

3690 & 3630 Riverside Drive

TIA Strategy Report

prepared for:
Taggart Realty Management
225 Metcalfe Street, Suite 708
Ottawa, Ontario
K2P 1P9

prepared by:
PARSONS
1223 Michael Street
Suite 100
Ottawa, ON K1J 7T2

March 15, 2018

476575-01000

Table of Contents

1. INTRODUCTION	1
2. SCOPING REPORT.....	3
2.1. EXISTING AND PLANNED CONDITIONS.....	3
2.1.1. Proposed Development	3
2.1.2. Existing Conditions.....	3
2.1.3. Planned Conditions.....	7
2.2. STUDY AREA AND TIME PERIODS	7
2.2.1. Study Area	7
2.2.2. Time Periods.....	8
2.2.3. Horizon Years	8
2.3. EXEMPTION REVIEW	9
3. FORECASTING REPORT	9
3.1. DEVELOPMENT-GENERATED TRAVEL DEMAND.....	9
3.1.1. Trip Generation and Mode Shares.....	9
3.1.2. Trip Distribution.....	13
3.1.3. Trip Assignment.....	14
3.2. BACKGROUND NETWORK TRAVEL DEMANDS	15
3.2.1. Transportation Network Plans.....	15
3.2.2. Background Growth	15
3.2.3. Other Developments	16
3.3. DEMAND RATIONALIZATION	16
4. STRATEGY REPORT.....	16
4.1. DEVELOPMENT DESIGN	16
4.1.1. Design for Sustainable Modes	16
4.1.2. Circulation and Access.....	17
4.2. PARKING.....	17
4.2.1. Parking Supply.....	17
4.3. BOUNDARY STREET DESIGN.....	17
4.4. ACCESS INTERSECTION DESIGN.....	18
4.4.1. Location and Design of Access	18
4.4.2. Intersection Control	18
4.4.3. Intersection Design	19
4.5. TRANSPORTATION DEMAND MANAGEMENT	20
4.6. NEIGHBOURHOOD TRAFFIC MANAGEMENT.....	20
4.7. TRANSIT.....	20
4.8. REVIEW OF NETWORK CONCEPT	21

4.9.	INTERSECTION DESIGN	21
4.9.1.	Existing Conditions.....	21
4.9.2.	Total Projected 2020 Conditions – Phase 1 Build Out.....	23
4.9.3.	Total Projected 2021 Conditions – Phase 1 and 2 Site Build-Out.....	24
5.	FINDINGS, CONCLUSIONS AND RECOMMENDATIONS.....	26

List of Appendices

APPENDIX A – Intersection Turning Movement Counts
APPENDIX B – Collision Data and Analysis
APPENDIX C – As-of-right Zoning Trip Generation
APPENDIX D – Traffic Growth Analysis
APPENDIX E – Multi-Modal Level of Service Analysis – Road Segment
APPENDIX F – Signal Warrant Analysis – Riverside/Site
APPENDIX G – Left-turn Lane Warrant Analysis
APPENDIX H – Multi-Modal Level of Service Analysis – Riverside/Site Intersection
APPENDIX I – Transportation Demand Management Checklist
APPENDIX J – SYNCHRO Capacity and MMLoS Analysis: Existing Conditions
APPENDIX K – SYNCHRO Capacity and MMLoS Analysis: Projected 2020 Conditions
APPENDIX L – SYNCHRO Capacity Analysis: Projected 2021 Conditions

List of Figures

Figure 1: Local Context	1
Figure 2: Proposed Site Plan	2
Figure 3: Area Transit Network.....	4
Figure 4: Existing Peak Hour Traffic Volumes.....	6
Figure 5: Study Area	8
Figure 6: Phase 1 ‘New’ and ‘Pass-by’ Site-Generated Traffic	14
Figure 7: Phases 1 and 2 ‘New’ and ‘Pass-by’ Site-Generated Traffic.....	15
Figure 8: Total Projected 2019 Traffic Volumes.....	23
Figure 9: Total Projected 2021 Traffic Volumes.....	25

List of Tables

Table 1: Existing Boarding and Alighting Passengers	4
Table 2: ITE Trip Generation Rates.....	9
Table 3: Phase 1 Modified Person Trip Generation – Car Dealership and Retail	10
Table 4: Car Dealership Modal Site Trip Generation.....	10
Table 5: Retail Modal Site Trip Generation.....	10
Table 6: School ITE Site Trip Generation	11
Table 7: Phase 1 Site Vehicle Trip Generation	11
Table 8: ITE Trip Generation Rates.....	11
Table 9: Phase 2 Modified Person Trip Generation	12
Table 10: Phase 2 Modal Site Trip Generation	12
Table 11: Phase 1 and 2 Site Person Trip Generation	12
Table 12: ‘As-of-right’ Zoning Trip Generation – Office Part (ITE 750).....	13
Table 13: OD Survey Trips by Primary Travel Mode – Hunt Club	13
Table 14: Riverside/Hunt Club Historical Background Growth (2009 – 2016).....	15
Table 15: MMLoS – Existing Riverside Drive Road Segment (West Side of Roadway)	18
Table 16: Storage Length Requirements at Proposed Riverside/Site Intersection	19
Table 17: MMLoS – Proposed Riverside/Site Intersection	19
Table 18: Existing Intersection Performance.....	21
Table 19: Existing Queues along Riverside Drive.....	21
Table 20: MMLoS – Signalized Study Area Intersections.....	22
Table 21: Total Projected 2020 Performance at Study Area Intersections.....	24
Table 22: Total Projected 2021 Performance at Study Area Intersections.....	25

TIA Strategy Report

1. INTRODUCTION

It is our understanding that Taggart is ready to proceed with the process to obtain development approval for the subject lands located at 3960 & 3930 Riverside Drive, which are located in the northwest quadrant of the Riverside/Hunt Club intersection. A variety of development proposals have been evaluated for this site over the past several decades, with on-going discussion with City staff that were supportive of development at this prime location in Ottawa.

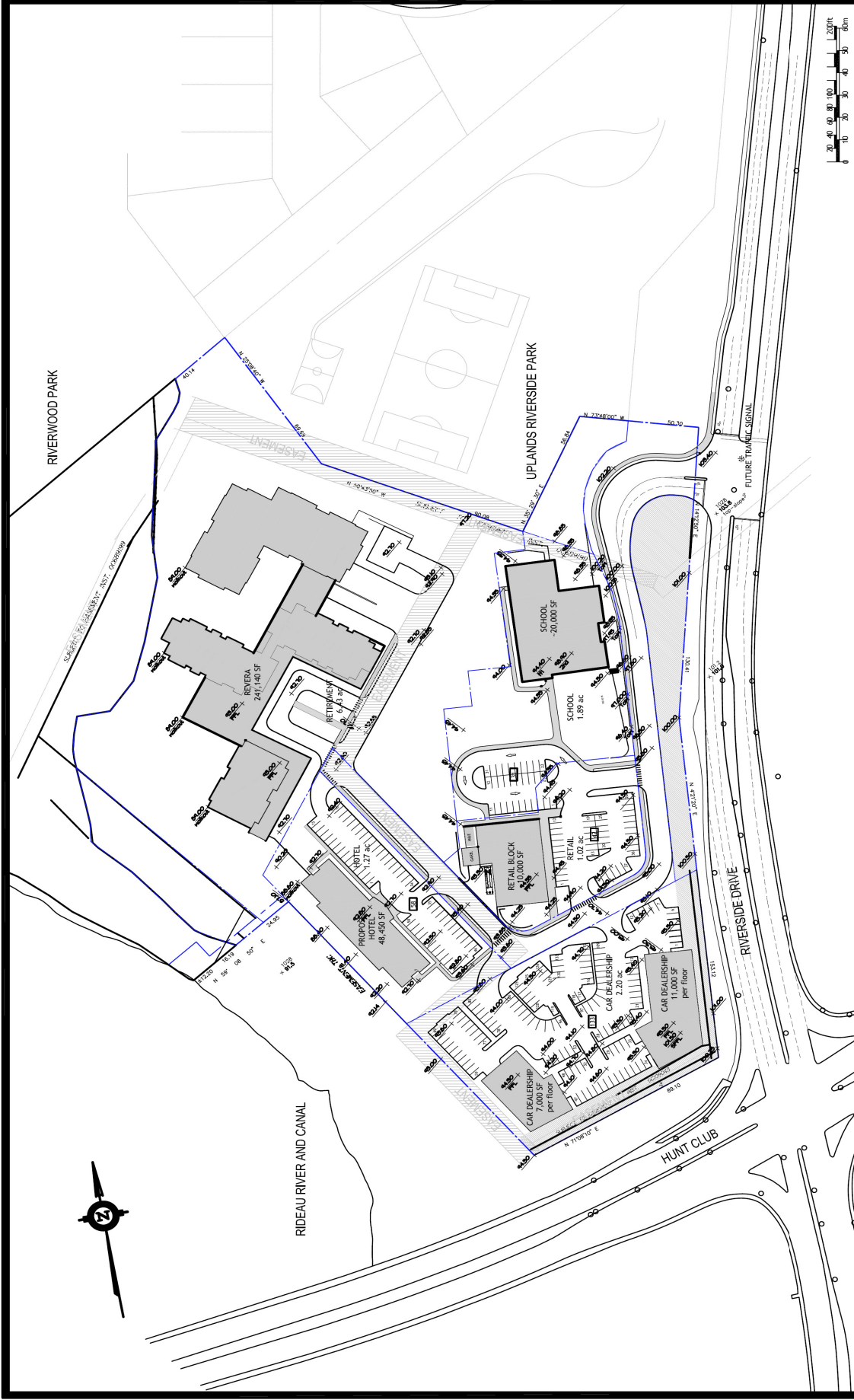
The current Concept Plan includes a mixed-use development comprised of senior apartments/retirement home, a 48,450 ft² hotel, 10,000 ft² of retail, 29,000 ft² car dealership, and 20,000 ft² private school (Westboro Academy). The approval process is understood initially to include a Vacant Land Condominium (VLC) application that will establish common elements and vacant parcels of land. Rezoning is also required to support some elements of the proposed land use plan, namely a car dealership and optional private school.

Vehicular access/egress is proposed via a new signalized intersection to Riverside Drive. This intersection is proposed approximately 270 m north of the Riverside/Hunt Club intersection. A Transportation Overview was previously prepared and submitted by Parsons for this site in 2008 in support of the Zoning Amendment Application. The proposed land use at the time was considerably more intensive that currently being considered, consisting of 325,000 ft² of office and 400 retirement units. As part of this earlier work a new signalized intersection to Riverside Drive was proposed to provide access to the development, and a functional sketch of the intersection was prepared featuring traffic signal control, northbound left-turn lane, southbound right-turn lane, and southbound acceleration lane departing the intersection and extending to Hunt Club Road.

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





SCALE 1:1500
08 MARCH 2018

HUNT CLUB RD. - RIVERSIDE DR. SITE STUDY
Mixed Use - Commercial / Retirement Living / School - GRADING AND EASEMENTS



Figure 2: Proposed Site Plan



As part of the Site Plan Approval process, the City of Ottawa requires a submission of a formal Transportation Impact Assessment (TIA) consistent with their updated 2017 guidelines. With respect to these guidelines, this Strategy Report has been prepared.

2. SCOPING REPORT

2.1. EXISTING AND PLANNED CONDITIONS

The TIA and ensuing analysis includes the signalized Riverside/Hunt Club, Riverside/Uplands, Hunt Club/Prince of Wales and the proposed Riverside/Site intersections.

2.1.1. PROPOSED DEVELOPMENT

Please see introduction.

2.1.2. EXISTING CONDITIONS

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. There is a guiderail located along the west side of Riverside Drive, adjacent to the site.

Hunt Club Road is an east-west arterial, which extends from HWY 417 in the east to Old Richmond Road in the west. Within the study area, it has a four-lane cross-section and auxiliary turn lanes are provided at major intersections. The posted speed limit within the study area is 80 km/h.

Prince of Wales Drive is a north-south arterial, which extends from Preston Street in the north to Fourth Line Road in the south. Within the study area, Prince of Wales Drive has a four-lane cross-section with auxiliary turn-lanes provided at major intersections. The posted speed limit is 60 km/h.

Uplands Drive is a collector roadway with a two-lane cross-section. Auxiliary turn lanes are provided at major intersections and the posted speed limit is 50 km/h.

Pedestrian/Cycling Network

Sidewalk facilities within the vicinity of the site are provided along both sides of Hunt Club Road and along the east side of Riverside Drive. A sub-standard sidewalk (maintenance strip) is provided along the west side of Riverside Drive, adjacent to the site. With respect to cycling, bicycle lanes exist along both sides of Riverside Drive, south of Hunt Club Road and a multi-use pathway (MUP) is provided along the west side of Riverside Drive (south of Hunt Club). The bicycle lane along the east side of Riverside Drive continues north of Hunt Club Road for approximately 125 m. Bicycle lanes are also provided along Hunt Club Road, except between Riverside Drive and North Bowesville Road, which are planned to be provided in the future as a Phase 2 City Project. The City's Cycling Plan identifies Riverside Drive, Hunt Club Road, and Prince of Wales Drive as Spine Routes and Uplands Drive as a Local Route. A major pathway is planned along the Rideau River along the western boundary of the site. It is noteworthy that this pathway may not be feasible due to slopes and soil conditions.

With regard to pedestrian volumes, according to the most recent traffic count data, approximately 5 to 20 pedestrians per hour were observed crossing the Riverside/Hunt Club intersection during the morning and afternoon peak hours. With

regard to cycling volumes, approximately 5 to 30 cyclists per hour were observed at this intersection during the 8-hour count (in August).

Transit Network

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #87, 96, 189, and 199. Bus stops for Routes #96, 189 and 199 are located adjacent to the Riverside/Hunt Club intersection. Bus stops for Route #87 are located along Uplands Drive and along Riverside Drive, north of Uplands Drive. There are no bus stops or routes along Riverside Drive adjacent to the proposed development lands.

Figure 3: Area Transit Network



Transit Capacity

Based on the information provided by OC Transpo, the following Table 1 provides the daily number of boarding and alighting passengers for an average day at the bus stops within the vicinity of the site. In addition, it provides the average number of persons on board busses leaving the stops.

Table 1: Existing Boarding and Alighting Passengers

Intersection	Location	STOP	Route	Boarding (persons/day)	Alighting (persons/day)	Average Load at Departure
HUNT CLUB / RIVERSIDE	Westbound on Hunt Club, east of Riverside Drive	6124	96	5	29	12
			199	0	0	25
	Eastbound on Hunt Club, east of Riverside Drive	4197	96	60	13	12
			189	1	0	7
			199	0	0	25
RIVERSIDE / HUNT CLUB	Northbound on Riverside, south of Hunt Club Road	2124	189	0	0	6
	Southbound of Riverside, south of Hunt Club Road	4849	189	3	0	4

As shown in Table 1, on average the total number of persons on each bus within the vicinity of the site ranges from 5 to 25 depending on the route. Capacity of busses is understood to be 55 persons per bus for regular busses, 75 persons per

PARSONS

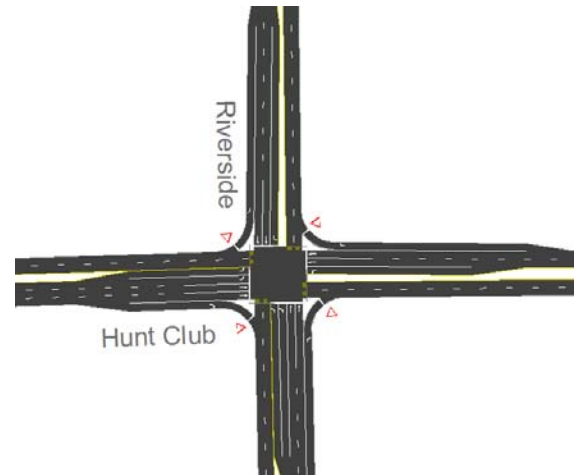
bus for articulated busses and 90 persons per bus for double decker busses. As such, it can be seen that all routes within the vicinity of the site are operating with significant spare capacity.

The most frequented bus route is Route #96, with approximately 65 boardings per day and 42 alightings per day within the area.

Existing Study Area Intersection

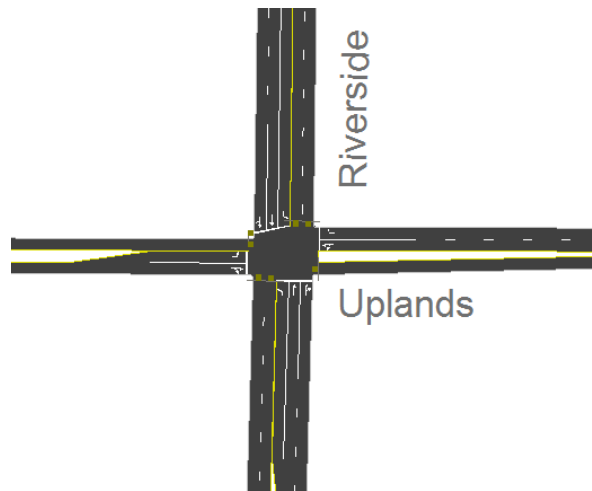
Riverside/Hunt Club

The Riverside/Hunt Club intersection is a signalized four-legged intersection. The northbound approach consists of double left-turn lanes, two through lanes and a channelized right-turn lane. The southbound approach consists of a left-turn lane, two through lanes, and a channelized right-turn lane. The westbound approach consists of a single left-turn lane, two through lanes, and a channelized right-turn lane. The eastbound approach consists of double left-turn lanes, two through lanes and a channelized right-turn lane. All movements are permitted at this location.



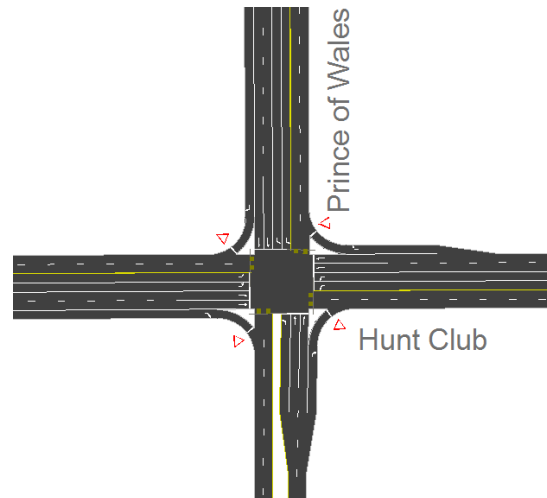
Riverside/Uplands

The Riverside/Uplands intersection is a signalized four-legged intersection. The south and northbound approaches consist of a single left-turn lane, a through lane and a shared through/right-turn lane. The westbound approach consists of a shared through/left-turn lane and a single right-turn lane. The eastbound approach consists of a single left-turn lane and a shared through/right-turn lane. All movements are permitted at this location.



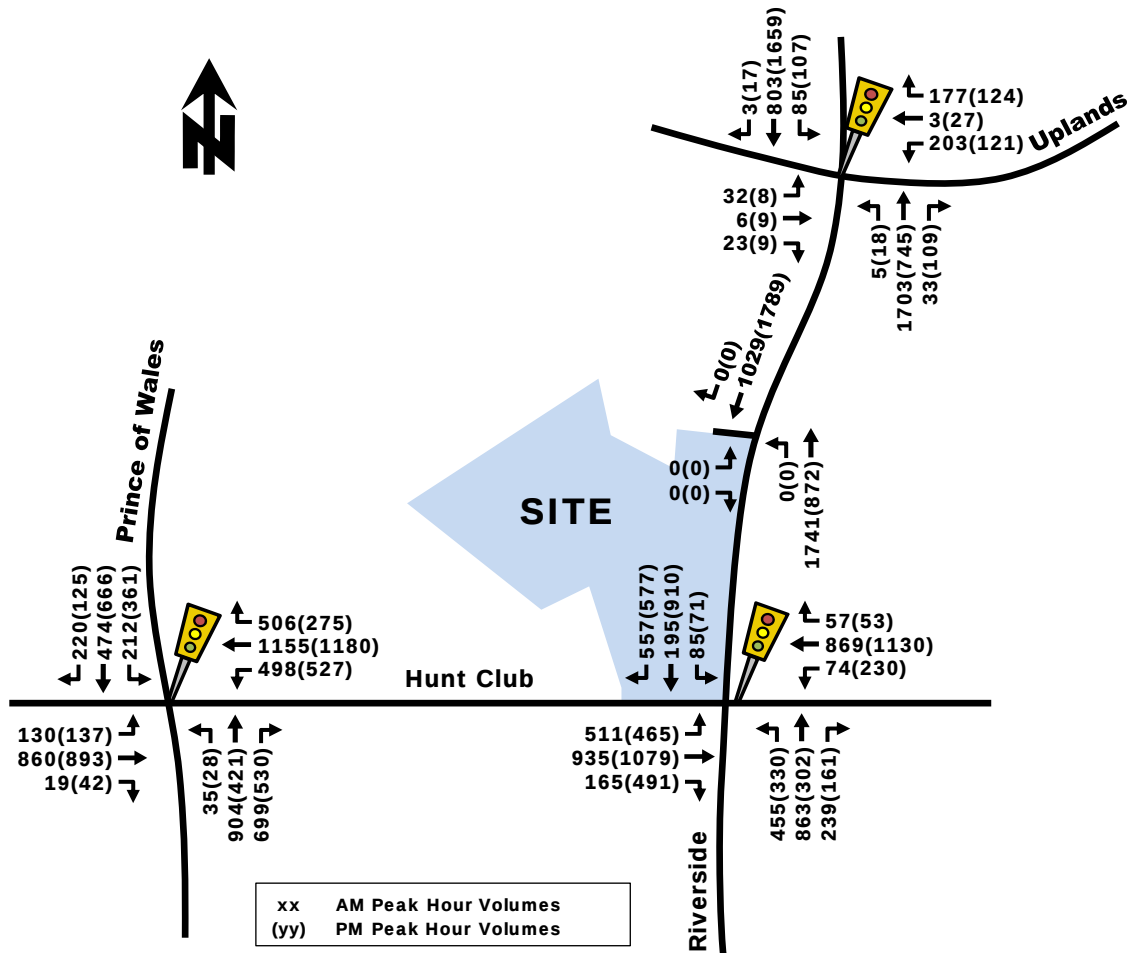
Prince of Wales/Hunt Club

The Prince of Wales/Hunt Club intersection is a signalized four-legged intersection. The east, west and southbound approaches consist of double left-turn lanes, two through lanes and a channelized right-turn lane. The northbound approach consists of a single left-turn lane, two through lanes and a channelized right-turn lane. All movements are permitted at this location.



Illustrated as Figure 4, are the most recent weekday morning and afternoon peak hour traffic volumes obtained from the City of Ottawa at the Riverside/Hunt Club, Riverside/Uplands and Prince of Wales/Hunt Club intersections. These peak hour traffic volumes are included as Appendix A.

Figure 4: Existing Peak Hour Traffic Volumes



Existing Road Safety Conditions

Collision history for the Hunt Club/Riverside and Riverside/Uplands intersections (2012 to 2016, inclusive) was obtained from the City of Ottawa and most collisions (80%) involved only property damage, indicating low impact speeds, and 20% involved personal injuries. The primary causes of collisions cited by police include; rear end (75%), sideswipe (11%), and turning movement (6%) 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:

- 1.78/MEV at the Hunt Club/Riverside intersection; and
- 0.47/MEV at the Riverside/Uplands intersection.

The Riverside/Hunt Club intersection experiences one of the highest collision rates at intersections in the City. A total of 213 collisions occurred at this intersection within a 5-year period, averaging approximately 40 collisions per year. The majority of collisions (80%) were reported as rear-end collisions, which occurred on all four legs of the intersection.

It is noteworthy that within the 5-years of recorded collision data, two collisions involved pedestrians (at the Riverside/Uplands intersection) and one collision involved a cyclist (at the Hunt Club/Riverside intersection). All three accidents resulted in non-fatal injuries. The source collision data as provided by the City of Ottawa and related analysis is provided as Appendix B.

2.1.3. PLANNED CONDITIONS

Planned Study Area Transportation Network Changes

Roadways

A notable transportation network change within the study area in the proposed widening of Hunt Club Road between the Airport Parkway and Old Richmond Road as identified on the 2031 Network Concept in the Transportation Master Plan (TMP). Other proposed road widenings within the area are Airport Parkway widening, Prince of Wales Drive widening and widening of Riverside Drive, south of Hunt Club Road.

The Hunt Club Road and Riverside Drive widenings are not identified in the Affordable Network and will likely not be implemented until post 2031. The widening of Prince of Wales Drive, south of Hunt Club Road, is identified as a Phase 3 City Project and the widening of the Airport Parking is identified as a Phase 1 (north of Hunt Club) and Phase 3 (south of Hunt Club) City Project (both in the Affordable Network).

It is noted that as part of the Prince of Wales Drive Coordinated Network Modifications Project, the east leg of the Hunt Club/Riverside intersection will be modified by extending the length of the westbound left-turn lane.

Transit

Identified in the 2031 Network Concept is Transit Priority (isolated measures) along Hunt Club Road and Riverside Drive (north of Hunt Club Road). However, these are not identified on the Affordable Network.

Other Area Development

According to the City's development application search tool, the following developments are planned within close proximity of the site.

2175 Prince of Wales Drive

A rezoning is proposed to permit commercial or industrial development at the above-noted site, which is located approximately 500 m southwest of the subject development. No Transportation Impact Assessment was prepared for the rezoning.

2200 and 2210 Prince of Wales Drive

Springcross Properties Inc. is proposing the construction of two-storey office development consisting of approximately 26,000 ft² of office and 60 parking spaces. The Transportation Overview (Prepared by Delcan, a Parsons' company) projected an increase in two-way vehicle traffic of approximately 40 to 45 veh/h during the peak hours.

2.2. STUDY AREA AND TIME PERIODS

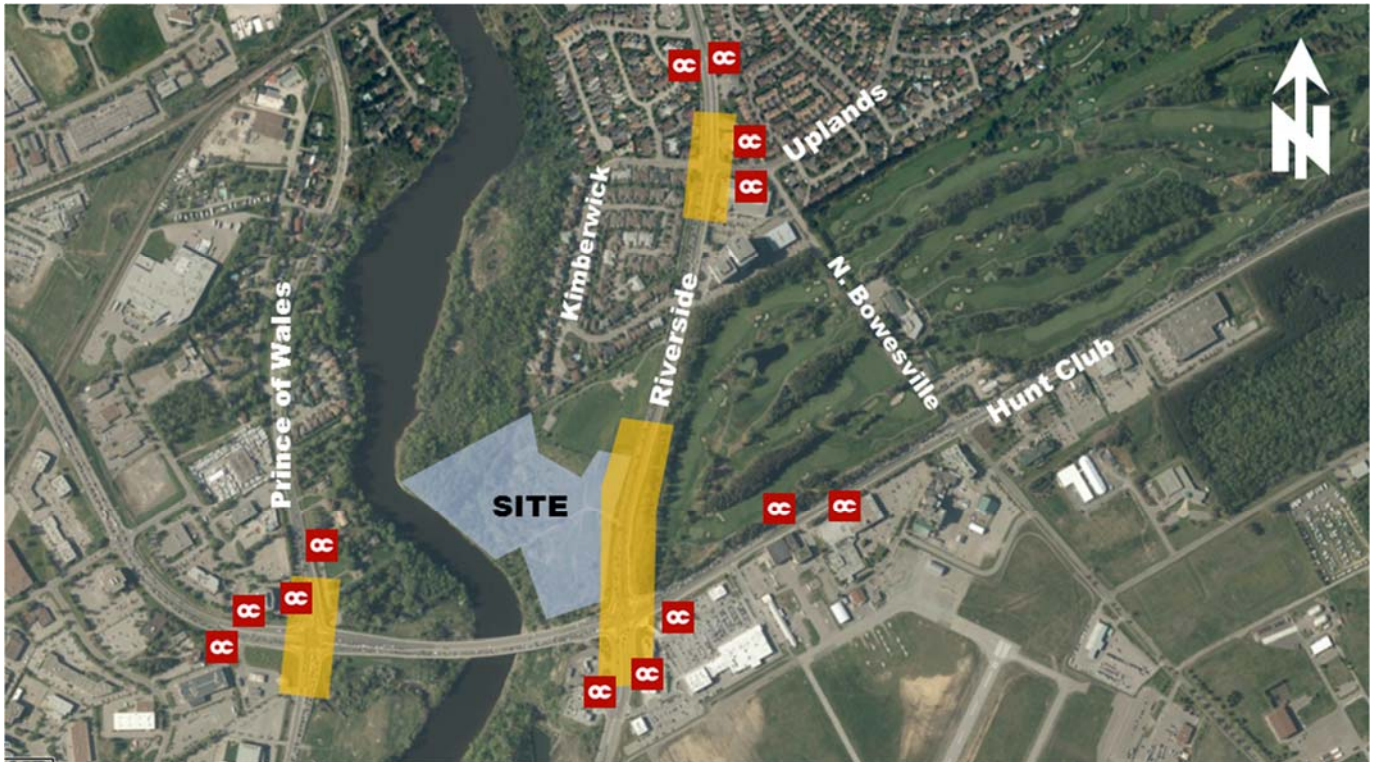
2.2.1. STUDY AREA

The proposed study area is outlined below and highlighted in Figure 5.

- Riverside/Hunt Club intersection;
- Riverside/Uplands intersection;

- Prince of Wales/Hunt Club intersection;
- Riverside/Site intersection (proposed);
- Riverside Drive – adjacent to the site.

Figure 5: Study Area



2.2.2. TIME PERIODS

The time periods to be assessed are the weekday morning and afternoon commuter peak hours. As shown in the Forecasting Report (Section 3) the results of the site-trip generation show that Saturday peak hour vehicle trips are less than the weekday peak hours trips. As such, the weekday morning and afternoon peak hours will be assessed as the most critical peak hours (busiest times of the week).

2.2.3. HORIZON YEARS

The expected build out date for the proposed development is outlined as follows:

- Phase 1 – consisting of the car dealership, school and retail– Year 2020; and
- Phase 2 – condominium development and hotel – Year 2021.

As such, horizon years will be assessed for Year 2020 and Year 2021.

2.3. EXEMPTION REVIEW

Based on the City's TIA guidelines and the proposed development, the following sections of the TIA process will be exempt.

Module	Element	Exemption Consideration
4.1 Development Design	4.1.3 New Street Networks	Not required for applications involving site plans.
4.2 Parking	4.2.2 Spillover Parking	There is no on-street parking within the vicinity of the site and as such, the proposed development will be required to supply the minimum amount of parking according to By-Law.
4.6 Neighbourhood Traffic Management	All elements	Access is provided along an arterial roadway.
4.8 Review of Network Concept	All elements	This development is not expected to generate 200 person trips more than the permitted zoning for the site.

3. FORECASTING REPORT

3.1. DEVELOPMENT-GENERATED TRAVEL DEMAND

3.1.1. TRIP GENERATION AND MODE SHARES

Phase 1 – Approximately 2020

Phase 1 of the development consists of an approximate 29,000 ft² luxury brand car dealership, approximately 10,000 ft² of specialty retail, and a 20,000 ft² private elementary school (165 students). We are advised that no school busses will be provided for the elementary school and all students will be picked-up/dropped-off by parents/guardians. Appropriate trip generation rates for the proposed Phase 1 development were obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, which are summarized in Table 2.

Table 2: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates		
		AM Peak	PM Peak	SAT Peak
Car Dealership	ITE 841	$T = 1.92(X)$	$T = 2.62(X)$	$T = 4.02(X)$
Specialty Retail	ITE 826	$T = 1.36(X)$ $T = 1.20(X) + 10.74$	$T = 2.71(X);$ $T = 2.40(X) + 21.48$	$T = 5.02(X)$
Private Elementary School	ITE 534	$T = 0.90(st);$ $T = 0.90(st) + 3.01$	$T = 0.60(st);$ $T = 0.61(st) - 4.70$	-
Notes: T = Average Vehicle Trip Ends X = 1000 ft ² Gross Floor Area St = Number of students Specialty Retail AM Peak is assumed to be 50% of the PM Peak and SAT Peak is assumed to be the same as PM Peak Hour Generator as no Saturday peak hour generator rate is provided in ITE.				

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 car dealership and retail components of the 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 1.28 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%. The person trip generation for the proposed car dealership and retail components of the development are summarized in Table 3.

Table 3: Phase 1 Modified Person Trip Generation – Car Dealership and Retail

Land Use	Area	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)			SAT Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total	In	Out	Total
Car Dealership	29,000 ft ²	53	18	71	38	59	97	74	75	149
Specialty Retail	10,000 ft ²	13	17	30	25	34	59	28	37	65
Total Person Trips		66	35	101	63	93	156	102	112	214
<i>Note: 1.28 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 3 for the proposed retail developments were then reduced by modal share and pass-by values based on the site's location and proximity to adjacent communities, employment, shopping uses and transit availability. Modal share and pass-by values for the proposed car dealership and retail are summarized in Tables 4 and 5, respectively.

Table 4: Car Dealership Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)			SAT Peak (Person Trips/h)		
		In	Out	In	Out	Total	Total	Out	Total	Total
Auto Driver	60%	32	11	43	23	36	59	45	45	90
Auto Passenger	15%	8	3	11	6	9	15	11	12	23
Transit	15%	8	3	11	6	9	15	11	11	22
Non-motorized	10%	5	1	6	3	5	8	7	7	14
Total Person Trips	100%	53	18	71	38	59	97	74	75	149
Total 'New' Auto Trips		32	11	43	23	36	59	45	45	90

Table 5: Retail Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)			SAT Peak (Person Trips/h)		
		In	Out	In	Out	Total	Total	Out	Total	Total
Auto Driver	60%	8	11	19	15	21	36	17	23	40
Auto Passenger	15%	2	3	5	4	5	9	5	6	11
Transit	15%	2	2	4	4	5	9	4	5	9
Non-motorized	10%	1	1	2	2	3	5	2	3	5
Total Person Trips	100%	13	17	30	25	34	59	28	37	65
Less Pass-by (25%)		-3	-3	-6	-5	-5	-10	-6	-6	-12
Total 'New' Auto Trips		5	8	13	10	16	26	11	17	28

For the private school, given elementary aged students are not expected to take transit, and the ITE rates are understood to account for some active modes for students who live near the school, the straight ITE trip generation rates were applied. The private school is not expected to provide any school bus service. The resulting number of vehicle trips during the weekday morning and afternoon peak hours are summarized in Table 6. It is noteworthy that the morning commuter peak hour corresponds with the school's morning peak hour, however, the afternoon commuter peak hour does not correspond with the school's afternoon peak hour. The ITE Trip Generation Manual only provides afternoon school peak hour (between 2:00-4:00PM) rates for the private elementary school land use, as such, those rates were used for the calculations in Table 6. During the afternoon commuter peak hour, the trip generation for the school site will be less than outlined in Table 6, however, for the purpose of this study, these school peak hour trips will be applied to the afternoon commuter peak hour.

Table 6: School ITE Site Trip Generation

Land Use	Number of Students	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Private Elementary School	165	83	69	152	45	51	96

The total Phase 1 site-generated vehicle trips are summarized in Table 7.

Table 7: Phase 1 Site Vehicle Trip Generation

Vehicle Trip Generation	AM Peak (veh/hr)			PM Peak (veh/hr)			SAT Peak (veh/hr)		
	In	Out	Total	In	Out	Total	In	Out	Total
Car Dealership	32	11	43	23	36	59	45	45	90
Specialty Retail	8	11	19	15	21	36	17	23	40
Private Elementary School	83	69	152	45	51	96	0	0	0
Less Specialty Retail Pass-by (25%)	-3	-3	-6	-5	-5	-10	-6	-6	-12
Total 'New' Auto Trips	120	88	208	78	103	181	56	62	118

As shown in Table 7, the total number of new vehicle trips projected to be generated by the proposed Phase 1 development is approximately 210, 180 and 118 veh/h during the weekday morning, afternoon and Saturday peak hours. The increase in transit trips is projected to be 15 to 30 persons per hour during the peak hours. The increase in active modes travelling to/from the development is projected to be 10 to 20 persons per hour during peak hours. As shown in Table 7, the critical peak hour is considered the morning peak hour for Phase 1.

Phase 2 – Approximately 2021

Phase 2 of the development consists of an approximate 278-unit retirement facility and a 70-room hotel. The retirement facility is understood to comprise different types of units, including 48 memory care units and 230 independent/retirement living units. Appropriate trip generation rates for the proposed Phase 2 development were obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual, which are summarized in Table 8.

Table 8: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates		
		AM Peak	PM Peak	SAT Peak
Assisted Living	ITE 254	$T = 0.14(du)$	$T = 0.22(du)$	$T = 0.33(du)$
Senior Adult Housing - Attached	ITE 252	$T = 0.20(du)$ $T = 0.20(du) - 0.13$	$T = 0.25(du);$ $T = 0.24(du) + 1.64$	$T = 0.31(du);$ $T = 0.31(du) + 0.48$
Hotel	ITE 310	$T = 0.53(rm)$	$T = 0.60(rm)$	$T = 0.72(rm)$ $T = 0.69(rm) + 4.32$
Notes: T = Average Vehicle Trip Ends du = Dwelling unit rm = Hotel room				

Similar to the Phase 1 trip generation, the ITE rates were factored to calculate total person trips. The person trip generation for the proposed Phase 2 of the development is summarized in Table 9.

Table 9: Phase 2 Modified Person Trip Generation

Land Use	Area	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)			SAT Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total	In	Out	Total
Assisted Living	48 units	5	4	9	6	8	14	9	11	20
Senior Adult Housing	230 units	20	40	60	39	35	74	53	40	93
Hotel	70 rooms	28	20	48	28	27	55	38	30	68
Total Person Trips		53	64	117	73	70	143	100	81	181
<i>Note: 1.28 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 9 for the proposed Phase 2 development were then reduced by modal share values based on the site's location and proximity to adjacent communities, employment, shopping uses and transit availability. Modal share values for the proposed Phase 2 retirement and hotel development are summarized in Table 10.

Table 10: Phase 2 Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)			SAT Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	60%	32	39	71	44	42	86	60	49	109
Auto Passenger	15%	8	10	18	11	11	22	15	12	27
Transit	15%	8	9	17	11	10	21	15	12	27
Non-motorized	10%	5	6	11	7	7	14	10	8	18
Total Person Trips	100%	53	64	117	73	70	143	100	81	181
Total 'New' Auto Trips		32	39	71	44	42	86	60	49	109

The total Phase 1 and 2 site-generated person trips are summarized in Table 11.

Table 11: Phase 1 and 2 Site Person Trip Generation

Travel Mode	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)			SAT Peak (Person Trips/h)		
	In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	155	130	285	127	150	277	120	115	235
Auto Passenger	18	16	34	21	25	46	30	29	59
Transit	18	14	32	21	24	45	30	28	58
Non-motorized	11	8	19	12	15	27	19	18	37
Total Person Trips	202	168	370	181	214	395	199	190	389
Less Retail Pass-by	-3	-3	-6	-5	-5	-10	-5	-5	-10
Total 'New' Auto Trips	152	127	279	122	145	267	115	110	225

As shown in Table 11, the total number of new vehicle trips projected to be generated by the proposed Phases 1 and 2 of the development is approximately 280, 270 and 225 veh/h during the weekday morning, afternoon and Saturday peak hours. The increase in transit trips is projected to be 30 to 60 persons per hour during the peak hours. The increase in active modes travelling to/from the development is projected to be 20 to 40 persons per hour during peak hours.

In terms of vehicle trip-generation, the critical peak hours are the weekday morning and afternoon peak hours. The development is projected to generate less traffic during the Saturday peak hour than during the weekday peak hours. Existing traffic volumes within the study area are very heavy during the weekday commuter peaks. As the Saturday vehicle trip-generation is lower than the weekday trip-generation and the weekday existing traffic volumes are understood to be higher than Saturday volumes within the study area, the weekday morning and afternoon peak hours are considered the

most critical and are assessed herein. Saturday peak hour traffic is expected to operate similar to or better than the weekday commuter peak hours.

Trip-Generation for 'as-of-right' Zoning

The existing zoning for the subject lands is approximately 60,385 m² (650,000 ft²) of commercial land use. This could be comprised of a mix of office and retail. The trip-generation for the zoned land uses is included herein to compare to the proposed land use trip generation. As the commercial could be office and/or retail land uses, the ITE land use Office Park (ITE 750) which represents a complex containing both office and retail/services within a "campus-like atmosphere" was used. The 650,000 ft² office park trip generation is provided below and detailed trip-generation for the 'as-of-right' zoning is provided as Appendix C.

Table 12: 'As-of-right' Zoning Trip Generation – Office Part (ITE 750)

Travel Mode	AM Peak (Person Trips/h)		PM Peak (Person Trips/h)		SAT Peak (Person Trips/h)		SAT Peak (Person Trips/h)		Total
	In	Out	In	Out	Total	Total	Out	Total	
Auto Driver	694	86	780	96	588	684	410	410	820
Auto Passenger	174	22	196	24	147	171	102	102	204
Transit	173	21	194	24	147	171	102	102	204
Non-motorized	115	14	129	15	97	112	68	68	136
Total Person Trips	1,156	143	1,299	159	979	1,138	682	682	1,364
Total 'New' Auto Trips	694	86	780	96	588	684	410	410	820

As shown in Table 12, a 650,000 ft² office/retail park at this location could generate up to 800 veh/h during peak hours. This amount of traffic is significantly more than generated by the proposed land uses, as outlined in Table 11.

Mode Shares

The existing mode shares outlined in Table 11 above were derived from the 2011 OD Survey for the Hunt Club area, which are shown below.

Table 13: OD Survey Trips by Primary Travel Mode – Hunt Club

Time Period	24 Hours			AM Peak Hour			PM Peak Hour			Average	Selected Split
Mode	From District	To District	Within District	From District	To District	Within District	From District	To District	Within District		
Driver	61%	61%	52%	44%	76%	43%	71%	55%	54%	57%	60%
Passenger	15%	15%	15%	12%	10%	14%	17%	13%	19%	14%	15%
Transit	18%	18%	4%	32%	6%	3%	9%	24%	3%	13%	15%
Bike/Walk	1%	1%	21%	2%	1%	21%	1%	1%	18%	7%	10%
Other	5%	5%	8%	11%	7%	18%	2%	6%	6%	8%	-

These existing modal shares are used to calculate the projected traffic to/from the proposed development for the build-out years 2020 and 2021.

Given the planned transportation network within the vicinity of the site does not provide any significant non-auto transportation improvements, there is no rationale that the future modal splits will be different than existing.

3.1.2. TRIP DISTRIBUTION

Based on the existing traffic volume counts and the location of adjacent arterial roadways and neighbourhoods, the distribution of site-generated traffic volumes is as follows:

Phase 1 – Retail and School:

- 30% to/from the north;
- 30% to/from the east;
- 30% to/from the west;
- 10% to/from the south; and
- Pass-by distribution is assumed to be 50% to/from the north and 50% to/from the south along Riverside Drive.

Phase 2 – Retirement and Hotel:

- 45% to/from the north;
- 30% to/from the east;
- 20% to/from the west; and
- 5% to/from the south.

3.1.3. TRIP ASSIGNMENT

A full movement driveway connection to Riverside Drive is proposed to serve the subject development. This driveway is proposed to be signalized and is located approximately 270 m north of the Riverside/Hunt Club intersection. Given the single proposed driveway, 'new' and 'pass-by' site-generated vehicle trips for Phase 1 are assigned to the study area network and illustrated as Figure 6. Phase 2 site-generated vehicle trips are illustrated as Figure 7.

Figure 6: Phase 1 'New' and 'Pass-by' Site-Generated Traffic

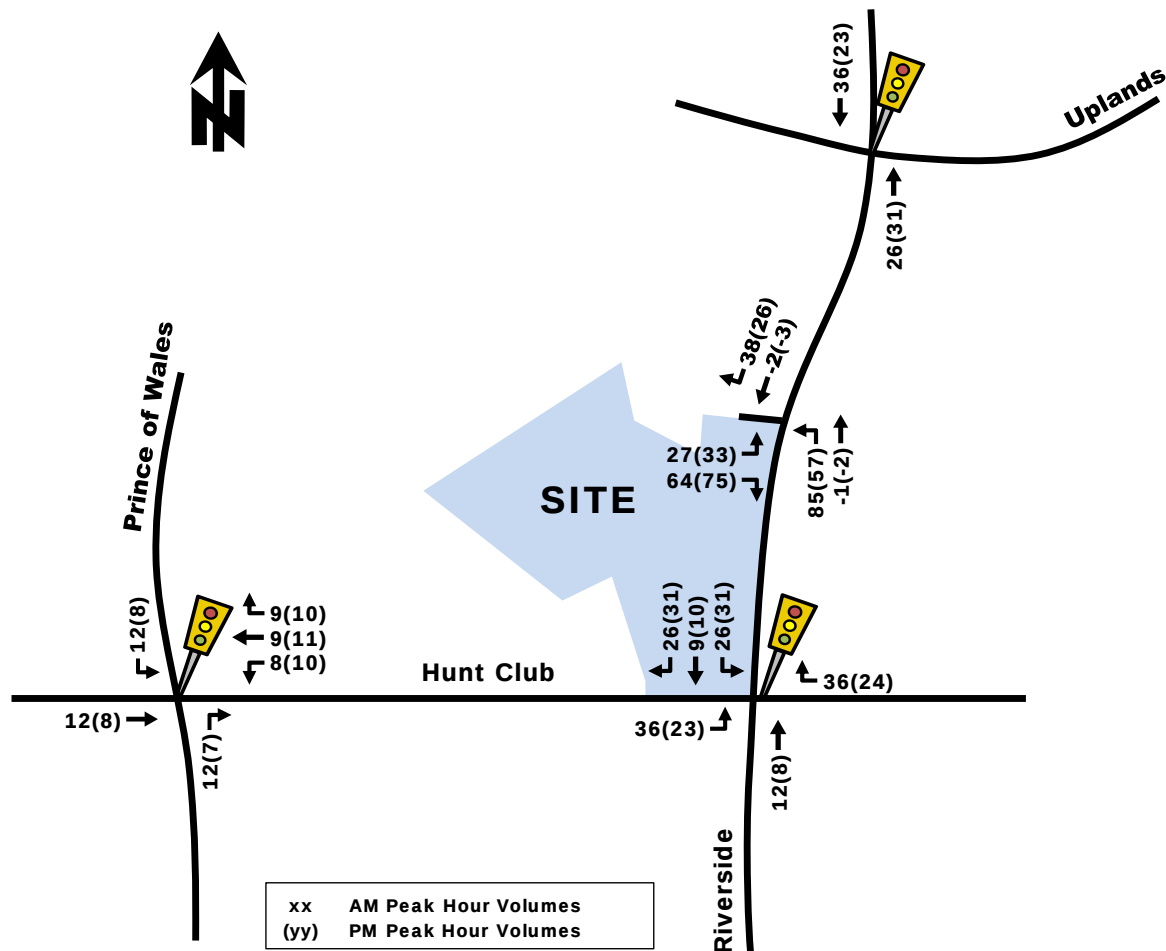
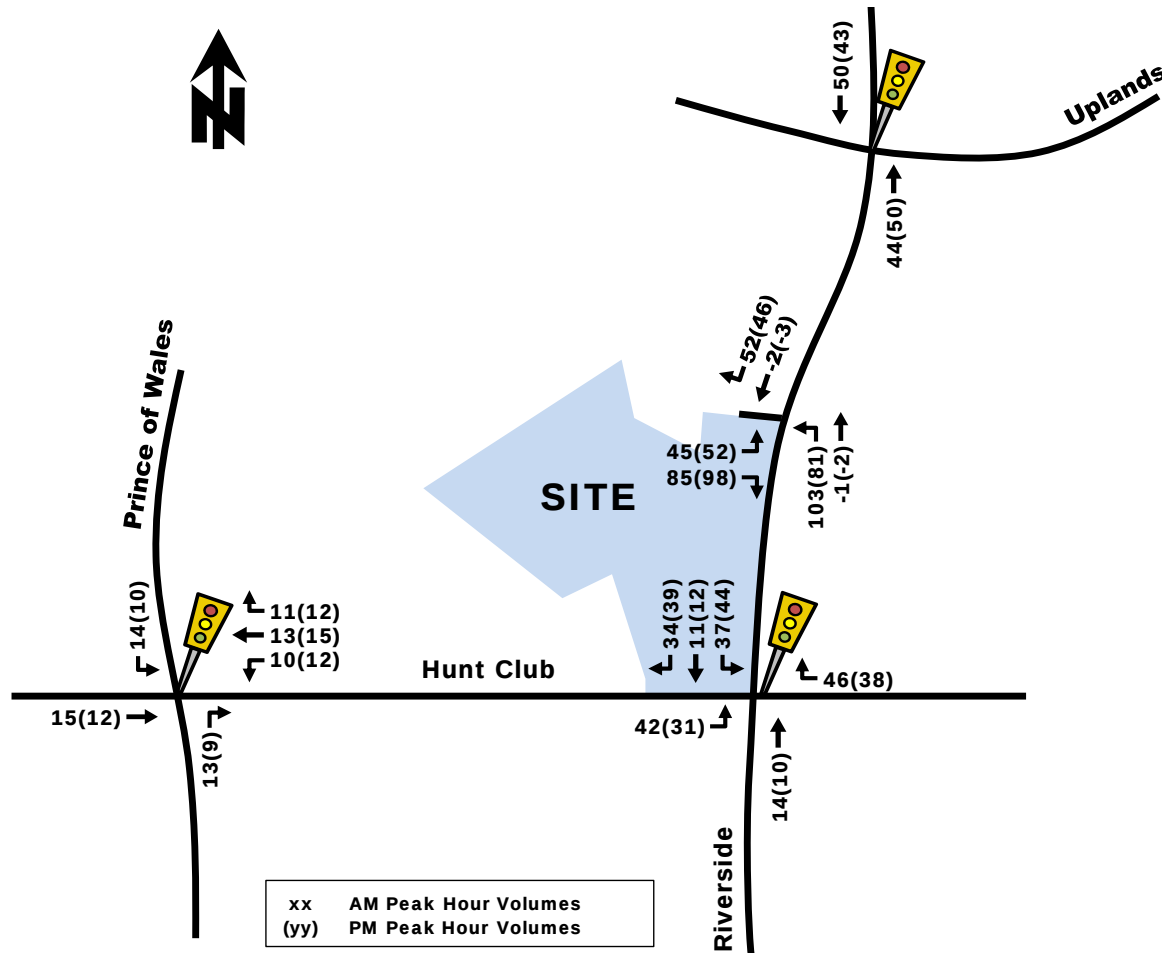


Figure 7: Phases 1 and 2 'New' and 'Pass-by' Site-Generated Traffic



3.2. BACKGROUND NETWORK TRAVEL DEMANDS

3.2.1. TRANSPORTATION NETWORK PLANS

Refer to section 2.1.3 Planned Conditions – Planned Study Area Transportation Network Changes.

3.2.2. BACKGROUND GROWTH

The following background traffic growth through the immediate study area (summarized in Table 14) was calculated based on historical traffic count data (years 2008, 2009, 2014, and 2016) provided by the City of Ottawa at the Riverside/Hunt Club intersection. Detailed background traffic growth analysis is included as Appendix D.

Table 14: Riverside/Hunt Club Historical Background Growth (2009 – 2016)

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	0.76%	2.14%	-0.87%	-1.24%	-0.09%
AM Peak	-0.82%	1.77%	-3.07%	-3.78%	-1.76%
PM Peak	-0.86%	2.51%	-1.81%	-3.43%	-1.25%

As shown in Table 14, the Riverside/Hunt Club intersection's traffic volumes overall have remained relatively constant over the years. The south leg has experienced an increase in traffic volumes and the east and west legs have experienced a decrease in traffic volumes. This change in traffic patterns is consistent with the timing of the Strandherd-Armstrong bridge opening.

Given the relatively consistent traffic volumes within the area, and the low volume projections of vehicle traffic generated by the area developments (noted in Section 2.1.3), no background traffic growth is applied to the existing traffic volumes. In addition, the study area intersections are currently operating at or above capacity and there is minimal spare capacity within this area for traffic growth.

3.2.3. OTHER DEVELOPMENTS

Refer to section 2.1.3 Planned Conditions – Other Area Developments.

3.3. DEMAND RATIONALIZATION

Based on the existing traffic volumes and site visits, there is an existing capacity issue at the Riverside/Hunt Club and Hunt Club/Prince of Wales intersections and along Riverside Drive north of Hunt Club Road. To improve operations within this area, a shift in travel modes and times is required. There are limited transit improvements within the area for the City's planning horizon of 2031, however, post 2031, there are planned transit priority lanes within the study area. This capacity issue will be further explored in a more detailed review of the existing traffic conditions compared to the future traffic conditions in the ensuing Strategy report.

4. STRATEGY REPORT

4.1. DEVELOPMENT DESIGN

4.1.1. DESIGN FOR SUSTAINABLE MODES

Vehicle and Bicycle Parking

Vehicle parking is proposed within surface parking lots for each commercial development pad and the school and an underground parking garage for the retirement development is planned. A total of 264 parking spaces are proposed for the school, retail, hotel, and car dealership parcels, which meets the City's By-Law minimum parking requirement. For the retirement development, parking should be provided at a rate of 0.25 per unit and 1 parking space per 100 m² of medical/health or personal services. At this stage of development, the number of vehicle parking spaces is not confirmed and will be reviewed during the Site Plan Approval process.

With regard to bicycle parking, according to the City's By-Law requirements, bicycle parking should be provided at a rate of 1 per 100 m² for the school land use, 1 per 250 m² for the retail land uses, 1 per 1,000 m² for the hotel and 0.25 per dwelling unit for the retirement residence. Bicycle parking should be located in well-lit areas and close to main entrances. The number and location of bicycle parking will be refined during the Site Plan Application process.

Transit and Pedestrians

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #87, 96, 189, and 199. Bus stops for Routes #96, 189 and 199 are located adjacent to the Riverside/Hunt Club intersection. Bus stops for Route #87 are located along Uplands Drive and along Riverside Drive, north of Uplands Drive. There are no bus stops or routes along Riverside Drive adjacent to the proposed development lands. Walking distance from the site to the bus stops along Hunt Club Road range between 600 and 750 m and walking distance to the bus stops along Uplands Drive range between 900m and 1 km.

Sidewalk facilities within the vicinity of the site are provided along both sides of Hunt Club Road and along the east side of Riverside Drive. A substandard sidewalk (maintenance strip) is currently provided along the west side of Riverside Drive, adjacent to the site. As part of the site development, these substandard sidewalks on Riverside Drive adjacent to the site should be upgraded to City standard sidewalks or a pathway along the site's frontage.

4.1.2. CIRCULATION AND ACCESS

The full-movement driveway to Riverside Drive is proposed to be signalized and will be designed to accommodate the appropriate service and delivery vehicles. All loading will occur on-site. Details of loading bays and on-site truck-turning movements will be applied during the Site Plan Application process. A review of the signalized access is provided in Section 4.4.

It is noteworthy that there are limitations with regard to the number of vehicle accesses that can be provided to the site. The proposed signalized intersection is located at the northern boundary of the site to maximize the distance between the site driveway and the Riverside/Hunt Club intersection. Vehicle access cannot be provided to Hunt Club Road as there is a significant grade differential. To provide a vehicle connection to the north of the site would require property acquisition to connect to Kimberwick Crescent. Based on the foregoing, the most appropriate location for vehicle access to/from the subject lands is at the northern boundary to Riverside Drive.

4.2. PARKING

4.2.1. PARKING SUPPLY

Vehicle Parking

A total of 264 surface parking spaces are proposed to serve the hotel, school, and retail land uses. An underground parking lot is proposed to serve the retirement development and should be provided at a rate of 0.25 per dwelling unit and 1 per 100 m² of health/medical and personal services. The parking space dimensions should be 5.2 m in length and 2.6 m in width to meet the City's By-Law requirements.

Bicycle Parking

Based on the bicycle parking minimum rates, a total of 70 bicycle parking spaces should be provided for the retirement residence and approximately 50 spaces should be provided for the hotel, school and retail components of the site. To meet the City's By-Law requirements and promote non-auto modes, bicycle parking should be located in a well-lit area close to the main entrances.

4.3. BOUNDARY STREET DESIGN

The boundary street for the development is Riverside Drive. At this time, there has not been any complete street concepts prepared for Riverside Drive. The existing roadway's geometry consists of the following features:

- 2 vehicle travel lanes in each direction;
- Raised median;
- 1.8 m concrete sidewalk on the east side of the roadway with 2.0 m buffer;
- Substandard asphalt sidewalk on west side of the roadway;
- More than 3,000 vehicles per day along Riverside Drive;
- Posted speed limit of 60 km/h, assumed operating speed of 60 to 70 km/h;
- 3.3 – 3.5 m wide centre lanes and 3.7 m wide curb lanes;
- No dedicated cycling facilities (with the exception of a bike lane on the east side of the roadway that ends approximately 120 m north of the Hunt Club/Riverside intersection);

- No dedicated transit facilities; and
- No on-street parking.

The multi-modal level of service analysis for the road segment along Riverside Drive adjacent to the site is summarized in Table 15, with detailed analyses provided in Appendix E.

Table 15: MMLOS – Existing Riverside Drive Road Segment (West Side of Roadway)

Road Segment	Level of Service							
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Riverside Dr.	F	C	F	C	N/A	No target	A	D

Given the development's location within a general urban area, the target levels of service for pedestrians and cyclists are both LoS 'C'. There are no transit priority plans for Riverside Drive identified within the City's Affordable Network and as such there is no TLoS target. As Riverside Drive forms part of the truck route, the truck target level of service is TkLoS 'D'. As shown in Table 15 in red text, the pedestrian and cycling level of service targets are not met and the truck level of service target is met.

With regard to pedestrians, the combination of high traffic volumes and vehicle speeds along Riverside Drive and substandard pedestrian facilities results in a score of PLoS 'F'. Providing a 2.0 m sidewalk and a boulevard greater than 2 m, will result in a score of PLoS 'D' for the subject road segment. PLoS 'C' is not achievable unless the vehicle speeds or volumes are reduced along Riverside Drive.

With regard to cyclists, there are currently no dedicated cycling facilities along this portion of Riverside Drive. To achieve the target level of service for cyclists along this road segment of BLoS 'C', bicycle lanes would need to be implemented.

4.4. ACCESS INTERSECTION DESIGN

4.4.1. LOCATION AND DESIGN OF ACCESS

The proposed access is located approximately 270 m north of the Hunt Club/Riverside intersection. At this location, Riverside Drive is divided by an existing centre median. To provide full-movement access to the site, a median break is required and based on operational analysis (SYNCHRO model), signalization is required. As shown on the Site Plan, the driveway is planned with a clear throat length of approximately 150 m.

4.4.2. INTERSECTION CONTROL

Signal warrant analysis was performed at the proposed Riverside/Site intersection and is included as Appendix F. Based on the total projected traffic volumes outlined in Section 4.9, signalization is not warranted at this location. However, the SYNCHRO analysis indicates delays of several minutes for vehicle turning left out of the site during the weekday afternoon peak hour. Given the SYNCHRO analysis, signalization is recommended at this location and full-movement access will not be feasible without a signal. As the signal is not warranted, it is our understanding the developer will be responsible for construction and maintenance of the signal through an agreement with the City.

With regard to the as-of-right zoning land uses, signal warrant analysis was performed at the proposed Riverside/Site intersection using the as-of-right zoning land use trip-generation traffic volumes (summarized in Section 3.1.1). Based on these projected traffic volumes, signalization at this location is warranted. Warrant analysis is included as Appendix F.

Turn Lane Requirements

Left-turn storage lane warrant analysis was performed and is included as Appendix G. Based on the projected traffic volumes, a northbound left-turn lane is warranted at this location.

With regard to an auxiliary southbound right-turn lane, the ‘rule-of-thumb’ for right-turn lane recommendations is that a right-turn lane is required when there are approximately 60 veh/h or more during the peak hour or if 10% or more of the traffic in the curb lane is turning right. Given the total traffic volume projections for the proposed land uses, a southbound right-turn lane is not required given the ‘rule of thumb’. However, given the heavy vehicle volumes along Riverside Drive, an auxiliary southbound right-turn lane is recommended. It is noteworthy that using the as-of-right zoning land use traffic projections, an auxiliary southbound right-turn lane is ‘warranted’ based on the ‘rule-of-thumb’.

The following Table 16 provides the recommended storage length requirements for the proposed full-movement access to Riverside Drive. These storage lengths are calculated using the total projected volumes based on the proposed Concept Plan and based on the as-of-right zoning land uses.

Table 16: Storage Length Requirements at Proposed Riverside/Site Intersection

Trip Generation Traffic Volumes	Northbound Left-turn Lane		Southbound Right-Turn Lane		Eastbound Left-Turn Lane	
	Warranted	Length (m)	Warranted	Length (m)	Warranted	Length (m)
Proposed Concept Plan	Yes	40	No	15 (recommended)	No	18
As-of-Right Zoning Land Uses	Yes	130	Yes	110	No	90

As a starting point, the proposed Functional Design will assume the as-of-right zoning land use turn lane requirements (130 m northbound left-turn lane and 110 m southbound right-turn lane) to demonstrate overall feasibility/implications. As the approval process unfolds and the land uses are confirmed, certain elements of the Functional Design will likely get refined.

4.4.3. INTERSECTION DESIGN

The MMLOS analysis for the proposed signalized intersection is outlined in Table 17 and included as Appendix H.

Table 17: MMLOS – Proposed Riverside/Site Intersection

Intersection	Level of Service									
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)		Vehicle (LOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target	LOS	Target
Riverside/Site	E	C	F	C	N/A	No target	F	Not a truck route intersection	D	D

As shown in Table 17, the pedestrian and bicycle level of service targets are not met for the proposed intersection. Similar to the other study area intersections, the width of Riverside Drive and the long cycle lengths result in low scores for pedestrian level of service. The PLOS ‘E’ is based on the ‘pedestrian crossing delay component’ and improving this score to be better than PLOS ‘E’ will reduce the green time for vehicles along Riverside Drive and is not recommended.

With regard to cyclists, providing cycle lanes and left-turn boxes or a multi-use path (MUP) at the intersection will improve the bicycle level of service to BLOS ‘D’ or better. The City of Ottawa’s long-term plan to provide cycling facilities on Riverside Drive (Spine Route) should be discussed with staff.

4.5. TRANSPORTATION DEMAND MANAGEMENT

The proposed Concept Plan, provided as Figure 2 provides some understanding of the on-site and off-site pedestrian, cycling and transit amenities. The Transportation Demand Management (TDM) measures should be refined during the Site Plan Application process and the Site Plan updated to reflect the proposed measures and active/transit mode facilities. This site is located within walking distance to transit stops and there are cycle lanes along some of the study area roadways, however improvements to promote multi-modal transportation in the area are recommended. It is noteworthy that there are limited opportunities to provide pedestrian/cycling connections along the site's frontage to Riverside Drive and Hunt Club Road because of grade differentials. All active modes will travel to public roads via the proposed driveway access to/from the site. The TDM recommendations are listed below:

Identified on the current Concept Plan:

- On-Site
 - o Sidewalks provided fronting all buildings;
 - o Pedestrian connections to/from drop-off/pick-up areas for the school and the retirement building;
 - o Designated pick-up/drop-off area is proposed for the school and retirement buildings;

Additional on-site recommendations:

- Provide marked cross-walks at designated areas on-site throughout parking lot;
- Provide pedestrian/cycling connection to/from the City park located to the north of the site;
- Provide on-site bicycle parking according to the City's By-Law requirements;
 - o Ensure bicycle parking is located in well-lit areas, close to building entrances and where possible provide secure indoor bicycle parking or bicycle lockers;

Off-site recommendations:

- Provide 1.8-2.0m concrete sidewalks along Riverside Drive fronting the site, or consider a MUP fronting the site;
- Discussions with the City are required to identify the most appropriate treatment for cyclists (consistent with their long-term network planning objectives):
 - o Opportunities include extending the existing cycle lanes along Riverside Drive adjacent to the site, or a MUP fronting the site along Riverside Drive; and
- Discuss with OC Transpo regarding the possibility of transit stops along Riverside Drive adjacent to the site.

The TDM Checklist is provided as Appendix I, however, at this stage of development the details of TDM measures have not been fully refined.

4.6. NEIGHBOURHOOD TRAFFIC MANAGEMENT

Exempt – See Section 2.3.

4.7. TRANSIT

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #87, 96, 189, and 199. Bus stops for Routes #96, 189 and 199 are located adjacent to the Riverside/Hunt Club intersection. Bus stops for Route #87 are located along Uplands Drive and along Riverside Drive, north of Uplands Drive. There are no bus stops or routes along Riverside Drive adjacent to the proposed development lands. Walking distance from the site to the bus stops ranges between 600 m and 1 km.

As shown in Section 2.1.2, the existing bus routes within the vicinity of the site have significant spare capacity. The total number of transit trips projected to travel to/from the proposed development within the peak hours is approximately 30 to 60 persons per hour during the peak hours. This amount of transit trips can be accommodated on the existing network.

There are limited opportunities to provide pedestrian connections to Hunt Club Road and Riverside Drive to/from the site due to grade constraints. Pedestrians travelling to/from the site will use the signalized driveway to access Riverside Drive. Discussions with OC Transpo may be required to include additional bus stops along Riverside Drive, adjacent to the site.

4.8. REVIEW OF NETWORK CONCEPT

Exempt – See Section 2.3.

4.9. INTERSECTION DESIGN

4.9.1. EXISTING CONDITIONS

The following Table 18 provides a summary of the existing traffic operations at the study area intersections based on the SYNCHRO (V9) traffic analysis software and the existing traffic volumes (Figure 4). The subject signalized 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 signalized intersections ‘as a whole’ were assessed based on weighted v/c ratio. The SYNCHRO model output of existing conditions is provided within Appendix J.

Table 18: Existing Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection ‘as a whole’		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Riverside/Hunt Club	F(F)	1.11(1.15)	WBT(SBT)	63.0(76.8)	F(F)	1.03(1.05)
Riverside/Uplands	F(C)	1.06(0.73)	NBT(SBT)	46.3(16.3)	E(C)	0.99(0.72)
Prince of Wales/Hunt Club	F(F)	1.10(1.03)	WBL(WBL)	48.4(41.1)	E(D)	0.94(0.83)
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 18, the Riverside/Hunt Club intersection ‘as a whole’ is currently operating above capacity (LoS ‘F’) during the weekday morning and afternoon peak hours. The Riverside/Uplands and Hunt Club/Prince of Wales intersections ‘as a whole’ are currently operating at capacity (LoS ‘E’) during the morning peak hour and at an acceptable LoS ‘C’ or ‘D’ during the afternoon peak hour. The critical movements at the Riverside/Hunt Club intersection are operating above capacity (LoS ‘F’) and are noted to be the westbound through movement during the morning peak hour and the southbound through movement during the afternoon peak hour. The northbound through movement at the Riverside/Uplands intersection is currently operating at LoS ‘F’ during the morning peak hour. At the Prince of Wales/Hunt Club intersection, the westbound left-turn movement is the critical movement and is operating at LoS ‘F’ during both peak hours. It is noteworthy that at the Riverside/Hunt Club intersection there are multiple movements that operate at LoS ‘F’.

Queues at the Riverside/Hunt Club and Riverside/Uplands intersections are summarized in Table 19. As shown, the existing queues during the weekday peak hours are significant, which have been confirmed through field observation.

Table 19: Existing Queues along Riverside Drive

Intersection	Northbound		Southbound		Eastbound		Westbound	
	95 th Percentile Queue	Average Queue	95 th Percentile Queue	Average Queue	95 th Percentile Queue	Average Queue	95 th Percentile Queue	Average Queue
Riverside/Hunt Club	#95 m	~60 m	#225 m	~185 m	#230 m	195 m	#245 m	195 m
Riverside/Uplands	#320	~270	180 m	120 m	15 m	7 m	#80 m	50 m
Note: # and ~ symbols indicate the queue is operating above capacity and queues may not clear intersection during one signal cycle.								

The 95th percentile queues at the Riverside/Hunt Club intersection extend 100 to 245 m from the intersection along each leg and are noted to be problematic and may not clear the intersection during one signal cycle. Average queues at this intersection range from 60 to 195 m on each leg. The westbound 95th percentile queue at the Riverside/Hunt Club intersection currently spills back into the adjacent intersection. At the Riverside/Uplands intersection, north and southbound 95th percentile queues range from 180 to 320 m along Riverside Drive.

The southbound right-turn queues at the Hunt Club/Riverside intersection spill back past the existing 95 m southbound auxiliary right-turn lane as the channelized movement is opposed by heavy westbound traffic on Hunt Club Road through the intersection. There are approximately 555 and 575 veh/h turning southbound right at this intersection during the morning and afternoon peak hours, respectively. An extension of the southbound right-turn lane will increase storage for this movement and may help alleviate southbound right-turn queues that often spill back out of the existing storage lane and block of the southbound through movement during peak times. Southbound right-turn queues are still expected to spill back out of the auxiliary right-turn lane on occasion given the heavy conflicting volumes on Hunt Club Road. The southbound right-turn lane at the Hunt Club/Riverside intersection can be extended back to the proposed site's signalized intersection, which equates to an approximate 100 m extension.

An alternative mitigative measure to address the heavy southbound right-turn movement at the Hunt Club/Riverside intersection is to provide double southbound right-turn lanes at this location. Providing two right-turn lanes improves the vehicle level of service for the southbound right-turn movement and reduces the peak hour queues in the southbound right-turn lane from 230 m to 50 m. The overall intersection continues to operate above capacity (LoS 'F'). It is noteworthy that this mitigative measure will help improve the southbound right-turn movement at the Hunt Club/Riverside intersection, however, these vehicles will experience delays at the adjacent Hunt Club/Prince of Wales intersection, which is currently has failing movements in the westbound direction. As this is an existing condition, the mitigative measure to improve operations at the Hunt Club/Riverside intersection should not be the responsibility of the proponent or a condition of approval. The SYNCHRO model output of the double southbound right-turn lane is provided within Appendix J.

With regard to the location of the proposed signalized access, the queues outlined in Table 19 from SYNCHRO indicate that they do not spill back beyond the proposed signalized intersection. However, if the queues do not clear the Hunt Club/Riverside intersection, they will build and likely extend back to the subject location.

Multi-Modal Level of Service – Existing Conditions

The MMLOS analysis for the two signalized intersections on either side of the proposed development, Riverside/Hunt Club and Riverside/Uplands, is summarized in Table 20. The existing detailed MMLOS analysis is provided as Appendix J.

Table 20: MMLOS – Signalized Study Area Intersections

Intersection	Level of Service									
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)		Vehicle (LoS)	
	PLOS	Target	BLOS	Target	TkLOS	TkLOS	TkLOS	Target	LoS	Target
Riverside/Hunt Club	F	C	F	C	F	No target	A	D	F	D
Riverside/Uplands	F	C	F	C/B	B	No target	C	No target	F	D

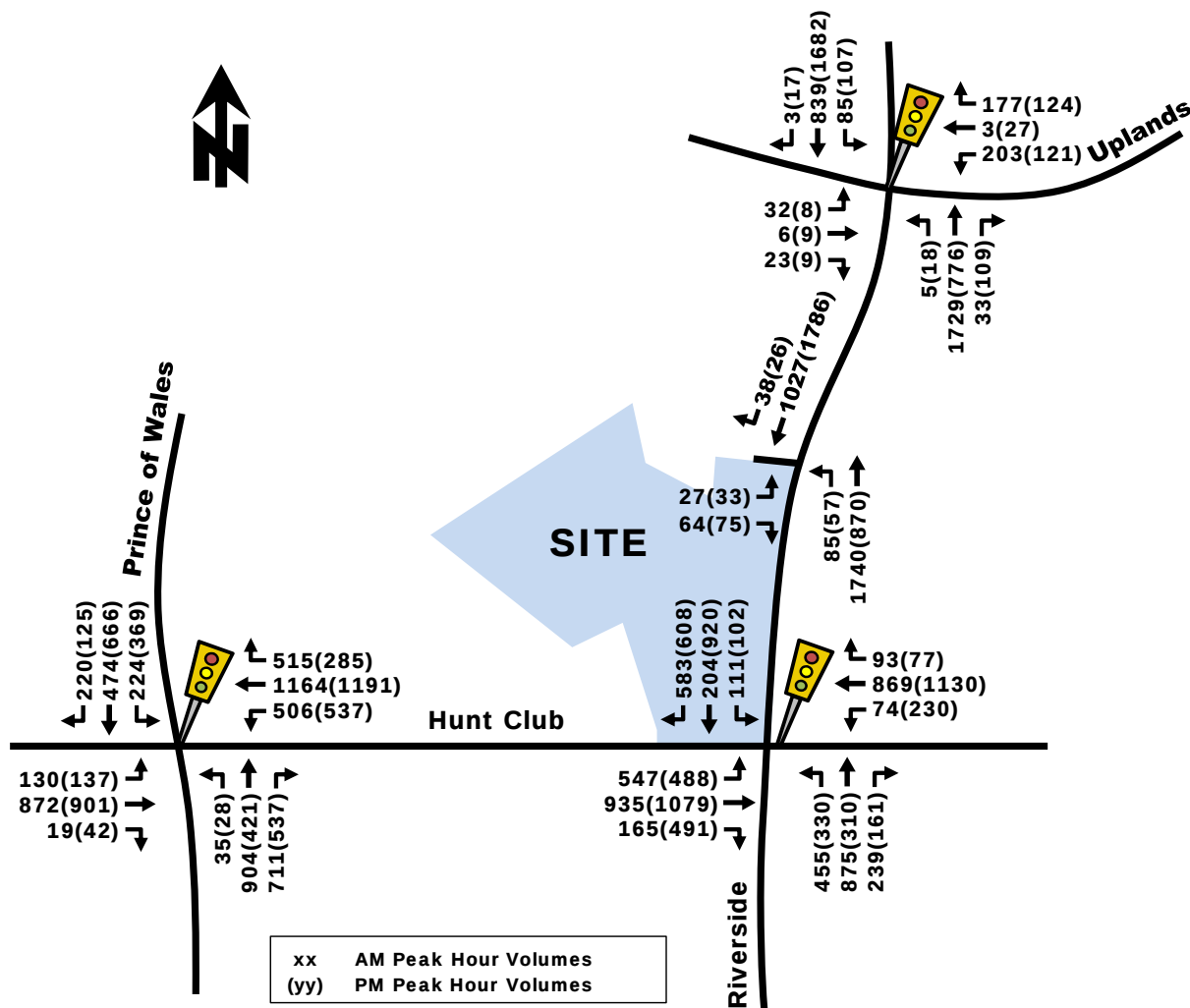
The letters identified in red text in Table 20 do not meet the MMLOS Targets for their designated area (general urban area). Within the study area there are no plans for transit priority measures identified in the TMP, as such, there is no target TLOS for these intersections. Uplands Drive does not form part of the truck route and is a collector roadway, as such, there is no TkLOS target for the Riverside/Uplands intersection. At both intersections, the pedestrian, bicycle and vehicle target levels of service are not met. The following discussion regarding these modes is provided:

- Pedestrian – High pedestrian level of service is difficult to achieve (PLOS 'A' is impossible to achieve) at signalized intersections. At both signalized intersections, pedestrians cross 5 to 8 lanes of traffic across Riverside Drive. Removing the channelized right-turn lanes (or providing 'smart channel' right-turn lanes) at the Riverside/Hunt Club intersection will slightly increase the pedestrian level of service. Providing high-vis crosswalk markings or advance pedestrian walk phases will also help to improve the PLOS, but may decrease the transit and vehicle levels of service. The best PLOS achievable at these intersections, without narrowing Riverside Drive, is PLOS 'E'.
- Bicycles – Pocket bike lanes are provided along the south, east and west legs of the Riverside/Hunt Club intersection only. Providing left-turn boxes and extending the bicycle lanes north along Riverside Drive would improve the BLOS to 'D' at intersections along Riverside Drive.
- Vehicles – Given the high traffic volumes along both Riverside Drive and Hunt Club Road, the delays and queues at this intersection are significant, with multiple movement operating at or above capacity. To improve operations of the study area intersections in terms of vehicle operation, a shift to more sustainable modes is required.

4.9.2. TOTAL PROJECTED 2020 CONDITIONS – PHASE 1 BUILD OUT

The total projected 2020 traffic volumes were derived by superimposing the Phase 1 site-generated traffic volumes (Figure 6) onto existing traffic volumes (Figure 4). The resulting total projected 2020 traffic volumes are illustrated in Figure 8.

Figure 8: Total Projected 2019 Traffic Volumes



The following Table 21 provides a summary of the total projected operations at the study area intersection based on the SYNCHRO (V9) traffic analysis software. The SYNCHRO model output of total projected conditions is provided within Appendix K.

Table 21: Total Projected 2020 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/Hunt Club	F(F)	1.13(1.17)	WBT(SBR)	66.2(81.0)	F(F)	1.07(1.06)
Riverside/Uplands	F(C)	1.08(0.74)	NBT(SBT)	47.0(15.6)	F(C)	1.01(0.73)
Riverside/Site (unsignalized)	F(F)	117(922)	EBL(EBL)	3.9(35.4)	-	-
Prince of Wales/Hunt Club	F(F)	1.12(1.06)	WBL(WBL)	49.3(42.1)	E(D)	0.95(0.84)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

Similar to the existing conditions, the Riverside/Hunt Club intersection 'as a whole' is projected to operate above capacity (LoS 'F') during the weekday peak hours. The Riverside/Uplands and Hunt Club/Prince of Wales intersections 'as a whole' are projected to operate at or above capacity (LoS 'E' and LoS 'F') during the morning peak hour and at an acceptable LoS 'C' and 'D' during the afternoon peak hour. This is similar to existing conditions.

The critical movements at existing signalized study area intersections are also projected to operate above capacity (LoS 'F') during both peak hours, with the exception of the critical movement at the Riverside/Uplands intersection during the afternoon peak hour. These results are the same as existing conditions outlined in Table 18.

Queues are projected to be similar to existing queues as outlined in Table 19, with most queues projected to be problematic and may not clear the intersections in one signal cycle.

With regard to the site driveway, the SYNCHRO results shown in Table 21 reflect an unsignalized intersection with STOP control on-site only. As shown, drivers would experience delays of 2 to 15 minutes attempting to exit the site and head in the northbound direction (turning left out of the site). On-site queues are projected to range from 7 to 14 vehicles in queue. Based on the projected site driveway performance, signalization of the Riverside/Site intersection is recommended. As mentioned in section 4.4.2, signalization at this location is not warranted based on projected traffic volumes generated by the proposed Site Plan, but is recommended based on the SYNCHRO results. The signalized intersection is projected to operate overall at an acceptable LoS 'C' or better with critical movements of LoS 'C' during the morning and afternoon peak hours. The SYNCHRO model output of the signalized Riverside/Site driveway is included in Appendix K.

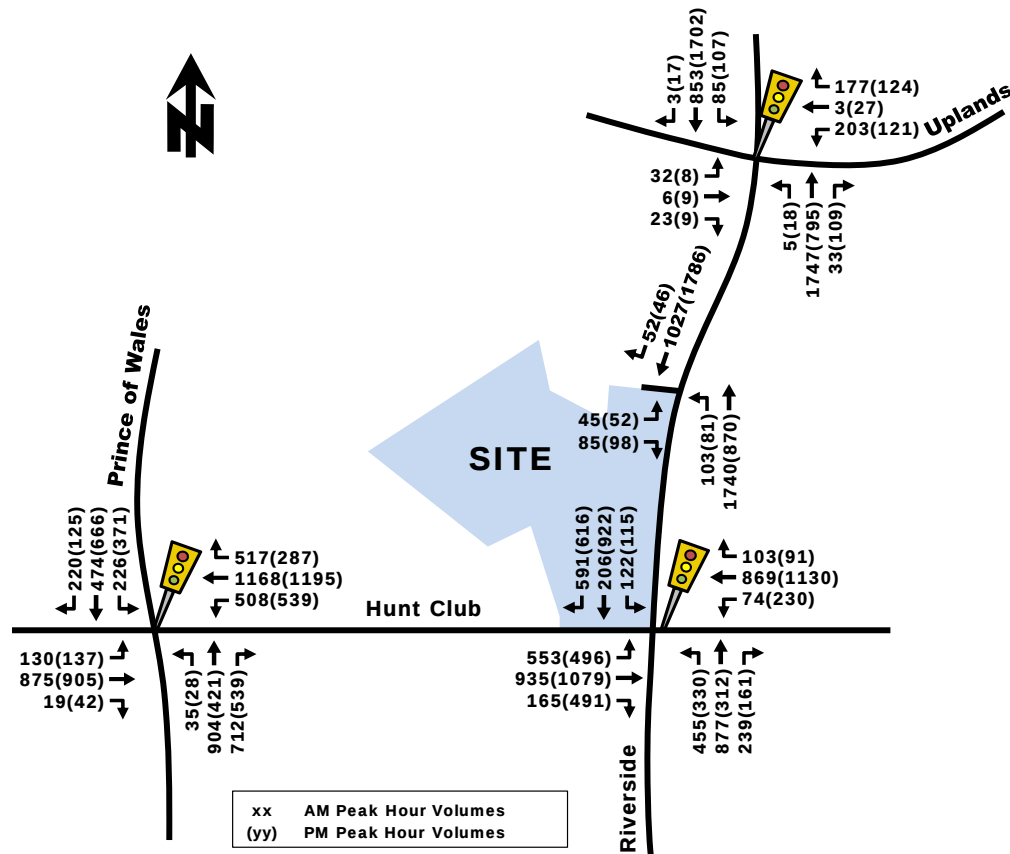
Multi-Modal Level of Service – Projected Conditions

Given there are no proposed geometric changes to the Hunt Club/Riverside or Riverside/Uplands intersections for the 2020 conditions, the multi-modal level of service for these intersections remains the same as existing conditions, outlined in Table 20. The projected 2020 MMLoS analysis is provided as Appendix K.

4.9.3. TOTAL PROJECTED 2021 CONDITIONS – PHASE 1 AND 2 SITE BUILD-OUT

The total projected 2021 traffic volumes were derived by superimposing the Phase 1 and 2 site-generated traffic volumes (Figure 7) onto existing traffic volumes (Figure 4). The resulting total projected 2021 traffic volumes are illustrated in Figure 9.

Figure 9: Total Projected 2021 Traffic Volumes



The following Table 22 provides a summary of the total projected operations at the study area intersection based on the SYNCHRO (V9) traffic analysis software. The SYNCHRO model outputs of total projected 2021 conditions is provided within Appendix L.

Table 22: Total Projected 2021 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/Hunt Club	F(F)	1.13(1.18)	WBT(SBR)	67.6(82.2)	F(F)	1.07(1.06)
Riverside/Uplands	F(C)	1.09(0.74)	NBT(SBT)	49.1(16.1)	F(C)	1.02(0.73)
Riverside/Site (signalized)	C(D)	0.72(0.85)	NBT(SBT)	8.6(23.1)	C(D)	0.71(0.81)
Prince of Wales/Hunt Club	F(F)	1.12(1.06)	WBL(WBL)	49.6(42.3)	E(D)	0.95(0.84)

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

Similar to the existing conditions, the Riverside/Hunt Club intersection 'as a whole' is projected to operate above capacity (LoS 'F') during the weekday peak hours. The Riverside/Uplands and Hunt Club/Prince of Wales intersections 'as a whole' are projected to operate at or above capacity (LoS 'E' and LoS 'F') during the morning peak hour and at an acceptable LoS 'C' and 'D' during the afternoon peak hour.

The proposed signalized Riverside/Site intersection is projected to operate overall at an acceptable LoS 'D' or better during the weekday peak hours. The critical movements are projected to be the northbound through movement during the morning peak hour and the southbound through movement during the afternoon peak hour. Both critical movements are projected to operate at an acceptable LoS 'D' or better during peak hours.

As shown herein, the study area intersections experience traffic congestion today and will continue to experience congestion in the future. There are minimal mitigative measures to improve the vehicle performance within this area. An approximate 100 m extension of the southbound right-turn lane at the Hunt Club/Riverside intersection (to the site driveway intersection) may help existing queue spill back for this movement. The site driveway is located at the most appropriate location given the land parcel and adjacent roadways (i.e. it is located as far away as possible from the existing signalized intersections). In addition, the as-of-right zoning land uses would increase the traffic volumes in this area more than the proposed Concept Plan land uses. The increase in vehicle traffic generated by the proposed development increases delays at the study area intersections by 0.5 to 6 seconds.

Multi-Modal Level of Service – Projected Conditions

Given there are no proposed geometric changes to the Hunt Club/Riverside or Riverside/Uplands intersections for the 2021 conditions, the multi-modal level of service for these intersections remains the same as existing conditions, outlined in Table 20.

5. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Based on the results summarized herein, the following transportation related conclusions are offered for each travel mode:

Pedestrians

- The transportation network surrounding the site includes sidewalks along both sides of Hunt Club Road and along the east side of Riverside Drive. Substandard asphalt sidewalks are currently provided along the west side of Riverside Drive, fronting the proposed development;
- The existing MMLoS analysis at the signalized Hunt Club/Riverside and Riverside/Uplands intersections indicates that the pedestrian level of service at both intersections does not meeting the City's target level of service for the area. Given the wide intersections and long cycle lengths at study area intersection, the best PLoS achievable at these intersections is PLoS 'E';
- The proposed signalized Riverside/Site intersection does not meet the City's level of service targets for pedestrians. Similar to the other study area intersections, the width of Riverside Drive and the long cycle lengths result in low scores for pedestrian level of service;
- Riverside Drive, adjacent to the site, does not meet the target multi-modal levels of service for pedestrians. Providing sidewalk and boulevards or MUPs along the site's frontage will result in a score of PLoS 'D' or better;
- Options to provide pedestrian connections from the site directly to Hunt Club Road or Riverside Drive are limited due to grade constraints. Pedestrians wishing to access public roads will use the signalized access at the north end of the site;
- A pedestrian connection should be provided to connect patrons and residents of the site to the north, through the City's park; and
- ***To help improve pedestrian level of service within the area and improve the pedestrian network, a sidewalk or a MUP is recommended along Riverside Drive fronting the site (link to Hunt Club/Riverside intersection).***

Cycling

- Bicycle lanes exist along both sides of Riverside Drive (south of Hunt Club) and a multi-use pathway (MUP) is provided along the west side of Riverside Drive (south of Hunt Club). The bicycle lane along the east side of Riverside Drive continues north of Hunt Club Road for approximately 125 m;
- Riverside Drive is identified as a Spine Cycling Route, however there are no current plans to provide cycling facilities along this roadway;

- A major pathway is planned along the Rideau River along the western boundary of the site;
- The existing MMLoS analysis at the signalized Hunt Club/Riverside and Riverside/Uplands intersections indicates that the cycling level of service at both intersections does not meeting the City's target level of service for the area. Providing left-turn boxes and extending the bicycle lanes north along Riverside Drive or providing a MUP would improve the BLoS to 'D' or better at intersections along Riverside Drive;
- The proposed signalized Riverside/Site intersection does not meet the City's level of service targets for cyclist. Providing cycle lanes and left-turn boxes at the intersection will improve the bicycle level of service to BLoS 'D'. Discussions with the City to provide continuous bike lanes or a MUP on either side of the proposed intersection along Riverside Drive may be required;
- Riverside Drive, adjacent to the site, does not meet the target multi-modal levels of service for bicycles. There are currently no dedicated cycling facilities along this portion of Riverside Drive. To achieve the target level of service for cyclists along this road segment of BLoS 'C', bicycle lanes or a MUP would need to be implemented;
- Bicycle parking is planned to be provided to meet the City's By-Law requirements;
- ***To help improve cycling level of service within the area and improve the cycling network, discussions with the City are required to develop a long-term vision for Riverside Drive. Providing a MUP along the site's frontage to Riverside Drive would improve the cycling and pedestrian network along this portion of the roadway, however, cycling facilities do not extend further north of the site along Riverside Drive. Providing on-road cycle lanes would also help to improve the cycling network, however this would require a commitment from the City to continue the cycle lanes north of the site;***

Transit

- ***There are no existing bus routes provided adjacent to the site along Riverside Drive. The nearest bus stops are along Hunt Club Road and Uplands Drive, located approximately 600 m to 1 km from the site (walking distance). Discussions with OC Transpo to provide a bus route adjacent to the site along Riverside Drive may be required;***
- There are no plans to provide transit priority along Riverside Drive in the City's Affordable Network, and as such, there are no transit level of service targets;
- Pedestrians destined for the bus stops along Hunt Club Road and Uplands Drive will have to walk from the site to the signalized site driveway to access sidewalk facilities along Riverside Drive. Due to grade differentials between the site and City's roadways, providing pedestrian connections directly to Hunt Club Road or Riverside Drive is not feasible;

Vehicles

- The existing study area intersections are currently operating at or above capacity during the weekday morning and afternoon peak hours. Queues within the study area are problematic and occasionally do not clear the intersections during one signal cycle;
- The net increase in vehicle demand generated by the proposed Phase 1 development is approximately 210 and 180 veh/h during the morning and afternoon peak hours, respectively;
- The net increase in vehicle demand generated by the proposed Phases 1 and 2 of the development is approximately 280 and 270 veh/h during the morning and afternoon peak hours, respectively. This is significantly less than the as-of-right zoning land uses and as such will have less of an impact on the existing congestion within the study area;
- Based on current intersection capacity constraints and the historic traffic data, no traffic growth was applied to the study area roadways and intersections;
- Based on the forecasted traffic volumes for Phase 1 build-out year (2020) and Phase 2 build-out year (2021), the study area intersections are projected to operate similar to existing conditions. All study area intersections continue to operate at or above capacity (LoS 'E' to LoS 'F') during the weekday commuter peak hours;

- o There are limited mitigative measures to improve the performance of the study area intersections. The City is investing in shifting the modes of travel away from passenger vehicles which will ultimately improve traffic operations at busy intersections. Within the study area, however, there are limited plans to improve transit and active mode facilities;
- o An approximate 100 m extension of the southbound right-turn lane at the Hunt Club/Riverside intersection may help to minimize queue spill back out of this auxiliary turn lane;
- o Providing a double southbound right-turn lane at the Hunt Club/Riverside intersection will help improve this movement, however drivers will experience further delays at adjacent intersections. As this is an existing operational concern, this mitigative measure should not be the responsibility of the proponent;
- The proposed full-movement driveway connection to Riverside Drive is located approximately 270 m north of the Hunt Club/Riverside intersection. To provide full-movement access, the driveway must be signalized at this location. Signalization is not warranted based on the analysis, but is required based on the SYNCHRO analysis. As the signal is not warranted, the cost of construction and maintenance of the signalized intersection is understood to be the responsibility of the proponent (until such time the signal is warranted);
 - o The storage lengths are recommended based on the as-of-right zoning land uses, which are an approximate 130 m auxiliary northbound left-turn lane and an approximate 110 m auxiliary southbound right-turn lane;
- A total of 264 vehicle parking spaces are proposed to serve the hotel, school and retail components of the site in a surface parking lot. An underground parking lot is proposed for the retirement residence and parking spaces should be provided at a rate of 0.25 per dwelling unit and 1 per 100 m² of health/medical and personal services to meet By-Law requirements; and
- On and off-site TDM measures will be refined during the Site Plan Application process.

The proposed site is located in an area where significant traffic congestion exists today during peak periods, which is not surprising as both Riverside Drive and Hunt Club Road are important arterial roads within the City's transportation network. The location makes the site very attractive for development, and despite the known constraints, access to/from the site must be provided. The proposed land uses will generate fewer people and vehicle trips than the as-of-right zoning land uses, and as such would have less of an impact on the existing traffic congestion in the area. However, without a significant shift of travel modes in the area, the congestion within the study area will continue. According to the analysis, the additional site traffic will contribute to very modest delay increases (0.5 to 6 seconds) at adjacent intersections during peak hours. There are currently limited known plans by the City of Ottawa to improve the transit and active mode facilities in the area. With regard to site access, the proposed driveway is located at the most appropriate location given the constraints of the land parcel, resulting in the least amount of impact to the adjacent road network.

Prepared By:



André Jane Sponder, B.A.Sc.
Transportation Analyst

Reviewed by:



Mark Baker, P.Eng.
Senior Transportation Project Manager



Appendix A

Traffic Count Data



Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

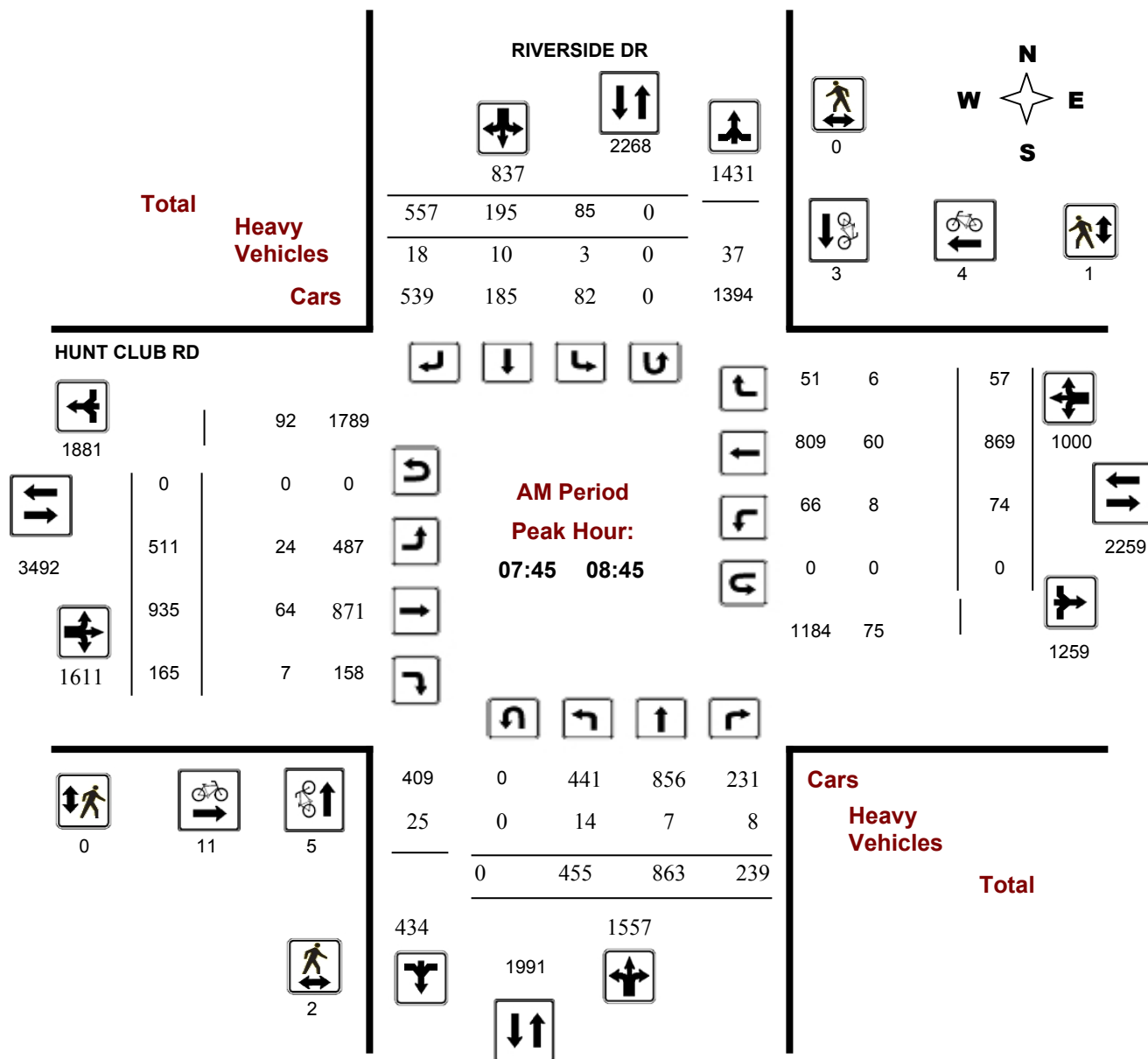
HUNT CLUB RD @ RIVERSIDE DR

Survey Date: Wednesday, August 03, 2016

Start Time: 07:00

WO No: 36119

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

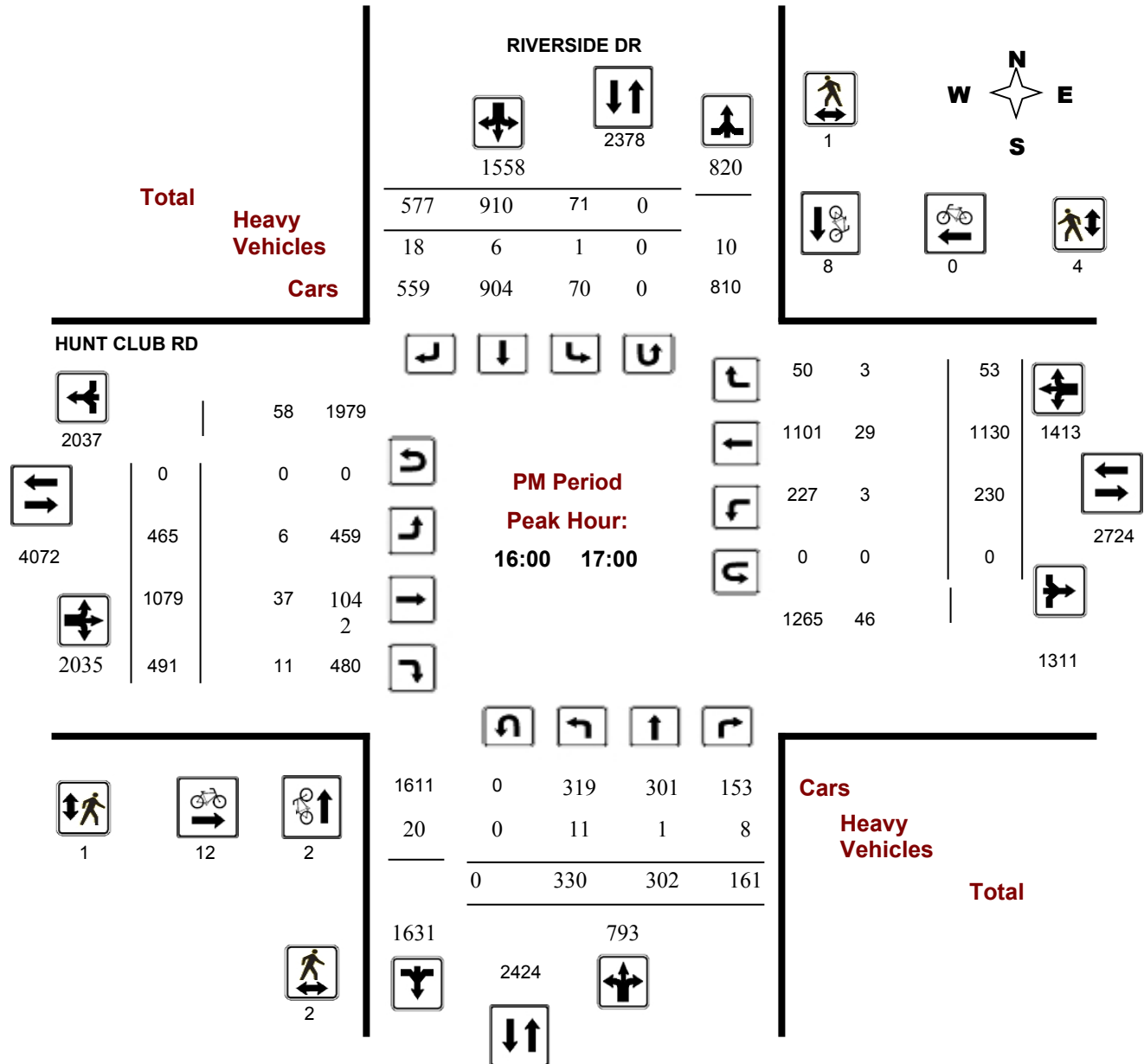
HUNT CLUB RD @ RIVERSIDE DR

Survey Date: Wednesday, August 03, 2016

Start Time: 07:00

WO No: 36119

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

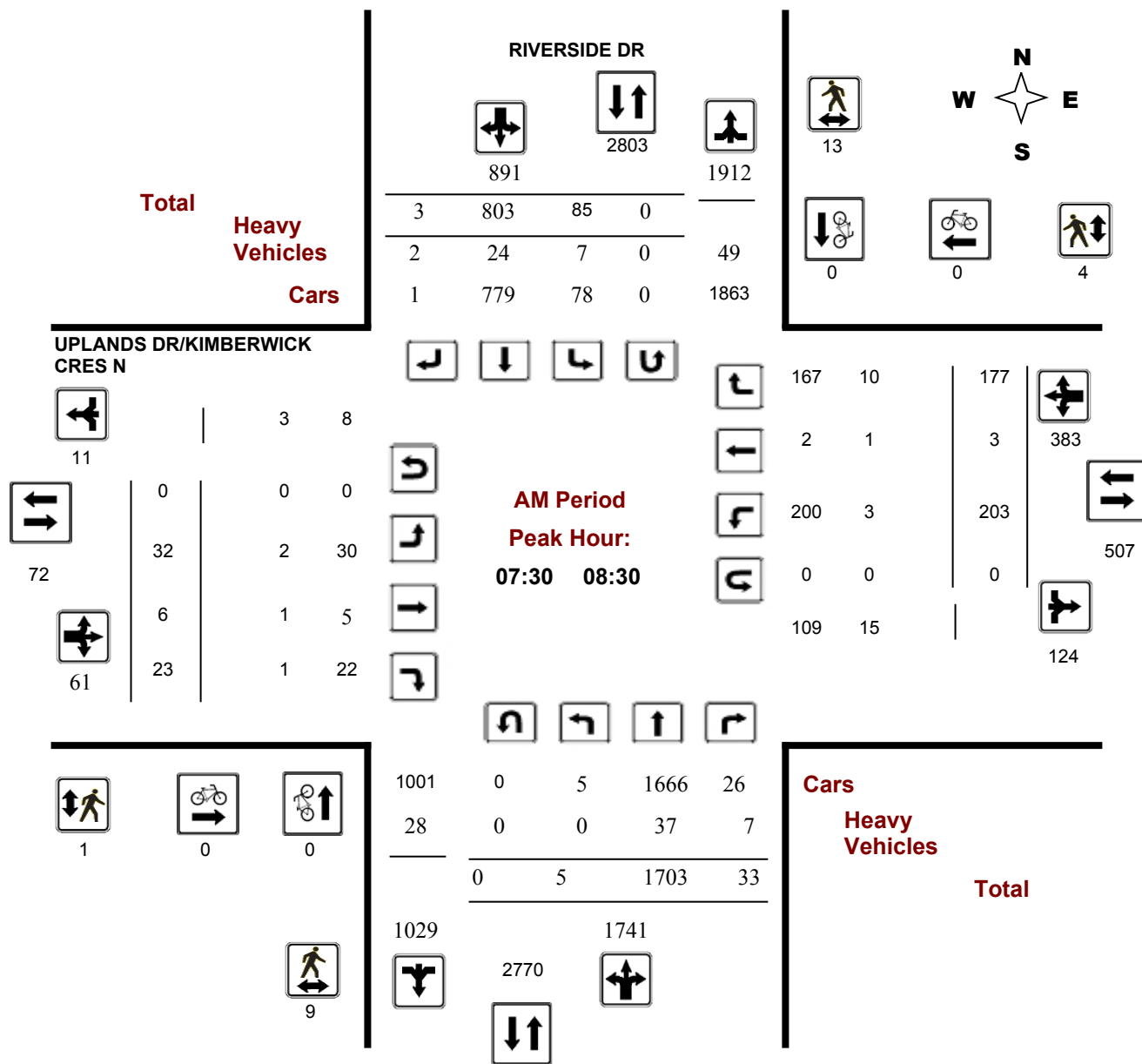
RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

Survey Date: Wednesday, November 16, 2016

Start Time: 07:00

WO No: 36487

Device: Miovision



Turning Movement Count - Full Study Peak Hour Diagram

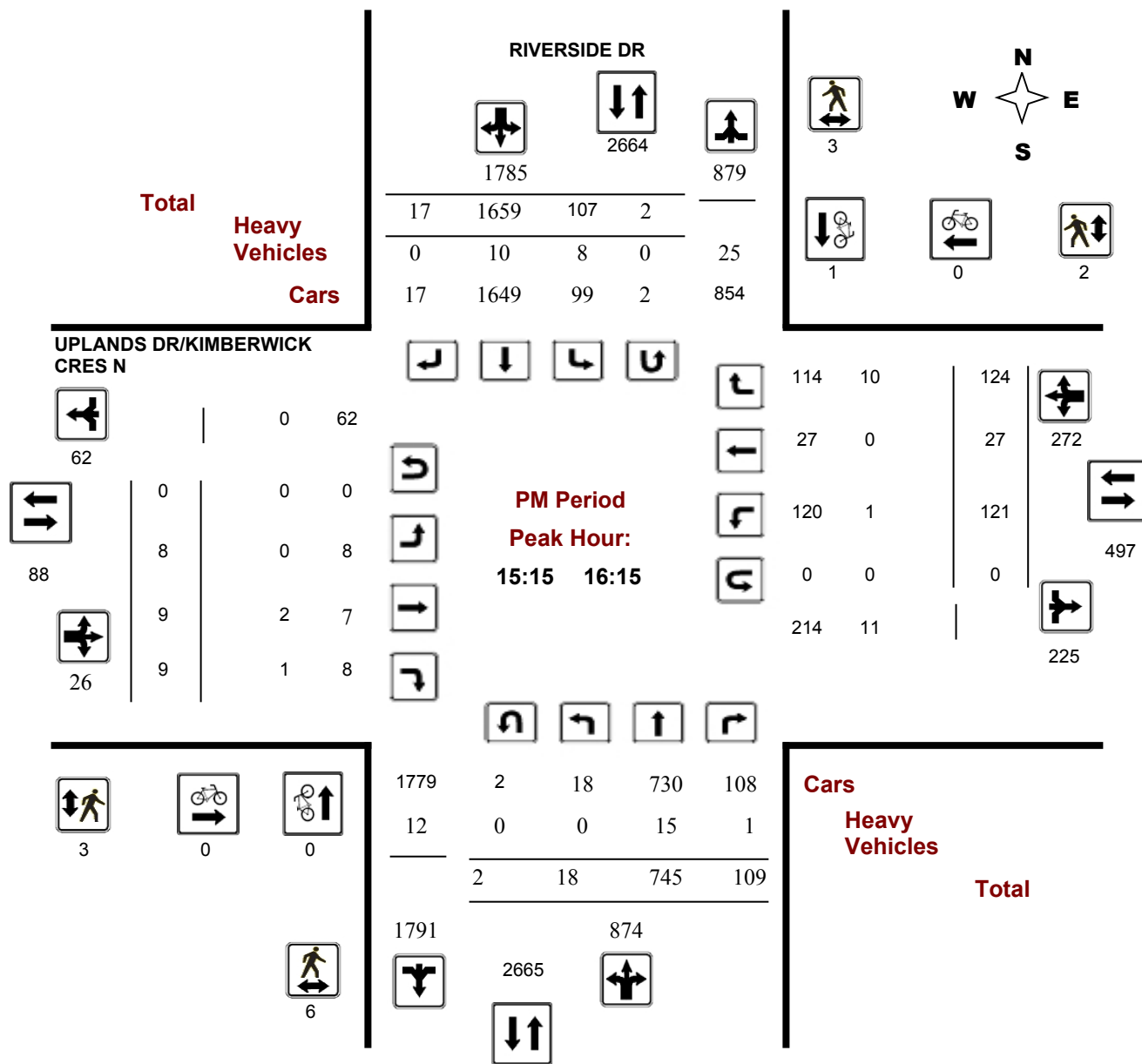
RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

Survey Date: Wednesday, November 16, 2016

Start Time: 07:00

WO No: 36487

Device: Miovision



Turning Movement Count - Full Study Summary Report

PRINCE OF WALES DR @ WEST HUNT CLUB RD

Survey Date: Wednesday, April 06, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 5 Westbound: 2

AADT Factor

.90

Full Study

PRINCE OF WALES DR										WEST HUNT CLUB RD										Grand Total
Northbound					Southbound					Eastbound					Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT		
07:00 08:00	25	937	717	1679	178	410	171	759	2438	97	797	13	907	431	1024	486	1941	2848	5286	
08:00 09:00	38	802	695	1535	205	462	272	939	2474	138	825	35	998	514	1178	425	2117	3115	5589	
09:00 10:00	51	581	511	1143	180	319	254	753	1896	139	805	41	985	393	1039	272	1704	2689	4585	
11:30 12:30	75	336	459	870	256	293	259	808	1678	195	1047	62	1304	427	1039	210	1676	2980	4658	
12:30 13:30	49	312	394	755	255	352	222	829	1584	200	1075	68	1343	352	1053	258	1663	3006	4590	
15:00 16:00	28	421	530	979	361	666	125	1152	2131	137	893	42	1072	527	1180	275	1982	3054	5185	
16:00 17:00	18	425	570	1013	406	619	96	1121	2134	96	812	32	940	471	1056	250	1777	2717	4851	
17:00 18:00	7	379	503	889	336	529	73	938	1827	108	846	20	974	440	850	218	1508	2482	4309	
Sub Total	291	4193	4379	8863	2177	3650	1472	7299	16162	1110	7100	313	8523	3555	8419	2394	14368	22891	39053	
U Turns				0				0	0				5				2	7	7	
Total	291	4193	4379	8863	2177	3650	1472	7299	16162	1110	7100	313	8528	3555	8419	2394	14370	22898	39060	
EQ 12Hr	404	5828	6087	12320	3026	5074	2046	10146	22466	1543	9869	435	11854	4941	11702	3328	19974	31828	54294	
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													1.39							
AVG 12Hr	364	5245	5478	11088	2723	4566	1841	9131	20219	1389	8882	392	10669	4447	10532	2995	17977	28646	48865	
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													.90							
AVG 24Hr	477	6872	7176	14525	3568	5982	2412	11962	26487	1819	11636	513	13976	5826	13797	3923	23550	37526	64013	
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													1.31							

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Appendix B

Collision Data and Analysis

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	156	13	29	7	0	4	0	4	213
Non-fatal injury	44	4	1	1	0	2	0	0	52
Non reportable	0	0	0	0	0	0	0	0	0
Total	200	17	30	8	0	6	0	4	265
	#1 or 75%	#3 or 6%	#2 or 11%	#4 or 3%	#7 or 0%	#5 or 2%	#7 or 0%	#6 or 2%	

80%
20%
0%
100%

HUNT CLUB RD / RIVERSIDE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2012-2016	213	65,630	1825	1.78

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	135	8	22	3	0	1	0	4	173
Non-fatal injury	35	3	1	1	0	0	0	0	40
Non reportable	0	0	0	0	0	0	0	0	0
Total	170	11	23	4	0	1	0	4	213
	80%	5%	11%	2%	0%	0%	0%	2%	

81%
19%
0%
100%

RIVERSIDE DR, KIMBERWICK CRES N to KIMBERWICK CRES S

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2012-2016	4	n/a	1825	n/a

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	2	0	0	1	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
Total	1	0	2	0	0	1	0	0	4
	25%	0%	50%	0%	0%	25%	0%	0%	

75%
25%
0%
100%

RIVERSIDE DR, HUNT CLUB RD to KIMBERWICK CRES S

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2012-2016	18	n/a	1825	n/a

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	11	0	2	0	0	1	0	0	14
Non-fatal injury	4	0	0	0	0	0	0	0	4
Non reportable	0	0	0	0	0	0	0	0	0
Total	15	0	2	0	0	1	0	0	18
	83%	0%	11%	0%	0%	6%	0%	0%	

78%
22%
0%
100%

KIMBERWICK CRES N / RIVERSIDE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2012-2016	28	32,971	1825	0.47

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	8	5	3	4	0	1	0	0	21
Non-fatal injury	4	1	0	0	0	2	0	0	7
Non reportable	0	0	0	0	0	0	0	0	0
Total	12	6	3	4	0	3	0	0	28
	43%	21%	11%	14%	0%	11%	0%	0%	

75%
25%
0%
100%



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** January 1, 2017

Location: HUNT CLUB RD @ RIVERSIDE DR

Traffic Control: Traffic signal

Total Collisions: 145

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-06, Mon,11:38	Snow	Rear end	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle	
					South	Turning right	Automobile, station wagon	Other motor vehicle	
2014-Jan-09, Thu,07:20	Clear	Rear end	Non-fatal injury	Ice	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Jan-11, Sat,06:36	Freezing Rain	Angle	Non-fatal injury	Ice	West	Slowing or stopping	Automobile, station wagon	Skidding/sliding	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Jan-17, Fri,17:33	Snow	Sideswipe	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Jan-27, Mon,11:45	Drifting Snow	Rear end	P.D. only	Loose snow	North	Turning right	Automobile, station wagon	Other motor vehicle	
					North	Turning right	Pick-up truck	Other motor vehicle	

2014-Jan-28, Tue,10:00	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2014-Jan-26, Sun,14:34	Clear	Rear end	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Feb-14, Fri,06:50	Snow	Rear end	P.D. only	Loose snow	North	Slowing or stopping	Pick-up truck	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2014-Mar-27, Thu,11:40	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Mar-10, Mon,18:15	Clear	Rear end	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Passenger van	Other motor vehicle
2014-Mar-28, Fri,21:57	Clear	Angle	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Mar-08, Sat,14:25	Clear	Rear end	P.D. only	Dry	East	Turning right	Pick-up truck	Other motor vehicle
					East	Turning right	Passenger van	Other motor vehicle
2014-Mar-31, Mon,19:55	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Pick-up truck	Other motor vehicle

					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Apr-07, Mon,08:20	Clear	Rear end	Non-fatal injury	Dry	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2014-May-26, Mon,10:20	Clear	Rear end	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning right	Pick-up truck	Other motor vehicle
2014-May-21, Wed,19:00	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Jun-12, Thu,14:30	Rain	Rear end	P.D. only	Wet	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-May-30, Fri,08:29	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2014-Jun-03, Tue,08:50	Rain	Rear end	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2014-Jun-03, Tue,07:50	Rain	Rear end	Non-fatal injury	Wet	East	Turning right	Pick-up truck	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle

2014-Jul-03, Thu,10:00	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Jun-15, Sun,16:53	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2014-Jul-04, Fri,15:30	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Jul-14, Mon,17:10	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2014-Jul-15, Tue,11:30	Rain	Rear end	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2014-Jul-26, Sat,08:00	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Jul-21, Mon,10:40	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Delivery van	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle

2014-Aug-05, Tue,14:47	Clear	Rear end	P.D. only	Dry	West	Unknown	Motorcycle	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2014-Jul-15, Tue,11:28	Rain	Rear end	P.D. only	Wet	South	Turning right	Passenger van	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2014-Aug-20, Wed,12:29	Clear	Rear end	P.D. only	Dry	North	Turning right	Delivery van	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2014-Aug-27, Wed,16:18	Clear	Rear end	Non-fatal injury	Dry	North	Turning right	Pick-up truck	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2014-Nov-27, Thu,07:35	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Pick-up truck	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2014-Nov-19, Wed,19:53	Clear	Rear end	P.D. only	Wet	North	Turning right	Automobile, station wagon	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2014-Jun-07, Sat,19:00	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Truck - closed	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2014-Oct-07, Tue,16:20	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle

					South	Turning right	Pick-up truck	Other motor vehicle
2014-Dec-15, Mon,19:57	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Dec-13, Sat,11:06	Clear	Rear end	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle
2014-Dec-13, Sat,21:30	Clear	Sideswipe	P.D. only	Wet	West	Overtaking	Ambulance	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2015-Jan-15, Thu,13:05	Clear	Rear end	P.D. only	Wet	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2014-Oct-30, Thu,08:15	Clear	Rear end	Non-fatal injury	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2015-Mar-24, Tue,07:50	Clear	Turning movement	P.D. only	Dry	North	Turning left	Pick-up truck	Other motor vehicle
					South	Going ahead	Passenger van	Other motor vehicle
2015-Mar-11, Wed,09:31	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle

2014-Nov-17, Mon,16:22	Snow	Rear end	P.D. only	Loose snow	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Jun-24, Wed,20:44	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Feb-13, Fri,11:53	Clear	Rear end	P.D. only	Dry	North	Turning right	Passenger van	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2015-Jan-19, Mon,12:30	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Feb-04, Wed,07:54	Clear	Rear end	Non-fatal injury	Slush	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2015-Sep-29, Tue,20:28	Rain	Angle	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2015-Jun-26, Fri,15:18	Clear	Rear end	P.D. only	Dry	South	Turning right	Unknown	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle

2015-Sep-13, Sun,13:18	Rain	Rear end	P.D. only	Wet	West	Turning right	Automobile, station wagon	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2015-Feb-05, Thu,08:21	Snow	Rear end	P.D. only	Ice	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2015-Mar-17, Tue,10:39	Clear	Rear end	P.D. only	Wet	East	Going ahead	Truck and trailer	Other motor vehicle
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2015-Apr-28, Tue,19:59	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Feb-12, Thu,00:20	Snow	Rear end	P.D. only	Loose snow	West	Turning left	Passenger van	Skidding/sliding
					West	Turning left	Pick-up truck	Other motor vehicle
2015-Feb-21, Sat,16:20	Snow	Rear end	Non-fatal injury	Loose snow	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
					West	Slowing or stopping	Passenger van	Other motor vehicle
2015-Feb-23, Mon,16:57	Clear	Sideswipe	Non-fatal injury	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle

2014-Dec-17, Wed,17:15	Rain	Rear end	P.D. only	Wet	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2014-Dec-26, Fri,14:18	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Unknown	Other motor vehicle
					North	Turning left	Passenger van	Other motor vehicle
2015-Feb-26, Thu,06:25	Clear	Rear end	P.D. only	Dry	East	Going ahead	Delivery van	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Jan-09, Fri,19:54	Clear	Rear end	P.D. only	Packed snow	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Mar-06, Fri,21:51	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2015-Aug-16, Sun,02:05	Clear	Turning movement	P.D. only	Dry	West	Turning right	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Mar-22, Sun,14:35	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Passenger van	Other motor vehicle

2015-Jul-09, Thu,10:40	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Mar-31, Tue,07:29	Clear	Rear end	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Passenger van	Other motor vehicle
2015-Aug-31, Mon,16:21	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2015-Aug-27, Thu,16:50	Clear	Rear end	P.D. only	Dry	South	Turning right	Passenger van	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Mar-02, Mon,16:30	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2015-Apr-01, Wed,17:59	Clear	Rear end	P.D. only	Dry	South	Unknown	Unknown	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2015-Jun-08, Mon,23:26	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle

2015-Mar-25, Wed,20:16	Clear	Rear end	P.D. only	Wet	North	Turning right	Pick-up truck	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2015-Mar-24, Tue,14:50	Clear	Rear end	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					North	Turning left	Pick-up truck	Other motor vehicle
2015-Apr-09, Thu,12:12	Clear	Rear end	P.D. only	Dry	South	Turning right	Truck - open	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Jun-30, Tue,16:01	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Ambulance	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2015-May-26, Tue,07:15	Clear	Rear end	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Making "U" turn	Automobile, station wagon	Other motor vehicle
2015-Jul-10, Fri,15:34	Clear	Rear end	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					North	Turning left	Passenger van	Other motor vehicle
					North	Turning left	Unknown	Other motor vehicle
2015-Aug-19, Wed,22:48	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle

2015-Jul-16, Thu,16:35	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Truck and trailer	Other motor vehicle
					East	Turning right	Passenger van	Other motor vehicle
					East	Stopped	Passenger van	Other motor vehicle
2015-Jun-16, Tue,10:30	Rain	Rear end	P.D. only	Wet	West	Unknown	Unknown	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2015-Jul-31, Fri,10:11	Clear	Rear end	P.D. only	Dry	North	Turning right	Pick-up truck	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle
2015-Aug-04, Tue,08:25	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Jun-08, Mon,00:11	Clear	Turning movement	Non-fatal injury	Dry	West	Going ahead	Bicycle	Other motor vehicle
					West	Turning left	Unknown	Cyclist
2015-May-12, Tue,15:57	Clear	Rear end	P.D. only	Dry	South	Turning right	Unknown	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Sep-05, Sat,11:51	Clear	Rear end	P.D. only	Dry	East	Turning right	Pick-up truck	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle

2015-Aug-29, Sat,19:36	Clear	Sideswipe	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					North	Turning left	Pick-up truck	Other motor vehicle
2015-Sep-18, Fri,14:50	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Truck - dump	Other motor vehicle
2015-Sep-22, Tue,20:16	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2015-Apr-19, Sun,12:03	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2016-Aug-05, Fri,15:04	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2016-Jan-27, Wed,17:56	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Slowing or stopping	Passenger van	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2016-May-12, Thu,07:00	Clear	Rear end	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning right	Pick-up truck	Other motor vehicle

2016-Feb-25, Thu,19:01	Clear	Rear end	P.D. only	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Turning left	Pick-up truck	Other motor vehicle
2016-Mar-29, Tue,11:00	Clear	Rear end	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Unknown	Other motor vehicle
2016-Aug-31, Wed,11:12	Clear	Sideswipe	P.D. only	Dry	North	Overtaking	Pick-up truck	Other motor vehicle
					North	Stopped	Unknown	Other motor vehicle
2016-Jul-15, Fri,09:15	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2016-Feb-11, Thu,10:41	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Going ahead	Passenger van	Other motor vehicle
2016-Feb-13, Sat,16:40	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2016-Feb-13, Sat,20:01	Snow	Rear end	P.D. only	Ice	East	Turning right	Pick-up truck	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle
2016-Oct-26, Wed,09:45	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle

					North	Turning right	Automobile, station wagon	Other motor vehicle
2016-Oct-28, Fri,15:41	Rain	Rear end	Non-fatal injury	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2016-Jun-07, Tue,12:38	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Motorcycle	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2016-Jun-09, Thu,14:33	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Sep-12, Sat,09:20	Rain	Rear end	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Nov-02, Mon,18:15	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Nov-19, Thu,18:30	Rain	Rear end	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2015-Jul-17, Fri,10:34	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle

2015-Nov-24, Tue,12:06	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Oct-09, Fri,18:16	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-Nov-15, Sun,14:47	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Oct-06, Tue,10:51	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Oct-06, Tue,17:09	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Oct-17, Sat,08:23	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Passenger van	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2015-Aug-16, Sun,02:01	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Unknown	Other motor vehicle
					West	Unknown	Automobile, station wagon	Other motor vehicle

2015-Oct-27, Tue,15:40	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Oct-03, Sat,12:30	Clear	Rear end	Non-fatal injury	Dry	South	Turning right	Unknown	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2015-Nov-25, Wed,21:33	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Passenger van	Other motor vehicle
2016-Jan-11, Mon,15:57	Clear	Rear end	P.D. only	Wet	West	Slowing or stopping	Pick-up truck	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2016-Apr-19, Tue,17:11	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2016-Apr-03, Sun,10:40	Clear	Rear end	P.D. only	Dry	South	Turning right	Passenger van	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2016-Mar-12, Sat,11:50	Clear	Rear end	P.D. only	Dry	West	Turning right	Passenger van	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2016-May-06, Fri,08:53	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle

					North	Stopped	Automobile, station wagon	Other motor vehicle
2016-Mar-18, Fri,09:02	Clear	Rear end	P.D. only	Dry	West	Going ahead	Delivery van	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2016-Sep-15, Thu,18:41	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2016-Aug-19, Fri,08:20	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Passenger van	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2016-Mar-28, Mon,13:57	Rain	Rear end	Non-fatal injury	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2016-Mar-29, Tue,09:08	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2016-Jul-15, Fri,09:45	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Pick-up truck	Other motor vehicle
2016-Apr-08, Fri,15:12	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle

2016-May-03, Tue,06:31	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2016-Apr-14, Thu,11:37	Clear	Sideswipe	P.D. only	Dry	North	Turning right	Passenger van	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Mar-23, Wed,20:52	Clear	Rear end	P.D. only	Dry	West	Unknown	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2016-Jun-24, Fri,11:35	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Pick-up truck	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Jun-28, Tue,16:26	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2016-May-30, Mon,14:09	Clear	Rear end	P.D. only	Dry	South	Turning right	Motorcycle	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle
2016-Oct-29, Sat,13:56	Clear	Rear end	P.D. only	Dry	North	Stopped	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle

2016-Jul-09, Sat,13:30	Rain	Rear end	P.D. only	Wet	North	Going ahead	Pick-up truck	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2016-Oct-01, Sat,18:30	Clear	Rear end	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle
					South	Turning right	Passenger van	Other motor vehicle
2016-Dec-09, Fri,08:00	Clear	Rear end	P.D. only	Ice	North	Slowing or stopping	Passenger van	Other motor vehicle
					North	Stopped	Delivery van	Other motor vehicle
2016-Dec-18, Sun,15:48	Snow	Turning movement	P.D. only	Loose snow	West	Turning left	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Jul-27, Wed,17:06	Clear	Turning movement	P.D. only	Dry	North	Turning left	Passenger van	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
2016-Nov-21, Mon,11:48	Clear	Rear end	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2016-Dec-29, Thu,13:20	Snow	Rear end	P.D. only	Packed snow	East	Turning right	Pick-up truck	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle

2016-Nov-30, Wed,18:55	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Pick-up truck	Other motor vehicle

2016-Nov-28, Mon,18:05	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle

2016-Nov-07, Mon,19:55	Clear	Rear end	P.D. only	Dry	South	Going ahead	Passenger van	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle

Location: KIMBERWICK CRES S @ RIVERSIDE DR

Traffic Control: Stop sign

Total Collisions: 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Feb-09, Sun,20:11	Snow	Angle	P.D. only	Wet	East	Turning right	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	

2016-Jan-18, Mon,09:35	Clear	Rear end	P.D. only	Loose snow	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle

Location: RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

Traffic Control: Traffic signal

Total Collisions: 19

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-02, Thu,17:17	Clear	SMV other	Non-fatal injury	Ice	South	Turning left	Automobile, station wagon	Pedestrian	1

2014-May-13, Tue,17:20	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2014-Jul-18, Fri,20:00	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Truck - closed	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2015-May-07, Thu,04:22	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Pole (sign, parking meter)
2015-Feb-22, Sun,09:54	Clear	Rear end	Non-fatal injury	Packed snow	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2015-Aug-09, Sun,15:42	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Passenger van	Other motor vehicle
2015-Jun-18, Thu,11:09	Clear	Rear end	P.D. only	Dry	North	Going ahead	Truck and trailer	Other motor vehicle
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Slowing or stopping	Pick-up truck	Other motor vehicle
2015-Sep-04, Fri,08:05	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Dec-23, Wed,17:39	Rain	Turning movement	P.D. only	Wet	South	Making "U" turn	Pick-up truck	Other motor vehicle

					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Apr-06, Wed,18:32	Snow	Turning movement	P.D. only	Loose snow	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	
2016-Oct-28, Fri,20:54	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Oct-13, Tue,10:35	Rain	SMV other	Non-fatal injury	Wet	West	Turning left	Automobile, station wagon	Pedestrian	1
2015-Nov-22, Sun,18:11	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Slowing or stopping	Passenger van	Other motor vehicle	
2015-Aug-09, Sun,15:05	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Passenger van	Other motor vehicle	
2015-Sep-05, Sat,01:28	Clear	Angle	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2016-May-11, Wed,09:28	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	

2016-Aug-13, Sat,14:17	Clear	Turning movement	P.D. only	Dry	North	Turning right	Delivery van	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Jun-15, Wed,17:30	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Jul-02, Sat,15:24	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle

Location: RIVERSIDE DR btwn HUNT CLUB RD & KIMBERWICK CRES

Traffic Control: No control

Total Collisions: 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jun-30, Mon,08:05	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2015-Feb-02, Mon,15:49	Clear	Rear end	P.D. only	Loose snow	North	Changing lanes	Unknown	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Aug-13, Thu,17:10	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Aug-18, Thu,18:17	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	

					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2016-Oct-07, Fri, 17:00	Clear	Rear end	Non-fatal injury	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle

Location: RIVERSIDE DR btwn HUNT CLUB RD & TURN LANE

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-02, Mon, 09:18	Snow	Rear end	P.D. only	Packed snow	North	Slowing or stopping	Pick-up truck	Skidding/sliding	
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Passenger van	Other motor vehicle	
2016-Aug-02, Tue, 16:59	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	

Location: RIVERSIDE DR btwn KIMBERWICK CRES & KIMBERWICK CRES

Traffic Control: No control

Total Collisions: 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Sep-10, Wed, 11:44	Clear	Rear end	Non-fatal injury	Dry	South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Going ahead	Pick-up truck	Other motor vehicle	
2015-Aug-12, Wed, 16:15	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Truck - closed	Other motor vehicle	

					South	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-29, Thu,20:52	Snow	Sideswipe	P.D. only	Loose snow	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Delivery van	Other motor vehicle

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

HUNT CLUB RD & RIVERSIDE DR

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 68

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2012-01-04	We	17:33	Snow	Dusk	Rear end	P.D. only	V1 W V2 W	Wet Wet	Changing lanes Slowing or	Pick-up truck Pick-up truck	Other motor vehicle Other motor vehicle	0
2	2012-01-11	We	07:01	Clear	Dark	Angle	P.D. only	V1 S V2 W	Dry Dry	Turning right Going ahead	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
3	2012-01-19	Thu	07:50	Clear	Dawn	Rear end	Non-fatal	V1 N V2 N	Ice Ice	Slowing or Stopped	Pick-up truck Automobile, station	Other motor vehicle Other motor vehicle	0
4	2012-01-25	We	09:56	Clear	Daylight	Sideswipe	P.D. only	V1 W V2 W	Dry Dry	Changing lanes Stopped	Truck - closed Automobile, station	Other motor vehicle Other motor vehicle	0
5	2012-01-26	Thu	18:35	Clear	Dark	Rear end	P.D. only	V1 S V2 S	Dry Dry	Turning right Turning right	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
6	2012-02-06	Mo	22:25	Clear	Dark	Single vehicle	P.D. only	V1 E	Ice	Turning right	Automobile, station	Skidding/Sliding	0
7	2012-02-18	Sat	05:52	Clear	Dark	Turning	Non-fatal	V1 W V2 E	Dry Dry	Going ahead Turning left	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
8	2012-04-02	Mo	07:05	Clear	Daylight	Rear end	P.D. only	V1 S V2 S	Dry Dry	Turning left Turning left	Truck and trailer Automobile, station	Other motor vehicle Other motor vehicle	0
9	2012-04-07	Sat	17:31	Clear	Daylight	Rear end	P.D. only	V1 S V2 S	Dry Dry	Turning right Turning right	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle	0
10	2012-05-05	Sat	16:00	Clear	Daylight	Rear end	P.D. only	V1 W V2 W	Dry Dry	Going ahead Slowing or	Automobile, station Pick-up truck	Other motor vehicle Other motor vehicle	0
11	2012-05-09	We	17:26	Clear	Daylight	Rear end	Non-fatal	V1 N V2 N	Dry Dry	Turning left Turning left	Automobile, station Truck - closed	Other motor vehicle Other motor vehicle	0
12	2012-05-11	Fri	12:48	Clear	Daylight	Rear end	P.D. only	V1 E V2 E V3 E	Dry Dry Dry	Slowing or Slowing or Stopped	Automobile, station Automobile, station Automobile, station	Other motor vehicle Other motor vehicle Other motor vehicle	0
13	2012-05-25	Fri	16:10	Clear	Daylight	Rear end	P.D. only	V1 S V2 S	Dry Dry	Turning right Turning right	Truck and trailer Pick-up truck	Other motor vehicle Other motor vehicle	0

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

Wednesday, November 29, 2017

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

14	2012-06-10	Sun	17:10	Clear	Daylight	Rear end	P.D. only	V1 E	Dry	Going ahead	Passenger van	Other motor vehicle	0
								V2 E	Dry	Stopped	Passenger van	Other motor vehicle	
15	2012-06-30	Sat	11:30	Clear	Daylight	Sideswipe	P.D. only	V1 S	Dry	Changing lanes	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning left	Automobile, station	Other motor vehicle	
16	2012-07-18	We	18:43	Clear	Daylight	Rear end	Non-fatal	V1 E	Dry	Slowing or	Motorcycle	Other motor vehicle	0
								V2 E	Dry	Stopped	Automobile, station	Other motor vehicle	
17	2012-07-21	Sat	19:48	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Turning right	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
18	2012-07-23	Mo	09:08	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
19	2012-08-05	Sun	10:03	Clear	Daylight	Rear end	P.D. only	V1 E	Dry	Going ahead	Automobile, station	Other motor vehicle	0
								V2 E	Dry	Stopped	Pick-up truck	Other motor vehicle	
20	2012-08-10	Fri	08:50	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	
21	2012-08-21	Tue	20:40	Rain	Dusk	Rear end	P.D. only	V1 S	Wet	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Turning right	Pick-up truck	Other motor vehicle	
22	2012-08-21	Tue	13:50	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Going ahead	Passenger van	Other motor vehicle	0
								V2 S	Dry	Stopped	Automobile, station	Other motor vehicle	
23	2012-08-22	We	11:55	Clear	Daylight	Other	P.D. only	V1 S	Dry	Reversing	Truck - closed	Other motor vehicle	0
								V2 N	Dry	Turning left	Automobile, station	Other motor vehicle	
24	2012-09-28	Fri	08:55	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
25	2012-10-12	Fri	13:20	Clear	Daylight	Rear end	P.D. only	V1 W	Dry	Going ahead	Passenger van	Other motor vehicle	0
								V2 W	Dry	Stopped	Automobile, station	Other motor vehicle	
26	2012-10-14	Sun	09:32	Clear	Daylight	Turning	Non-fatal	V1 E	Wet	Turning left	Automobile, station	Other motor vehicle	0
								V2 W	Wet	Going ahead	Pick-up truck	Other motor vehicle	
27	2012-11-07	We	17:45	Clear	Dark	Sideswipe	P.D. only	V1 W	Dry	Changing lanes	Automobile, station	Other motor vehicle	0
								V2 W	Dry	Unknown	Automobile, station	Other motor vehicle	

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

Wednesday, November 29, 2017

Page 2 of 8

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01

TO: 2014-01-01

28	2012-11-21	We	08:10	Clear	Daylight	Sideswipe	P.D. only	V1 E	Dry	Changing lanes	Pick-up truck	Other motor vehicle	0
								V2 E	Dry	Going ahead	Passenger van	Other motor vehicle	
29	2012-11-26	Mo	17:34	Clear	Dark	Rear end	P.D. only	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Pick-up truck	Other motor vehicle	
30	2012-11-26	Mo	12:40	Snow	Daylight	Rear end	P.D. only	V1 W	Loose snow	Slowing or	Automobile, station	Other motor vehicle	0
								V2 W	Loose snow	Slowing or	Automobile, station	Other motor vehicle	
31	2012-12-02	Sun	15:30	Clear	Daylight	Rear end	P.D. only	V1 N	Wet	Turning left	Automobile, station	Other motor vehicle	0
								V2 N	Wet	Turning left	Automobile, station	Other motor vehicle	
32	2012-12-12	We	15:50	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Turning right	Passenger van	Other motor vehicle	0
								V2 S	Dry	Turning right	Pick-up truck	Other motor vehicle	
33	2012-12-27	Thu	19:00	Snow	Dark	Rear end	P.D. only	V1 E	Loose snow	Turning right	Automobile, station	Other motor vehicle	0
								V2 E	Loose snow	Turning right	Automobile, station	Other motor vehicle	
34	2012-12-28	Fri	09:40	Snow	Daylight	Rear end	P.D. only	V1 S	Loose snow	Turning right	Snow plow	Other motor vehicle	0
								V2 S	Slush	Turning right	Automobile, station	Other motor vehicle	
35	2013-01-23	We	14:22	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Turning right	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
36	2013-02-02	Sat	09:32	Snow	Daylight	Rear end	P.D. only	V1 S	Loose snow	Turning right	Pick-up truck	Other motor vehicle	0
								V2 S	Loose snow	Turning right	Automobile, station	Other motor vehicle	
37	2013-02-06	We	06:35	Clear	Dawn	Turning	P.D. only	V1 W	Dry	Going ahead	Passenger van	Other motor vehicle	0
								V2 E	Dry	Turning left	Automobile, station	Other motor vehicle	
								V3 E	Dry	Turning left	Automobile, station	Other motor vehicle	
38	2013-03-08	Fri	13:29	Clear	Daylight	Sideswipe	P.D. only	V1 N	Wet	Turning left	Truck and trailer	Other motor vehicle	0
								V2 N	Wet	Turning left	Automobile, station	Other motor vehicle	
39	2013-03-08	Fri	16:55	Clear	Daylight	Rear end	P.D. only	V1 S	Wet	Going ahead	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Stopped	Pick-up truck	Other motor vehicle	
40	2013-03-18	Mo	13:50	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Turning right	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
41	2013-03-20	We	08:31	Clear	Daylight	Rear end	P.D. only	V1 S	Wet	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Turning right	Pick-up truck	Other motor vehicle	

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

Wednesday, November 29, 2017

Page 3 of 8

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01

TO: 2014-01-01

42	2013-03-21	Thu	18:55	Clear	Dusk	Rear end	P.D. only	V1 S	Wet	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
43	2013-04-25	Thu	09:45	Clear	Daylight	Other	P.D. only	V1 W	Dry	Reversing	Truck - dump	Other motor vehicle	0
								V2 E	Dry	Turning left	Automobile, station	Other motor vehicle	
44	2013-04-26	Fri	07:10	Clear	Daylight	Other	P.D. only	V1 E	Dry	Reversing	Truck - open	Other motor vehicle	0
								V2 W	Dry	Turning left	Automobile, station	Other motor vehicle	
45	2013-05-07	Tue	09:09	Clear	Daylight	Turning	P.D. only	V1 S	Dry	Turning left	Automobile, station	Other motor vehicle	0
								V2 N	Dry	Going ahead	Pick-up truck	Other motor vehicle	
46	2013-05-09	Thu	16:08	Clear	Daylight	Sideswipe	P.D. only	V1 W	Dry	Changing lanes	Automobile, station	Other motor vehicle	0
								V2 W	Dry	Stopped	Pick-up truck	Other motor vehicle	
47	2013-05-13	Mo	07:34	Clear	Daylight	Rear end	Non-fatal	V1 W	Dry	Going ahead	Pick-up truck	Other motor vehicle	0
								V2 W	Dry	Stopped	Automobile, station	Other motor vehicle	
48	2013-05-23	Thu	15:18	Rain	Daylight	Rear end	P.D. only	V1 S	Wet	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Turning right	Automobile, station	Other motor vehicle	
49	2013-06-05	We	19:10	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
50	2013-06-14	Fri	16:50	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Slowing or	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Stopped	Automobile, station	Other motor vehicle	
51	2013-06-16	Sun	16:03	Clear	Daylight	Sideswipe	P.D. only	V1 E	Wet	Changing lanes	Automobile, station	Other motor vehicle	0
								V2 E	Wet	Turning left	Automobile, station	Other motor vehicle	
52	2013-06-17	Mo	11:00	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
53	2013-06-21	Fri	17:15	Clear	Daylight	Rear end	P.D. only	V1 W	Dry	Slowing or	Pick-up truck	Other motor vehicle	0
								V2 W	Dry	Stopped	Pick-up truck	Other motor vehicle	
								V3 W	Dry	Stopped	Automobile, station	Other motor vehicle	
54	2013-07-17	We	13:41	Clear	Daylight	Rear end	P.D. only	V1 N	Dry	Slowing or	Pick-up truck	Other motor vehicle	0
								V2 N	Dry	Stopped	Automobile, station	Other motor vehicle	

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

Wednesday, November 29, 2017

Page 4 of 8

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

55	2013-07-23	Tue	06:33	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Turning right	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
56	2013-07-23	Tue	06:36	Clear	Daylight	Rear end	P.D. only	V1 E	Dry	Going ahead	Automobile, station	Other motor vehicle	0
								V2 E	Dry	Slowing or	Automobile, station	Other motor vehicle	
57	2013-07-28	Sun	21:40	Clear	Dark	Rear end	P.D. only	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Passenger van	Other motor vehicle	
58	2013-08-03	Sat	13:25	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Turning right	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
59	2013-08-12	Mo	13:46	Clear	Daylight	Turning	P.D. only	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 N	Dry	Turning left	Truck - other	Other motor vehicle	
60	2013-10-12	Sat	08:54	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Turning right	Passenger van	Other motor vehicle	0
								V2 S	Dry	Turning right	Automobile, station	Other motor vehicle	
61	2013-10-28	Mo	16:46	Clear	Daylight	Other	P.D. only	V1 W	Dry	Reversing	Automobile, station	Other motor vehicle	0
								V2 E	Dry	Stopped	Truck - dump	Other motor vehicle	
62	2013-11-07	Thu	16:40	Clear	Dusk	Rear end	P.D. only	V1 S	Dry	Slowing or	Unknown	Other motor vehicle	0
								V2 S	Dry	Slowing or	Pick-up truck	Other motor vehicle	
63	2013-11-13	We	09:35	Clear	Daylight	Sideswipe	P.D. only	V1 N	Dry	Changing lanes	Automobile, station	Other motor vehicle	0
								V2 N	Dry	Turning left	Pick-up truck	Other motor vehicle	
64	2013-11-25	Mo	13:00	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Pick-up truck	Other motor vehicle	
65	2013-11-26	Tue	12:38	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Turning right	Pick-up truck	Other motor vehicle	
66	2013-12-17	Tue	07:38	Clear	Dawn	Rear end	P.D. only	V1 E	Ice	Slowing or	Automobile, station	Other motor vehicle	0
								V2 E	Ice	Slowing or	Pick-up truck	Other motor vehicle	
67	2013-12-19	Thu	06:31	Clear	Dark	Rear end	P.D. only	V1 S	Packed snow	Turning right	Automobile, station	Other motor vehicle	0
								V2 S	Packed snow	Turning right	Automobile, station	Other motor vehicle	
68	2013-12-20	Fri	08:54	Snow	Daylight	Rear end	P.D. only	V1 S	Packed snow	Slowing or	Automobile, station	Other motor vehicle	0
								V2 S	Packed snow	Slowing or	Automobile, station	Other motor vehicle	

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

Wednesday, November 29, 2017

Page 5 of 8

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

KIMBERWICK CRES N & RIVERSIDE DR

Former Municipality: Ottawa

Traffic Control: Traffic signal

Number of Collisions: 7

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
69	2012-02-07	Tue	18:30	Clear	Dark	Sideswipe	P.D. only	V1 S	Dry	Changing lanes	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Turning left	Automobile, station	Other motor vehicle	
70	2012-12-27	Thu	15:00	Snow	Daylight	Angle	P.D. only	V1 W	Loose snow	Stopped	Automobile, station	Other motor vehicle	0
								V2 N	Loose snow	Slowing or	Automobile, station	Other motor vehicle	
71	2013-01-03	Thu	18:51	Snow	Dark	Angle	P.D. only	V1 N	Ice	Slowing or	Automobile, station	Other motor vehicle	0
								V2 W	Ice	Going ahead	Automobile, station	Other motor vehicle	
72	2013-06-14	Fri	15:28	Clear	Daylight	Turning	Non-fatal	V1 S	Dry	Going ahead	Passenger van	Other motor vehicle	0
								V2 N	Dry	Turning left	Automobile, station	Other motor vehicle	
73	2013-06-23	Sun	19:10	Clear	Daylight	Rear end	Non-fatal	V1 N	Dry	Going ahead	Automobile, station	Other motor vehicle	0
								V2 N	Dry	Stopped	Automobile, station	Other motor vehicle	
74	2013-10-31	Thu	17:20	Rain	Daylight	Rear end	P.D. only	V1 S	Wet	Going ahead	Passenger van	Other motor vehicle	0
								V2 S	Wet	Stopped	Pick-up truck	Other motor vehicle	
75	2013-11-23	Sat	13:04	Snow	Daylight	Rear end	Non-fatal	V1 N	Ice	Going ahead	Pick-up truck	Other motor vehicle	0
								V2 N	Ice	Slowing or	Pick-up truck	Other motor vehicle	

RIVERSIDE DR, HUNT CLUB RD to KIMBERWICK CRES S

Former Municipality: Ottawa

Traffic Control: No control

Number of Collisions: 13

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
76	2012-02-08	We	06:40	Clear	Dawn	Single vehicle	P.D. only	V1 N	Dry	Going ahead	Pick-up truck	Animal - domestic	0
77	2012-05-09	We	16:19	Clear	Daylight	Sideswipe	P.D. only	V1 S	Dry	Changing lanes	Pick-up truck	Other motor vehicle	0
								V2 S	Dry	Going ahead	Pick-up truck	Other motor vehicle	
78	2012-06-18	Mo	16:51	Clear	Daylight	Rear end	Non-fatal	V1 N	Dry	Going ahead	Passenger van	Other motor vehicle	0
								V2 N	Dry	Stopped	Pick-up truck	Other motor vehicle	
								V3 N	Dry	Stopped	Automobile, station	Other motor vehicle	
								V4 N	Dry	Stopped	Automobile, station	Other motor vehicle	

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

Wednesday, November 29, 2017

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

79	2012-08-02	Thu	16:31	Clear	Daylight	Rear end	Non-fatal	V1 S	Dry	Slowing or	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Stopped	Pick-up truck	Other motor vehicle	
								V3 S	Dry	Stopped	Pick-up truck	Other motor vehicle	
								V4 S	Dry	Stopped	Automobile, station	Other motor vehicle	
80	2012-08-09	Thu	16:52	Clear	Daylight	Rear end	P.D. only	V1 S	Wet	Going ahead	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Slowing or	Automobile, station	Other motor vehicle	
81	2012-10-17	We	16:56	Clear	Daylight	Rear end	P.D. only	V1 S	Dry	Changing lanes	Automobile, station	Other motor vehicle	0
								V2 S	Dry	Slowing or	Pick-up truck	Other motor vehicle	
82	2013-02-25	Mo	07:53	Clear	Daylight	Rear end	P.D. only	V1 S	Wet	Going ahead	Delivery van	Other motor vehicle	0
								V2 S	Wet	Slowing or	Automobile, station	Other motor vehicle	
								V3 S	Wet	Stopped	Pick-up truck	Other motor vehicle	
83	2013-06-07	Fri	17:30	Rain	Daylight	Rear end	P.D. only	V1 S	Wet	Going ahead	Passenger van	Other motor vehicle	0
								V2 S	Wet	Stopped	Automobile, station	Other motor vehicle	
84	2013-10-18	Fri	08:00	Rain	Daylight	Rear end	P.D. only	V1 S	Wet	Slowing or	Automobile, station	Other motor vehicle	0
								V2 S	Wet	Slowing or	Automobile, station	Other motor vehicle	
COMMENTS: EXACT LOCATION UNKNOWN.													
85	2013-11-01	Fri	07:17	Rain	Daylight	Rear end	P.D. only	V1 N	Wet	Going ahead	Automobile, station	Other motor vehicle	0
								V2 N	Wet	Slowing or	Automobile, station	Other motor vehicle	
								V3 N	Wet	Slowing or	Automobile, station	Other motor vehicle	
86	2013-11-02	Sat	20:34	Clear	Dark	Sideswipe	P.D. only	V1 N	Dry	Going ahead	Unknown	Other motor vehicle	0
								V2 N	Dry	Going ahead	Automobile, station	Other motor vehicle	
87	2013-12-06	Fri	11:01	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	
88	2013-12-13	Fri	17:13	Clear	Dark	Rear end	P.D. only	V1 S	Ice	Going ahead	Passenger van	Other motor vehicle	0
								V2 S	Ice	Going ahead	Automobile, station	Other motor vehicle	
								V3 S	Ice	Going ahead	Automobile, station	Other motor vehicle	

RIVERSIDE DR, KIMBERWICK CRES N to KIMBERWICK CRES S

Former Municipality: Ottawa

Traffic Control: No control

Number of Collisions: 1

DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
------	-----	------	-----	-------	-------------	-------	-----	----------------	-------------------	--------------	-------------	---------

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

Wednesday, November 29, 2017

Page 7 of 8

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2012-01-01 TO: 2014-01-01

89	2013-10-04	Fri	17:18	Clear	Daylight	Single vehicle	P.D. only	V1	N	Dry	Going ahead	Automobile, station	Curb	0
----	------------	-----	-------	-------	----------	----------------	-----------	----	---	-----	-------------	---------------------	------	---

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

Wednesday, November 29, 2017

Page 8 of 8

Appendix C

As-of-right Zoning Trip Generation

Trip Generation - As-of-right Zoning

2/12/2018 12:03 PM

ITE Vehicle Trip Generation Rates

Land Use	Data Source	Trip Rate		
		AM Peak	PM Peak	SAT Peak
Office Park	ITE 750	1.71	1.48	1.64

Modified Person Trip Generation Rates

Land Use	Data Source	Person Trip Rate		
		AM Peak	PM Peak	SAT Peak
Office Park	ITE 750	2.19	1.89	2.10

Note: 1.28 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%

ITE Fitted Curve Equations

Land Use	Data Source	Fitted Curve Equation								
		AM Peak			PM Peak			SAT Peak		
Office Park	ITE 750	T=	1.37(x)	+ 124.36	T=	1.22(x)	+ 95.83	N/A	0.00(x)	+ 0.00

Modified Person Trip Generation

Land Use	Data Source	Area ft ²	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)			SAT Peak (Person Trips/hr)		
			In	Out	Total	In	Out	Total	In	Out	Total
			89%	11%		14%	86%		50%	50%	
Office Park	ITE 750	649,979 ft ²	1,156	143	1,299	159	979	1,138	682	682	1,364
Total			1,156	143	1,299	159	979	1,138	682	682	1,364

Total Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)			SAT Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	60%	694	86	780	96	588	684	410	410	820
Auto Passenger	15%	174	22	196	24	147	171	102	102	204
Transit	15%	173	21	194	24	147	171	102	102	204
Non-motorized	10%	115	14	129	15	97	112	68	68	136
Total Person Trips	100%	1,156	143	1,299	159	979	1,138	682	682	1,364
Total 'New' Auto Trips		694	86	780	96	588	684	410	410	820

Total Site Vehicle Trip Generation

Travel Mode	AM Peak (veh/hr)			PM Peak (veh/hr)			SAT Peak (veh/hr)		
	In	Out	Total	In	Out	Total	In	Out	Total
Total Site Trip Generation	694	86	780	96	588	684	410	410	820
Total 'New' Auto Trips	694	86	780	96	588	684	410	410	820

Appendix D

Traffic Growth Analysis

Riverside / Hunt Club
8 hrs

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2008	Wednesday May 7	8114	8071	6420	8035	9821	11886	17415	15778	85540
2009	Monday June	6960	8192	7222	4728	8116	11638	17099	14839	78794
2014	Thursday August	9156	8487	8778	7560	9786	10466	14709	15916	84858
2016	Wednesday August 3	8217	7820	7879	7186	9490	9868	14462	15174	80096

North Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2008	8071	8114	16185	85540				
	2009	8192	6960	15152	78794	1.5%	-14.2%	-6.4%	-7.9%
	2014	8487	9156	17643	84858	3.6%	31.6%	16.4%	7.7%
	2016	7820	8217	16037	80096	-7.9%	-10.3%	-9.1%	-5.6%

Regression Estimate 2008 8181 7613 15794
Regression Estimate 2016 8098 8677 16776
Average Annual Change -0.13 % 1.65 % 0.76 %

West Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2008	17415	15778	33193	85540				
	2009	17099	14839	31938	78794	-1.8%	-6.0%	-3.8%	-7.9%
	2014	14709	15916	30625	84858	-14.0%	7.3%	-4.1%	7.7%
	2016	14462	15174	29636	80096	-1.7%	-4.7%	-3.2%	-5.6%

Regression Estimate 2008 17410 15399 32810
Regression Estimate 2016 14234 15458 29691
Average Annual Change -2.49 % 0.05 % -1.24 %

East Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2008	11886	9821	21707	85540				
	2009	11638	8116	19754	78794	-2.1%	-17.4%	-9.0%	-7.9%
	2014	10466	9786	20252	84858	-10.1%	20.6%	2.5%	7.7%
	2016	9868	9490	19358	80096	-5.7%	-3.0%	-4.4%	-5.6%

Regression Estimate 2008 11894 9035 20929
Regression Estimate 2016 9911 9607 19519
Average Annual Change -2.25 % 0.77 % -0.87 %

South Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2008	6420	8035	14455	85540				
	2009	7222	4728	11950	78794	12.5%	-41.2%	-17.3%	-7.9%
	2014	8778	7560	16338	84858	21.5%	59.9%	36.7%	7.7%
	2016	7879	7186	15065	80096	-10.2%	-4.9%	-7.8%	-5.6%

Regression Estimate 2008 6795 6507 13302
Regression Estimate 2016 8458 7297 15755
Average Annual Change 2.77 % 1.44 % 2.14 %

Riverside / Hunt Club
AM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2008	Wednesday May 7	969	1661	1514	403	1289	1701	2357	2364	12258
2009	Monday June	860	1573	1543	359	1058	1705	2474	2298	11870
2014	Thursday August	909	1756	1993	491	1031	1457	1847	2076	11560
2016	Wednesday August 3	837	1431	1557	434	1000	1259	1611	1881	10010

North Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2008	1661	969	2630	12258				
	2009	1573	860	2433	11870	-5.3%	-11.2%	-7.5%	-3.2%
	2014	1756	909	2665	11560	11.6%	5.7%	9.5%	-2.6%
	2016	1431	837	2268	10010	-18.5%	-7.9%	-14.9%	-13.4%

Regression Estimate 2008 1649 927 2576
Regression Estimate 2016 1556 856 2412
Average Annual Change -0.73 % -0.99 % -0.82 %

West Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2008	2357	2364	4721	12258				
	2009	2474	2298	4772	11870	5.0%	-2.8%	1.1%	-3.2%
	2014	1847	2076	3923	11560	-25.3%	-9.7%	-17.8%	-2.6%
	2016	1611	1881	3492	10010	-12.8%	-9.4%	-11.0%	-13.4%

Regression Estimate 2008 2461 2366 4827
Regression Estimate 2016 1632 1915 3547
Average Annual Change -5.01 % -2.61 % -3.78 %

East Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2008	1701	1289	2990	12258				
	2009	1705	1058	2763	11870	0.2%	-17.9%	-7.6%	-3.2%
	2014	1457	1031	2488	11560	-14.5%	-2.6%	-10.0%	-2.6%
	2016	1259	1000	2259	10010	-13.6%	-3.0%	-9.2%	-13.4%

Regression Estimate 2008 1735 1193 2928
Regression Estimate 2016 1299 983 2282
Average Annual Change -3.55 % -2.39 % -3.07 %

South Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2008	1514	403	1917	12258				
	2009	1543	359	1902	11870	1.9%	-10.9%	-0.8%	-3.2%
	2014	1993	491	2484	11560	29.2%	36.8%	30.6%	-2.6%
	2016	1557	434	1991	10010	-21.9%	-11.6%	-19.8%	-13.4%

Regression Estimate 2008 1553 384 1937
Regression Estimate 2016 1764 465 2228
Average Annual Change 1.61 % 2.41 % 1.77 %

Riverside / Hunt Club
PM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2008	Wednesday May 7	1576	956	561	1539	1383	1788	2965	2225	12993
2009	Monday June	1444	1216	852	1194	1223	1989	3149	2267	13334
2014	Thursday August	1686	861	843	1708	1545	1430	2125	2200	12398
2016	Wednesday August 3	1558	820	793	1631	1413	1311	2035	2037	11598

North Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2008	956	1576	2532	12993				
	2009	1216	1444	2660	13334	27.2%	-8.4%	5.1%	2.6%
	2014	861	1686	2547	12398	-29.2%	16.8%	-4.2%	-7.0%
	2016	820	1558	2378	11598	-4.8%	-7.6%	-6.6%	-6.5%

Regression Estimate 2008 1090 1521 2611
Regression Estimate 2016 820 1617 2437
Average Annual Change -3.49 % 0.76 % -0.86 %

West Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2008	2965	2225	5190	12993				
	2009	3149	2267	5416	13334	6.2%	1.9%	4.4%	2.6%
	2014	2125	2200	4325	12398	-32.5%	-3.0%	-20.1%	-7.0%
	2016	2035	2037	4072	11598	-4.2%	-7.4%	-5.8%	-6.5%

Regression Estimate 2008 3100 2264 5364
Regression Estimate 2016 1966 2090 4056
Average Annual Change -5.54 % -0.99 % -3.43 %

East Leg	Year	Counts				% Change			
		EB	WB	EB+WB	INT	EB	WB	EB+WB	INT
	2008	1788	1383	3171	12993				
	2009	1989	1223	3212	13334	11.2%	-11.6%	1.3%	2.6%
	2014	1430	1545	2975	12398	-28.1%	26.3%	-7.4%	-7.0%
	2016	1311	1413	2724	11598	-8.3%	-8.5%	-8.4%	-6.5%

Regression Estimate 2008 1913 1313 3226
Regression Estimate 2016 1308 1480 2787
Average Annual Change -4.64 % 1.50 % -1.81 %

South Leg	Year	Counts				% Change			
		NB	SB	NB+SB	INT	NB	SB	NB+SB	INT
	2008	561	1539	2100	12993				
	2009	852	1194	2046	13334	51.9%	-22.4%	-2.6%	2.6%
	2014	843	1708	2551	12398	-1.1%	43.0%	24.7%	-7.0%
	2016	793	1631	2424	11598	-5.9%	-4.5%	-5.0%	-6.5%

Regression Estimate 2008 694 1374 2067
Regression Estimate 2016 840 1681 2522
Average Annual Change 2.43 % 2.56 % 2.51 %

Appendix E

Multi-Modal Level of Service Analysis – Road Segment

Multi-Modal Level of Service - Segments Form

Consultant	Parsons	Project	3960 Riverside
Scenario	Existing	Date	Mar-18
Comments			

SEGMENTS		Street A	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8	Section 9
Pedestrian	Sidewalk Width	-	< 1.5 m								
	Boulevard Width		n/a								
	Avg Daily Curb Lane Traffic Volume		> 3000								
	Operating Speed		> 60 km/h								
	On-Street Parking		no								
	Exposure to Traffic PLoS		F	-	-	-	-	-	-	-	-
	Effective Sidewalk Width										
	Pedestrian Volume										
	Crowding PLoS		-	-	-	-	-	-	-	-	-
	Level of Service		-	-	-	-	-	-	-	-	-
Bicycle	Type of Cycling Facility	-	Mixed Traffic								
	Number of Travel Lanes		2-3 lanes total								
	Operating Speed		≥ 60 km/h								
	# of Lanes & Operating Speed LoS		F	-	-	-	-	-	-	-	-
	Bike Lane (+ Parking Lane) Width										
	Bike Lane Width LoS		-	-	-	-	-	-	-	-	-
	Bike Lane Blockages										
	Blockage LoS		-	-	-	-	-	-	-	-	-
	Median Refuge Width (no median = < 1.8 m)										
	No. of Lanes at Unsignalized Crossing										
	Sidestreet Operating Speed										
	Unsignalized Crossing - Lowest LoS		-	-	-	-	-	-	-	-	-
	Level of Service		-	-	-	-	-	-	-	-	-
Transit	Facility Type	-									
	Friction or Ratio Transit:Posted Speed										
	Level of Service		-	-	-	-	-	-	-	-	-
Truck	Truck Lane Width	A	> 3.7 m								
	Travel Lanes per Direction		> 1								
	Level of Service		A	-	-	-	-	-	-	-	-

Appendix F

Signal Warrant Analysis – Riverside/Site

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	166%	27%	32 % No
		(4) B	Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	255	27%		
	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	159%	32%	
		(2) B	Combined Vehicle and Pedestrian Volume <u>Crossing</u> the Major Street for Each of the Same 8 Hours	75	32%		

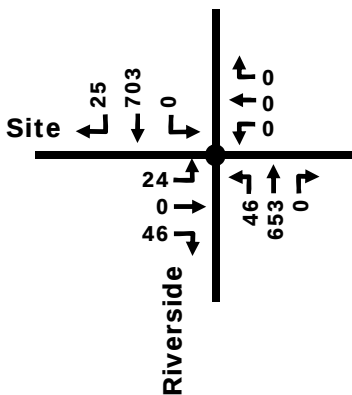
Notes

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

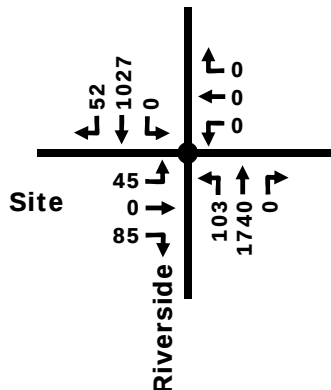
Yes

Yes

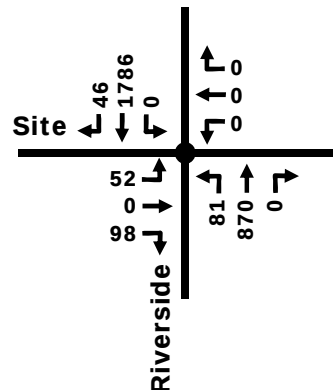
Average 8 Hour Volumes



AM Peak Hour Volumes



PM Peak Hour Volumes

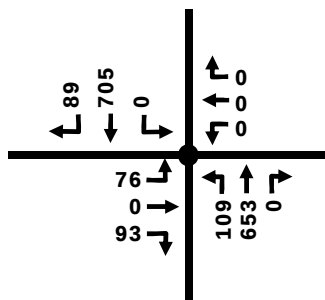
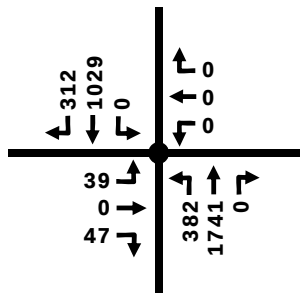
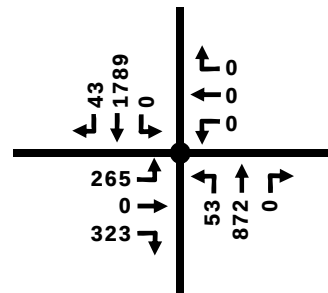


Riverside / Site - (peak hour signal warrant) - As of Right Zoning

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	192%	66%	100 % Yes
		(4) B	Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	255	66%		
	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	173%	101%	
		(2) B	Combined Vehicle and Pedestrian Volume <u>Crossing</u> the Major Street for Each of the Same 8 Hours	75	101%		

Notes

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

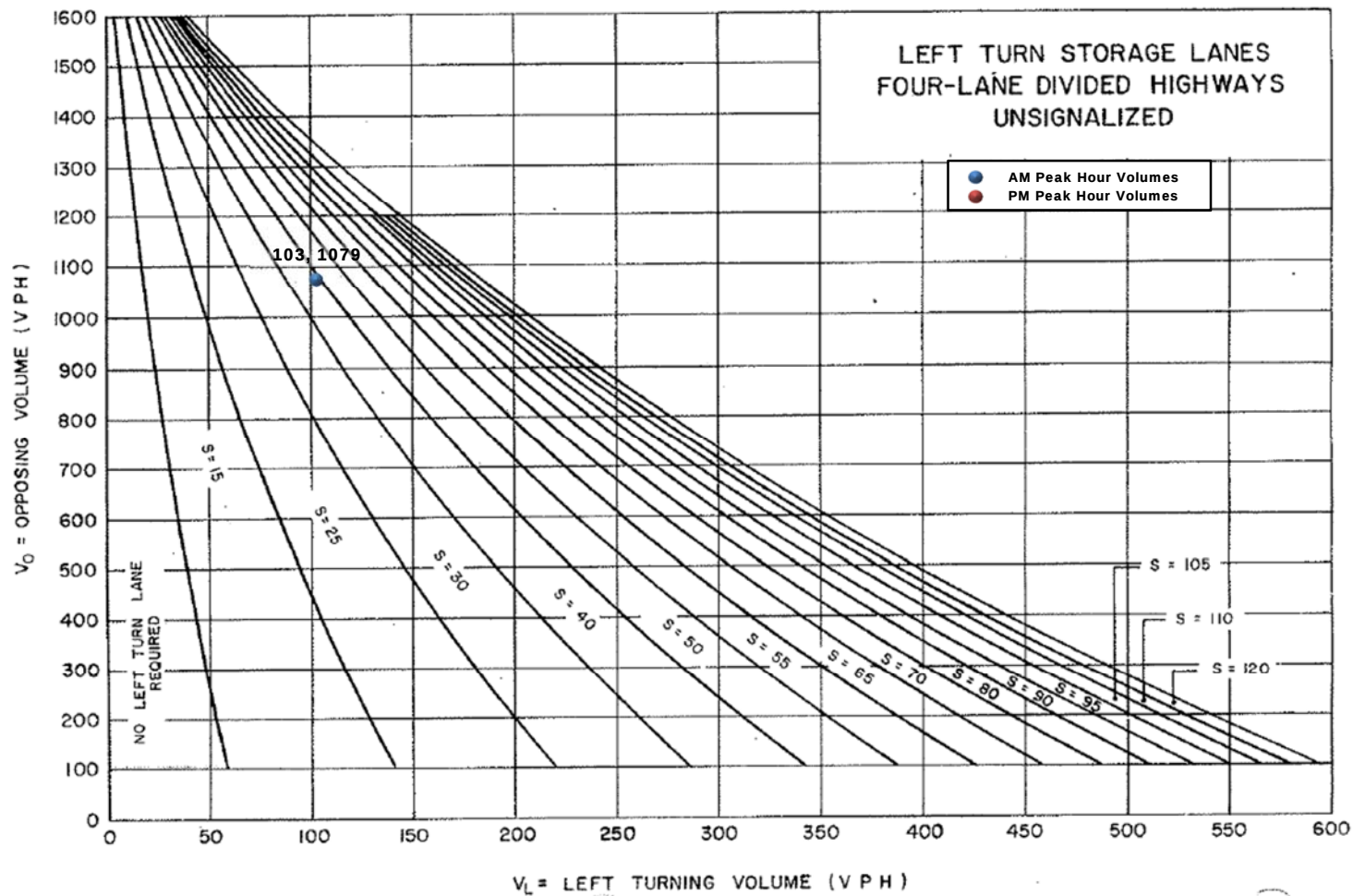
Yes
Yes
Average 8 Hour Volumes

AM Peak Hour Volumes

PM Peak Hour Volumes


Appendix G

Left-turn Lane Warrant Analysis

	Design Speed	Advancing Traffic Volume (V_A)		Opposing Traffic Volume (V_O)		Left Turn Traffic Volume (V_L)		% of Left Turning Traffic		Warrant Left Turn Lane
		AM	PM	AM	PM	AM	PM	AM	PM	
Existing										
Riverside/Site	70	1843	951	1079	1832	103	81	6%	9%	Yes

Peak	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
	Warrant?											
AM	103	1740	0	0	1027	52	45	0	85	0	0	0
PM	81	870	0	0	1786	46	52	0	98	0	0	0



Appendix H

Multi-Modal Level of Service Analysis – Riverside/Site Intersection

Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

Parsons
Future

Project
Date

3960 Riverside
Mar-18

INTERSECTIONS		Riverside/Site			
Crossing Side		NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	5	5	0 - 2	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	No left turn / Prohib.	No left turn / Prohib.	Protected/ Permissive
	Conflicting Right Turns	No right turn	Permissive or yield control	No right turn	Permissive or yield control
	Right Turns on Red (RTor) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	43	46	99	71
	Ped. Exposure to Traffic LoS	E	D	A	C
	Cycle Length	130	130		130
	Effective Walk Time	7	7		58
	Average Pedestrian Delay	58	58		20
	Pedestrian Delay LoS	E	E	-	C
Level of Service	E	E	A	C	
		E			
Approach From		NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic		Mixed Traffic
	Right Turn Lane Configuration	≤ 50 m	≤ 50 m		≤ 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h		≤ 25 km/h
	Cyclist relative to RT motorists	D	D	-	D
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	-	Mixed Traffic
	Left Turn Approach	≥ 2 lanes crossed	No lane crossed		One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h		> 40 to ≤ 50 km/h
	Left Turning Cyclist	F	C	-	D
	Level of Service	F	D	-	D
			F		
Transit	Average Signal Delay				
	Level of Service	-	-	-	-
		-			
Truck	Effective Corner Radius	< 10 m	< 10 m	< 10 m	< 10 m
	Number of Receiving Lanes on Departure from Intersection	1	1	≥ 2	≥ 2
	Level of Service	F	F	D	D
		F			
Auto	Volume to Capacity Ratio	0.81 - 0.90			
	Level of Service	D			

Appendix I

Transportation Demand Management Checklist

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

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

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

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

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
2. WALKING & CYCLING: END-OF-TRIP FACILITIES		
2.1 Bicycle parking		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see <i>Official Plan policy 4.3.6</i>)	☒ Will be confirmed at SPA
REQUIRED	2.1.2 Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see <i>Zoning By-law Section 111</i>)	☒ Will be confirmed at SPA
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see <i>Zoning By-law Section 111</i>)	☒ Will be confirmed at SPA
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☒
BETTER	2.1.5 Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
2.2 Secure bicycle parking		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see <i>Zoning By-law Section 111</i>)	☐
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
2.3 Shower & change facilities		
BASIC	2.3.1 Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2 In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
2.4 Bicycle repair station		
BETTER	2.4.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
3. TRANSIT		
3.1 Customer amenities		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2 Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
4. RIDESHARING		
4.1 Pick-up & drop-off facilities		
BASIC	4.1.1 Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☒
4.2 Carpool parking		
BASIC	4.2.1 Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2 At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
5. CARSHARING & BIKESHARING		
5.1 Carshare parking spaces		
BETTER	5.1.1 Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces (<i>see Zoning By-law Section 94</i>)	☐
5.2 Bikeshare station location		
BETTER	5.2.1 Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
6. PARKING		
6.1 Number of parking spaces		
REQUIRED	6.1.1 Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☒
BASIC	6.1.2 Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☒
BASIC	6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (<i>see Zoning By-law Section 104</i>)	☐
BETTER	6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (<i>see Zoning By-law Section 111</i>)	☐
6.2 Separate long-term & short-term parking areas		
BETTER	6.2.1 Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
7. OTHER		
7.1 On-site amenities to minimize off-site trips		
BETTER	7.1.1 Provide on-site amenities to minimize mid-day or mid-commute errands	☐

Appendix J

SYNCHRO Capacity and MMLoS Analysis: Existing Conditions

Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

Parsons
Existing

Project
Date

3960 Riverside
Mar-18

INTERSECTIONS		Riverside/Hunt Club				Riverside/Uplands			
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	7	8	7	8	6	5	3	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected	Protected	Protected	Protected	Permissive	Permissive	Protected/ Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RTor) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No
	Right Turn Channel	Conv'tl without Receiving Lane	Conventional with Receiving Lane	Conventional with Receiving Lane	Conv'tl without Receiving Lane	No Channel	No Channel	No Channel	No Channel
	Corner Radius	15-25m	15-25m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	14	-5	13	0	20	37	70	70
	Ped. Exposure to Traffic LoS	F	F	F	F	F	E	C	C
	Cycle Length	150	150	150	150	130	130	130	130
	Effective Walk Time	17	17	34	34	7	7	46	70
	Average Pedestrian Delay	59	59	45	45	58	58	27	14
	Pedestrian Delay LoS	E	E	E	E	E	E	C	B
	Level of Service	F	F	F	F	F	E	C	C
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	Bike lane shifts to the left of right turn	Bike lane shifts to the left of right turn	Bike lane shifts to the left of right turn	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	D	D	D	D	D	D	D
	Separated or Mixed Traffic	Mixed Traffic	Separated	Separated	Separated	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	F	F	F	F	F	F	D	D
	Level of Service	F	F	F	F	F	F	D	D
		F				F			
Transit	Average Signal Delay	> 40 sec		> 40 sec	> 40 sec	≤ 10 sec		≤ 10 sec	
	Level of Service	F	-	F	F	B	-	B	-
		F				B			
Truck	Effective Corner Radius	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	1	1	≥ 2	≥ 2
	Level of Service	A	A	A	A	C	C	A	A
		A				C			
Auto	Volume to Capacity Ratio	> 1.00				> 1.00			
	Level of Service	F				F			

Existing AM

1: Riverside & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	511	935	165	74	869	57	455	863	239	85	195	557
Future Volume (vph)	511	935	165	74	869	57	455	863	239	85	195	557
Lane Group Flow (vph)	568	1039	183	82	966	63	506	959	266	94	217	619
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			6			Free			4
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	12.0	32.8		11.4	32.8	32.8	11.2	32.7		11.2	32.7	32.7
Total Split (s)	34.0	59.0		17.0	42.0	42.0	39.0	59.0		15.0	35.0	35.0
Total Split (%)	22.7%	39.3%		11.3%	28.0%	28.0%	26.0%	39.3%		10.0%	23.3%	23.3%
Yellow Time (s)	4.6	4.6		4.6	4.6	4.6	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.4	2.2		1.8	2.2	2.2	2.5	3.0		2.5	3.0	3.0
Lost Time Adjust (s)	-3.0	-2.8		-2.4	-2.8	-2.8	-2.2	-2.7		-2.2	-2.7	-2.7
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)	29.6	55.6	150.0	12.4	38.4	38.4	30.1	55.0	150.0	11.0	35.9	35.9
Actuated g/C Ratio	0.20	0.37	1.00	0.08	0.26	0.26	0.20	0.37	1.00	0.07	0.24	0.24
v/c Ratio	0.88	0.83	0.12	0.59	1.11	0.12	0.77	0.77	0.18	0.76	0.27	1.06
Control Delay	49.7	52.3	0.1	83.6	116.8	0.4	64.7	47.0	0.3	102.4	48.4	80.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	52.3	0.1	83.6	116.8	0.4	64.7	47.0	0.3	102.4	48.4	80.8
LOS	D	D	A	F	F	A	E	D	A	F	D	F
Approach Delay		46.2			107.8			45.0			75.4	
Approach LOS		D			F			D			E	
Queue Length 50th (m)	81.2	165.5	0.0	23.8	~174.1	0.0	73.9	132.2	0.0	28.0	27.9	~130.9
Queue Length 95th (m)	m#110.5	189.3	m0.0	42.2	#215.6	0.0	90.3	158.5	0.0	#57.3	41.6	#214.3
Internal Link Dist (m)		79.7			1199.8			383.2			850.2	
Turn Bay Length (m)	55.0		55.0	75.0		100.0	70.0		150.0	100.0		100.0
Base Capacity (vph)	657	1256	1494	146	868	543	767	1243	1498	124	811	586
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.83	0.12	0.56	1.11	0.12	0.66	0.77	0.18	0.76	0.27	1.06

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 16 (11%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 63.0

Intersection LOS: E

Intersection Capacity Utilization 85.5%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

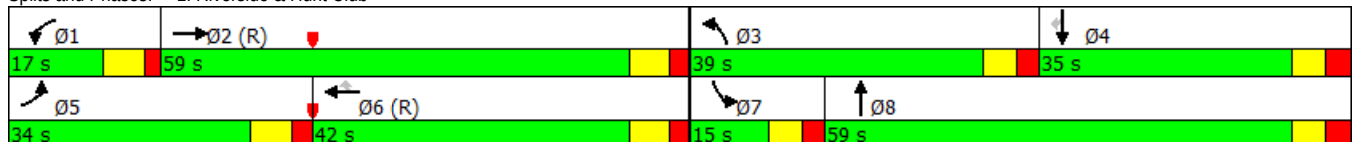
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club



Existing AM
2: Riverside & Uplands

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	32	6	203	3	177	5	1703	85	803
Future Volume (vph)	32	6	203	3	177	5	1703	85	803
Lane Group Flow (vph)	36	33	0	229	197	6	1929	94	895
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4		8			2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	31.1	31.1	11.1	31.1
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	20.0	85.0
Total Split (%)	29.2%	29.2%	29.2%	29.2%	29.2%	54.2%	54.2%	16.7%	70.8%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	27.4	27.4		27.4	27.4	64.6	64.6	84.6	84.6
Actuated g/C Ratio	0.23	0.23		0.23	0.23	0.54	0.54	0.70	0.70
v/c Ratio	0.22	0.09		0.80	0.40	0.02	1.06	0.33	0.37
Control Delay	39.6	15.8		64.1	7.3	15.0	67.5	30.5	8.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	15.8		64.1	7.3	15.0	67.5	30.5	8.0
LOS	D	B		E	A	B	E	C	A
Approach Delay		28.2		37.8			67.3		10.2
Approach LOS		C		D			E		B
Queue Length 50th (m)	6.8	1.3		49.9	0.0	0.7	~271.4	6.7	42.6
Queue Length 95th (m)	16.0	9.2		#79.7	17.6	3.0	#319.7	21.7	55.7
Internal Link Dist (m)		134.6		144.2			850.2		317.7
Turn Bay Length (m)	30.0					55.0		175.0	
Base Capacity (vph)	185	421		324	538	265	1819	284	2388
Starvation Cap Reductn	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.08		0.71	0.37	0.02	1.06	0.33	0.37

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 46.3

Intersection LOS: D

Intersection Capacity Utilization 84.5%

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: 2: Riverside & Uplands

		
Ø2 (R)	Ø1	Ø4
65 s	20 s	35 s
		
Ø6 (R)		Ø8
85 s		35 s

Existing AM

4: Prince of Wales & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	860	19	498	1155	506	35	904	699	212	474	220
Future Volume (vph)	130	860	19	498	1155	506	35	904	699	212	474	220
Lane Group Flow (vph)	144	956	21	553	1283	562	39	1004	777	236	527	244
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.8	31.8		11.8	31.8		11.6	30.6		11.6	30.6	
Total Split (s)	18.0	54.0		27.0	63.0		22.0	47.0		22.0	47.0	
Total Split (%)	12.0%	36.0%		18.0%	42.0%		14.7%	31.3%		14.7%	31.3%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	-2.8	-2.8		-2.8	-2.8		-2.6	-2.6		-2.6	-2.6	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	13.3	50.0	150.0	23.0	59.7	150.0	11.4	44.0	150.0	17.0	52.0	150.0
Actuated g/C Ratio	0.09	0.33	1.00	0.15	0.40	1.00	0.08	0.29	1.00	0.11	0.35	1.00
v/c Ratio	0.49	0.85	0.01	1.10	0.95	0.38	0.30	1.01	0.52	0.63	0.45	0.16
Control Delay	71.1	54.7	0.0	118.2	41.8	0.3	70.7	83.2	1.3	71.5	40.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.1	54.7	0.0	118.2	41.8	0.3	70.7	83.2	1.3	71.5	40.5	0.2
LOS	E	D	A	F	D	A	E	F	A	E	D	A
Approach Delay		55.8			49.7			47.9			38.0	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	21.2	139.1	0.0	~94.0	207.8	0.0	11.2	~168.1	0.0	34.8	65.4	0.0
Queue Length 95th (m)	32.8	166.6	0.0	m#96.8	m194.8	m0.0	22.9	#210.0	0.0	49.2	85.9	0.0
Internal Link Dist (m)		453.6			178.9			272.9			338.4	
Turn Bay Length (m)	125.0		110.0	158.0		80.0	45.0		50.0	120.0		170.0
Base Capacity (vph)	306	1130	1496	504	1348	1495	203	993	1497	394	1175	1493
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.85	0.01	1.10	0.95	0.38	0.19	1.01	0.52	0.60	0.45	0.16

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 68 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 48.4

Intersection LOS: D

Intersection Capacity Utilization 86.2%

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.

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

Splits and Phases: 4: Prince of Wales & Hunt Club

			
Ø1	Ø2 (R)	Ø3	Ø4
27 s	54 s	22 s	47 s
			
Ø5	Ø6 (R)	Ø7	Ø8
18 s	63 s	22 s	47 s

Existing PM

1: Riverside & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	465	1079	491	230	1130	53	330	302	161	71	910	577
Future Volume (vph)	465	1079	491	230	1130	53	330	302	161	71	910	577
Lane Group Flow (vph)	517	1199	546	256	1256	59	367	336	179	79	1011	641
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Prot
Protected Phases	5	2		1	6		3	8		7	4	4
Permitted Phases			Free			6			Free			
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	12.0	32.8		11.4	32.8	32.8	11.2	32.7		11.2	32.7	32.7
Total Split (s)	27.0	60.0		27.0	60.0	60.0	20.0	43.0		20.0	43.0	43.0
Total Split (%)	18.0%	40.0%		18.0%	40.0%	40.0%	13.3%	28.7%		13.3%	28.7%	28.7%
Yellow Time (s)	4.6	4.6		4.6	4.6	4.6	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.4	2.2		1.8	2.2	2.2	2.5	3.0		2.5	3.0	3.0
Lost Time Adjust (s)	-3.0	-2.8		-2.4	-2.8	-2.8	-2.2	-2.7		-2.2	-2.7	-2.7
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)	23.0	56.0	150.0	23.0	56.0	56.0	16.0	41.3	150.0	13.7	39.0	39.0
Actuated g/C Ratio	0.15	0.37	1.00	0.15	0.37	0.37	0.11	0.28	1.00	0.09	0.26	0.26
v/c Ratio	1.03	0.95	0.37	0.99	0.99	0.09	1.05	0.36	0.12	0.51	1.15	0.62
Control Delay	97.3	55.2	0.6	115.3	70.1	0.3	124.0	45.6	0.2	76.2	128.3	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	97.3	55.2	0.6	115.3	70.1	0.3	124.0	45.6	0.2	76.2	128.3	16.2
LOS	F	E	A	F	E	A	F	D	A	E	F	B
Approach Delay		51.6			74.8			69.0			84.4	
Approach LOS		D			E			E			F	
Queue Length 50th (m)	~84.8	194.5	0.0	77.0	195.1	0.0	~60.9	42.8	0.0	22.7	~185.1	26.3
Queue Length 95th (m)	#119.0	#230.3	0.0	#133.9	#245.1	0.0	#93.3	58.3	0.0	40.0	#226.9	49.1
Internal Link Dist (m)		79.7			1199.8			383.2			848.5	
Turn Bay Length (m)	55.0		55.0	75.0		100.0	70.0		150.0	100.0		100.0
Base Capacity (vph)	504	1265	1494	259	1265	643	350	933	1496	180	881	1031
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.95	0.37	0.99	0.99	0.09	1.05	0.36	0.12	0.44	1.15	0.62

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 105 (70%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.15

Intersection Signal Delay: 68.5

Intersection LOS: E

Intersection Capacity Utilization 96.8%

ICU Level of Service F

Analysis Period (min) 15

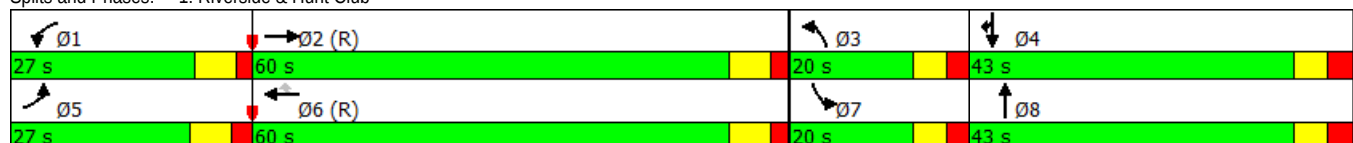
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Riverside & Hunt Club



Existing PM
2: Riverside & Uplands

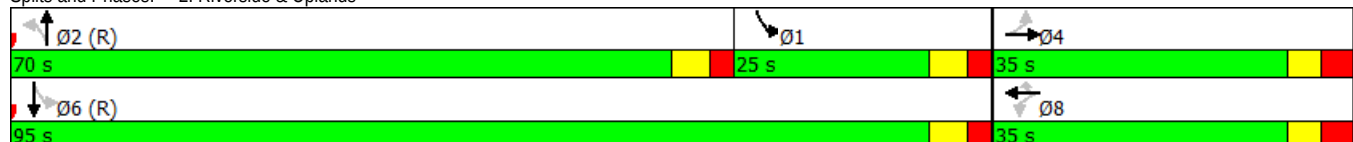
									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	8	9	121	27	124	18	745	107	1659
Future Volume (vph)	8	9	121	27	124	18	745	107	1659
Lane Group Flow (vph)	9	20	0	164	138	20	949	119	1862
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4		8			2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	31.1	31.1	11.1	31.1
Total Split (s)	35.0	35.0	35.0	35.0	35.0	70.0	70.0	25.0	95.0
Total Split (%)	26.9%	26.9%	26.9%	26.9%	26.9%	53.8%	53.8%	19.2%	73.1%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	23.5	23.5		23.5	23.5	73.5	73.5	98.5	98.5
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.57	0.57	0.76	0.76
v/c Ratio	0.06	0.07		0.68	0.37	0.31	0.51	0.23	0.73
Control Delay	41.5	26.7		63.3	9.3	33.6	18.8	8.3	11.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	26.7		63.3	9.3	33.6	18.8	8.3	11.5
LOS	D	C		E	A	C	B	A	B
Approach Delay		31.3		38.6			19.1		11.3
Approach LOS		C		D			B		B
Queue Length 50th (m)	1.9	2.1		39.6	0.0	2.6	73.4	7.0	118.1
Queue Length 95th (m)	6.6	8.7		59.8	16.2	12.0	103.5	15.1	182.0
Internal Link Dist (m)		134.6		144.2			848.5		317.7
Turn Bay Length (m)	30.0					55.0		175.0	
Base Capacity (vph)	195	398		318	452	65	1876	520	2564
Starvation Cap Reductn	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.05		0.52	0.31	0.31	0.51	0.23	0.73

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 16.3
 Intersection Capacity Utilization 86.6%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service E

Splits and Phases: 2: Riverside & Uplands



Existing PM

4: Prince of Wales & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	893	42	527	1180	275	28	421	530	361	666	125
Future Volume (vph)	137	893	42	527	1180	275	28	421	530	361	666	125
Lane Group Flow (vph)	152	992	47	586	1311	306	31	468	589	401	740	139
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.8	31.8		11.8	31.8		11.6	30.6		11.6	30.6	
Total Split (s)	15.0	63.0		28.0	76.0		13.0	31.0		28.0	46.0	
Total Split (%)	10.0%	42.0%		18.7%	50.7%		8.7%	20.7%		18.7%	30.7%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	-2.8	-2.8		-2.8	-2.8		-2.6	-2.6		-2.6	-2.6	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	11.4	59.0	150.0	25.9	73.5	150.0	8.8	25.9	150.0	23.2	45.3	150.0
Actuated g/C Ratio	0.08	0.39	1.00	0.17	0.49	1.00	0.06	0.17	1.00	0.15	0.30	1.00
v/c Ratio	0.61	0.74	0.03	1.03	0.79	0.20	0.31	0.80	0.39	0.79	0.72	0.09
Control Delay	78.3	43.2	0.0	84.9	29.4	0.1	76.3	70.7	0.8	72.9	52.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.3	43.2	0.0	84.9	29.4	0.1	76.3	70.7	0.8	72.9	52.2	0.1
LOS	E	D	A	F	C	A	E	E	A	E	D	A
Approach Delay		46.0			40.1			33.0			53.0	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	23.0	132.5	0.0	~101.2	205.6	0.0	9.0	70.5	0.0	59.6	107.3	0.0
Queue Length 95th (m)	35.1	158.2	0.0	m#111.7	m199.1	m0.0	20.2	90.5	0.0	78.0	131.2	0.0
Internal Link Dist (m)		453.6			178.9			272.9			338.4	
Turn Bay Length (m)	125.0		110.0	158.0		80.0	45.0		50.0	120.0		170.0
Base Capacity (vph)	250	1333	1497	567	1661	1497	101	610	1517	526	1023	1517
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.74	0.03	1.03	0.79	0.20	0.31	0.77	0.39	0.76	0.72	0.09

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 31 (21%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 42.9

Intersection LOS: D

Intersection Capacity Utilization 78.9%

ICU Level of Service D

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

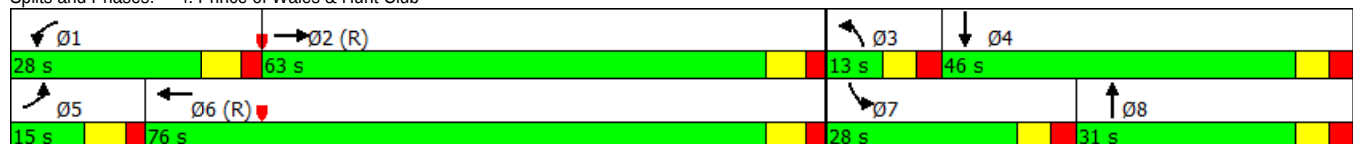
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Prince of Wales & Hunt Club



Appendix K

SYNCHRO Capacity and MMLoS Analysis: Projected 2020 Conditions

Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

Parsons
Future

Project
Date

3960 Riverside
Mar-18

INTERSECTIONS		Riverside/Hunt Club				Riverside/Uplands			
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	7	8	7	8	6	5	3	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected	Protected	Protected	Protected	Permissive	Permissive	Protected/ Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RTor) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No
	Right Turn Channel	Conv'tl without Receiving Lane	Conventional with Receiving Lane	Conventional with Receiving Lane	Conv'tl without Receiving Lane	No Channel	No Channel	No Channel	No Channel
	Corner Radius	15-25m	15-25m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	14	-5	13	0	20	37	70	70
	Ped. Exposure to Traffic LoS	F	F	F	F	F	E	C	C
	Cycle Length	150	150	150	150	130	130	130	130
	Effective Walk Time	17	17	34	34	7	7	46	70
	Average Pedestrian Delay	59	59	45	45	58	58	27	14
	Pedestrian Delay LoS	E	E	E	E	E	E	C	B
	Level of Service	F	F	F	F	F	E	C	C
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	Bike lane shifts to the left of right turn	Bike lane shifts to the left of right turn	Bike lane shifts to the left of right turn	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	D	D	D	D	D	D	D
	Separated or Mixed Traffic	Mixed Traffic	Separated	Separated	Separated	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	F	F	F	F	F	F	D	D
	Level of Service	F	F	F	F	F	F	D	D
	Level of Service	F				F			
Transit	Average Signal Delay	> 40 sec		> 40 sec	> 40 sec	≤ 10 sec		≤ 10 sec	
	Level of Service	F	-	F	F	B	-	B	-
	Level of Service	F				B			
Truck	Effective Corner Radius	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m	> 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	1	1	≥ 2	≥ 2
	Level of Service	A	A	A	A	C	C	A	A
	Level of Service	A				C			
Auto	Volume to Capacity Ratio	> 1.00				> 1.00			
	Level of Service	F				F			

Projected 2020 - AM
1: Riverside & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	547	935	165	74	869	93	455	875	239	111	204	583
Future Volume (vph)	547	935	165	74	869	93	455	875	239	111	204	583
Lane Group Flow (vph)	608	1039	183	82	966	103	506	972	266	123	227	648
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.0	32.8	32.8	11.4	32.8	32.8	11.2	32.7	32.7	11.2	32.7	32.7
Total Split (s)	34.0	59.0	59.0	17.0	42.0	42.0	39.0	59.0	59.0	15.0	35.0	35.0
Total Split (%)	22.7%	39.3%	39.3%	11.3%	28.0%	28.0%	26.0%	39.3%	39.3%	10.0%	23.3%	23.3%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.2	2.2	1.8	2.2	2.2	2.5	3.0	3.0	2.5	3.0	3.0
Lost Time Adjust (s)	-3.0	-2.8	-2.8	-2.4	-2.8	-2.8	-2.2	-2.7	-2.7	-2.2	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	30.0	55.6	55.6	12.4	38.0	38.0	30.1	55.0	55.0	11.0	35.9	35.9
Actuated g/C Ratio	0.20	0.37	0.37	0.08	0.25	0.25	0.20	0.37	0.37	0.07	0.24	0.24
v/c Ratio	0.93	0.83	0.28	0.59	1.13	0.19	0.77	0.78	0.39	0.99	0.28	1.11
Control Delay	50.9	39.5	8.4	83.6	121.4	0.8	64.7	47.6	9.8	146.2	48.6	97.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	39.5	8.4	83.6	121.4	0.8	64.7	47.6	9.8	146.2	48.6	97.4
LOS	D	D	A	F	F	A	E	D	A	F	D	F
Approach Delay		40.2			107.9			46.8			92.3	
Approach LOS		D			F			D			F	
Queue Length 50th (m)	87.4	148.2	14.0	23.8	~174.1	0.0	73.9	134.7	10.9	37.2	29.3	~149.0
Queue Length 95th (m)	m90.8	m142.9	m14.3	42.2	#215.6	0.0	90.3	161.3	32.8	#79.5	43.3	#233.0
Internal Link Dist (m)		79.7			1199.8			383.2			245.6	
Turn Bay Length (m)	55.0		55.0	75.0		100.0	70.0		150.0	100.0		100.0
Base Capacity (vph)	657	1256	649	146	858	539	767	1243	680	124	811	586
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.83	0.28	0.56	1.13	0.19	0.66	0.78	0.39	0.99	0.28	1.11

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 10 (7%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 64.9

Intersection LOS: E

Intersection Capacity Utilization 87.2%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

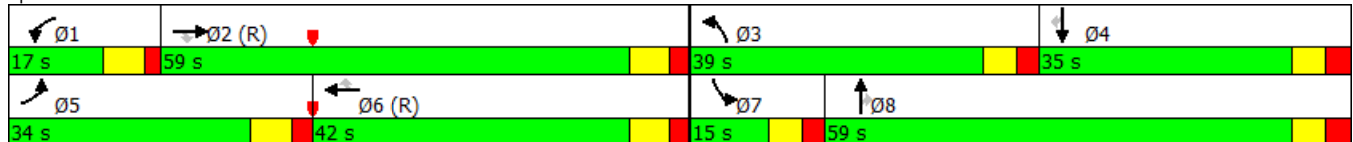
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club



Projected 2020 - AM
2: Riverside & Uplands

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	32	6	203	3	177	5	1729	85	839
Future Volume (vph)	32	6	203	3	177	5	1729	85	839
Lane Group Flow (vph)	36	33	0	229	197	6	1958	94	935
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4		8			2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	31.1	31.1	11.1	31.1
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	20.0	85.0
Total Split (%)	29.2%	29.2%	29.2%	29.2%	29.2%	54.2%	54.2%	16.7%	70.8%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	27.4	27.4		27.4	27.4	64.6	64.6	84.6	84.6
Actuated g/C Ratio	0.23	0.23		0.23	0.23	0.54	0.54	0.70	0.70
v/c Ratio	0.22	0.09		0.80	0.40	0.02	1.08	0.33	0.39
Control Delay	39.6	15.8		64.1	7.3	15.2	73.2	30.5	8.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	15.8		64.1	7.3	15.2	73.2	30.5	8.2
LOS	D	B		E	A	B	E	C	A
Approach Delay		28.2		37.8			73.0		10.2
Approach LOS		C		D			E		B
Queue Length 50th (m)	6.8	1.3		49.9	0.0	0.7	~279.1	6.7	45.3
Queue Length 95th (m)	16.0	9.2		#79.7	17.6	3.0	#327.1	21.7	58.8
Internal Link Dist (m)		134.6		144.2			580.6		317.7
Turn Bay Length (m)	30.0					55.0		175.0	
Base Capacity (vph)	185	421		324	538	251	1819	284	2390
Starvation Cap Reductn	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.08		0.71	0.37	0.02	1.08	0.33	0.39

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: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 49.3

Intersection LOS: D

Intersection Capacity Utilization 85.2%

ICU Level of Service E

Analysis Period (min) 15

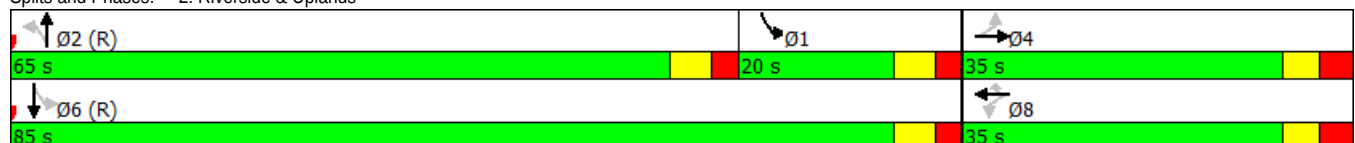
~ Volume exceeds capacity, queue is theoretically infinite.

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: 2: Riverside & Uplands



Projected 2020 - AM
4: Prince of Wales & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	872	19	506	1164	515	35	904	711	224	474	220
Future Volume (vph)	130	872	19	506	1164	515	35	904	711	224	474	220
Lane Group Flow (vph)	144	969	21	562	1293	572	39	1004	790	249	527	244
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.8	31.8	31.8	11.8	31.8	31.8	11.6	30.6	30.6	11.6	30.6	30.6
Total Split (s)	18.0	54.0	54.0	27.0	63.0	63.0	22.0	47.0	47.0	22.0	47.0	47.0
Total Split (%)	12.0%	36.0%	36.0%	18.0%	42.0%	42.0%	14.7%	31.3%	31.3%	14.7%	31.3%	31.3%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	13.3	50.0	50.0	23.0	59.7	59.7	11.4	43.8	43.8	17.2	52.0	52.0
Actuated g/C Ratio	0.09	0.33	0.33	0.15	0.40	0.40	0.08	0.29	0.29	0.11	0.35	0.35
v/c Ratio	0.49	0.86	0.03	1.12	0.96	0.76	0.30	1.02	1.34	0.66	0.45	0.37
Control Delay	71.1	55.5	0.1	119.5	44.1	14.4	70.7	84.4	195.2	72.4	40.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.1	55.5	0.1	119.5	44.1	14.4	70.7	84.4	195.2	72.4	40.5	5.9
LOS	E	E	A	F	D	B	E	F	F	E	D	A
Approach Delay		56.5			54.5			131.9			40.0	
Approach LOS		E			D			F			D	
Queue Length 50th (m)	21.2	141.7	0.0	~96.9	205.7	71.2	11.2	~168.1	~259.8	36.9	65.4	0.0
Queue Length 95th (m)	32.8	169.7	0.0	m#96.9	m199.6	m75.5	22.9	#210.0	#338.0	51.6	85.9	19.8
Internal Link Dist (m)		453.6			178.9			272.9			338.4	
Turn Bay Length (m)	125.0		110.0	158.0		80.0	45.0		50.0	120.0		170.0
Base Capacity (vph)	306	1130	610	504	1348	756	203	988	588	394	1175	667
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.86	0.03	1.12	0.96	0.76	0.19	1.02	1.34	0.63	0.45	0.37

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 68 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.34

Intersection Signal Delay: 74.7

Intersection LOS: E

Intersection Capacity Utilization 89.1%

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.

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

Splits and Phases: 4: Prince of Wales & Hunt Club

			
27 s	54 s	22 s	47 s
			
18 s	63 s	22 s	47 s

Projected 2020 - AM
3: Riverside & Site

							
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	27	64	85	1740	1027	38	
Future Volume (Veh/h)	27	64	85	1740	1027	38	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Hourly flow rate (vph)	30	71	94	1933	1141	42	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)		4					
Median type				None	None		
Median storage veh							
Upstream signal (m)				270			
pX, platoon unblocked	0.75						
vC, conflicting volume	2296	570	1183				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2063	570	1183				
tC, single (s)	6.8	6.9	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	0	85	84				
cM capacity (veh/h)	30	464	586				
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	101	94	966	966	570	570	42
Volume Left	30	94	0	0	0	0	0
Volume Right	71	0	0	0	0	0	42
cSH	100	586	1700	1700	1700	1700	1700
Volume to Capacity	1.01	0.16	0.57	0.57	0.34	0.34	0.02
Queue Length 95th (m)	47.1	4.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	117.1	12.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	B					
Approach Delay (s)	117.1	0.6			0.0		
Approach LOS	F						
Intersection Summary							
Average Delay			3.9				
Intersection Capacity Utilization			62.1%		ICU Level of Service		B
Analysis Period (min)			15				

Projected 2020 - PM
1: Riverside & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	488	1079	491	230	1130	77	330	310	161	102	920	608
Future Volume (vph)	488	1079	491	230	1130	77	330	310	161	102	920	608
Lane Group Flow (vph)	542	1199	546	256	1256	86	367	344	179	113	1022	676
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.0	32.8	32.8	11.4	32.8	32.8	11.2	32.7	32.7	11.2	32.7	32.7
Total Split (s)	27.0	60.0	60.0	27.0	60.0	60.0	20.0	43.0	43.0	20.0	43.0	43.0
Total Split (%)	18.0%	40.0%	40.0%	18.0%	40.0%	40.0%	13.3%	28.7%	28.7%	13.3%	28.7%	28.7%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.4	2.2	2.2	1.8	2.2	2.2	2.5	3.0	3.0	2.5	3.0	3.0
Lost Time Adjust (s)	-3.0	-2.8	-2.8	-2.4	-2.8	-2.8	-2.2	-2.7	-2.7	-2.2	-2.7	-2.7
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	23.0	56.0	56.0	23.0	56.0	56.0	16.0	40.1	40.1	14.9	39.0	39.0
Actuated g/C Ratio	0.15	0.37	0.37	0.15	0.37	0.37	0.11	0.27	0.27	0.10	0.26	0.26
v/c Ratio	1.08	0.95	0.77	0.99	0.99	0.13	1.05	0.38	0.34	0.67	1.16	1.17
Control Delay	106.2	50.5	22.2	115.3	70.1	1.9	124.0	46.6	7.5	84.7	132.8	122.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	106.2	50.5	22.2	115.3	70.1	1.9	124.0	46.6	7.5	84.7	132.8	122.7
LOS	F	D	C	F	E	A	F	D	A	F	F	F
Approach Delay		56.9			73.6			70.7			126.0	
Approach LOS		E			E			E			F	
Queue Length 50th (m)	~93.0	181.6	81.4	77.0	195.1	0.0	~60.9	44.6	0.0	32.7	~188.6	~178.4
Queue Length 95th (m)	m#108.3	m187.7	m102.9	#133.9	#245.1	4.2	#93.3	59.6	18.5	54.1	#230.8	#254.0
Internal Link Dist (m)		79.7			1199.8			383.2			256.3	
Turn Bay Length (m)	55.0		55.0	75.0		100.0	70.0		150.0	100.0		100.0
Base Capacity (vph)	504	1265	706	259	1265	643	350	905	527	180	881	579
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.95	0.77	0.99	0.99	0.13	1.05	0.38	0.34	0.63	1.16	1.17

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 105 (70%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.17

Intersection Signal Delay: 81.8

Intersection LOS: F

Intersection Capacity Utilization 97.8%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

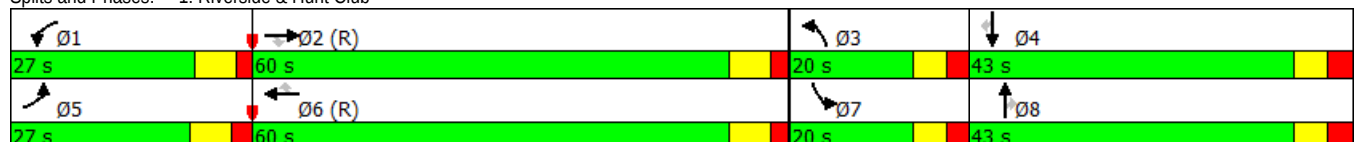
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club



Projected 2020 - PM
2: Riverside & Uplands

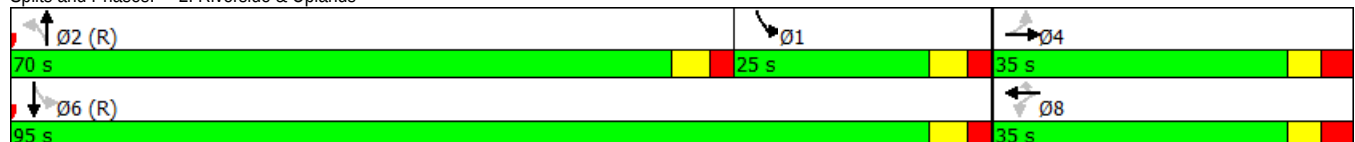
									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	8	9	121	27	124	18	776	107	1682
Future Volume (vph)	8	9	121	27	124	18	776	107	1682
Lane Group Flow (vph)	9	20	0	164	138	20	983	119	1888
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4		8			2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	31.1	31.1	11.1	31.1
Total Split (s)	35.0	35.0	35.0	35.0	35.0	70.0	70.0	25.0	95.0
Total Split (%)	26.9%	26.9%	26.9%	26.9%	26.9%	53.8%	53.8%	19.2%	73.1%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	23.5	23.5		23.5	23.5	73.5	73.5	98.5	98.5
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.57	0.57	0.76	0.76
v/c Ratio	0.06	0.07		0.68	0.37	0.33	0.52	0.23	0.74
Control Delay	41.5	26.7		63.3	9.3	36.2	19.2	8.6	11.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	26.7		63.3	9.3	36.2	19.2	8.6	11.8
LOS	D	C		E	A	D	B	A	B
Approach Delay		31.3		38.6			19.5		11.6
Approach LOS		C		D			B		B
Queue Length 50th (m)	1.9	2.1		39.6	0.0	2.6	77.3	7.0	121.8
Queue Length 95th (m)	6.6	8.7		59.8	16.2	12.6	108.6	15.1	188.0
Internal Link Dist (m)		134.6		144.2			569.8		317.7
Turn Bay Length (m)	30.0					55.0		175.0	
Base Capacity (vph)	195	398		318	452	61	1878	508	2564
Starvation Cap Reductn	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.05		0.52	0.31	0.33	0.52	0.23	0.74

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 16.6
 Intersection Capacity Utilization 87.3%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service E

Splits and Phases: 2: Riverside & Uplands



Projected 2020 - PM
4: Prince of Wales & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	901	42	537	1191	285	28	421	537	369	666	125
Future Volume (vph)	137	901	42	537	1191	285	28	421	537	369	666	125
Lane Group Flow (vph)	152	1001	47	597	1323	317	31	468	597	410	740	139
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.8	31.8	31.8	11.8	31.8	31.8	11.6	30.6	30.6	11.6	30.6	30.6
Total Split (s)	15.0	63.0	63.0	28.0	76.0	76.0	13.0	31.0	31.0	28.0	46.0	46.0
Total Split (%)	10.0%	42.0%	42.0%	18.7%	50.7%	50.7%	8.7%	20.7%	20.7%	18.7%	30.7%	30.7%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.9	2.9	2.9	2.9	2.9	2.9
Lost Time Adjust (s)	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	11.0	59.0	59.0	24.0	72.0	72.0	8.8	27.6	27.6	23.4	47.2	47.2
Actuated g/C Ratio	0.07	0.39	0.39	0.16	0.48	0.48	0.06	0.18	0.18	0.16	0.31	0.31
v/c Ratio	0.63	0.75	0.07	1.13	0.81	0.38	0.31	0.75	1.30	0.80	0.69	0.23
Control Delay	79.8	43.5	0.2	112.5	28.1	6.3	76.3	66.6	178.0	73.5	50.3	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.8	43.5	0.2	112.5	28.1	6.3	76.3	66.6	178.0	73.5	50.3	3.1
LOS	E	D	A	F	C	A	E	E	F	E	D	A
Approach Delay		46.4			47.6			127.6			52.6	
Approach LOS		D			D			F			D	
Queue Length 50th (m)	23.0	134.2	0.0	~105.1	189.9	23.7	9.0	70.5	~170.9	61.1	107.3	0.0
Queue Length 95th (m)	35.1	160.1	0.0	m#96.3	m178.1	m20.4	20.2	90.5	#244.6	79.9	131.2	8.0
Internal Link Dist (m)		453.6			178.9			272.9			338.4	
Turn Bay Length (m)	125.0		110.0	158.0		80.0	45.0		50.0	120.0		170.0
Base Capacity (vph)	241	1333	719	526	1627	840	101	624	460	526	1067	597
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.75	0.07	1.13	0.81	0.38	0.31	0.75	1.30	0.78	0.69	0.23

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 31 (21%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.30

Intersection Signal Delay: 63.5

Intersection LOS: E

Intersection Capacity Utilization 82.5%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

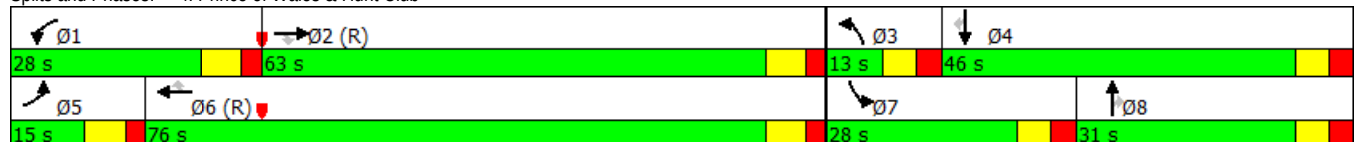
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Prince of Wales & Hunt Club



Projected 2020 - PM
3: Riverside & Site

							
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	33	75	57	870	1786	26	
Future Volume (Veh/h)	33	75	57	870	1786	26	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Hourly flow rate (vph)	37	83	63	967	1984	29	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)		4					
Median type				None	None		
Median storage veh							
Upstream signal (m)				280			
pX, platoon unblocked	0.93						
vC, conflicting volume	2594	992	2013				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2565	992	2013				
tC, single (s)	6.8	6.9	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	0	66	77				
cM capacity (veh/h)	15	244	280				
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	120	63	484	484	992	992	29
Volume Left	37	63	0	0	0	0	0
Volume Right	83	0	0	0	0	0	29
cSH	46	280	1700	1700	1700	1700	1700
Volume to Capacity	2.62	0.23	0.28	0.28	0.58	0.58	0.02
Queue Length 95th (m)	97.2	6.4	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	922.2	21.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	C					
Approach Delay (s)	922.2	1.3			0.0		
Approach LOS	F						
Intersection Summary							
Average Delay			35.4				
Intersection Capacity Utilization			63.7%		ICU Level of Service		B
Analysis Period (min)			15				

Projected 2020 AM
3: Riverside & Site

					
Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Configurations					
Traffic Volume (vph)	27	85	1740	1027	38
Future Volume (vph)	27	85	1740	1027	38
Lane Group Flow (vph)	101	94	1933	1141	42
Turn Type	Prot	Perm	NA	NA	Perm
Protected Phases	4		2	6	
Permitted Phases		2			6
Detector Phase	4	2	2	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	34.5	31.1	31.1	31.1	31.1
Total Split (s)	35.0	85.0	85.0	85.0	85.0
Total Split (%)	29.2%	70.8%	70.8%	70.8%	70.8%
Yellow Time (s)	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-1.3	-1.7	-1.7	-1.7	-1.7
Total Lost Time (s)	5.2	4.4	4.4	4.4	4.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	14.9	95.5	95.5	95.5	95.5
Actuated g/C Ratio	0.12	0.80	0.80	0.80	0.80
v/c Ratio	0.39	0.29	0.72	0.42	0.03
Control Delay	20.7	7.4	9.1	3.7	1.6
Queue Delay	0.0	0.0	0.4	0.0	0.0
Total Delay	20.7	7.4	9.5	3.7	1.6
LOS	C	A	A	A	A
Approach Delay	20.7		9.4	3.6	
Approach LOS	C		A	A	
Queue Length 50th (m)	6.6	3.9	74.8	20.8	0.3
Queue Length 95th (m)	19.5	18.9	201.1	50.2	m2.7
Internal Link Dist (m)	114.7		245.6	580.6	
Turn Bay Length (m)		40.0			25.0
Base Capacity (vph)	448	324	2697	2697	1212
Starvation Cap Reductn	0	0	294	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.23	0.29	0.80	0.42	0.03

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 7.7

Intersection LOS: A

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 3: Riverside & Site

		Ø2 (R)		Ø4
85 s			35 s	
		Ø6 (R)		
85 s				

Projected 2020 PM
3: Riverside & Site

					
Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Configurations					
Traffic Volume (vph)	33	57	870	1786	26
Future Volume (vph)	33	57	870	1786	26
Lane Group Flow (vph)	120	63	967	1984	29
Turn Type	Prot	Perm	NA	NA	Perm
Protected Phases	4		2	6	
Permitted Phases		2			6
Detector Phase	4	2	2	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	34.5	31.1	31.1	31.1	31.1
Total Split (s)	35.0	95.0	95.0	95.0	95.0
Total Split (%)	26.9%	73.1%	73.1%	73.1%	73.1%
Yellow Time (s)	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	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)	18.1	103.9	103.9	103.9	103.9
Actuated g/C Ratio	0.14	0.80	0.80	0.80	0.80
v/c Ratio	0.50	0.61	0.36	0.73	0.02
Control Delay	47.1	37.6	4.7	15.2	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	47.1	37.6	4.7	15.2	4.9
LOS	D	D	A	B	A
Approach Delay	47.1		6.7	15.1	
Approach LOS	D		A	B	
Queue Length 50th (m)	23.6	4.6	26.8	154.0	1.3
Queue Length 95th (m)	38.1	#39.0	59.7	261.3	m3.2
Internal Link Dist (m)	162.0		256.3	569.8	
Turn Bay Length (m)		40.0			35.0
Base Capacity (vph)	397	103	2708	2708	1214
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.30	0.61	0.36	0.73	0.02

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 13.6
 Intersection LOS: B
 Intersection Capacity Utilization 67.1%
 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: 3: Riverside & Site

		
Ø2 (R)	Ø4	
95 s	35 s	
		
Ø6 (R)		
95 s		

Appendix L

SYNCHRO Capacity Analysis: Projected 2021 Conditions

Projected 2021 - AM
1: Riverside & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	553	935	165	74	869	103	455	877	239	122	206	591
Future Volume (vph)	553	935	165	74	869	103	455	877	239	122	206	591
Lane Group Flow (vph)	614	1039	183	82	966	114	506	974	266	136	229	657
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			6			Free			4
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	12.0	32.8		11.4	32.8	32.8	11.2	32.7		11.2	32.7	32.7
Total Split (s)	34.0	59.0		17.0	42.0	42.0	39.0	59.0		15.0	35.0	35.0
Total Split (%)	22.7%	39.3%		11.3%	28.0%	28.0%	26.0%	39.3%		10.0%	23.3%	23.3%
Yellow Time (s)	4.6	4.6		4.6	4.6	4.6	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.4	2.2		1.8	2.2	2.2	2.5	3.0		2.5	3.0	3.0
Lost Time Adjust (s)	-3.0	-2.8		-2.4	-2.8	-2.8	-2.2	-2.7		-2.2	-2.7	-2.7
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)	30.0	55.6	150.0	12.4	38.0	38.0	30.1	55.0	150.0	11.0	35.9	35.9
Actuated g/C Ratio	0.20	0.37	1.00	0.08	0.25	0.25	0.20	0.37	1.00	0.07	0.24	0.24
v/c Ratio	0.93	0.83	0.12	0.59	1.13	0.21	0.77	0.78	0.18	1.10	0.28	1.12
Control Delay	55.6	48.3	0.1	83.6	121.4	0.9	64.7	47.6	0.3	170.4	48.7	102.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	48.3	0.1	83.6	121.4	0.9	64.7	47.6	0.3	170.4	48.7	102.9
LOS	E	D	A	F	F	A	E	D	A	F	D	F
Approach Delay		45.9			106.9			45.4			99.7	
Approach LOS		D			F			D			F	
Queue Length 50th (m)	86.3	165.5	0.0	23.8	~174.1	0.0	73.9	135.1	0.0	~45.5	29.5	~154.6
Queue Length 95th (m)	m#124.0	189.3	m0.0	42.2	#215.6	0.0	90.3	161.7	0.0	#89.3	43.7	#239.3
Internal Link Dist (m)		79.7			1199.8			383.2			245.6	
Turn Bay Length (m)	55.0		55.0	75.0		100.0	70.0		150.0	100.0		100.0
Base Capacity (vph)	657	1256	1494	146	858	539	767	1243	1498	124	811	586
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.83	0.12	0.56	1.13	0.21	0.66	0.78	0.18	1.10	0.28	1.12

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 10 (7%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 67.6

Intersection LOS: E

Intersection Capacity Utilization 88.1%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

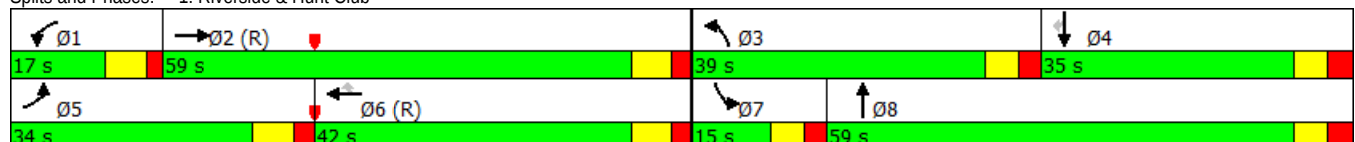
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club



Projected 2021 - AM
2: Riverside & Uplands

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	32	6	203	3	177	5	1747	85	853
Future Volume (vph)	32	6	203	3	177	5	1747	85	853
Lane Group Flow (vph)	36	33	0	229	197	6	1978	94	951
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4		8			2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	31.1	31.1	11.1	31.1
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	20.0	85.0
Total Split (%)	29.2%	29.2%	29.2%	29.2%	29.2%	54.2%	54.2%	16.7%	70.8%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	27.4	27.4		27.4	27.4	64.6	64.6	84.6	84.6
Actuated g/C Ratio	0.23	0.23		0.23	0.23	0.54	0.54	0.70	0.70
v/c Ratio	0.22	0.09		0.80	0.40	0.02	1.09	0.33	0.40
Control Delay	39.6	15.8		64.1	7.3	20.0	72.9	30.5	8.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	15.8		64.1	7.3	20.0	72.9	30.5	8.3
LOS	D	B		E	A	B	E	C	A
Approach Delay		28.2		37.8			72.7		10.3
Approach LOS		C		D			E		B
Queue Length 50th (m)	6.8	1.3		49.9	0.0	0.7	~284.6	6.7	46.4
Queue Length 95th (m)	16.0	9.2		#79.7	17.6	m1.3	#327.8	21.7	60.1
Internal Link Dist (m)		134.6		144.2			580.6		317.7
Turn Bay Length (m)	30.0					55.0		175.0	
Base Capacity (vph)	185	421		324	538	245	1819	284	2390
Starvation Cap Reductn	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.08		0.71	0.37	0.02	1.09	0.33	0.40

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 49.1

Intersection LOS: D

Intersection Capacity Utilization 85.8%

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.

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

Splits and Phases: 2: Riverside & Uplands

			
Ø2 (R)		Ø1	Ø4
65 s		20 s	35 s
			
Ø6 (R)			Ø8
85 s			35 s

Projected 2021 - AM
3: Riverside & Site

					
Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Configurations					
Traffic Volume (vph)	45	103	1740	1027	52
Future Volume (vph)	45	103	1740	1027	52
Lane Group Flow (vph)	144	114	1933	1141	58
Turn Type	Prot	Perm	NA	NA	Perm
Protected Phases	4		2	6	
Permitted Phases		2			6
Detector Phase	4	2	2	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	34.5	31.1	31.1	31.1	31.1
Total Split (s)	35.0	85.0	85.0	85.0	85.0
Total Split (%)	29.2%	70.8%	70.8%	70.8%	70.8%
Yellow Time (s)	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-1.3	-1.7	-1.7	-1.7	-1.7
Total Lost Time (s)	5.2	4.4	4.4	4.4	4.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	15.8	94.6	94.6	94.6	94.6
Actuated g/C Ratio	0.13	0.79	0.79	0.79	0.79
v/c Ratio	0.52	0.36	0.72	0.43	0.05
Control Delay	29.5	9.0	9.6	3.9	1.5
Queue Delay	0.0	0.0	0.4	0.0	0.0
Total Delay	29.5	9.0	10.0	3.9	1.5
LOS	C	A	B	A	A
Approach Delay	29.5		10.0	3.8	
Approach LOS	C		A	A	
Queue Length 50th (m)	15.5	5.3	78.7	22.1	0.3
Queue Length 95th (m)	30.6	24.7	201.1	50.4	m3.2
Internal Link Dist (m)	114.7		245.6	580.6	
Turn Bay Length (m)		40.0			25.0
Base Capacity (vph)	453	319	2673	2673	1204
Starvation Cap Reductn	0	0	286	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.36	0.81	0.43	0.05

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 8.6

Intersection LOS: A

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 3: Riverside & Site

									
Ø2 (R)					Ø4				
85 s					35 s				
									
Ø6 (R)									
85 s									

Projected 2021 - AM
4: Prince of Wales & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	875	19	508	1168	517	35	904	712	226	474	220
Future Volume (vph)	130	875	19	508	1168	517	35	904	712	226	474	220
Lane Group Flow (vph)	144	972	21	564	1298	574	39	1004	791	251	527	244
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.8	31.8		11.8	31.8		11.6	30.6		11.6	30.6	
Total Split (s)	18.0	54.0		27.0	63.0		22.0	47.0		22.0	47.0	
Total Split (%)	12.0%	36.0%		18.0%	42.0%		14.7%	31.3%		14.7%	31.3%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	-2.8	-2.8		-2.8	-2.8		-2.6	-2.6		-2.6	-2.6	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	13.3	50.0	150.0	23.0	59.7	150.0	11.4	43.8	150.0	17.2	52.0	150.0
Actuated g/C Ratio	0.09	0.33	1.00	0.15	0.40	1.00	0.08	0.29	1.00	0.11	0.35	1.00
v/c Ratio	0.49	0.86	0.01	1.12	0.96	0.38	0.30	1.02	0.53	0.67	0.45	0.16
Control Delay	71.1	55.7	0.0	120.7	44.7	0.3	70.7	84.4	1.3	72.7	40.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.1	55.7	0.0	120.7	44.7	0.3	70.7	84.4	1.3	72.7	40.5	0.2
LOS	E	E	A	F	D	A	E	F	A	E	D	A
Approach Delay		56.6			51.8			48.3			38.8	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	21.2	142.3	0.0	~97.6	206.6	0.0	11.2	~168.1	0.0	37.2	65.4	0.0
Queue Length 95th (m)	32.8	170.3	0.0	m#97.1	m199.7	m0.0	22.9	#210.0	0.0	52.1	85.9	0.0
Internal Link Dist (m)		453.6			178.9			272.9			338.4	
Turn Bay Length (m)	125.0		110.0	158.0		80.0	45.0		50.0	120.0		170.0
Base Capacity (vph)	306	1130	1496	504	1348	1495	203	988	1497	394	1175	1493
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.86	0.01	1.12	0.96	0.38	0.19	1.02	0.53	0.64	0.45	0.16

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 68 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.12

Intersection Signal Delay: 49.6

Intersection LOS: D

Intersection Capacity Utilization 87.3%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

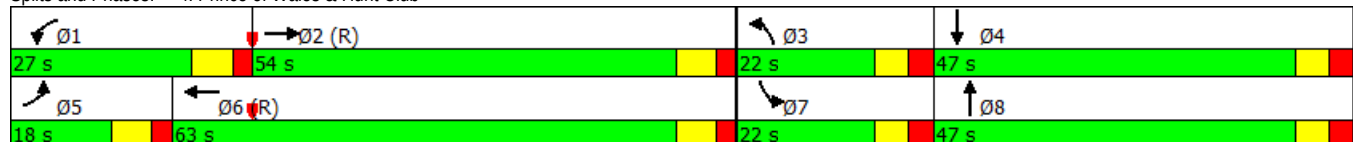
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Prince of Wales & Hunt Club



Projected 2021 - PM
1: Riverside & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	496	1079	491	230	1130	91	330	312	161	115	922	616
Future Volume (vph)	496	1079	491	230	1130	91	330	312	161	115	922	616
Lane Group Flow (vph)	551	1199	546	256	1256	101	367	347	179	128	1024	684
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			6			Free			4
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	12.0	32.8		11.4	32.8	32.8	11.2	32.7		11.2	32.7	32.7
Total Split (s)	27.0	60.0		27.0	60.0	60.0	20.0	43.0		20.0	43.0	43.0
Total Split (%)	18.0%	40.0%		18.0%	40.0%	40.0%	13.3%	28.7%		13.3%	28.7%	28.7%
Yellow Time (s)	4.6	4.6		4.6	4.6	4.6	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.4	2.2		1.8	2.2	2.2	2.5	3.0		2.5	3.0	3.0
Lost Time Adjust (s)	-3.0	-2.8		-2.4	-2.8	-2.8	-2.2	-2.7		-2.2	-2.7	-2.7
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	None
Act Effct Green (s)	23.0	56.0	150.0	23.0	56.0	56.0	16.0	39.6	150.0	15.4	39.0	39.0
Actuated g/C Ratio	0.15	0.37	1.00	0.15	0.37	0.37	0.11	0.26	1.00	0.10	0.26	0.26
v/c Ratio	1.09	0.95	0.37	0.99	0.99	0.16	1.05	0.39	0.12	0.74	1.16	1.18
Control Delay	115.5	54.9	0.6	115.3	70.1	3.2	124.0	47.0	0.2	89.7	133.7	128.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.5	54.9	0.6	115.3	70.1	3.2	124.0	47.0	0.2	89.7	133.7	128.0
LOS	F	D	A	F	E	A	F	D	A	F	F	F
Approach Delay		56.5			73.0			69.3			128.5	
Approach LOS		E			E			E			F	
Queue Length 50th (m)	~95.8	194.7	0.0	77.0	195.1	0.0	~60.9	45.1	0.0	37.4	~189.3	~183.4
Queue Length 95th (m)	#130.6	#230.6	0.0	#133.9	#245.1	7.8	#93.3	60.0	0.0	#65.7	#231.5	#259.6
Internal Link Dist (m)		79.7			1199.8			383.2			256.3	
Turn Bay Length (m)	55.0		55.0	75.0		100.0	70.0		150.0	100.0		100.0
Base Capacity (vph)	504	1265	1494	259	1265	643	350	895	1496	180	881	579
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.95	0.37	0.99	0.99	0.16	1.05	0.39	0.12	0.71	1.16	1.18

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 105 (70%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.18

Intersection Signal Delay: 82.2

Intersection LOS: F

Intersection Capacity Utilization 98.1%

ICU Level of Service F

Analysis Period (min) 15

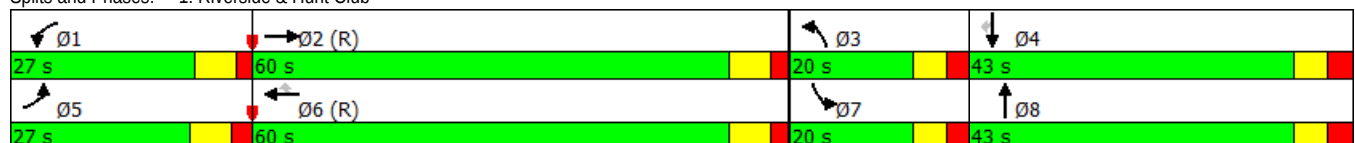
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Riverside & Hunt Club



Projected 2021 - PM
2: Riverside & Uplands

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	8	9	121	27	124	18	795	107	1702
Future Volume (vph)	8	9	121	27	124	18	795	107	1702
Lane Group Flow (vph)	9	20	0	164	138	20	1004	119	1910
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases		4		8			2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	8	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	31.1	31.1	11.1	31.1
Total Split (s)	35.0	35.0	35.0	35.0	35.0	70.0	70.0	25.0	95.0
Total Split (%)	26.9%	26.9%	26.9%	26.9%	26.9%	53.8%	53.8%	19.2%	73.1%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						Lead	Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	23.5	23.5		23.5	23.5	73.5	73.5	98.5	98.5
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.57	0.57	0.76	0.76
v/c Ratio	0.06	0.07		0.68	0.37	0.34	0.53	0.24	0.74
Control Delay	41.5	26.7		63.3	9.3	34.6	17.0	8.8	12.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	26.7		63.3	9.3	34.6	17.0	8.8	12.0
LOS	D	C		E	A	C	B	A	B
Approach Delay		31.3		38.6			17.4		11.8
Approach LOS		C		D			B		B
Queue Length 50th (m)	1.9	2.1		39.6	0.0	2.9	84.7	7.0	125.0
Queue Length 95th (m)	6.6	8.7		59.8	16.2	#13.7	116.3	15.1	192.6
Internal Link Dist (m)		134.6		144.2			569.8		317.7
Turn Bay Length (m)	30.0					55.0		175.0	
Base Capacity (vph)	195	398		318	452	58	1878	500	2567
Starvation Cap Reductn	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.05		0.52	0.31	0.34	0.53	0.24	0.74

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 16.1

Intersection LOS: B

Intersection Capacity Utilization 87.9%

ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Riverside & Uplands

 Ø2 (R)	 Ø1	 Ø4
70 s	25 s	35 s
 Ø6 (R)		 Ø8
95 s		35 s

Projected 2021 - PM
3: Riverside & Site

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	52	98	81	870	1786	46
Future Volume (vph)	52	98	81	870	1786	46
Lane Group Flow (vph)	58	109	90	967	1984	51
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	34.5	34.5	11.1	31.1	31.1	31.1
Total Split (s)	35.0	35.0	12.0	95.0	83.0	83.0
Total Split (%)	26.9%	26.9%	9.2%	73.1%	63.8%	63.8%
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	-2.5	0.0	-2.1	-2.1	-2.1	-2.1
Total Lost Time (s)	4.0	6.5	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	19.7	17.2	102.3	102.3	89.8	89.8
Actuated g/C Ratio	0.15	0.13	0.79	0.79	0.69	0.69
v/c Ratio	0.23	0.39	0.55	0.36	0.85	0.05
Control Delay	47.4	17.0	32.3	5.5	31.2	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.4	17.0	32.3	5.5	31.2	10.8
LOS	D	B	C	A	C	B
Approach Delay	27.5			7.8	30.7	
Approach LOS	C			A	C	
Queue Length 50th (m)	14.1	4.9	5.8	21.8	239.2	3.9
Queue Length 95th (m)	23.7	19.4	26.7	59.7	#316.8	m8.2
Internal Link Dist (m)	145.9			256.3	569.8	
Turn Bay Length (m)	30.0		40.0			35.0
Base Capacity (vph)	404	402	165	2667	2343	1054
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	0.14	0.27	0.55	0.36	0.85	0.05

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

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

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 23.1

Intersection LOS: C

Intersection Capacity Utilization 75.2%

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.

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

Splits and Phases: 3: Riverside & Site

 Ø2 (R) 	 Ø4
95 s	35 s
 Ø5 	
12 s 83 s	

Projected 2021 - PM
4: Prince of Wales & Hunt Club

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	905	42	539	1195	287	28	421	539	371	666	125
Future Volume (vph)	137	905	42	539	1195	287	28	421	539	371	666	125
Lane Group Flow (vph)	152	1006	47	599	1328	319	31	468	599	412	740	139
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.8	31.8		11.8	31.8		11.6	30.6		11.6	30.6	
Total Split (s)	15.0	63.0		28.0	76.0		13.0	31.0		28.0	46.0	
Total Split (%)	10.0%	42.0%		18.7%	50.7%		8.7%	20.7%		18.7%	30.7%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	-2.8	-2.8		-2.8	-2.8		-2.6	-2.6		-2.6	-2.6	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	11.3	59.0	150.0	25.7	73.4	150.0	8.8	25.9	150.0	23.4	45.5	150.0
Actuated g/C Ratio	0.08	0.39	1.00	0.17	0.49	1.00	0.06	0.17	1.00	0.16	0.30	1.00
v/c Ratio	0.61	0.75	0.03	1.06	0.80	0.21	0.31	0.80	0.39	0.80	0.72	0.09
Control Delay	78.5	43.7	0.0	84.0	27.2	0.0	76.3	70.7	0.8	73.8	52.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.5	43.7	0.0	84.0	27.2	0.0	76.3	70.7	0.8	73.8	52.0	0.1
LOS	E	D	A	F	C	A	E	E	A	E	D	A
Approach Delay		46.4			38.5			32.7			53.3	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	23.0	135.2	0.0	~105.8	190.6	0.0	9.0	70.5	0.0	61.5	107.3	0.0
Queue Length 95th (m)	35.1	161.3	0.0	m#96.5	m177.7	m0.0	20.2	90.5	0.0	80.3	131.2	0.0
Internal Link Dist (m)		453.6			178.9			272.9			338.4	
Turn Bay Length (m)	125.0		110.0	158.0		80.0	45.0		50.0	120.0		170.0
Base Capacity (vph)	248	1333	1497	564	1658	1497	101	610	1517	526	1028	1517
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.75	0.03	1.06	0.80	0.21	0.31	0.77	0.39	0.78	0.72	0.09

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 31 (21%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 42.3

Intersection LOS: D

Intersection Capacity Utilization 79.6%

ICU Level of Service D

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Prince of Wales & Hunt Club

