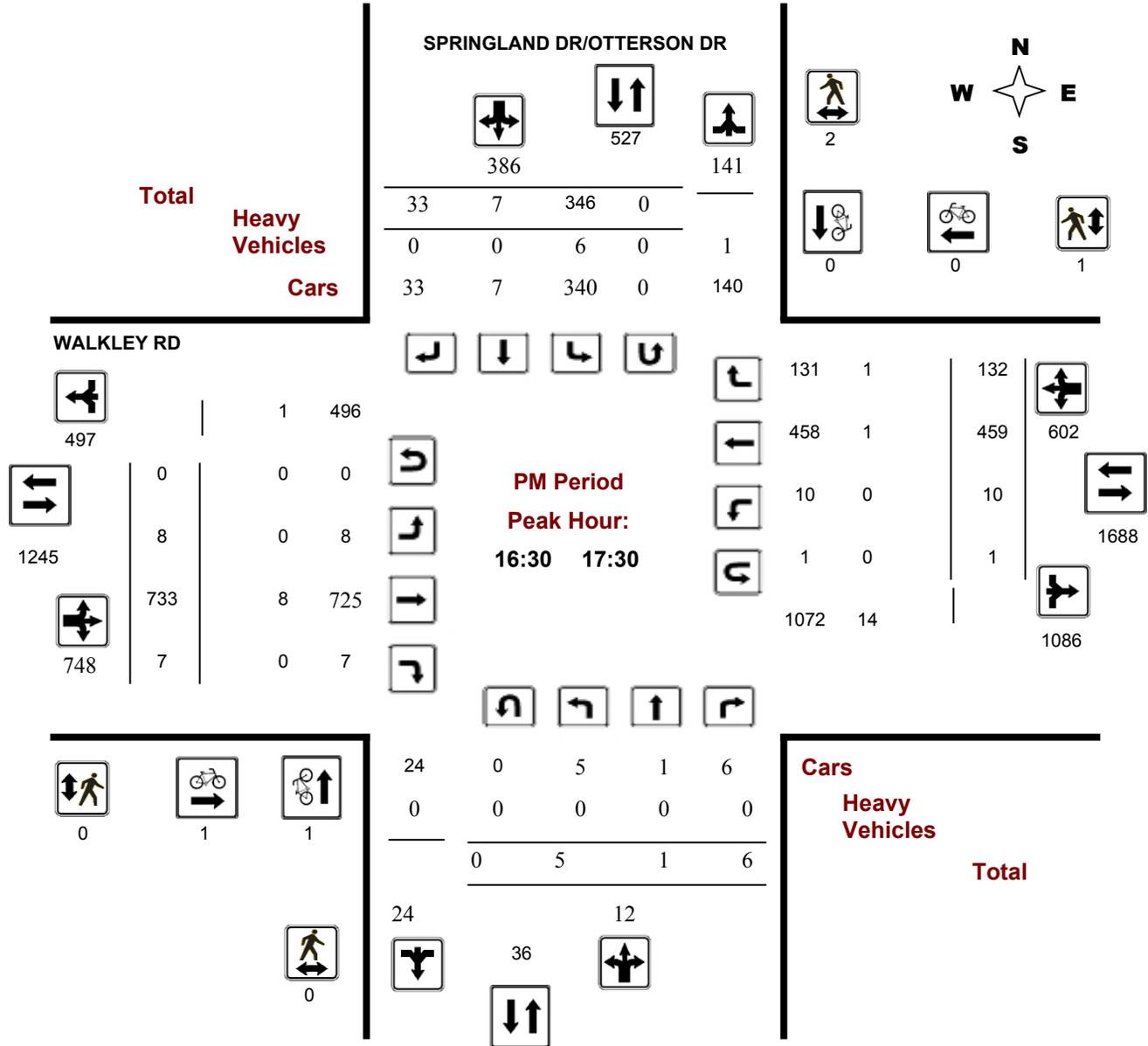
### WALKLEY RD @ SPRINGLAND DR/OTTERSON DR

**Survey Date:** Wednesday, November 16, 2016

**Start Time:** 07:00

**WO No:** 36491

**Device:** Miovision



**Comments**

# Appendix B

SYNCHRO Capacity Analysis: Existing Conditions

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Existing AM  
1: Riverside & Mooney's Bay

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	15	1817	3	9	635
Future Volume (vph)	10	15	1817	3	9	635
Lane Group Flow (vph)	11	16	1913	3	9	668
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.7	29.7	17.3	17.3	15.3	15.3
Total Split (s)	30.0	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.4	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	-0.4	-0.4	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.3	5.3	5.3	5.3	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)	13.2	13.2	104.6	104.6	104.6	104.6
Actuated g/C Ratio	0.11	0.11	0.87	0.87	0.87	0.87
v/c Ratio	0.06	0.09	0.65	0.00	0.06	0.23
Control Delay	45.2	19.4	4.6	2.0	5.1	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	19.4	4.6	2.0	5.1	2.9
LOS	D	B	A	A	A	A
Approach Delay	29.9		4.6			2.9
Approach LOS	C		A			A
Queue Length 50th (m)	2.4	0.0	24.5	0.0	0.3	13.9
Queue Length 95th (m)	7.2	6.0	m46.6	m0.1	2.5	34.3
Internal Link Dist (m)	281.8		436.0			131.0
Turn Bay Length (m)		25.0		55.0	85.0	
Base Capacity (vph)	348	318	2955	1250	141	2955
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.05	0.65	0.00	0.06	0.23

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 90 (75%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.65  
 Intersection Signal Delay: 4.4  
 Intersection Capacity Utilization 70.6%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside & Mooney's Bay



Existing AM

3: Otterson/Springland & Walkley

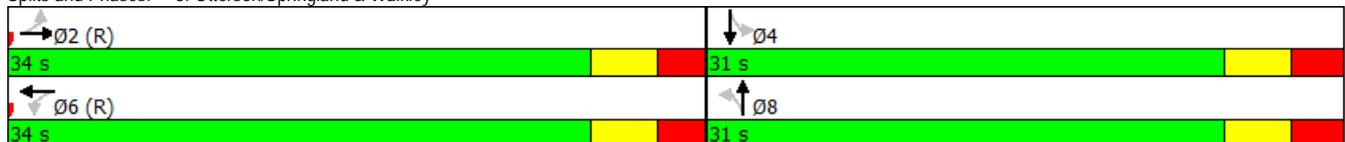
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	431	27	794	12	27	83	1
Future Volume (vph)	34	431	27	794	12	27	83	1
Lane Group Flow (vph)	0	495	0	920	0	50	87	18
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	25.7	25.7	25.7	30.9	30.9	30.9	30.9
Total Split (s)	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0
Total Split (%)	52.3%	52.3%	52.3%	52.3%	47.7%	47.7%	47.7%	47.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.6
Lost Time Adjust (s)		-0.1		-0.1		0.2		0.2
Total Lost Time (s)		5.6		5.6		6.1		6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		44.5		44.5		13.1		13.1
Actuated g/C Ratio		0.68		0.68		0.20		0.20
v/c Ratio		0.25		0.43		0.15		0.06
Control Delay		6.9		8.1		17.2		8.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		6.9		8.1		17.2		8.8
LOS		A		A		B		C
Approach Delay		6.9		8.1		17.2		21.4
Approach LOS		A		A		B		C
Queue Length 50th (m)		10.2		22.0		4.4		0.1
Queue Length 95th (m)		30.5		61.8		8.9		3.4
Internal Link Dist (m)		310.8		196.6		87.8		339.8
Turn Bay Length (m)							20.0	
Base Capacity (vph)		1982		2141		618		589
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		0.25		0.43		0.08		0.03

Intersection Summary

Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 29 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.43  
 Intersection Signal Delay: 8.9  
 Intersection Capacity Utilization 67.3%  
 Analysis Period (min) 15

Intersection LOS: A  
 ICU Level of Service C

Splits and Phases: 3: Otterson/Springland & Walkley



Existing AM  
7: Riverside & Walkley

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	284	415	1723	270	114	509
Future Volume (vph)	284	415	1723	270	114	509
Lane Group Flow (vph)	299	437	1814	284	120	536
Turn Type	Perm	Free	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	Free		2		
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	5.0	10.0
Minimum Split (s)	36.0		23.7	23.7	10.9	23.7
Total Split (s)	36.0		69.0	69.0	15.0	84.0
Total Split (%)	30.0%		57.5%	57.5%	12.5%	70.0%
Yellow Time (s)	4.0		3.7	3.7	3.7	3.7
All-Red Time (s)	2.0		2.0	2.0	2.2	2.0
Lost Time Adjust (s)	-0.3		0.0	0.0	-0.2	0.0
Total Lost Time (s)	5.7		5.7	5.7	5.7	5.7
Lead/Lag			Lead	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None		C-Max	C-Max	None	C-Max
Act Effct Green (s)	26.2	120.0	67.4	67.4	9.3	82.4
Actuated g/C Ratio	0.22	1.00	0.56	0.56	0.08	0.69
v/c Ratio	0.84	0.29	0.95	0.32	0.47	0.23
Control Delay	65.6	0.5	38.3	6.5	56.6	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.6	0.5	38.3	6.5	56.6	7.4
LOS	E	A	D	A	E	A
Approach Delay	26.9		34.0			16.4
Approach LOS	C		C			B
Queue Length 50th (m)	66.9	0.0	208.3	11.4	14.2	22.9
Queue Length 95th (m)	96.9	0.0	#279.5	27.9	23.8	28.6
Internal Link Dist (m)	310.8		95.9			436.0
Turn Bay Length (m)				65.0	95.0	
Base Capacity (vph)	410	1485	1903	900	254	2326
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.29	0.95	0.32	0.47	0.23

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 85 (71%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 29.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 78.6%  
 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: 7: Riverside & Walkley



Existing PM  
1: Riverside & Mooney's Bay

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	18	930	16	17	1750
Future Volume (vph)	19	18	930	16	17	1750
Lane Group Flow (vph)	20	19	979	17	18	1842
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.7	29.7	17.3	17.3	15.3	15.3
Total Split (s)	30.0	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.4	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	-0.4	-0.4	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.3	5.3	5.3	5.3	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)	13.2	13.2	104.6	104.6	104.6	104.6
Actuated g/C Ratio	0.11	0.11	0.87	0.87	0.87	0.87
v/c Ratio	0.11	0.11	0.33	0.01	0.04	0.62
Control Delay	46.6	18.6	1.6	0.0	3.7	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	18.6	1.6	0.0	3.7	6.0
LOS	D	B	A	A	A	A
Approach Delay	33.0		1.6			5.9
Approach LOS	C		A			A
Queue Length 50th (m)	4.4	0.0	5.9	0.0	0.6	67.2
Queue Length 95th (m)	10.6	6.4	13.4	m0.0	3.4	158.5
Internal Link Dist (m)	281.8		436.0			131.0
Turn Bay Length (m)		25.0		55.0	85.0	
Base Capacity (vph)	348	320	2955	1252	441	2955
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.06	0.33	0.01	0.04	0.62

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 110 (92%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.62  
 Intersection Signal Delay: 4.8  
 Intersection Capacity Utilization 68.6%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside & Mooney's Bay



Existing PM

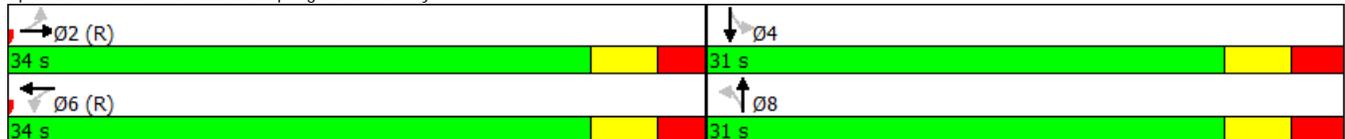
3: Otterson/Springland & Walkley

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	8	733	10	459	5	1	346	7
Future Volume (vph)	8	733	10	459	5	1	346	7
Lane Group Flow (vph)	0	787	0	633	0	12	364	42
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	25.7	25.7	25.7	30.9	30.9	30.9	30.9
Total Split (s)	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0
Total Split (%)	52.3%	52.3%	52.3%	52.3%	47.7%	47.7%	47.7%	47.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.6
Lost Time Adjust (s)		-0.1		-0.1		0.2		0.2
Total Lost Time (s)		5.6		5.6		6.1		6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		32.0		32.0		21.3		21.3
Actuated g/C Ratio		0.49		0.49		0.33		0.33
v/c Ratio		0.50		0.41		0.02		0.08
Control Delay		13.3		11.1		10.0		37.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		13.3		11.1		10.0		37.2
LOS		B		B		A		D
Approach Delay		13.3		11.1		10.0		34.0
Approach LOS		B		B		A		C
Queue Length 50th (m)		33.1		22.0		0.5		38.2
Queue Length 95th (m)		50.6		35.8		3.2		#72.7
Internal Link Dist (m)		310.8		196.6		87.8		339.8
Turn Bay Length (m)							20.0	
Base Capacity (vph)		1580		1540		591		511
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.50		0.41		0.02		0.71

Intersection Summary

Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 29 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 17.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 64.2%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Otterson/Springland & Walkley



Existing PM  
7: Riverside & Walkley

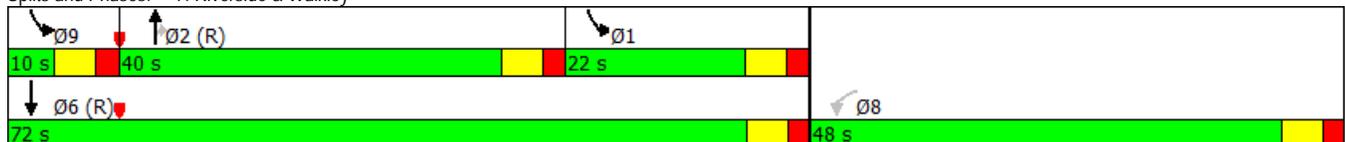
	↙	↖	↑	↗	↘	↓	Ø1	Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations	↙	↖	↑↑	↗	↘↘	↑↑		
Traffic Volume (vph)	415	247	636	258	318	1295		
Future Volume (vph)	415	247	636	258	318	1295		
Lane Group Flow (vph)	437	260	669	272	335	1363		
Turn Type	Perm	Free	NA	Perm	Prot	NA		
Protected Phases			2		1 9	6	1	9
Permitted Phases	8	Free		2				
Detector Phase	8		2	2	1 9	6		
Switch Phase								
Minimum Initial (s)	10.0		10.0	10.0		10.0	5.0	5.0
Minimum Split (s)	36.0		23.7	23.7		23.7	10.9	10.9
Total Split (s)	48.0		40.0	40.0		72.0	22.0	10.0
Total Split (%)	40.0%		33.3%	33.3%		60.0%	18%	8%
Yellow Time (s)	3.7		3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.0		2.0	2.0		2.0	2.2	2.2
Lost Time Adjust (s)	0.0		0.0	0.0		0.0		
Total Lost Time (s)	5.7		5.7	5.7		5.7		
Lead/Lag			Lag	Lag				Lead
Lead-Lag Optimize?			Yes	Yes				Yes
Recall Mode	None		C-Max	C-Max		C-Max	None	None
Act Effct Green (s)	36.6	120.0	37.1	37.1	23.5	72.0		
Actuated g/C Ratio	0.30	1.00	0.31	0.31	0.20	0.60		
v/c Ratio	0.88	0.17	0.64	0.42	0.52	0.67		
Control Delay	59.3	0.3	39.8	6.0	35.4	24.7		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	59.3	0.3	39.8	6.0	35.4	24.7		
LOS	E	A	D	A	D	C		
Approach Delay	37.3		30.0			26.8		
Approach LOS	D		C			C		
Queue Length 50th (m)	96.1	0.0	73.7	0.0	19.6	122.3		
Queue Length 95th (m)	130.6	0.0	94.5	19.6	45.1	192.6		
Internal Link Dist (m)	310.8		95.9			436.0		
Turn Bay Length (m)				65.0	95.0			
Base Capacity (vph)	572	1492	1048	643	643	2034		
Starvation Cap Reductn	0	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0		
Reduced v/c Ratio	0.76	0.17	0.64	0.42	0.52	0.67		

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 85 (71%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 85  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 29.9  
 Intersection Capacity Utilization 71.6%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service C

Splits and Phases: 7: Riverside & Walkley



# Appendix C

Collision Data and Analysis

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**Total Area**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	21	3	7	2	0	2	1	3	39
Non-fatal injury	2	0	0	1	0	1	0	1	5
Fatal Injury	0	0	0	0	0	1	0	0	1
Non reportable	0	0	1	0	0	0	0	0	1
<b>Total</b>	<b>23</b>	<b>3</b>	<b>8</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>4</b>	<b>46</b>
	50%	7%	17%	7%	0%	9%	2%	9%	100%

**MOONEY'S BAY PL/RIVERSIDE DR**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	4	28,825	1095	<b>0.13</b>

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	2	0	1	0	0	0	0	0	3
Non-fatal injury	1	0	0	0	0	0	0	0	1
Non reportable	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>
	75%	0%	25%	0%	0%	0%	0%	0%	100%

**RIVERSIDE DR/WALKLEY RD**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	29	38,098	1095	<b>0.70</b>

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	16	2	4	1	0	1	0	2	26
Non-fatal injury	0	0	0	0	0	1	0	1	2
Non reportable	0	0	1	0	0	0	0	0	1
<b>Total</b>	<b>16</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>29</b>
	55%	7%	17%	3%	0%	7%	0%	10%	100%

**RIVERSIDE DR, MOONEY'S BAY PL to WALKLEY RD**

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2015	4	29,440	1095	<b>0.12</b>

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	1	0	1	0	0	1	0	0	3
Non-fatal injury	0	0	0	0	0	0	0	0	0
Fatal Injury	0	0	1	0	0	0	0	0	1
Non reportable	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>4</b>
	25%	0%	50%	0%	0%	25%	0%	0%	75%

# Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01 TO: 2014-01-01

## MOONEY'S BAY PL & RIVERSIDE DR

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 1

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2013-12-06	Fri	17:23	Clear	Dark	Rear end	P.D. only	V1 S V2 S	Dry Dry	Going ahead Slowing or	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0

## RIVERSIDE DR, MOONEY'S BAY PL to WALKLEY RD

Former Municipality: Ottawa

Traffic Control: No control

Number of Collisions: 2

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
2	2013-01-23	We	07:40	Clear	Dawn	Rear end	P.D. only	V1 N V2 N V3 N	Other Other Other	Going ahead Slowing or Going ahead	Pick-up truck Passenger van Delivery van	Other motor vehicle Other motor vehicle Other motor vehicle	0
3	2013-09-10	Tue	08:59	Clear	Daylight	Sideswipe	P.D. only	V1 N V2 N	Wet Wet	Merging Going ahead	Automobile, station Passenger van	Other motor vehicle Other motor vehicle	0

## RIVERSIDE DR & WALKLEY RD

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 13

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
4	2013-01-14	Mo	21:04	Clear	Dark	Sideswipe	P.D. only	V1 S V2 S	Dry Dry	Going ahead Stopped	Automobile, station Passenger van	Other motor vehicle Other motor vehicle	0
5	2013-01-19	Sat	16:17	Clear	Daylight	Other	Non-fatal	V1 N V2 S	Slush Slush	Going ahead Turning left	Automobile, station Pick-up truck	Curb Other motor vehicle	0
6	2013-02-08	Fri	09:15	Snow	Daylight	Rear end	P.D. only	V1 N V2 N	Ice Loose snow	Slowing or Stopped	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
7	2013-02-19	Tue	08:05	Clear	Daylight	Rear end	P.D. only	V1 S V2 S	Dry Dry	Going ahead Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
8	2013-02-27	We	16:30	Snow	Daylight	Rear end	P.D. only	V1 W V2 W	Loose snow Loose snow	Turning left Turning left	Passenger van Automobile, station	Other motor vehicle Other motor vehicle	0
9	2013-06-21	Fri	17:28	Clear	Daylight	Angle	P.D. only	V1 W V2 N	Dry Dry	Turning right Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Thursday, April 13, 2017

## Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01 TO: 2014-01-01

ID	Date	Day	Time	Env	Light	Impact	Class	Dir	Surf	Cond'n	Vehicle	Manoeuvre	Vehicle Type	First Event	No. PED
10	2013-07-26	Fri	22:31	Clear	Dark	Rear end	P.D. only	V1 S	Dry		Going ahead	Automobile, station	Other motor vehicle		0
								V2 S	Dry		Stopped	Automobile, station	Other motor vehicle		
11	2013-08-08	Thu	10:10	Clear	Daylight	Rear end	P.D. only	V1 N	Dry		Going ahead	Automobile, station	Other motor vehicle		0
								V2 N	Dry		Stopped	Pick-up truck	Other motor vehicle		
12	2013-08-31	Sat	21:05	Clear	Dark	Other	P.D. only	V1 W	Dry		Turning right	Automobile, station	Ran off road		0
								V2 W	Dry		Turning left	Automobile, station	Pole (utility, tower)		
13	2013-09-13	Fri	20:54	Clear	Dark	Rear end	P.D. only	V1 S	Dry		Going ahead	Automobile, station	Other motor vehicle		0
								V2 S	Dry		Going ahead	Pick-up truck	Other motor vehicle		
14	2013-09-18	We	08:30	Clear	Daylight	Sideswipe	P.D. only	V1 S	Dry		Turning left	Passenger van	Other motor vehicle		0
								V2 S	Dry		Stopped	Automobile, station	Other motor vehicle		
15	2013-09-27	Fri	23:47	Clear	Dark	Other	P.D. only	V1 E	Dry		Reversing	Pick-up truck	Other motor vehicle		0
								V2 W	Dry		Stopped	Automobile, station	Other motor vehicle		
16	2013-10-11	Fri	14:00	Clear	Daylight	Sideswipe	P.D. only	V1 N	Dry		Changing lanes	Automobile, station	Other motor vehicle		0
								V2 N	Dry		Turning right	Automobile, station	Other motor vehicle		

### SPRINGLAND DR, FLANNERY DR S to MOONEY'S BAY PL

Former Municipality: Ottawa

Traffic Control: No control

Number of Collisions: 1

ID	Date	Day	Time	Env	Light	Impact	Class	Dir	Surf	Cond'n	Vehicle	Manoeuvre	Vehicle Type	First Event	No. PED
17	2013-07-28	Sun	16:45	Clear	Daylight	Angle	P.D. only	V1 E	Dry		Reversing	Automobile, station	Cyclist		0
								V2 N	Dry		Going ahead	Bicycle	Other motor vehicle		

### WALKLEY RD, OTTERSON DR to RIVER GARDEN PRIV

Former Municipality: Ottawa

Traffic Control: School bus

Number of Collisions: 1

ID	Date	Day	Time	Env	Light	Impact	Class	Dir	Surf	Cond'n	Vehicle	Manoeuvre	Vehicle Type	First Event	No. PED
18	2013-01-21	Mo	16:00	Clear	Daylight	Rear end	P.D. only	V1 E	Wet		Going ahead	Automobile, station	Other motor vehicle		0
								V2 E	Wet		Stopped	Automobile, station	Other motor vehicle		

(Note: Time of Day = "00:00" represents unknown collision time)

Thursday, April 13, 2017

Page 2 of 2



# City Operations - Transportation Services

## Collision Details Report - Public Version

**From:** January 1, 2014 **To:** December 31, 2015

**Location:** MOONEY'S BAY PL @ RIVERSIDE DR

**Traffic Control:** Traffic signal

**Total Collisions:** 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-May-01, Fri,15:58	Clear	Rear end	P.D. only	Dry	South	Going ahead	Passenger van	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Aug-20, Thu,10:08	Clear	Sideswipe	P.D. only	Dry	North	Going ahead	Truck - closed	Other motor vehicle	
					North	Slowing or stopping	Passenger van	Other motor vehicle	
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2015-Aug-08, Sat,12:30	Clear	Rear end	Non-fatal injury	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Passenger van	Other motor vehicle	
					North	Changing lanes	Automobile, station wagon	Other motor vehicle	

**Location:** RIVERSIDE DR @ WALKLEY RD

**Traffic Control:** Traffic signal

**Total Collisions:** 16

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-27, Mon,14:20	Clear	Rear end	P.D. only	Loose snow	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

					North	Stopped	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2014-Jan-11, Sat,06:53	Freezing Rain	Sideswipe	Non-reportable	Ice	West	Turning left	Automobile, station wagon	Skidding/sliding
					West	Stopped	Ambulance	Other motor vehicle
2014-Feb-27, Thu,18:00	Snow	Rear end	P.D. only	Loose snow	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2014-Jan-11, Sat,06:30	Rain	SMV other	Non-fatal injury	Ice	North	Going ahead	Automobile, station wagon	Pole (utility, power)
2014-Mar-16, Sun,05:41	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Curb
2014-Feb-05, Wed,14:30	Snow	Rear end	P.D. only	Loose snow	North	Slowing or stopping	Automobile, station wagon	Skidding/sliding
					North	Stopped	Delivery van	Other motor vehicle
2014-Apr-22, Tue,14:30	Clear	Rear end	P.D. only	Dry	North	Turning right	Pick-up truck	Other motor vehicle
					North	Turning right	Pick-up truck	Other motor vehicle
2014-Sep-22, Mon,08:30	Clear	Rear end	P.D. only	Dry	West	Turning right	Passenger van	Other motor vehicle
					West	Turning right	Pick-up truck	Other motor vehicle

2014-Sep-16, Tue,08:43	Clear	Rear end	P.D. only	Dry	South	Stopped	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2014-Oct-22, Wed,01:06	Clear	Rear end	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2015-Jun-18, Thu,20:55	Clear	Turning movement	P.D. only	Dry	North	Making "U" turn	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Mar-05, Thu,08:45	Clear	Rear end	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2015-Jan-30, Fri,06:58	Snow	Turning movement	P.D. only	Loose snow	South	Turning left	Passenger van	Other motor vehicle
					North	Stopped	Municipal transit bus	Other motor vehicle
2014-Nov-26, Wed,12:02	Clear	Rear end	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					North	Turning left	Pick-up truck	Other motor vehicle
2015-Jun-16, Tue,12:10	Clear	Rear end	P.D. only	Dry	West	Turning right	Automobile, station wagon	Other motor vehicle
					West	Turning right	Unknown	Other motor vehicle
2015-Nov-09, Mon,16:59	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle

North      Going ahead      Automobile,  
station wagon      Other motor  
vehicle

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**Location:** RIVERSIDE DR btwn MOONEY'S BAY PL & WALKLEY RD

**Traffic Control:** No control

**Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Feb-03, Tue,00:24	Drifting Snow	SMV other	P.D. only	Loose snow	South	Going ahead	Automobile, station wagon	Curb	
2015-Jul-08, Wed,21:58	Clear	SMV other	Fatal injury	Dry	South	Going ahead	Pick-up truck	Pedestrian	1

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# Appendix D

Existing Screenline Classification and Occupancy Survey

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### Classification and Occupancy Survey Report Summary Report

Station : 51020 Inbound  
Screenline Number : 13

AIRPORT PARKWAY AT C.N.R. CROSSING  
Survey Date : Monday, 03/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	10197	11129	1172	1513	317	347	64	73	44	330	79	79	11873	13471	1	49	52
8.0 HR TOTAL*	7366	7952	721	896	235	263	39	46	31	196	56	56	8448	9409	0	36	38
AM PEAK (0700-0800)	1371	1479	81	96	21	30	3	5	0	0	11	11	1487	1621	0	8	8
AM TOTAL (0700-0930)	3200	3396	170	212	60	71	6	8	11	56	29	29	3476	3772	0	15	15
PM PEAK (1600-1700)	1060	1147	155	194	24	28	1	2	4	27	1	1	1245	1399	0	2	2
PM TOTAL (1530-1800)	1907	2024	267	337	47	52	3	4	12	81	12	12	2248	2510	0	8	8

Time Period	OC Transpo		Outaouais		Driver Only No.	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	6	60	0	0	19	6	25	5	26	8	200	44	330
8.0 HR TOTAL*	2	0	0	0	15	6	25	2	6	6	150	31	196
AM PEAK (0700-0800)	0	0	0	0	0	0	0	0	0	0	0	0	0
AM TOTAL (0700-0930)	0	0	0	0	6	4	25	0	0	1	25	11	56
PM PEAK (1600-1700)	1	0	0	0	2	0	0	0	0	1	25	4	27
PM TOTAL (1530-1800)	2	0	0	0	6	1	0	0	0	3	75	12	81

Note : Any Intercity buses included have an assumed inbound occupancy of 25.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

SCREEN  
LINE  
B

### Classification and Occupancy Survey Report Summary Report

Station : 51020 Outbound      AIRPORT PARKWAY AT C.N.R. CROSSING  
 Screenline Number : 13      Survey Date : Monday, 03/06/2013      Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	10793	11781	1452	1768	315	344	87	94	50	347	70	70	12767	14404	22	75	79
8.0 HR TOTAL*	7552	8264	967	1159	225	247	60	66	37	232	45	45	8886	10013	18	52	55
AM PEAK (0715-0815)	709	746	122	140	21	23	7	8	5	42	2	2	866	961	0	7	8
AM TOTAL (0700-0930)	1639	1745	254	294	57	64	15	17	8	57	4	4	1977	2181	0	12	13
PM PEAK (1600-1700)	1341	1532	180	221	37	43	6	9	1	5	4	4	1569	1814	5	11	12
PM TOTAL (1530-1800)	3287	3635	365	421	68	76	29	32	9	18	19	19	3777	4201	18	22	23

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	10	140	0	0	22	7	45	9	80	2	60	50	347
8.0 HR TOTAL*	6	65	0	0	17	5	45	8	75	1	30	37	232
AM PEAK (0715-0815)	0	0	0	0	2	3	40	0	0	0	0	5	42
AM TOTAL (0700-0930)	1	5	0	0	2	4	45	1	5	0	0	8	57
PM PEAK (1600-1700)	0	0	0	0	0	0	0	1	5	0	0	1	5
PM TOTAL (1530-1800)	2	10	0	0	3	1	0	3	5	0	0	9	18

Note : Any Intercity buses included have an assumed Outbound occupancy of 30.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 08501 Outbound  
Screenline Number : 13

BANK AT C.N.R. UNDERPASS  
Survey Date : Monday, 03/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.		No.	Occ.
12.0 HR TOTAL	10405	11819	123	144	412	472	365	392	131	1193	38	38	11474	14058	97	85	85
8.0 HR TOTAL*	7582	8597	81	94	291	341	267	291	89	848	24	24	8334	10195	76	66	66
AM PEAK (0730-0830)	1450	1617	14	17	67	77	41	45	24	228	5	5	1601	1989	13	21	21
AM TOTAL (0700-0930)	2427	2682	20	24	111	131	86	95	45	316	7	7	2696	3255	17	27	27
PM PEAK (1615-1715)	1350	1583	16	20	31	37	24	28	6	145	5	5	1432	1818	3	12	12
PM TOTAL (1530-1800)	3007	3544	35	42	71	90	51	57	21	333	11	11	3196	4077	25	28	28

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	57	880	3	20	33	23	55	9	25	6	180	131	1193
8.0 HR TOTAL*	34	560	1	20	23	19	50	6	15	6	180	89	848
AM PEAK (0730-0830)	3	60	1	20	8	9	50	0	0	3	90	24	228
AM TOTAL (0700-0930)	9	140	1	20	16	16	50	0	0	3	90	45	316
PM PEAK (1615-1715)	5	140	0	0	0	0	0	1	5	0	0	6	145
PM TOTAL (1530-1800)	12	290	0	0	3	2	0	3	10	1	30	21	333

Note : Any Intercity buses included have an assumed Outbound occupancy of 30.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 08501 Inbound  
Screenline Number : 13

BANK AT C.N.R. UNDERPASS  
Survey Date : Monday, 03/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	No.	Occ.
12.0 HR TOTAL	12305	13351	130	152	401	463	412	444	117	961	35	35	13400	15406	115	93	93
8.0 HR TOTAL*	8476	9167	86	101	252	293	289	315	88	847	25	25	9216	10748	80	69	69
AM PEAK (0745-0845)	1572	1682	11	13	50	63	47	49	15	270	5	5	1700	2082	11	23	23
AM TOTAL (0700-0930)	3013	3199	23	25	103	120	132	143	30	486	10	10	3311	3983	30	39	39
PM PEAK (1615-1715)	1126	1231	14	16	25	26	11	13	8	41	0	0	1184	1327	18	7	7
PM TOTAL (1530-1800)	2644	2900	30	35	55	57	36	38	25	131	4	4	2794	3165	32	17	17

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.	No.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	40	440	4	5	26	36	370	7	20	4	100	117	961
8.0 HR TOTAL*	30	395	3	5	17	29	360	7	20	2	50	88	847
AM PEAK (0745-0845)	3	90	0	0	0	12	180	0	0	0	0	15	270
AM TOTAL (0700-0930)	9	170	1	5	1	19	310	0	0	0	0	30	486
PM PEAK (1615-1715)	4	30	0	0	1	0	0	3	10	0	0	8	41
PM TOTAL (1530-1800)	11	90	0	0	6	4	0	3	10	1	25	25	131

Note : Any Intercity buses included have an assumed Inbound occupancy of 25.  
\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 12502 Outbound  
Screenline Number : 13

CONROY AT C.N.R. CROSSING  
Survey Date : Monday, 03/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	11046	12636	110	129	459	535	0	0	36	461	0	0	11651	13761	12	16	16
8.0 HR TOTAL*	7925	9002	72	84	250	304	0	0	29	351	0	0	8276	9741	9	9	9
AM PEAK (0700-0800)	775	862	12	14	29	34	0	0	5	90	0	0	821	1000	0	1	1
AM TOTAL (0700-0930)	1404	1545	17	19	95	137	0	0	9	110	0	0	1525	1811	7	1	1
PM PEAK (1545-1645)	1900	2184	14	14	28	30	0	0	4	41	0	0	1946	2269	0	0	0
PM TOTAL (1530-1800)	4166	4791	31	40	59	63	0	0	10	131	0	0	4266	5025	0	0	0

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	35	460	0	0	1	0	0	0	0	0	0	36	461
8.0 HR TOTAL*	28	350	0	0	1	0	0	0	0	0	0	29	351
AM PEAK (0700-0800)	5	90	0	0	0	0	0	0	0	0	0	5	90
AM TOTAL (0700-0930)	9	110	0	0	0	0	0	0	0	0	0	9	110
PM PEAK (1545-1645)	3	40	0	0	1	0	0	0	0	0	0	4	41
PM TOTAL (1530-1800)	9	130	0	0	1	0	0	0	0	0	0	10	131

Note : Any intercity buses included have an assumed Outbound occupancy of 30.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 12502 Inbound  
Screenline Number : 13

CONROY AT C.N.R. CROSSING  
Survey Date : Monday, 03/06/2013

Weather: I

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.		No.	Occ.
12.0 HR TOTAL	10428	11341	96	120	52	116	0	0	51	442	0	0	10627	12019	68	117	117
8.0 HR TOTAL*	7596	8234	74	93	47	105	0	0	34	294	0	0	7751	8726	56	98	98
AM PEAK (0830-0930)	1730	1848	15	15	6	14	0	0	10	155	0	0	1761	2032	18	26	26
AM TOTAL (0700-0930)	3050	3270	27	27	30	68	0	0	10	155	0	0	3117	3520	24	68	68
PM PEAK (1700-1800)	1028	1167	7	8	4	9	0	0	5	25	0	0	1044	1209	9	8	8
PM TOTAL (1530-1800)	2330	2618	17	24	15	32	0	0	16	59	0	0	2378	2733	23	18	18

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	40	365	0	0	7	0	0	4	70	0	0	51	442
8.0 HR TOTAL*	26	220	0	0	4	0	0	4	70	0	0	34	294
AM PEAK (0830-0930)	7	105	0	0	0	0	0	3	50	0	0	10	155
AM TOTAL (0700-0930)	7	105	0	0	0	0	0	3	50	0	0	10	155
PM PEAK (1700-1800)	5	25	0	0	0	0	0	0	0	0	0	5	25
PM TOTAL (1530-1800)	12	55	0	0	4	0	0	0	0	0	0	16	59

Note : Any Intercity buses included have an assumed Inbound occupancy of 25.  
\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

**Classification and Occupancy Survey Report  
Summary Report**

Station : 03215 Outbound      HAWTHORNE RD. SOUTH OF WALKLEY AT CNR OVERPAS  
 Screenline Number : 13      Survey Date : Tuesday, 04/06/2013      Weather: 2

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	9623	10858	88	117	1289	1434	1872	2007	118	452	114	114	13104	14982	59	39	48
8.0 HR TOTAL*	6682	7603	65	89	834	952	1257	1362	84	185	82	82	9004	10273	44	25	33
AM PEAK (0745-0845)	931	1040	11	11	83	87	136	146	31	48	11	11	1203	1343	7	8	11
AM TOTAL (0700-0930)	2113	2392	23	26	215	237	316	339	56	118	20	20	2743	3132	15	14	18
PM PEAK (1600-1700)	961	1115	7	8	127	147	162	176	3	6	12	12	1272	1464	6	2	2
PM TOTAL (1530-1800)	2303	2650	15	18	240	280	383	420	12	40	38	38	2991	3446	15	4	5

Time Period	OC Transpo		Outaouais		Driver Only No.	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	20	75	0	0	47	27	45	17	75	7	210	118	452
8.0 HR TOTAL*	18	75	0	0	35	16	5	14	40	1	30	84	185
AM PEAK (0745-0845)	8	25	0	0	13	8	5	2	5	0	0	31	48
AM TOTAL (0700-0930)	15	75	0	0	23	11	5	7	15	0	0	56	118
PM PEAK (1600-1700)	0	0	0	0	1	1	0	1	5	0	0	3	6
PM TOTAL (1530-1800)	2	0	0	0	5	2	0	2	5	1	30	12	40

Note : Any Intercity buses included have an assumed Outbound occupancy of 30.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

**Classification and Occupancy Survey Report  
Summary Report**

Station : 03215 Inbound      HAWTHORNE RD. SOUTH OF WALKLEY AT CNR OVERPAS  
 Screenline Number : 13      Survey Date : Tuesday, 04/06/2013      Weather: 2

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	10846	11605	80	88	1197	1265	2150	2203	180	626	135	135	14588	15922	10	30	35
8.0 HR TOTAL*	7449	7931	53	60	749	797	1470	1517	161	450	88	88	9970	10843	8	24	28
AM PEAK (0730-0830)	1100	1123	6	6	111	119	248	253	10	109	7	7	1482	1617	0	1	1
AM TOTAL (0700-0930)	2296	2342	14	16	228	238	625	633	50	258	15	15	3228	3502	3	6	9
PM PEAK (1600-1700)	1098	1175	11	15	81	82	116	120	56	68	12	12	1374	1472	0	7	7
PM TOTAL (1530-1800)	2637	2910	19	23	188	203	252	265	84	149	37	37	3217	3587	3	12	12

Time Period	OC Transpo		Outaouais		Driver Only No.	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	17	110	2	0	91	46	45	11	55	13	325	180	626
8.0 HR TOTAL*	13	85	2	0	85	44	25	8	30	9	225	161	450
AM PEAK (0730-0830)	1	5	1	0	4	0	0	0	0	4	100	10	109
AM TOTAL (0700-0930)	3	45	2	0	38	0	0	0	0	7	175	50	258
PM PEAK (1600-1700)	3	20	0	0	23	29	20	1	5	0	0	56	68
PM TOTAL (1530-1800)	9	35	0	0	34	37	20	2	10	2	50	84	149

Note : Any Intercity buses included have an assumed inbound occupancy of 25.  
 \* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 07202 Outbound      GEORGE MCILRAITH (SMYTH ROAD) BRIDGE  
 Screenline Number : 19      Survey Date : Tuesday, 11/06/2013      Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	8923	10550	234	296	346	401	47	59	77	480	12	12	9639	11798	74	111	111
8.0 HR TOTAL*	6657	7792	160	203	226	259	33	39	52	262	10	10	7138	8565	38	86	86
AM PEAK (0715-0815)	1106	1217	26	37	19	20	2	2	13	65	0	0	1166	1341	8	15	15
AM TOTAL (0700-0930)	2380	2652	53	68	52	55	5	5	23	112	2	2	2515	2894	15	39	39
PM PEAK (1630-1730)	1093	1299	19	21	35	38	6	6	0	0	0	0	1153	1364	12	22	22
PM TOTAL (1530-1800)	2456	2928	50	54	95	114	8	9	8	4	5	5	2622	3114	18	40	40

Time Period	OC Transpo		Outaouais		Driver Only No.	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	7	110	0	0	25	25	280	20	65	0	0	77	480
8.0 HR TOTAL*	4	10	0	0	17	17	185	14	50	0	0	52	262
AM PEAK (0715-0815)	0	0	0	0	5	5	50	3	10	0	0	13	65
AM TOTAL (0700-0930)	1	0	0	0	7	9	80	6	25	0	0	23	112
PM PEAK (1630-1730)	0	0	0	0	0	0	0	0	0	0	0	0	0
PM TOTAL (1530-1800)	0	0	0	0	4	3	0	1	0	0	0	8	4

Note : Any Intercity buses included have an assumed Outbound occupancy of 30.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

## Classification and Occupancy Survey Report Summary Report

Station : 07202 Inbound  
Screenline Number : 19

GEORGE MCILRAITH (SMYTH ROAD) BRIDGE

Survey Date : Tuesday, 11/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.		No.	Occ.
12.0 HR TOTAL	8749	10436	273	343	240	284	96	119	79	403	8	8	9445	11593	46	92	92
8.0 HR TOTAL*	6485	7659	185	234	145	168	79	95	50	342	6	6	6950	8504	35	82	82
AM PEAK (0745-0845)	1163	1404	29	34	17	18	21	22	11	87	0	0	1241	1565	4	22	22
AM TOTAL (0700-0930)	2286	2689	64	70	46	56	48	56	17	90	3	3	2464	2964	4	42	42
PM PEAK (1530-1630)	1117	1287	16	25	22	26	6	7	7	67	1	1	1169	1413	8	9	9
PM TOTAL (1530-1800)	2353	2734	44	63	43	51	10	12	14	198	2	2	2466	3060	24	32	32

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	12	95	0	0	23	17	175	26	85	1	25	79	403
8.0 HR TOTAL*	9	70	0	0	12	11	170	17	65	1	25	50	342
AM PEAK (0745-0845)	2	15	0	0	2	4	65	3	5	0	0	11	87
AM TOTAL (0700-0930)	2	15	0	0	5	6	65	4	5	0	0	17	90
PM PEAK (1530-1630)	2	10	0	0	2	1	50	2	5	0	0	7	67
PM TOTAL (1530-1800)	5	35	0	0	3	2	100	3	35	1	25	14	198

Note : Any Intercity buses included have an assumed Inbound occupancy of 25.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 07902 Outbound  
Screenline Number : 19

GEORGE DUNBAR BRIDGE  
Survey Date : Tuesday, 11/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	16385	17306	531	640	320	360	173	199	158	1298	17	17	17584	19820	21	66	70
8.0 HR TOTAL*	11935	12588	355	431	173	189	120	132	106	911	14	14	12703	14265	15	29	30
AM PEAK (0745-0845)	1193	1298	32	35	18	20	11	13	14	81	1	1	1269	1448	3	2	2
AM TOTAL (0700-0930)	2592	2787	55	62	51	56	33	40	36	219	3	3	2770	3167	8	7	7
PM PEAK (1600-1700)	2716	2830	92	106	24	26	12	12	18	307	4	4	2866	3285	4	7	8
PM TOTAL (1530-1800)	5841	6199	201	249	48	50	33	34	42	427	5	5	6170	6964	4	13	14

Time Period	OC Transpo		Outaouais		Driver Only No.	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	108	1230	0	0	23	12	20	15	25	0	0	158	1298
8.0 HR TOTAL*	70	855	0	0	16	10	20	10	20	0	0	106	911
AM PEAK (0745-0845)	10	65	0	0	1	1	5	2	10	0	0	14	81
AM TOTAL (0700-0930)	24	185	0	0	4	4	15	4	15	0	0	36	219
PM PEAK (1600-1700)	13	300	0	0	2	1	0	2	5	0	0	18	307
PM TOTAL (1530-1800)	28	415	0	0	7	2	0	5	5	0	0	42	427

Note : Any Intercity buses included have an assumed Outbound occupancy of 30.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

**Classification and Occupancy Survey Report  
Summary Report**

Station : 07902 Inbound  
Screenline Number : 19

GEORGE DUNBAR BRIDGE  
Survey Date : Tuesday, 11/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	13012	13579	751	1031	379	425	158	172	155	3190	6	6	14461	18403	16	39	40
8.0 HR TOTAL*	9423	9802	515	690	252	286	97	107	103	2214	6	6	10396	13105	10	35	36
AM PEAK (0800-0900)	1496	1509	53	69	48	52	21	21	13	290	0	0	1631	1941	1	8	9
AM TOTAL (0700-0930)	3356	3412	96	122	106	119	54	58	33	761	3	3	3648	4475	1	16	17
PM PEAK (1630-1730)	1659	1726	110	158	24	30	7	9	14	331	0	0	1814	2254	2	5	5
PM TOTAL (1530-1800)	3273	3355	255	355	65	81	21	26	36	743	0	0	3650	4560	8	14	14

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	127	3015	0	0	10	11	95	7	70	0	0	155	3190
8.0 HR TOTAL*	87	2125	0	0	4	7	30	5	55	0	0	103	2214
AM PEAK (0800-0900)	12	275	0	0	0	0	0	1	15	0	0	13	290
AM TOTAL (0700-0930)	29	740	0	0	1	2	5	1	15	0	0	33	761
PM PEAK (1630-1730)	13	330	0	0	1	0	0	0	0	0	0	14	331
PM TOTAL (1530-1800)	28	710	0	0	3	3	10	2	20	0	0	36	743

Note : Any Intercity buses included have an assumed Inbound occupancy of 25.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 08505 Outbound  
Screenline Number : 19

BILLINGS BRIDGE  
Survey Date : Monday, 10/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	6784	8243	120	150	337	415	297	357	131	2188	25	25	7694	11378	494	363	364
8.0 HR TOTAL*	4635	5601	76	97	225	277	175	212	85	1447	15	15	5211	7649	375	251	252
AM PEAK (0830-0930)	461	541	8	8	27	40	20	23	12	188	2	2	530	802	26	40	40
AM TOTAL (0700-0930)	1066	1213	11	13	52	67	42	50	28	400	2	2	1201	1745	63	93	93
PM PEAK (1645-1745)	737	885	7	9	17	19	14	19	14	280	3	3	792	1215	53	70	70
PM TOTAL (1530-1800)	1790	2193	16	21	44	54	40	50	33	696	7	7	1930	3021	114	122	122

Time Period	OC Transpo		Outaouais		Driver Only No.	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	100	2140	0	0	13	6	10	12	25	0	0	131	2188
8.0 HR TOTAL*	67	1410	0	0	7	4	5	7	25	0	0	85	1447
AM PEAK (0830-0930)	7	185	0	0	3	1	0	1	0	0	0	12	188
AM TOTAL (0700-0930)	17	380	0	0	5	2	0	4	15	0	0	28	400
PM PEAK (1645-1745)	14	280	0	0	0	0	0	0	0	0	0	14	280
PM TOTAL (1530-1800)	30	690	0	0	1	0	0	2	5	0	0	33	696

Note : Any Intercity buses included have an assumed Outbound occupancy of 30.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

SCREENLINE  
19

## Classification and Occupancy Survey Report Summary Report

Station : 08505 Inbound  
Screenline Number : 19

BILLINGS BRIDGE  
Survey Date : Monday, 10/06/2013

Weather: I

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds No.	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.			
12.0 HR TOTAL	6393	7116	168	198	266	344	216	260	144	1815	49	49	7236	9782	371	464	465
8.0 HR TOTAL*	4441	4937	112	129	177	226	141	172	107	1356	31	31	5009	6851	258	365	365
AM PEAK (0745-0845)	775	821	17	18	23	34	24	33	22	196	7	7	868	1109	6	61	61
AM TOTAL (0700-0930)	1725	1849	39	45	66	85	53	71	40	391	16	16	1939	2457	23	119	119
PM PEAK (1615-1715)	581	651	13	17	4	7	3	3	15	137	3	3	619	818	34	67	67
PM TOTAL (1530-1800)	1268	1410	25	31	20	29	14	15	39	564	5	5	1371	2054	93	162	162

Time Period	OC Transpo		Outaouais		Driver Only No.	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	110	1700	0	0	10	14	55	10	50	0	0	144	1815
8.0 HR TOTAL*	84	1260	0	0	6	11	55	6	35	0	0	107	1356
AM PEAK (0745-0845)	17	155	0	0	1	1	15	3	25	0	0	22	196
AM TOTAL (0700-0930)	35	350	0	0	1	1	15	3	25	0	0	40	391
PM PEAK (1615-1715)	10	130	0	0	2	2	0	1	5	0	0	15	137
PM TOTAL (1530-1800)	27	540	0	0	4	5	10	3	10	0	0	39	564

Note : Any Intercity buses included have an assumed Inbound occupancy of 25.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 01908 Outbound RIVERSIDE DR. AT C.N.R. OVERPASS  
 Screenline Number : 13 Survey Date : Monday, 03/06/2013 Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	No.	Occ.		
12.0 HR TOTAL	9835	11492	55	72	449	527	316	391	110	2009	81	81	10846	14572	39	175	176
8.0 HR TOTAL*	7138	8193	40	55	324	377	231	286	86	1417	64	64	7883	10392	34	121	122
AM PEAK (0800-0900)	805	866	3	3	45	55	46	50	18	92	8	8	925	1074	1	32	32
AM TOTAL (0700-0930)	1743	1879	9	9	107	129	79	87	31	208	19	19	1988	2331	9	56	56
PM PEAK (1530-1630)	1415	1614	4	6	48	54	27	34	20	520	18	18	1532	2246	0	21	22
PM TOTAL (1530-1800)	3122	3618	14	21	71	80	61	84	31	1020	25	25	3324	4848	8	45	46

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.	No.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	49	1265	0	0	12	35	626	12	46	2	60	110	2009
8.0 HR TOTAL*	34	940	0	0	11	30	371	9	35	2	60	86	1417
AM PEAK (0800-0900)	4	75	0	0	7	6	5	1	5	0	0	18	92
AM TOTAL (0700-0930)	9	125	0	0	7	13	66	2	10	0	0	31	208
PM PEAK (1530-1630)	3	175	0	0	0	12	275	3	10	2	60	20	520
PM TOTAL (1530-1800)	13	670	0	0	0	12	275	4	15	2	60	31	1020

Note : Any Intercity buses included have an assumed Outbound occupancy of 30.  
 \* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 01908 Inbound

RIVERSIDE DR. AT C.N.R. OVERPASS

Screenline Number : 13

Survey Date : Monday, 03/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.		No.	Occ.
12.0 HR TOTAL	8399	9602	38	46	528	584	265	310	95	739	59	59	9384	11340	37	101	101
8.0 HR TOTAL*	5844	6678	23	27	392	438	184	220	66	565	40	40	6549	7968	25	71	71
AM PEAK (0830-0930)	934	1088	0	0	112	132	39	47	11	82	2	2	1098	1351	8	6	6
AM TOTAL (0700-0930)	2178	2561	3	3	212	239	67	82	20	277	2	2	2482	3164	14	11	11
PM PEAK (1700-1800)	759	838	3	3	13	13	9	11	3	50	5	5	792	920	1	23	23
PM TOTAL (1530-1800)	1623	1795	6	6	42	43	29	32	18	140	15	15	1733	2031	3	46	46

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	47	670	0	0	24	23	40	1	5	0	0	95	739
8.0 HR TOTAL*	34	505	0	0	15	16	40	1	5	0	0	66	565
AM PEAK (0830-0930)	6	65	0	0	2	2	10	1	5	0	0	11	82
AM TOTAL (0700-0930)	13	245	0	0	2	4	25	1	5	0	0	20	277
PM PEAK (1700-1800)	3	50	0	0	0	0	0	0	0	0	0	3	50
PM TOTAL (1530-1800)	8	135	0	0	5	5	0	0	0	0	0	18	140

Note : Any Intercity buses included have an assumed Inbound occupancy of 25.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 50630 Outbound    MCCARTHY AT C.N.R. CROSSING  
 Screenline Number : 13    Survey Date : Tuesday, 04/06/2013    Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	No.		Occ.	
12.0 HR TOTAL	2660	3273	30	41	124	159	25	31	93	1365	13	13	2945	4882	61	137	149
8.0 HR TOTAL*	1842	2219	20	26	65	75	13	15	68	903	8	8	2016	3246	30	82	91
AM PEAK (0700-0800)	153	170	2	2	6	6	1	1	18	58	1	1	181	238	4	14	16
AM TOTAL (0700-0930)	358	391	4	7	20	25	4	5	38	110	1	1	425	539	8	14	16
PM PEAK (1600-1700)	422	508	2	3	9	9	0	0	7	285	5	5	445	810	2	17	19
PM TOTAL (1530-1800)	898	1087	8	10	17	17	0	0	13	510	6	6	942	1630	4	43	45

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	30	715	0	0	20	36	580	6	20	1	30	93	1365
8.0 HR TOTAL*	23	635	0	0	18	24	250	3	0	0	0	68	903
AM PEAK (0700-0800)	3	5	0	0	8	7	45	0	0	0	0	18	58
AM TOTAL (0700-0930)	6	20	0	0	15	15	75	2	0	0	0	38	110
PM PEAK (1600-1700)	3	205	0	0	0	4	80	0	0	0	0	7	285
PM TOTAL (1530-1800)	7	340	0	0	0	6	170	0	0	0	0	13	510

Note : Any intercity buses included have an assumed Outbound occupancy of 30.  
 \* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

### Classification and Occupancy Survey Report Summary Report

Station : 50630 Inbound

MCCARTHY AT C.N.R. CROSSING

Screenline Number : 13

Survey Date : Tuesday, 04/06/2013

Weather: 1

Time Period	Passenger Vehicles		Taxis		Light Trucks		Heavy Trucks		All Buses		Other Vehicles		All Vehicles		Peds	Bikes	
	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.		No.	Occ.
12.0 HR TOTAL	3245	4141	48	58	128	149	40	48	90	1056	12	12	3563	5464	74	149	150
8.0 HR TOTAL*	2307	3006	35	41	85	97	28	32	58	841	9	9	2522	4026	49	121	122
AM PEAK (0745-0845)	491	634	9	11	24	24	3	4	15	375	1	1	543	1049	12	31	31
AM TOTAL (0700-0930)	977	1255	12	14	38	41	12	14	29	620	4	4	1072	1948	23	65	66
PM PEAK (1545-1645)	291	398	4	4	11	14	1	1	6	35	1	1	314	453	5	10	10
PM TOTAL (1530-1800)	699	987	10	12	20	26	5	5	12	85	3	3	749	1118	17	31	31

Time Period	OC Transpo		Outaouais		Driver Only	School Buses		Other Buses		Intercity Buses		All Buses	
	No.	Occ.	No.	Occ.		No.	Occ.	No.	Occ.	No.	Occ.	No.	Occ.
12.0 HR TOTAL	51	759	0	0	12	23	250	4	35	0	0	90	1056
8.0 HR TOTAL*	38	579	0	0	2	14	225	4	35	0	0	58	841
AM PEAK (0745-0845)	8	220	0	0	0	7	155	0	0	0	0	15	375
AM TOTAL (0700-0930)	17	395	0	0	0	12	225	0	0	0	0	29	620
PM PEAK (1545-1645)	6	35	0	0	0	0	0	0	0	0	0	6	35
PM TOTAL (1530-1800)	10	60	0	0	0	0	0	2	25	0	0	12	85

Note : Any Intercity buses included have an assumed inbound occupancy of 25.

\* 8.0 HR total not factored (0700-1000, 1130-1330, 1500-1800)

Anomalies:

Data modified:

# Appendix E

SYNCHRO Capacity Analysis: Projected 2019 Conditions

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Projected 2019 AM  
1: Riverside & Mooney's Bay

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	19	1926	3	14	697
Future Volume (vph)	10	19	1926	3	14	697
Lane Group Flow (vph)	11	20	2027	3	15	734
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.7	29.7	17.3	17.3	15.3	15.3
Total Split (s)	30.0	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.4	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.4	0.4	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	5.3	5.3	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)	12.4	12.4	104.6	104.6	104.6	104.6
Actuated g/C Ratio	0.10	0.10	0.87	0.87	0.87	0.87
v/c Ratio	0.06	0.12	0.69	0.00	0.13	0.25
Control Delay	46.0	18.4	4.2	3.7	6.7	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.0	18.4	4.2	3.7	6.7	3.0
LOS	D	B	A	A	A	A
Approach Delay	28.2		4.2			3.0
Approach LOS	C		A			A
Queue Length 50th (m)	2.5	0.0	30.8	0.0	0.6	15.6
Queue Length 95th (m)	7.2	6.6	66.1	m0.2	4.1	38.2
Internal Link Dist (m)	265.5		46.8			135.9
Turn Bay Length (m)		25.0		55.0	85.0	
Base Capacity (vph)	337	311	2955	1250	119	2955
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.06	0.69	0.00	0.13	0.25

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 90 (75%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 4.2  
 Intersection Capacity Utilization 74.4%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside & Mooney's Bay



Projected 2019 AM  
2: Riverside & Site

	↙	↑	↖	↘	↓
Lane Group	WBL	NBT	SBU	SBL	SBT
Lane Configurations	↘	↑↔		↘	↑↔
Traffic Volume (vph)	23	1870	3	39	665
Future Volume (vph)	23	1870	3	39	665
Lane Group Flow (vph)	44	1982	0	44	700
Turn Type	Prot	NA	Perm	Perm	NA
Protected Phases	8	2			6
Permitted Phases			6	6	
Detector Phase	8	2	6	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	23.9	23.9	23.9	23.9
Total Split (s)	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7
All-Red Time (s)	3.3	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-2.3	-1.9		-1.9	-1.9
Total Lost Time (s)	4.0	4.0		4.0	4.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.7	101.4		101.4	101.4
Actuated g/C Ratio	0.12	0.84		0.84	0.84
v/c Ratio	0.20	0.69		0.37	0.24
Control Delay	30.7	2.8		14.2	2.3
Queue Delay	0.0	0.2		0.0	0.0
Total Delay	30.7	3.0		14.2	2.3
LOS	C	A		B	A
Approach Delay	30.7	3.0			3.0
Approach LOS	C	A			A
Queue Length 50th (m)	5.2	6.9		1.5	12.4
Queue Length 95th (m)	14.7	13.3		12.2	16.4
Internal Link Dist (m)	71.5	177.4			70.2
Turn Bay Length (m)				55.0	
Base Capacity (vph)	368	2861		120	2863
Starvation Cap Reductn	0	246		0	0
Spillback Cap Reductn	0	0		0	0
Storage Cap Reductn	0	0		0	0
Reduced v/c Ratio	0.12	0.76		0.37	0.24

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 88 (73%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 3.5  
 Intersection Capacity Utilization 70.0%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside & Site



Projected 2019 AM  
 3: Otterson/Springland & Walkley

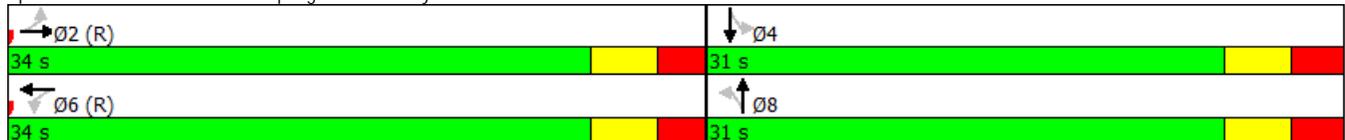
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	48	442	27	804	12	27	86	1
Future Volume (vph)	48	442	27	804	12	27	86	1
Lane Group Flow (vph)	0	521	0	930	0	50	91	28
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	25.7	25.7	25.7	30.9	30.9	30.9	30.9
Total Split (s)	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0
Total Split (%)	52.3%	52.3%	52.3%	52.3%	47.7%	47.7%	47.7%	47.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.6
Lost Time Adjust (s)		0.1		0.1		0.2		0.2
Total Lost Time (s)		5.8		5.8		6.1		6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		44.3		44.3		13.2		13.2
Actuated g/C Ratio		0.68		0.68		0.20		0.20
v/c Ratio		0.28		0.44		0.15		0.09
Control Delay		7.3		8.3		17.1		7.7
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		7.3		8.3		17.1		7.7
LOS		A		A		B		C
Approach Delay		7.3		8.3		17.1		20.3
Approach LOS		A		A		B		C
Queue Length 50th (m)		11.1		22.6		4.4		0.1
Queue Length 95th (m)		33.2		63.2		8.9		4.3
Internal Link Dist (m)		296.4		200.9		87.8		81.6
Turn Bay Length (m)							20.0	
Base Capacity (vph)		1868		2129		616		593
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		0.28		0.44		0.08		0.05

Intersection Summary

Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 29 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.44  
 Intersection Signal Delay: 9.1  
 Intersection Capacity Utilization 69.5%  
 Analysis Period (min) 15

Intersection LOS: A  
 ICU Level of Service C

Splits and Phases: 3: Otterson/Springland & Walkley



Projected 2019 AM  
7: Riverside & Walkley

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↑↑	↗	↘↘	↓↓
Traffic Volume (vph)	287	432	1767	275	134	529
Future Volume (vph)	287	432	1767	275	134	529
Lane Group Flow (vph)	302	455	1860	289	141	557
Turn Type	Perm	Free	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	Free		2		
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	5.0	10.0
Minimum Split (s)	36.0		23.7	23.7	10.9	23.7
Total Split (s)	36.0		69.0	69.0	15.0	84.0
Total Split (%)	30.0%		57.5%	57.5%	12.5%	70.0%
Yellow Time (s)	4.0		3.7	3.7	3.7	3.7
All-Red Time (s)	2.0		2.0	2.0	2.2	2.0
Lost Time Adjust (s)	0.3		0.0	0.0	0.2	0.0
Total Lost Time (s)	6.3		5.7	5.7	6.1	5.7
Lead/Lag			Lead	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None		C-Max	C-Max	None	C-Max
Act Effct Green (s)	25.9	120.0	67.1	67.1	8.9	82.1
Actuated g/C Ratio	0.22	1.00	0.56	0.56	0.07	0.68
v/c Ratio	0.86	0.31	0.98	0.32	0.58	0.24
Control Delay	68.5	0.5	43.6	6.7	59.1	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.5	0.5	43.6	6.7	59.1	6.1
LOS	E	A	D	A	E	A
Approach Delay	27.7		38.6			16.8
Approach LOS	C		D			B
Queue Length 50th (m)	67.8	0.0	-225.1	12.2	16.9	15.1
Queue Length 95th (m)	#103.9	0.0	#291.3	29.1	27.5	19.1
Internal Link Dist (m)	296.4		111.4			177.4
Turn Bay Length (m)				65.0	95.0	
Base Capacity (vph)	401	1485	1895	897	243	2319
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.31	0.98	0.32	0.58	0.24

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 85 (71%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 120  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.98  
 Intersection Signal Delay: 32.1  
 Intersection LOS: C  
 Intersection Capacity Utilization 88.3%  
 ICU Level of Service E  
 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: 7: Riverside & Walkley



Projected 2019 AM  
4: Springland & Site

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	13	14	114	100	5
Future Volume (Veh/h)	4	13	14	114	100	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	14	15	120	105	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)	105					
pX, platoon unblocked						
vC, conflicting volume	258	108	110			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	258	108	110			
IC, single (s)	6.4	6.2	4.1			
IC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	724	946	1480			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	18	135	110			
Volume Left	4	15	0			
Volume Right	14	0	5			
cSH	886	1480	1700			
Volume to Capacity	0.02	0.01	0.06			
Queue Length 95th (m)	0.5	0.2	0.0			
Control Delay (s)	9.1	0.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	0.9	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay				1.1		
Intersection Capacity Utilization				23.8%	ICU Level of Service	A
Analysis Period (min)				15		

Projected 2019 AM  
5: Riverside & Site

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	33	1896	7	0	707
Future Volume (Veh/h)	0	33	1896	7	0	707
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	35	1996	7	0	744
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			187			71
pX, platoon unblocked	0.69	0.67			0.67	
vC, conflicting volume	2372	1002			2003	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1803	0			1502	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	49	722			294	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	35	1331	672	372	372	
Volume Left	0	0	0	0	0	
Volume Right	35	0	7	0	0	
cSH	722	1700	1700	1700	1700	
Volume to Capacity	0.05	0.78	0.40	0.22	0.22	
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	
Control Delay (s)	10.2	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	10.2	0.0		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.1			
Intersection Capacity Utilization			65.6%		ICU Level of Service	C
Analysis Period (min)			15			

Projected 2019 AM  
6: Riverside & U/G parking

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	15	1888	4	0	707
Future Volume (Veh/h)	0	15	1888	4	0	707
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	16	1987	4	0	744
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			94			164
pX, platoon unblocked	0.72	0.70			0.70	
vC, conflicting volume	2361	996			1991	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1890	150			1566	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	45	611			294	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	16	1325	666	372	372	
Volume Left	0	0	0	0	0	
Volume Right	16	0	4	0	0	
cSH	611	1700	1700	1700	1700	
Volume to Capacity	0.03	0.78	0.39	0.22	0.22	
Queue Length 95th (m)	0.6	0.0	0.0	0.0	0.0	
Control Delay (s)	11.0	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	11.0	0.0		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.1			
Intersection Capacity Utilization			65.2%		ICU Level of Service	C
Analysis Period (min)			15			

Projected 2019 PM  
1: Riverside & Mooney's Bay

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	23	1025	16	21	1857
Future Volume (vph)	19	23	1025	16	21	1857
Lane Group Flow (vph)	20	24	1079	17	22	1955
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.7	29.7	17.3	17.3	15.3	15.3
Total Split (s)	30.0	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.4	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.4	0.4	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	5.3	5.3	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)	12.4	12.4	104.6	104.6	104.6	104.6
Actuated g/C Ratio	0.10	0.10	0.87	0.87	0.87	0.87
v/c Ratio	0.11	0.14	0.37	0.01	0.06	0.66
Control Delay	47.5	17.5	1.2	0.0	3.8	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	17.5	1.2	0.0	3.8	6.6
LOS	D	B	A	A	A	A
Approach Delay	31.2		1.2			6.6
Approach LOS	C		A			A
Queue Length 50th (m)	4.5	0.0	7.7	0.0	0.7	77.2
Queue Length 95th (m)	10.6	7.3	16.1	m0.0	4.1	182.2
Internal Link Dist (m)	263.1		41.1			158.8
Turn Bay Length (m)		25.0		55.0	85.0	
Base Capacity (vph)	337	315	2955	1252	394	2955
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.08	0.37	0.01	0.06	0.66

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 110 (92%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.66  
 Intersection Signal Delay: 5.0  
 Intersection Capacity Utilization 72.4%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside & Mooney's Bay



Projected 2019 PM  
2: Riverside & Site

	↙	↑	↖	↘	↓
Lane Group	WBL	NBT	SBU	SBL	SBT
Lane Configurations	↙	↑		↘	↓
Traffic Volume (vph)	29	984	10	59	1808
Future Volume (vph)	29	984	10	59	1808
Lane Group Flow (vph)	55	1057	0	73	1903
Turn Type	Prot	NA	Perm	Perm	NA
Protected Phases	8	2			6
Permitted Phases			6	6	
Detector Phase	8	2	6	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	23.9	23.9	23.9	23.9
Total Split (s)	28.3	91.7	91.7	91.7	91.7
Total Split (%)	23.6%	76.4%	76.4%	76.4%	76.4%
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7
All-Red Time (s)	3.3	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-2.3	-1.9		-1.9	-1.9
Total Lost Time (s)	4.0	4.0		4.0	4.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.7	101.4		101.4	101.4
Actuated g/C Ratio	0.12	0.84		0.84	0.84
v/c Ratio	0.25	0.37		0.19	0.66
Control Delay	31.6	10.6		1.6	2.0
Queue Delay	0.2	0.4		0.0	0.1
Total Delay	31.8	11.0		1.6	2.1
LOS	C	B		A	A
Approach Delay	31.8	11.0			2.1
Approach LOS	C	B			A
Queue Length 50th (m)	6.8	108.0		0.5	6.8
Queue Length 95th (m)	17.2	135.5		m0.7	7.3
Internal Link Dist (m)	72.2	174.6			63.3
Turn Bay Length (m)				55.0	
Base Capacity (vph)	350	2855		385	2863
Starvation Cap Reductn	0	1119		0	35
Spillback Cap Reductn	83	0		0	125
Storage Cap Reductn	0	0		0	0
Reduced v/c Ratio	0.21	0.61		0.19	0.70

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: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.66  
 Intersection Signal Delay: 5.7  
 Intersection Capacity Utilization 67.8%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside & Site



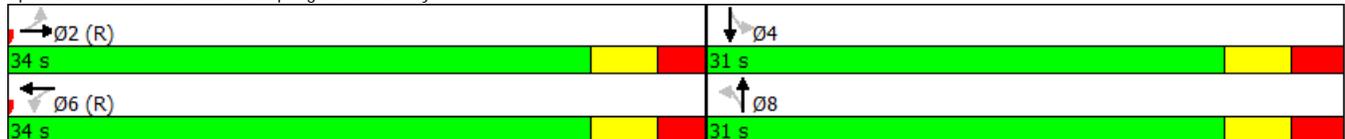
Projected 2019 PM  
 3: Otterson/Springland & Walkley

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	746	10	475	5	1	349	7
Future Volume (vph)	20	746	10	475	5	1	349	7
Lane Group Flow (vph)	0	813	0	650	0	12	367	53
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	25.7	25.7	25.7	30.9	30.9	30.9	30.9
Total Split (s)	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0
Total Split (%)	52.3%	52.3%	52.3%	52.3%	47.7%	47.7%	47.7%	47.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.6
Lost Time Adjust (s)		0.1		0.1		0.2		0.2
Total Lost Time (s)		5.8		5.8		6.1		6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		31.7		31.7		21.4		21.4
Actuated g/C Ratio		0.49		0.49		0.33		0.33
v/c Ratio		0.53		0.43		0.02		0.10
Control Delay		14.0		11.4		10.0		37.4
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		14.0		11.4		10.0		37.4
LOS		B		B		A		D
Approach Delay		14.0		11.4		10.0		33.4
Approach LOS		B		B		A		C
Queue Length 50th (m)		35.2		23.3		0.5		38.4
Queue Length 95th (m)		53.5		37.5		3.2		#73.7
Internal Link Dist (m)		298.5		204.9		70.7		74.7
Turn Bay Length (m)							20.0	
Base Capacity (vph)		1535		1527		590		616
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		0.53		0.43		0.02		0.09

Intersection Summary

Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 29 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 17.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 74.2%  
 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: 3: Otterson/Springland & Walkley



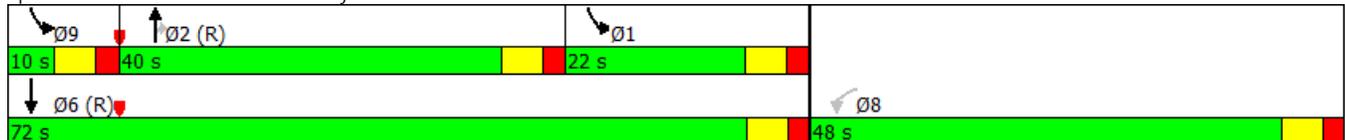
Projected 2019 PM  
7: Riverside & Walkley

	↙	↖	↑	↗	↘	↓	Ø1	Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations	↙	↖	↑↑	↗	↘↘	↑↑		
Traffic Volume (vph)	417	272	663	263	338	1333		
Future Volume (vph)	417	272	663	263	338	1333		
Lane Group Flow (vph)	439	286	698	277	356	1403		
Turn Type	Perm	Free	NA	Perm	Prot	NA		
Protected Phases			2		1 9	6	1	9
Permitted Phases	8	Free		2				
Detector Phase	8		2	2	1 9	6		
Switch Phase								
Minimum Initial (s)	10.0		10.0	10.0		10.0	5.0	5.0
Minimum Split (s)	36.0		23.7	23.7		23.7	10.9	10.9
Total Split (s)	48.0		40.0	40.0		72.0	22.0	10.0
Total Split (%)	40.0%		33.3%	33.3%		60.0%	18%	8%
Yellow Time (s)	3.7		3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.0		2.0	2.0		2.0	2.2	2.2
Lost Time Adjust (s)	0.0		0.0	0.0		0.0		
Total Lost Time (s)	5.7		5.7	5.7		5.7		
Lead/Lag			Lag	Lag				Lead
Lead-Lag Optimize?			Yes	Yes				Yes
Recall Mode	None		C-Max	C-Max		C-Max	None	None
Act Effct Green (s)	36.7	120.0	36.9	36.9	22.8	71.9		
Actuated g/C Ratio	0.31	1.00	0.31	0.31	0.19	0.60		
v/c Ratio	0.89	0.19	0.67	0.43	0.57	0.69		
Control Delay	59.3	0.3	40.8	6.1	36.5	24.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.6		
Total Delay	59.3	0.3	40.8	6.1	36.5	25.5		
LOS	E	A	D	A	D	C		
Approach Delay	36.0		30.9			27.7		
Approach LOS	D		C			C		
Queue Length 50th (m)	96.5	0.0	77.8	0.0	21.8	130.4		
Queue Length 95th (m)	131.2	0.0	99.2	19.6	45.8	191.2		
Internal Link Dist (m)	298.5		102.7			174.6		
Turn Bay Length (m)				65.0	95.0			
Base Capacity (vph)	572	1492	1042	644	624	2031		
Starvation Cap Reductn	0	0	0	0	0	274		
Spillback Cap Reductn	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0		
Reduced v/c Ratio	0.77	0.19	0.67	0.43	0.57	0.80		

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 85 (71%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 85  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 30.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 72.8%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 7: Riverside & Walkley



Projected 2019 PM  
4: Springland & Site

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	14	12	141	386	4
Future Volume (Veh/h)	5	14	12	141	386	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	15	13	148	406	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)	99					
pX, platoon unblocked						
vC, conflicting volume	582	408	410			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582	408	410			
IC, single (s)	6.4	6.2	4.1			
IC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	99			
cM capacity (veh/h)	470	643	1149			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	20	161	410			
Volume Left	5	13	0			
Volume Right	15	0	4			
cSH	589	1149	1700			
Volume to Capacity	0.03	0.01	0.24			
Queue Length 95th (m)	0.8	0.3	0.0			
Control Delay (s)	11.3	0.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.3	0.8	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay				0.6		
Intersection Capacity Utilization				31.7%	ICU Level of Service	A
Analysis Period (min)				15		

Projected 2019 PM  
5: Riverside & Site

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	39	1002	9	0	1877
Future Volume (Veh/h)	0	39	1002	9	0	1877
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	41	1055	9	0	1976
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			186			65
pX, platoon unblocked	0.78	0.93			0.93	
vC, conflicting volume	2048	532			1064	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1374	347			919	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	107	604			687	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	41	703	361	988	988	
Volume Left	0	0	0	0	0	
Volume Right	41	0	9	0	0	
cSH	604	1700	1700	1700	1700	
Volume to Capacity	0.07	0.41	0.21	0.58	0.58	
Queue Length 95th (m)	1.7	0.0	0.0	0.0	0.0	
Control Delay (s)	11.4	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	11.4	0.0		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.2			
Intersection Capacity Utilization			58.1%		ICU Level of Service	B
Analysis Period (min)			15			

Projected 2019 PM  
6: Riverside & U/G parking

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	8	1003	14	0	1877
Future Volume (Veh/h)	0	8	1003	14	0	1877
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	8	1056	15	0	1976
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			87			163
pX, platoon unblocked	0.75	0.92			0.92	
vC, conflicting volume	2052	536			1071	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1271	330			910	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	120	615			687	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	8	704	367	988	988	
Volume Left	0	0	0	0	0	
Volume Right	8	0	15	0	0	
cSH	615	1700	1700	1700	1700	
Volume to Capacity	0.01	0.41	0.22	0.58	0.58	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0	
Control Delay (s)	10.9	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	10.9	0.0		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			58.1%		ICU Level of Service	B
Analysis Period (min)			15			

# Appendix F

Signal Warrant Analysis

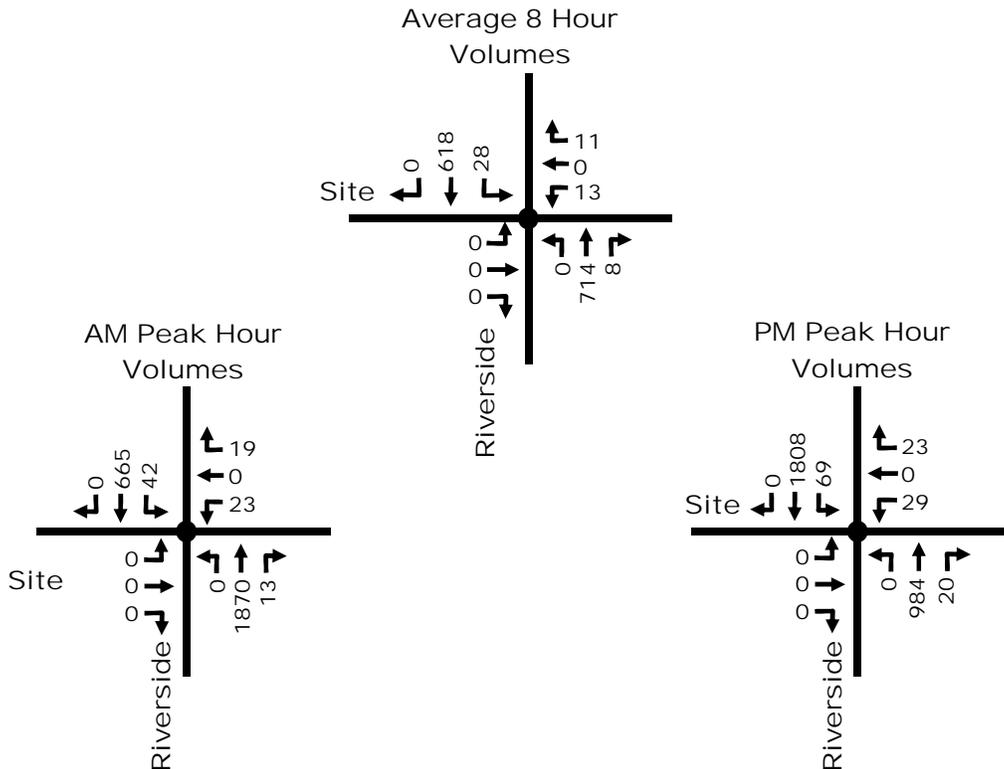
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**Riverside/Site - (peak hour signal warrant)**

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	900	155%	9%	<b>17% No</b>
		(4) B Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	255	9%		
	2. Delay to Cross Traffic	(1) A Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	900	152%	17%	
		(2) B Combined Vehicle and Pedestrian Volume <u>Crossing</u> the Major Street for Each of the Same 8 Hours	75	17%		

**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 **Yes**
- 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) **Yes**



# Appendix G

SYNCHRO Capacity Analysis: Projected 2024 Conditions

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Projected 2024 AM  
1: Riverside & Mooney's Bay

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	19	2020	3	14	730
Future Volume (vph)	10	19	2020	3	14	730
Lane Group Flow (vph)	11	20	2126	3	15	768
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.7	29.7	17.3	17.3	15.3	15.3
Total Split (s)	30.0	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.4	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.4	0.4	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	5.3	5.3	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)	12.4	12.4	104.6	104.6	104.6	104.6
Actuated g/C Ratio	0.10	0.10	0.87	0.87	0.87	0.87
v/c Ratio	0.06	0.12	0.72	0.00	0.15	0.26
Control Delay	46.0	22.4	4.8	3.7	7.9	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.0	22.4	4.8	3.7	7.9	3.0
LOS	D	C	A	A	A	A
Approach Delay	30.8		4.8			3.1
Approach LOS	C		A			A
Queue Length 50th (m)	2.5	0.7	40.6	0.1	0.5	16.5
Queue Length 95th (m)	7.2	7.3	66.1	m0.2	4.5	40.4
Internal Link Dist (m)	265.5		46.8			135.9
Turn Bay Length (m)		25.0		55.0	85.0	
Base Capacity (vph)	337	309	2955	1250	103	2955
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.06	0.72	0.00	0.15	0.26

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 90 (75%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 4.6  
 Intersection Capacity Utilization 77.2%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside & Mooney's Bay



Projected 2024 AM  
2: Riverside & Site

	↙	↑	↖	↘	↓
Lane Group	WBL	NBT	SBU	SBL	SBT
Lane Configurations	↘↙	↑↕		↘↙	↑↕
Traffic Volume (vph)	23	1964	3	39	699
Future Volume (vph)	23	1964	3	39	699
Lane Group Flow (vph)	44	2081	0	44	736
Turn Type	Prot	NA	Perm	Perm	NA
Protected Phases	8	2			6
Permitted Phases			6	6	
Detector Phase	8	2	6	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	23.9	23.9	23.9	23.9
Total Split (s)	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7
All-Red Time (s)	3.3	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-2.3	-1.9		-1.9	-1.9
Total Lost Time (s)	4.0	4.0		4.0	4.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.7	101.4		101.4	101.4
Actuated g/C Ratio	0.12	0.84		0.84	0.84
v/c Ratio	0.20	0.73		0.43	0.26
Control Delay	30.7	4.1		22.2	2.3
Queue Delay	0.0	0.3		0.0	0.0
Total Delay	30.7	4.4		22.2	2.3
LOS	C	A		C	A
Approach Delay	30.7	4.4			3.4
Approach LOS	C	A			A
Queue Length 50th (m)	5.2	7.0		1.5	13.1
Queue Length 95th (m)	14.7	m12.8		#24.4	17.1
Internal Link Dist (m)	71.5	177.4			70.2
Turn Bay Length (m)				55.0	
Base Capacity (vph)	368	2861		102	2863
Starvation Cap Reductn	0	245		0	0
Spillback Cap Reductn	0	14		0	0
Storage Cap Reductn	0	0		0	0
Reduced v/c Ratio	0.12	0.80		0.43	0.26

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 88 (73%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 4.6  
 Intersection LOS: A  
 Intersection Capacity Utilization 72.7%  
 ICU Level of Service C  
 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: 2: Riverside & Site



Projected 2024 AM  
 3: Otterson/Springland & Walkley

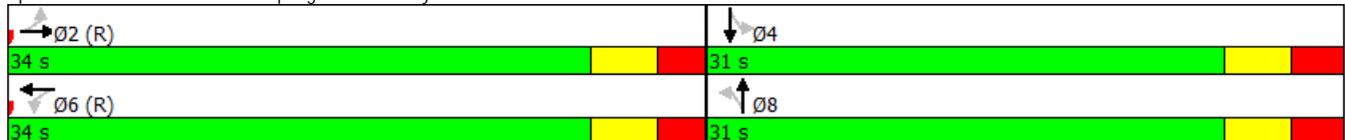
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	48	442	27	804	12	27	86	1
Future Volume (vph)	48	442	27	804	12	27	86	1
Lane Group Flow (vph)	0	521	0	930	0	50	91	28
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	25.7	25.7	25.7	30.9	30.9	30.9	30.9
Total Split (s)	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0
Total Split (%)	52.3%	52.3%	52.3%	52.3%	47.7%	47.7%	47.7%	47.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.6
Lost Time Adjust (s)		0.1		0.1		0.2		0.2
Total Lost Time (s)		5.8		5.8		6.1		6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		44.3		44.3		13.2		13.2
Actuated g/C Ratio		0.68		0.68		0.20		0.20
v/c Ratio		0.28		0.44		0.15		0.09
Control Delay		7.3		8.3		17.1		7.7
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		7.3		8.3		17.1		7.7
LOS		A		A		B		C
Approach Delay		7.3		8.3		17.1		20.3
Approach LOS		A		A		B		C
Queue Length 50th (m)		11.1		22.6		4.4		0.1
Queue Length 95th (m)		33.2		63.2		8.9		4.3
Internal Link Dist (m)		296.4		200.9		87.8		81.6
Turn Bay Length (m)							20.0	
Base Capacity (vph)		1868		2129		616		593
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		0.28		0.44		0.08		0.05

Intersection Summary

Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 29 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.44  
 Intersection Signal Delay: 9.1  
 Intersection Capacity Utilization 69.5%  
 Analysis Period (min) 15

Intersection LOS: A  
 ICU Level of Service C

Splits and Phases: 3: Otterson/Springland & Walkley





Projected 2024 AM  
4: Springland & Site

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	13	14	114	100	5
Future Volume (Veh/h)	4	13	14	114	100	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	14	15	120	105	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)	105					
pX, platoon unblocked						
vC, conflicting volume	258	108	110			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	258	108	110			
IC, single (s)	6.4	6.2	4.1			
IC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	724	946	1480			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	18	135	110			
Volume Left	4	15	0			
Volume Right	14	0	5			
cSH	886	1480	1700			
Volume to Capacity	0.02	0.01	0.06			
Queue Length 95th (m)	0.5	0.2	0.0			
Control Delay (s)	9.1	0.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	0.9	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay				1.1		
Intersection Capacity Utilization				23.8%	ICU Level of Service	A
Analysis Period (min)				15		

Projected 2024 AM  
5: Riverside & Site

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	33	1990	7	0	741
Future Volume (Veh/h)	0	33	1990	7	0	741
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	35	2095	7	0	780
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			187			71
pX, platoon unblocked	0.22	0.20			0.20	
vC, conflicting volume	2488	1051			2102	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	84			100	
cM capacity (veh/h)	230	218			327	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	35	1397	705	390	390	
Volume Left	0	0	0	0	0	
Volume Right	35	0	7	0	0	
cSH	218	1700	1700	1700	1700	
Volume to Capacity	0.16	0.82	0.41	0.23	0.23	
Queue Length 95th (m)	4.2	0.0	0.0	0.0	0.0	
Control Delay (s)	24.6	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	24.6	0.0		0.0		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			0.3			
Intersection Capacity Utilization			68.3%		ICU Level of Service	C
Analysis Period (min)			15			

Projected 2024 AM  
6: Riverside & U/G parking

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	15	1982	4	0	741
Future Volume (Veh/h)	0	15	1982	4	0	741
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	16	2086	4	0	780
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			94			164
pX, platoon unblocked	0.21	0.19			0.19	
vC, conflicting volume	2478	1045			2090	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	92			100	
cM capacity (veh/h)	213	205			306	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	16	1391	699	390	390	
Volume Left	0	0	0	0	0	
Volume Right	16	0	4	0	0	
cSH	205	1700	1700	1700	1700	
Volume to Capacity	0.08	0.82	0.41	0.23	0.23	
Queue Length 95th (m)	1.9	0.0	0.0	0.0	0.0	
Control Delay (s)	24.1	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	24.1	0.0		0.0		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			0.1			
Intersection Capacity Utilization			68.0%		ICU Level of Service	C
Analysis Period (min)			15			

Projected 2024 PM  
1: Riverside & Mooney's Bay

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	23	1073	16	21	1948
Future Volume (vph)	19	23	1073	16	21	1948
Lane Group Flow (vph)	20	24	1129	17	22	2051
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	29.7	29.7	17.3	17.3	15.3	15.3
Total Split (s)	30.0	30.0	90.0	90.0	90.0	90.0
Total Split (%)	25.0%	25.0%	75.0%	75.0%	75.0%	75.0%
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.4	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.4	0.4	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	5.3	5.3	5.3	5.3
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)	12.4	12.4	104.6	104.6	104.6	104.6
Actuated g/C Ratio	0.10	0.10	0.87	0.87	0.87	0.87
v/c Ratio	0.11	0.14	0.38	0.01	0.06	0.69
Control Delay	47.5	17.5	1.2	0.0	3.9	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	17.5	1.2	0.0	3.9	7.3
LOS	D	B	A	A	A	A
Approach Delay	31.2		1.2			7.3
Approach LOS	C		A			A
Queue Length 50th (m)	4.5	0.0	8.1	0.0	0.8	86.7
Queue Length 95th (m)	10.6	7.3	16.6	m0.0	4.1	205.6
Internal Link Dist (m)	263.1		41.1			158.8
Turn Bay Length (m)		25.0		55.0	85.0	
Base Capacity (vph)	337	315	2955	1252	374	2955
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.08	0.38	0.01	0.06	0.69

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 110 (92%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 5.5  
 Intersection LOS: A  
 Intersection Capacity Utilization 75.1%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside & Mooney's Bay



Projected 2024 PM  
2: Riverside & Site

	↙	↑	↖	↘	↓
Lane Group	WBL	NBT	SBU	SBL	SBT
Lane Configurations	↙	↑		↘	↓
Traffic Volume (vph)	29	1033	10	59	1900
Future Volume (vph)	29	1033	10	59	1900
Lane Group Flow (vph)	55	1108	0	73	2000
Turn Type	Prot	NA	Perm	Perm	NA
Protected Phases	8	2			6
Permitted Phases			6	6	
Detector Phase	8	2	6	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	23.9	23.9	23.9	23.9
Total Split (s)	28.3	91.7	91.7	91.7	91.7
Total Split (%)	23.6%	76.4%	76.4%	76.4%	76.4%
Yellow Time (s)	3.0	3.7	3.7	3.7	3.7
All-Red Time (s)	3.3	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-2.3	-1.9		-1.9	-1.9
Total Lost Time (s)	4.0	4.0		4.0	4.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.7	101.4		101.4	101.4
Actuated g/C Ratio	0.12	0.84		0.84	0.84
v/c Ratio	0.25	0.39		0.20	0.70
Control Delay	31.6	10.9		1.5	2.0
Queue Delay	0.2	0.4		0.0	0.1
Total Delay	31.8	11.3		1.5	2.1
LOS	C	B		A	A
Approach Delay	31.8	11.3			2.1
Approach LOS	C	B			A
Queue Length 50th (m)	6.8	115.8		0.3	4.7
Queue Length 95th (m)	17.2	142.2		m0.5	5.4
Internal Link Dist (m)	72.2	174.6			63.3
Turn Bay Length (m)				55.0	
Base Capacity (vph)	350	2855		364	2863
Starvation Cap Reductn	0	1112		0	27
Spillback Cap Reductn	83	0		0	129
Storage Cap Reductn	0	0		0	0
Reduced v/c Ratio	0.21	0.64		0.20	0.73

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: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.70  
 Intersection Signal Delay: 5.8  
 Intersection Capacity Utilization 70.4%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside & Site



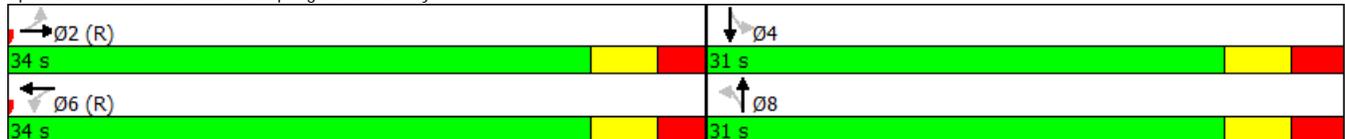
Projected 2024 PM  
 3: Otterson/Springland & Walkley

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	746	10	475	5	1	349	7
Future Volume (vph)	20	746	10	475	5	1	349	7
Lane Group Flow (vph)	0	813	0	650	0	12	367	53
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	25.7	25.7	25.7	30.9	30.9	30.9	30.9
Total Split (s)	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0
Total Split (%)	52.3%	52.3%	52.3%	52.3%	47.7%	47.7%	47.7%	47.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.6
Lost Time Adjust (s)		0.1		0.1		0.2		0.2
Total Lost Time (s)		5.8		5.8		6.1		6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		31.7		31.7		21.4		21.4
Actuated g/C Ratio		0.49		0.49		0.33		0.33
v/c Ratio		0.53		0.43		0.02		0.10
Control Delay		14.0		11.4		10.0		37.4
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		14.0		11.4		10.0		37.4
LOS		B		B		A		D
Approach Delay		14.0		11.4		10.0		33.4
Approach LOS		B		B		A		C
Queue Length 50th (m)		35.2		23.3		0.5		38.4
Queue Length 95th (m)		53.5		37.5		3.2		#73.7
Internal Link Dist (m)		298.5		204.9		70.7		74.7
Turn Bay Length (m)							20.0	
Base Capacity (vph)		1535		1527		590		616
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		0.53		0.43		0.02		0.09

Intersection Summary

Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 29 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 17.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 74.2%  
 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: 3: Otterson/Springland & Walkley



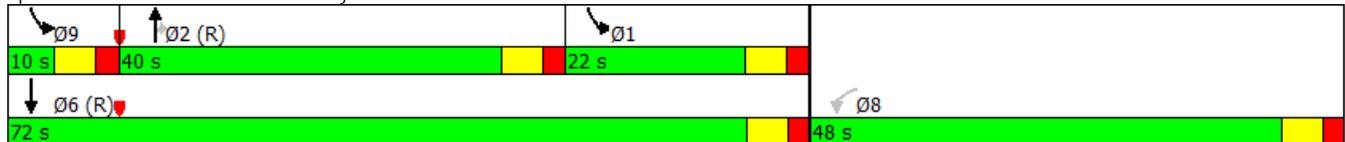
Projected 2024 PM  
7: Riverside & Walkley

	↙	↖	↑	↗	↘	↓	Ø1	Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations	↙	↖	↑↑	↗	↘↘	↑↑		
Traffic Volume (vph)	417	272	696	263	338	1400		
Future Volume (vph)	417	272	696	263	338	1400		
Lane Group Flow (vph)	439	286	733	277	356	1474		
Turn Type	Perm	Free	NA	Perm	Prot	NA		
Protected Phases			2		1 9	6	1	9
Permitted Phases	8	Free		2				
Detector Phase	8		2	2	1 9	6		
Switch Phase								
Minimum Initial (s)	10.0		10.0	10.0		10.0	5.0	5.0
Minimum Split (s)	36.0		23.7	23.7		23.7	10.9	10.9
Total Split (s)	48.0		40.0	40.0		72.0	22.0	10.0
Total Split (%)	40.0%		33.3%	33.3%		60.0%	18%	8%
Yellow Time (s)	3.7		3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.0		2.0	2.0		2.0	2.2	2.2
Lost Time Adjust (s)	0.0		0.0	0.0		0.0		
Total Lost Time (s)	5.7		5.7	5.7		5.7		
Lead/Lag			Lag	Lag				Lead
Lead-Lag Optimize?			Yes	Yes				Yes
Recall Mode	None		C-Max	C-Max		C-Max	None	None
Act Effct Green (s)	36.7	120.0	36.9	36.9	22.8	71.9		
Actuated g/C Ratio	0.31	1.00	0.31	0.31	0.19	0.60		
v/c Ratio	0.89	0.19	0.70	0.43	0.57	0.73		
Control Delay	59.3	0.3	41.8	6.1	36.7	26.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.9		
Total Delay	59.3	0.3	41.8	6.1	36.7	27.1		
LOS	E	A	D	A	D	C		
Approach Delay	36.0		32.0			29.0		
Approach LOS	D		C			C		
Queue Length 50th (m)	96.5	0.0	82.8	0.0	22.6	141.2		
Queue Length 95th (m)	131.2	0.0	105.1	19.6	43.8	202.0		
Internal Link Dist (m)	298.5		102.7			174.6		
Turn Bay Length (m)				65.0	95.0			
Base Capacity (vph)	572	1492	1042	644	624	2031		
Starvation Cap Reductn	0	0	0	0	0	274		
Spillback Cap Reductn	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0		
Reduced v/c Ratio	0.77	0.19	0.70	0.43	0.57	0.84		

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 85 (71%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 85  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 31.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 74.8%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 7: Riverside & Walkley



Projected 2024 PM  
4: Springland & Site

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	14	12	141	386	4
Future Volume (Veh/h)	5	14	12	141	386	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	15	13	148	406	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)	99					
pX, platoon unblocked						
vC, conflicting volume	582	408	410			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582	408	410			
IC, single (s)	6.4	6.2	4.1			
IC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	99			
cM capacity (veh/h)	470	643	1149			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	20	161	410			
Volume Left	5	13	0			
Volume Right	15	0	4			
cSH	589	1149	1700			
Volume to Capacity	0.03	0.01	0.24			
Queue Length 95th (m)	0.8	0.3	0.0			
Control Delay (s)	11.3	0.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.3	0.8	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay				0.6		
Intersection Capacity Utilization				31.7%	ICU Level of Service	A
Analysis Period (min)				15		

Projected 2024 PM  
5: Riverside & Site

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	39	1051	9	0	1969
Future Volume (Veh/h)	0	39	1051	9	0	1969
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	41	1106	9	0	2073
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			186			65
pX, platoon unblocked	0.21	0.92			0.92	
vC, conflicting volume	2147	558			1115	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	353			957	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	219	594			659	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	41	737	378	1036	1036	
Volume Left	0	0	0	0	0	
Volume Right	41	0	9	0	0	
cSH	594	1700	1700	1700	1700	
Volume to Capacity	0.07	0.43	0.22	0.61	0.61	
Queue Length 95th (m)	1.7	0.0	0.0	0.0	0.0	
Control Delay (s)	11.5	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	11.5	0.0		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.1			
Intersection Capacity Utilization			60.8%		ICU Level of Service	B
Analysis Period (min)			15			

Projected 2024 PM  
6: Riverside & U/G parking

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	8	1052	14	0	1969
Future Volume (Veh/h)	0	8	1052	14	0	1969
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	8	1107	15	0	2073
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			87			163
pX, platoon unblocked	0.23	0.92			0.92	
vC, conflicting volume	2151	561			1122	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	339			951	
IC, single (s)	6.8	6.9			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	234	602			658	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	8	738	384	1036	1036	
Volume Left	0	0	0	0	0	
Volume Right	8	0	15	0	0	
cSH	602	1700	1700	1700	1700	
Volume to Capacity	0.01	0.43	0.23	0.61	0.61	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0	
Control Delay (s)	11.1	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	11.1	0.0		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			60.8%	ICU Level of Service		B
Analysis Period (min)			15			