3930 & 3960 Riverside Drive

TIA Strategy Report

DRAFT

December 2022

3930 & 3960 Riverside Drive

TIA Strategy Report

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STRATEGY REPORT

Background

Parsons has been retained by Taggart Realty Management on behalf of St. Mary's Land Corp. to prepare a revised Transportation Impact Assessment in support of a Zoning By-Law Amendment and Draft Plan of Subdivision application for the existing properties located at 3930 & 3960 Riverside Drive (St. Mary's subdivision). The current proposal includes approximately 24 single dwelling units, 53 townhouse dwelling units and 590 apartment dwelling units in a multi-phase development.

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 most recent TIA Strategy Report (March, 2018) had evaluated a mixed-use development which included apartment dwelling units, and commercial uses such as retail, hotel and car dealership developments.

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 which was later supported by a 2018 Transportation Impact Assessment. The proposed land use at the time was considerably more intensive than currently being considered, which consisted of 325,000 ft^2 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. This updated TIA provides a revised functional plan for the Riverside Drive signalized access which includes revisions to adopt design details according to the recent Protected Intersection Design Guide (September, 2021).

This document follows the TIA process as outlined in the City Transportation Impact Assessment (TIA) Guidelines (2017). The following report represents a revision to the previous TIA (2018) to address Step 4 – Strategy Report. The revised Screening Form and City comment correspondence has been provided in **Appendix A.**

1.0 SCREENING FORM

The Screening Form has been updated to reflect the residential context of the proposed St. Mary's subdivision. The Screening Form has confirmed the need for a TIA Report based on the Trip Generation, Location and Safety triggers.

2.0 SCOPING REPORT

2.1. Existing and Planned Conditions

2.1.1. Proposed Development

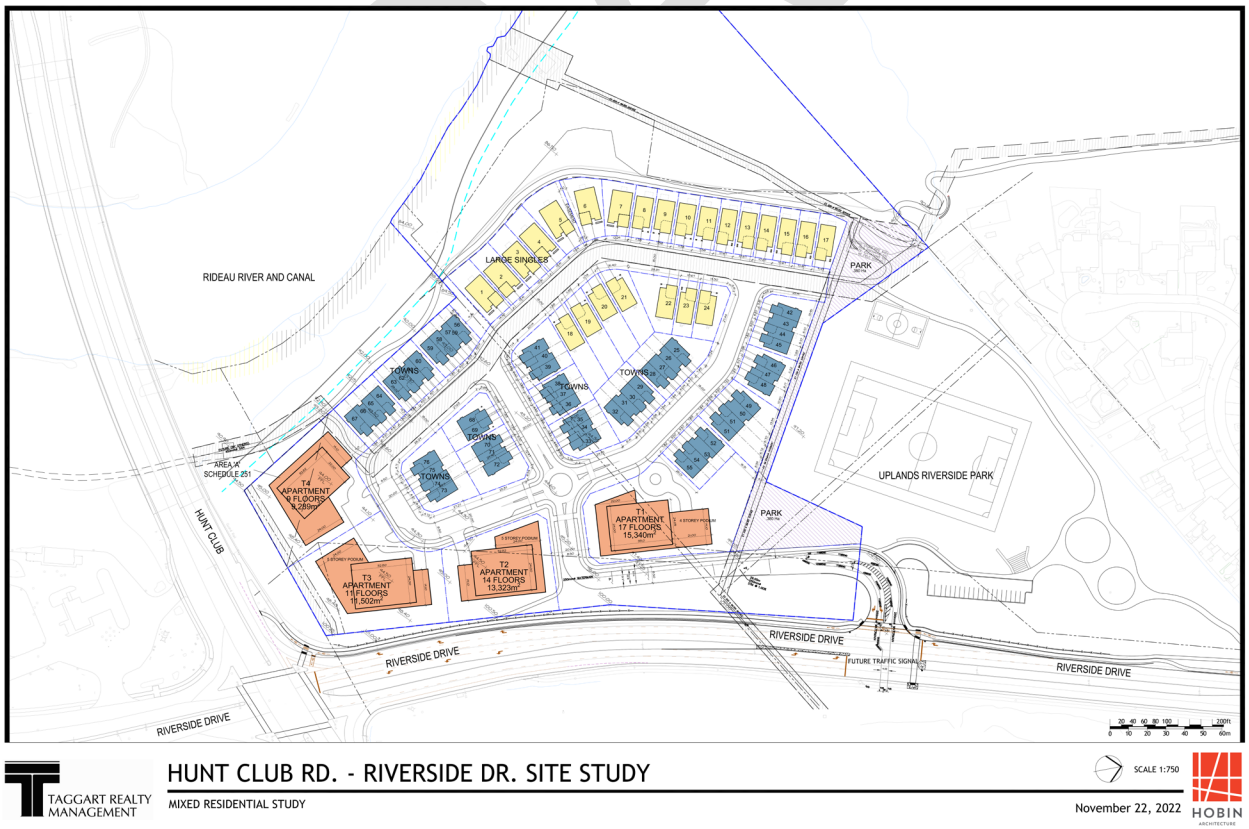
The current Plan of Subdivision for the proposed 3930-3960 Riverside Drive (St. Mary's subdivision) proposes a mix of single dwelling units, townhouse dwelling units and multi-storey apartment dwelling units completed in two phases.

Phase 1 is anticipated to include approximately include 24 single dwelling units, 53 townhouse dwelling units and a single 17-storey apartment block (T1) consisting of an estimated 183 apartment units. Phase 2 is anticipated to include an estimated 407 additional apartment units within three towers ranging in height from 9- to 13-storeys. The site plan details of each apartment block will be established within future separate SPC applications. Phase 1 would also include the entirety of the road network to support multi-modal connectivity throughout the subdivision and for construction of the apartment blocks.

The local context of the site is provided as **Figure 1** and the proposed Site Plan is provided as **Figure 2**.

Figure 1: Local Transportation Context

Figure 2: Preliminary St. Mary's Plan of Subdivision (November, 2022)



2.1.2. Existing Conditions

Area Road Network

The following roads were included in the TIA. Description for each road within the study area has been provided below.

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.

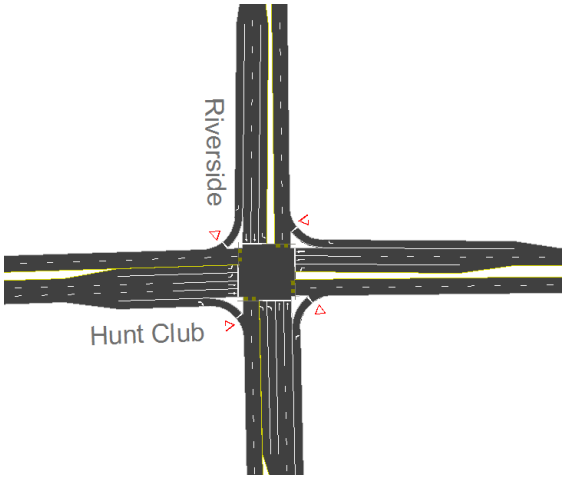
Prince of Wales Drive is a north-south arterial, which extends from Preston Street in the north to Fourth Line Road in the south. Within the study area, Prince of Wales Drive has a four-lane cross-section with auxiliary turn-lanes provided at major intersections. The posted speed limit is 60 km/h.

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.

Existing Study Area Intersections

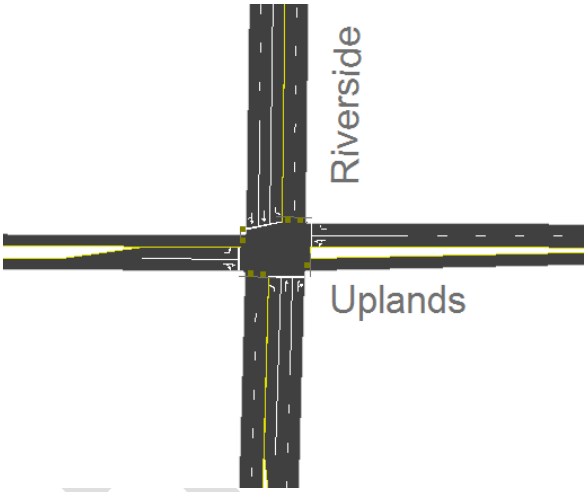
Riverside/Hunt Club

The Riverside/Hunt Club intersection is a signalized four-legged intersection. The northbound approach consists of double left-turn lanes, two through lanes and 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 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.



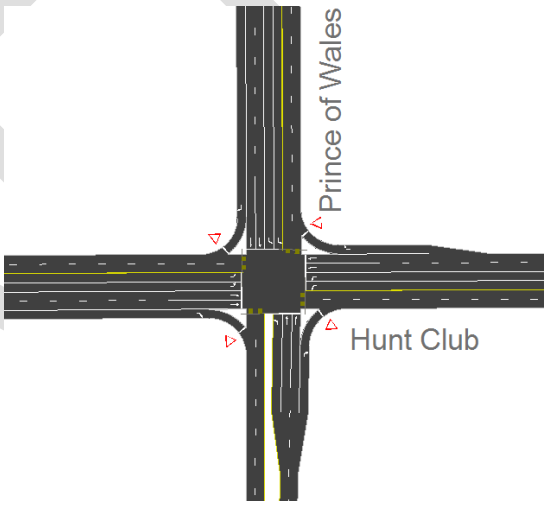
Riverside/Uplands

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.



Existing Driveways to Adjacent Developments

The St. Mary's Subdivision is located at the corner of Riverside Drive and Hunt Club Road, with a proposed access intersection to Riverside Drive. There are no adjacent accesses within 200m of the Riverside site access.

Existing Area Traffic Management Measures

No area traffic management measures are deployed along Riverside Drive or Hunt Club Road.

Kimberwick Crescent, located north of the St. Mary's subdivision and will not be connected to the subdivision via the proposed road network, has various area traffic management measures. These measures include speed humps, 'slow' paving marks, flex stakes and speed display boards.

Pedestrian/Cycling Network

Figure 4 illustrates an extract from the City of Ottawa's TMP, Map 1, Cycling Network – Primary Urban.

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 125m, where cyclists then have three options; continue along Riverside Drive amidst mixed, utilized the maintenance strip as a northbound cycle facility or make use of the sidewalk similar to a MUP arrangement. Access to the maintenance strip and sidewalk is provided via a curb depression and asphalt path, as shown in **Figure 3**.

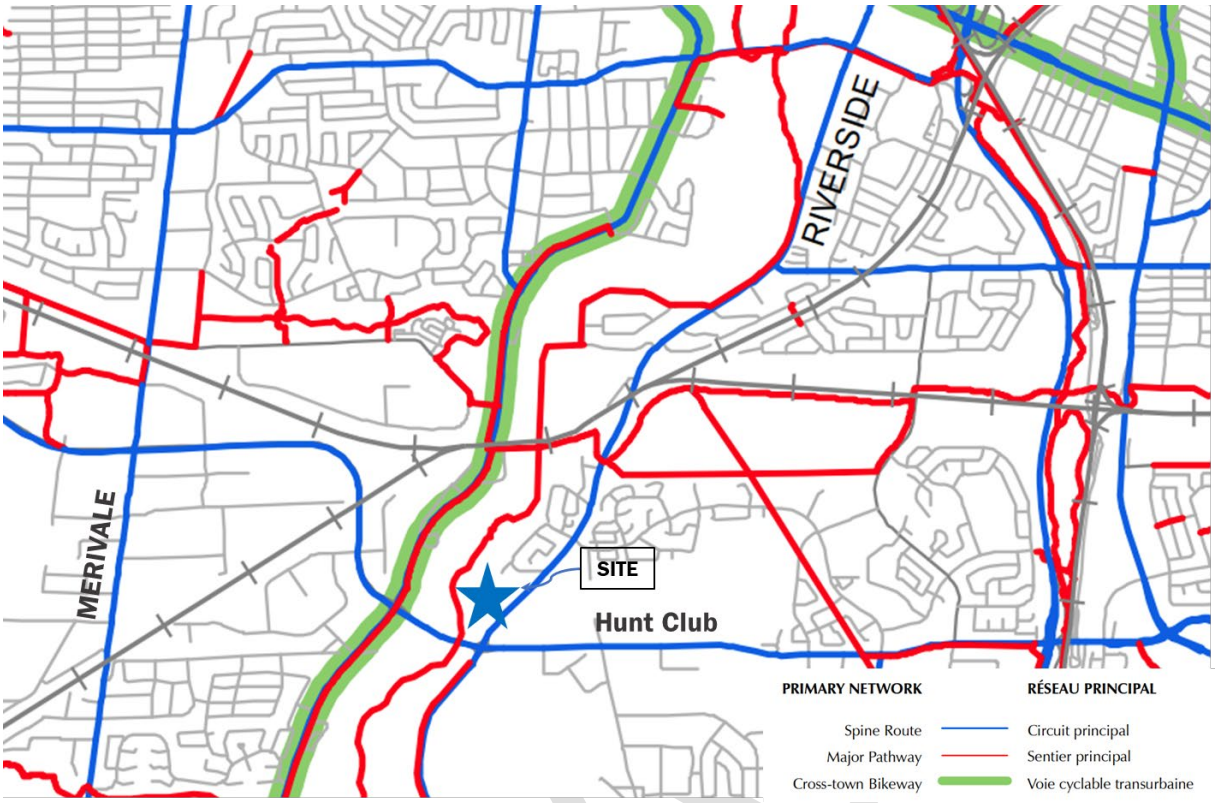
Bicycle lanes are also provided along Hunt Club Road, except between Riverside Drive and North Bowesville Road, which are planned to be provided in the future as a Phase 2 City Project. The City's Cycling Plan identifies Riverside Drive, Hunt Club Road, and Prince of Wales Drive as Spine Routes and Uplands 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.

Figure 3: Cyclist Option to Share Facilities with Pedestrians or Vehicles on Riverside Drive

Riverside Drive in northbound direction, approximately 125m north of Hunt Club/Riverside intersection. Sign reads "Share Sidewalk, Cyclists Yield to Pedestrians"

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).

Figure 4: Study Area Active Transportation Network



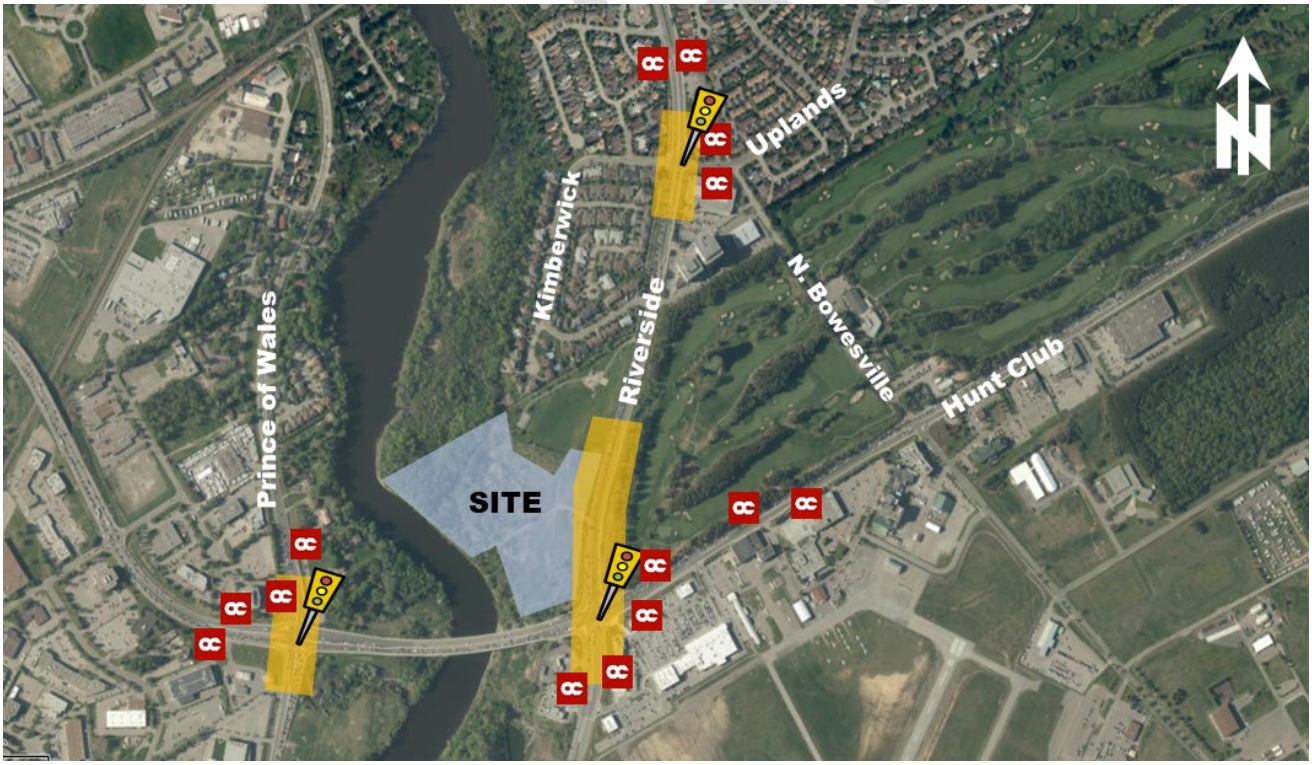
Transit Network

Transit service within the vicinity of the site is currently provided by OC Transpo Routes #90, 96, 197, 198, and 199. Bus stops for Routes #96, 198 and 199 are located adjacent to the Riverside/Hunt Club intersection (While #197 is access at the Riverside/Paul Benoit intersection to the east). Bus stops for Route #90 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 5 illustrates the surrounding extended transit network for the study area, while **Figure 6** depicts the immediately adjacent bus stops to the development. Transit route maps are provided in **Appendix B.**

Figure 5: Extended Area Transit Network (October, 2022)

Figure 6: Adjacent Transit Stops Surrounding the St. Mary's Subdivision



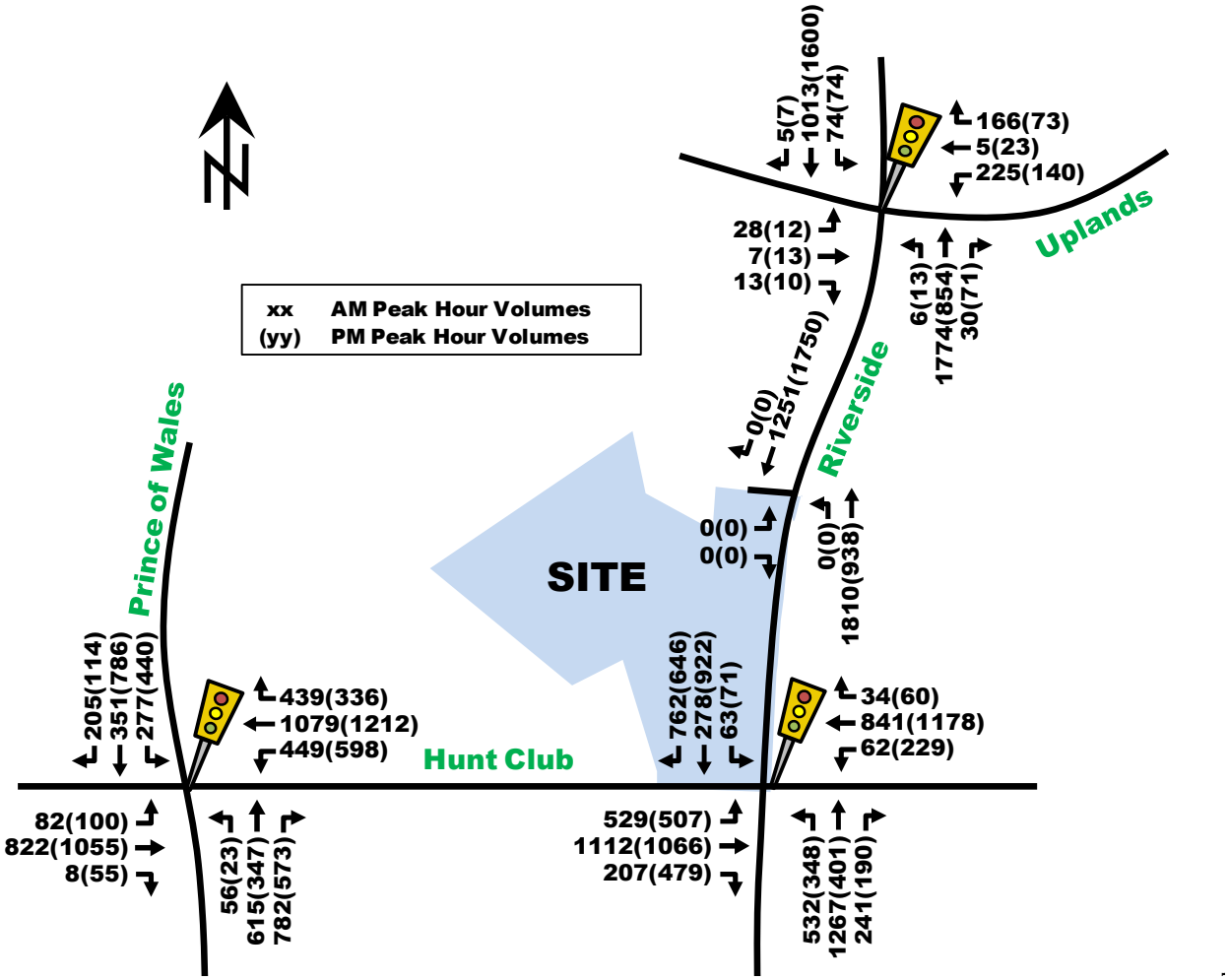
Peak Hour Travel Demands

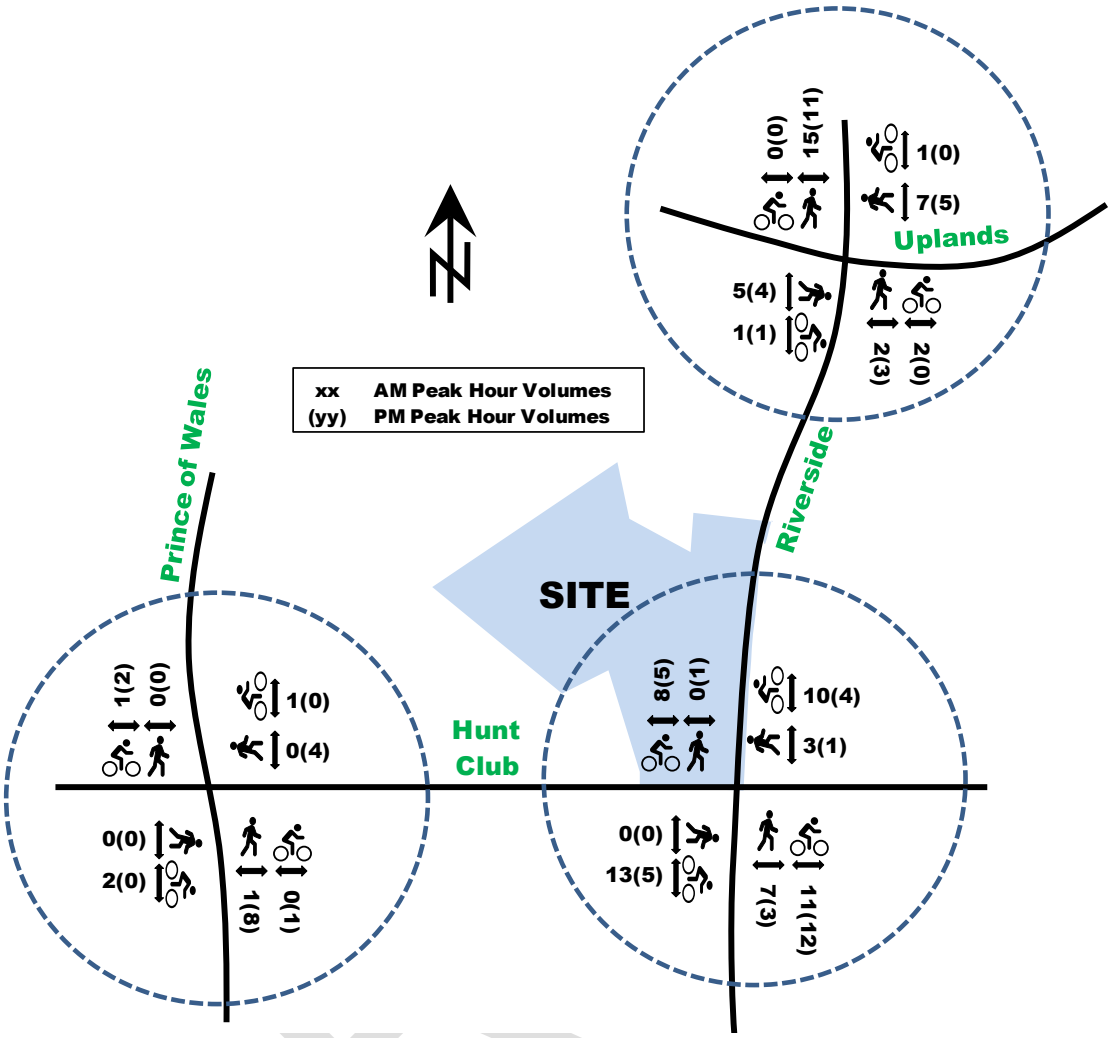
Updated existing peak hour traffic volumes at the signalized intersections within the study area were obtained from the City of Ottawa for the following intersections:

- Hunt Club/Riverside– Conducted Wednesday, June 12th, 2019
- Hunt Club/Prince of Wales – Conducted Monday, February 10th, 2020
- Riverside/Uplands-Kimberwick – Conducted Wednesday, January 22, 2020

The traffic volumes at study area intersections are illustrated in **Figure 7**, with raw traffic count data provided in **Appendix C**. No adjustments such as traffic growth have been applied to the traffic volumes given the known transportation network capacity constraints, the well-established neighborhoods surrounding the study area, and to reflect potential changes in travel behaviour made during the COVID-19 pandemic.

Figure 7: Existing Peak Hour Traffic Volumes





Existing Road Safety Conditions

Five-year collision data (2016-2020, inclusive) was obtained from the City of Ottawa for all intersections and road segments within the study area.

Of the 459 total collisions that occurred, 313 (68%) resulted from rear end, 81 (18%) from sideswipe, 30 (7%) from angle maneuvers and 15 (3%) from turning movement collisions. 212 collisions were observed to occur at the Hunt Club/Riverside intersection while 153 collisions were recorded at the Prince of Wales/Hunt Club intersection.

In terms of severity, 380 (83%) collisions of the total collisions were found to result in property-damage only (PDO), representing the majority of collisions, while the remaining 79 (17%) resulted in non-fatal injuries. No collisions resulted in fatalities or involved pedestrians. Three cyclist collisions were observed, one collision at Riverside/Hunt Club intersection, one at Prince of Wales/Hunt Club intersection and one at Hunt Club bridge (Between Prince of Wales and Riverside).

The source collision data and detailed analysis results are provided in **Appendix D**.

A standard unit of measure for assessing collisions at an intersection is based on the number of collisions per million entering vehicles (MEV). Intersections with a ratio of 1.0 Collisions/MEV or greater are considered to be at a higher risk for collisions. Based on the City of Ottawa TIA Guidelines (2017), a collision pattern is characterized as a sequence of more than six collisions of the same impact type occurring for a specific

movement within a five-year period. At signalized intersections within the study area, reported collisions have historically taken place at a rate of:

- 1.61 Collisions/MEV at the intersection of Riverside/Hunt Club. A total of 212 collisions occurred at this intersection in the five-year period, 155 (73%) were reported as rear-ends while 33 (16%) were reported as sideswipes. 23 (15%) of the rear-end collisions were reported as non-fatal injuries. 62 (40%) of the rear-end collisions were found to occur in the southbound direction, the majority of which were using the southbound right turn lane.
- 1.16 Collisions/MEV at the intersection of Prince of Wales/Hunt Club. 152 collisions were reported at this intersection, 102 (67%) were classified as rear-ends, 28 (18%) were classified as sideswipes and 15 (10%) were classified as angle collisions.
- 0.38 Collisions/MEV at the intersection of Uplands-Kimberwick/Riverside. A total of 27 collisions were reported, more than half of which (15 – 56%) were classified as rear-end incidents.

Riverside Drive / Hunt Club Road improvements are to be the responsibility of the City of Ottawa and require coordination with the planned intersection upgrades (RFP No. 3552292593-P01).

2.1.3. Planned Conditions

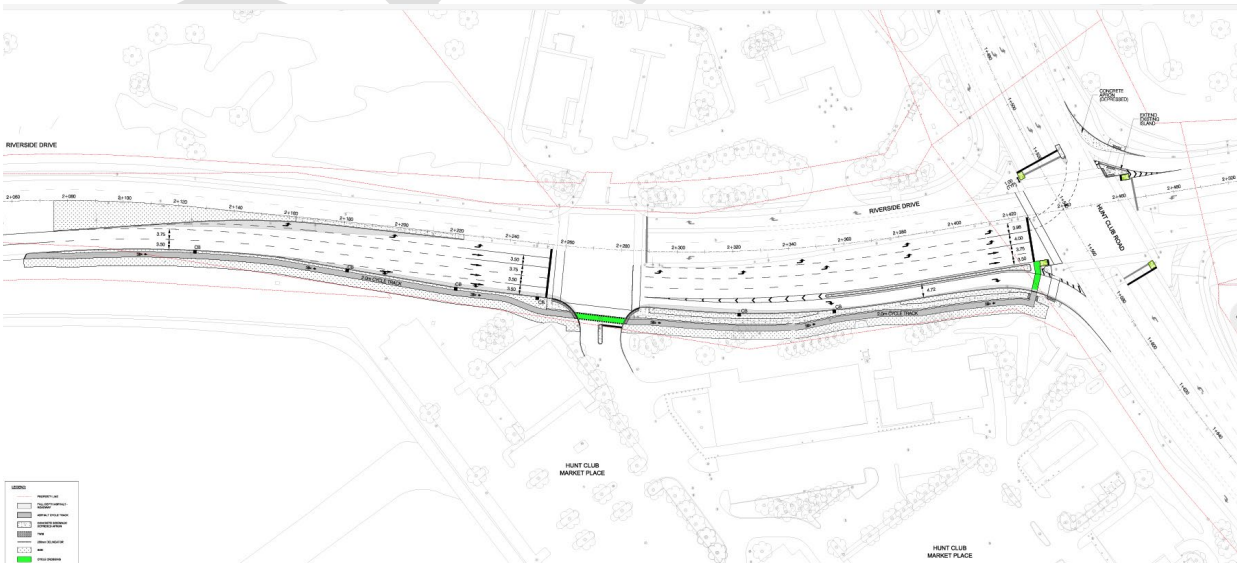
2.1.3.1. Future Transportation Network Changes

Roadway Network

A notable transportation network change within the study area is 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 Parkway is identified as a Phase 1 (north of Hunt Club) and Phase 3 (south of Hunt Club) City Project (both in the Affordable Network).

Figure 8: Option 3 Sketch of Riverside/Hunt Club Roadway Modifications, October 2022



It is noted that a recent RFQ opportunity from the City of Ottawa for the Preliminary Design, Detailed Design, Tender Documents, and Assistance during Tendering for the following modifications to the Riverside/Hunt Club intersection:

- Extension of the northbound left turn lane and median in the northbound direction
- Removal of the northbound floating bike lanes and the addition of bike boxes
- Reconfiguration of the southbound right turn channel to improve sight lines, vehicle speeds
- Shortening of the median on Hunt Club Road eastbound
- Addition of a northbound cycle track and relocation of the sidewalk on the east side of Riverside Drive.

For the purposes of this TIA assessment, the intersection capacity analysis will assume an extended northbound left turn storage 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.

2.1.3.1 Other Study Area Developments

Based on the City of Ottawa's Development Applications search tool, several applications have been initiated near the proposed development site which include:

- 3750 North Bowesville Road, Zoning By-Law Amendment: Located east of Riverside and south of Uplands, the 3750 Bowesville Road development proposes to re-develop the existing Tudor Hall Banquet and events venue to two-14-storey residential buildings with 365 units by 2026. The development is forecast to generate 54 and 64 auto trips in the AM and PM peak hours, respectively. A Step 4 TIA has been prepared by CGH dated April, 2022. These volumes have been added to background conditions.
- 4020 Spratt Road, Plan of Subdivision, Riverside South Employment Lands and Blocks 13, 14: This Plan of Subdivision proposal would include a mix of industrial, institutional, and residential land uses. The residential use at 4020 Spratt Road is forecast to generate less than 30 two-way person trips in the peak hours, while the industrial use is forecast to generate 936 to 1,008 person trips. A Step 4 TIA has been prepared by IBI Group, dated August 2022. This development is considered to have negligible impacts on the study area given the existing transportation network constraints.

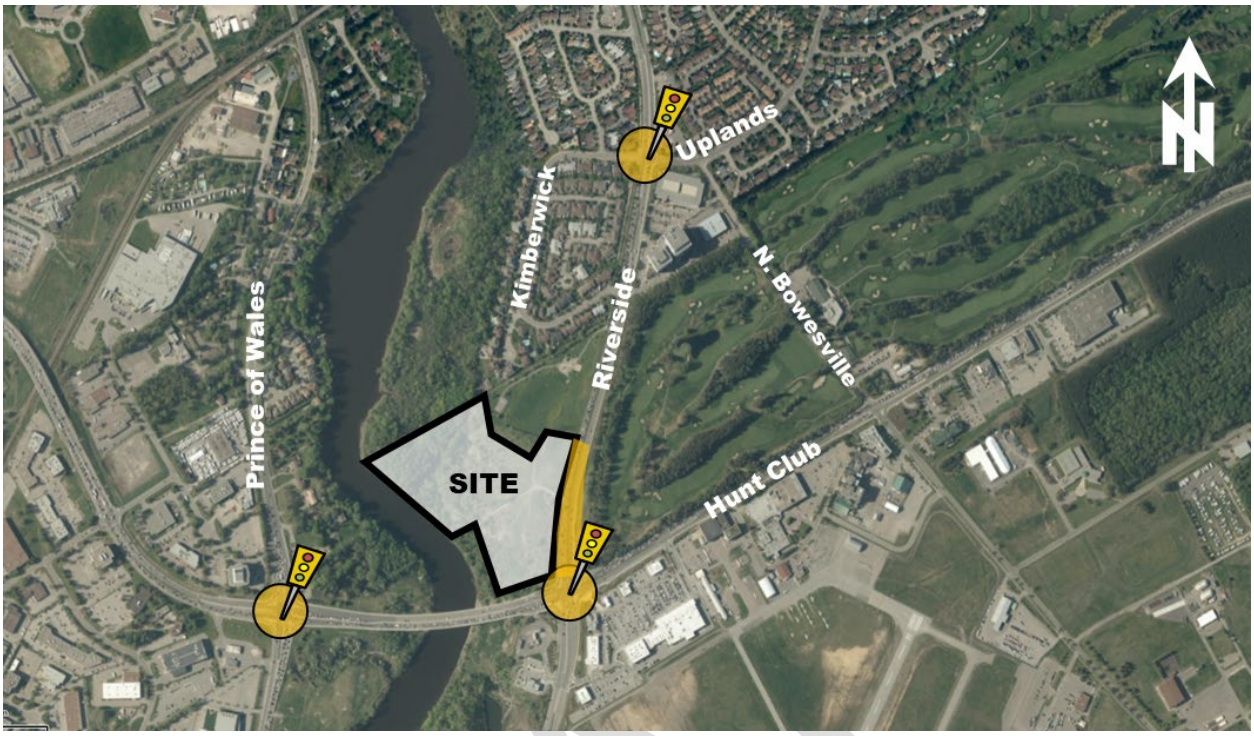
2.2. Study Area and Time Periods

The proposed St. Mary's subdivision is intended to be constructed in at least two phases, where Phase 1 is constructed for 2025 and Phase 2 (full build-out) by 2029. The study proposes to address the existing conditions, the 2025 Phase 1 build-out and the 2029 build-out horizon. Given the residential context of the proposed site, the AM and PM peak hours are proposed for evaluation.

In addition to the site access and the internal site roundabout, the proposed study area intersections for analysis are listed below and illustrated in **Figure 9.**

- Riverside/Hunt Club (Signalized)
- Riverside/Kimberwick-Uplands (Signalized)
- Hunt Club/Prince of Wales (Signalized)

Figure 9: Study Area



2.3. Exemption Review

The following modules/elements of the TIA process are recommended to be exempt based on the City's TIA guidelines:

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plan applications
4.2 Parking	All	Only required for site plan applications
4.8 Network Concept	All	Not envisioned to be required as the Plan of Subdivision is unlikely to generate more than 200 peak hour person-trips in excess of the equivalent volumes permitted by established zoning (General Mixed Use).

Notably, this Transportation Impact Assessment will address internal circulation of the subdivision street network, considerations of traffic calming measures to obtain 30 km/h streets and design elements related to the proposed intersection of Riverside Drive and the site access.

Site plan details for the apartment blocks remain to-be-determined during specific site plan applications.

3.0 FORECASTING

3.1. Development Generated Travel Demand

3.1.1. Trip Generation and mode shares

Trip Generation Rates

The proposed development includes two phases of development. The first phase is assumed to include 24 single homes, 53 townhomes and 183 apartment units. The second phase has been assumed to include an additional 407 apartment units based on projected densities. The trip generation rates were obtained from the City's 2020 TRANS Trip Generation Manual Report for residential uses. The relevant trip rates for the peak hour of the development are summarized in Table 2 below.

Table 2: Proposed Development Trip Rates

Land Use	Dwelling Type	Data Source	Trip Rates	
			AM PEAK	PM PEAK
Residential Phase 1	Single-Detached	ITE 210	T = 2.05(du)	T = 2.48(du)
	Multi-Unit (Low-Rise)	ITE 220	T = 1.35(du)	T = 1.58(du)
	Multi-Unit (High-Rise)	ITE 221	T = 0.80(du)	T = 0.90(du)
Residential Phase 2	Multi-Unit (High-Rise)	ITE 221	T = 0.80(du)	T = 0.90(du)

Notes: T = Average Vehicle Trip Ends; du = Dwelling Units

Table 3 summarizes the conversion factors from the 2020 TRANS Manual, Table 4, to convert the peak-period person-trips to peak-hour person trips by mode. Note that conversion factors for passenger trips are assumed to be equivalent to the published 'Auto Driver' factors for both the morning and afternoon peak period-to-hour conversion.

Table 3: Residential Peak Period to Peak Hour Conversion Factors (2020 TRANS Manual)

Travel Mode	Peak Period to Peak Hour Conversion Factors	
	AM	PM
Auto Driver	0.48	0.44
Passenger	0.48	0.44
Transit	0.55	0.47
Bike	0.58	0.48
Walk	0.58	0.52

Using the trip rates provided in Table 2, and the peak-period to peak-hour conversion factors within Table 3, resulting peak hour trips by mode are forecast in Table 4.

Table 4: Phase 1 and Phase 2 Peak Hour Person trips – AM Peak and PM Peak

Land Use Dwelling Type	Number of Dwellings	AM Peak (Trips/h)			PM Peak (Trips/h)		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Phase 1 Single Detached	24	7	17	25	17	10	27
Phase 1 Low-Rise	53	11	26	37	21	17	38
Phase 1 High-Rise	183	24	53	76	44	32	75
SUBTOTAL PHASE 1	260	42	96	138	82	59	141
Phase 2 High-Rise	407	53	117	170	97	70	168
TOTAL	667	95	213	308	179	129	308

Historical mode shares based on OD-Surveys have been summarized in the 2020 TRANS Trip Generation Manual Report for the Hunt Club District for each dwelling type. Traditionally, Hunt Club has a relatively high transit user base, predominantly for areas near the north-south transitway corridor, near South Keys Station or along the rapid transit routes #97, #98 and #99. Given that this development is not along any of those major transit routes, a reduction in transit user and an increase in vehicle driver is considered appropriate. It should be noted that although transit usage at this location is anticipated to be lower than other areas within Hunt Club District, that there remains suitable transit routes such as route #96, #197, #198 and #199 within 500-meter walk from the site and frequent transit route #90 within 800-meter walk from the site.

Table 5 summarizes the historical mode shares for each dwelling type for Hunt Club and the proposed mode shares for this development.

Table 5: TRANS Mode Shares for Hunt Club District

Travel Mode	Single Dwelling		Low Rise		High Rise		Weighted Avg.		Proposed	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Auto Driver	48%	51%	44%	47%	39%	44%	38%	43%	55%	55%
Auto Passenger	15%	19%	11%	15%	6%	11%	7%	12%	14%	14%
Transit	29%	23%	38%	29%	44%	35%	45%	34%	20%	20%
Cycling	1%	1%	1%	1%	1%	2%	1%	2%	2%	2%
Walking	7%	7%	6%	8%	9%	9%	10%	9%	9%	9%

If the TRANS mode share for Hunt Club district are adopted, then fewer vehicle trips would be generated. The current approach is reasonably conservative for analysis possible. Table 6 and summarizes the forecast mode shares and person trips for the proposed residential development based on the custom mode share proposed.

Table 6: Residential Peak Hour Trips Mode Shares Breakdown – Phase 1

Travel Mode	Mode Share	AM Peak (Trips/h)			PM Peak (Trips/h)		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	55%	23	53	76	45	32	77
Auto Passenger	20%	6	13	19	11	8	20
Transit	20%	8	19	28	16	12	28
Cycling	2%	1	2	3	2	1	3
Walking	3%	4	9	12	7	5	13
Total Person Trips	100%	42	96	138	82	59	141
'New' Auto Driver Trips Phase 1		23	53	76	45	32	77

Table 7: Residential Peak Hour Trips Mode Share Breakdown – Phase 1 and 2

Travel Mode	Mode Share	AM Peak (Trips/h)			PM Peak (Trips/h)		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	55%	52	117	169	99	71	170
Auto Passenger	20%	13	30	43	25	18	43
Transit	20%	19	43	62	36	26	62
Cycling	2%	2	4	6	4	3	6
Walking	3%	9	19	28	16	12	28
Total Person Trips	100%	95	213	308	179	129	308

'New' Auto Driver Trips Phase 1 & 2	52	117	169	99	71	170

Based on the 2020 TRANS Trip Generation Manual and custom mode shares, the proposed site is projected to generate approximately 75 and 170 new auto-trips per hour during the weekday commuter peak hours for phase 1 and phase 1+2 respectively. The increase in two-way transit trips is estimated to be approximately 30 and 60 persons per hour, and the increase in active trips is approximately 15 to 35 persons per hour for phase 1 and phase 1+2 combined respectively.

3.1.2. Trip Distribution and Assignment

Based on the 2011 OD Survey (Hunt Club District) and the location of adjacent arterial roadways and neighbourhoods, the distribution of site-generated traffic volumes was estimated as follows:

- 5% to/from the east via West Hunt Club Road
- 20% to/from the west via West Hunt Club Road
- 70% to/from the north via Riverside Drive
- 5% to/from the south via Riverside Drive

The anticipated total 'new' auto trips for the proposed development from **Table 6** and **Table** 7 were then assigned to the road network as shown in **Figure 10** and **Figure 11** for Phase 1 and for Phase 1 and 2 combined respectively.

Figure 10: Site-Generated Traffic Volumes – Phase 1

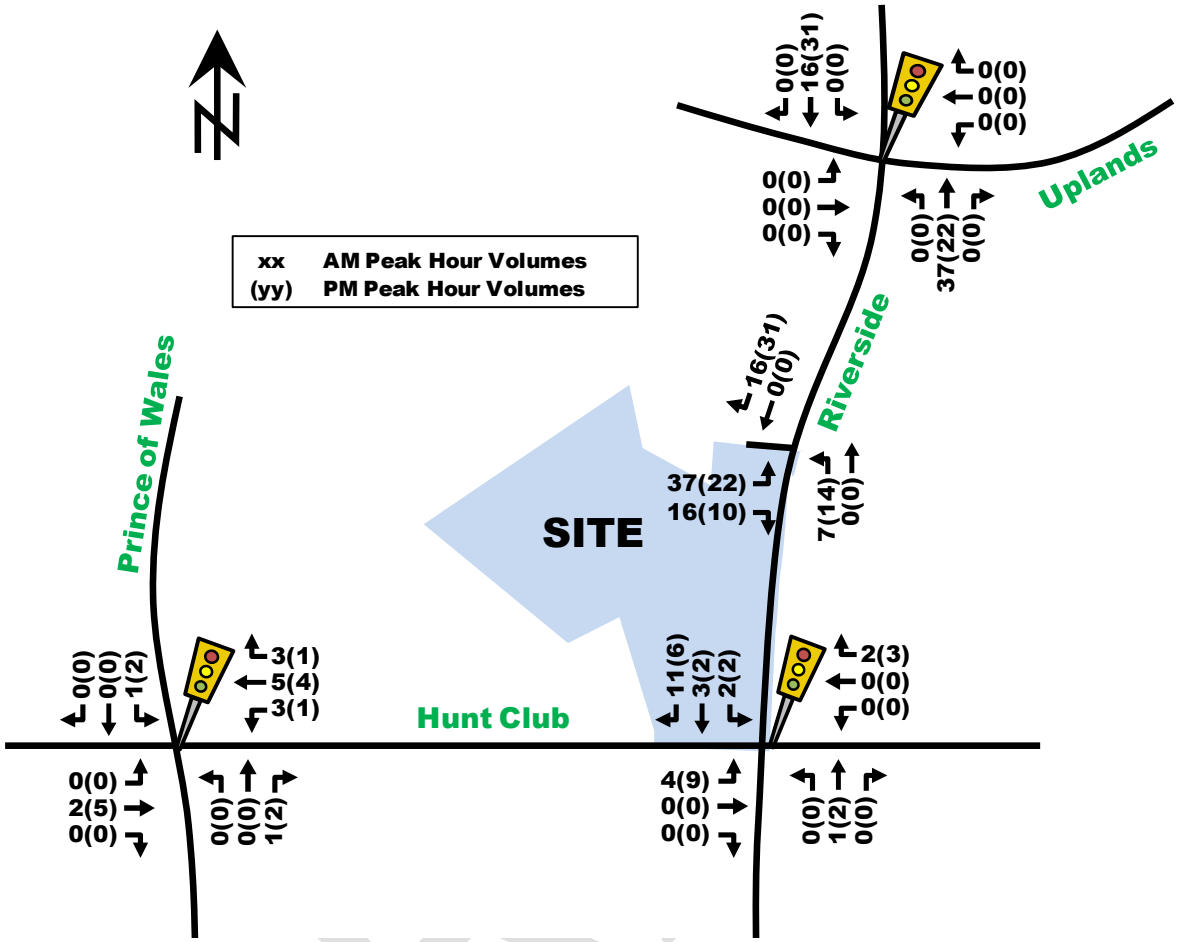
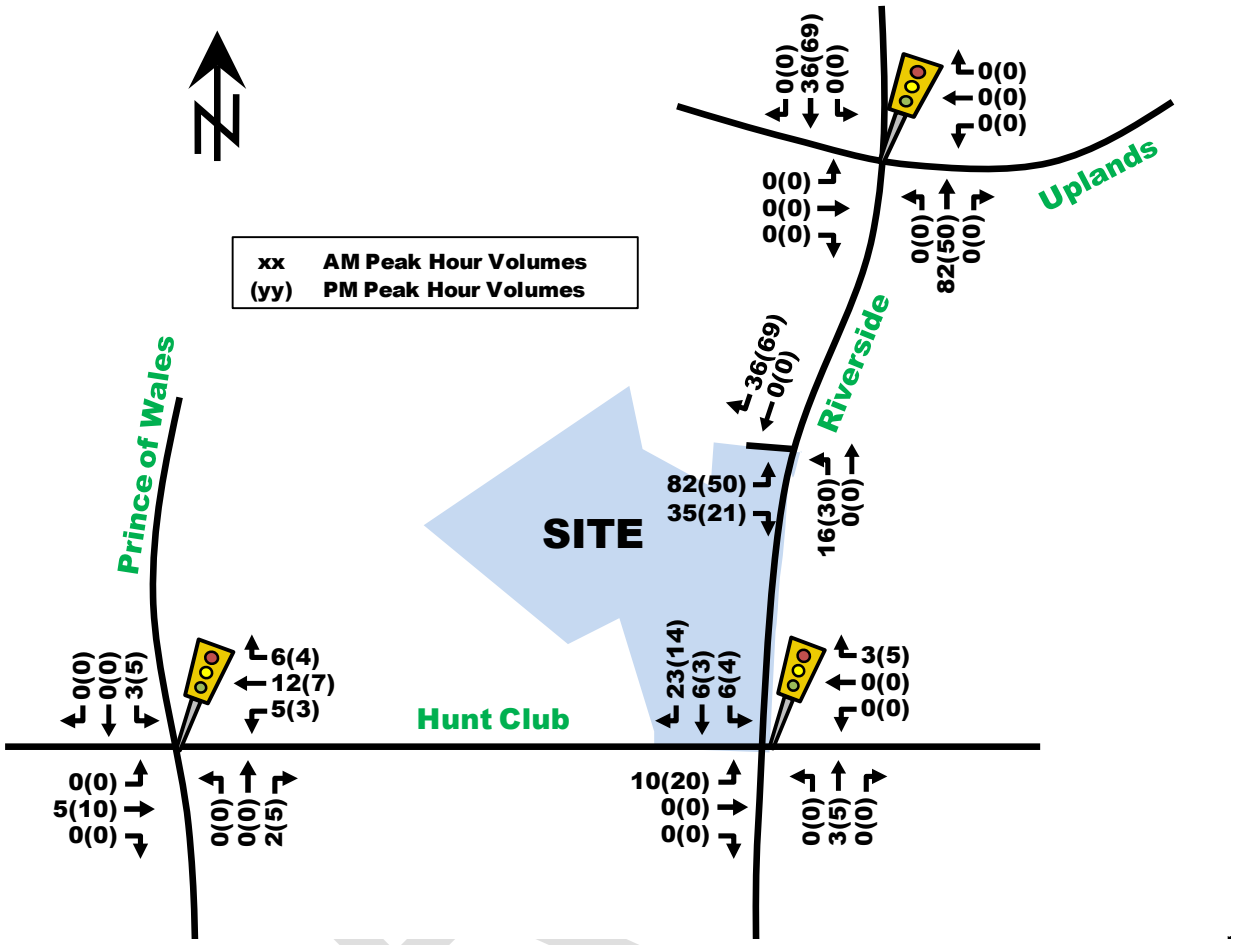


Figure 11: Site-Generated Traffic Volumes – Phase 2



3.2. Background Network Traffic

3.2.1. Transportation network plans

Refer to Section 2.1.3: Planned Conditions.

3.2.2. Background Growth

Background traffic growth through the immediate study area (summarized in Table 8) was calculated based on historical traffic count data (years 2008, 2009, 2014, 2016 and 2019) provided by the City of Ottawa at the Riverside/Hunt Club intersection. Detailed background traffic growth analysis is included as Appendix E.

Table 8: Riverside/Hunt Club Historical Background Growth (2008 – 2019)

Time Period	Percent Annual Change				
	NORTH LEG	SOUTH LEG	EAST LEG	WEST LEG	OVERALL
8 Hrs	1.38%	2.52%	-0.40%	-0.68%	**0.47%**
AM Peak	0.71%	2.47%	-2.32%	-2.37%	**-0.51%**
PM Peak	-0.24%	2.09%	-1.46%	-2.58%	**-0.78%**
Based on historical City counts from 2008, 2009, 2014, 2016 and 2019					

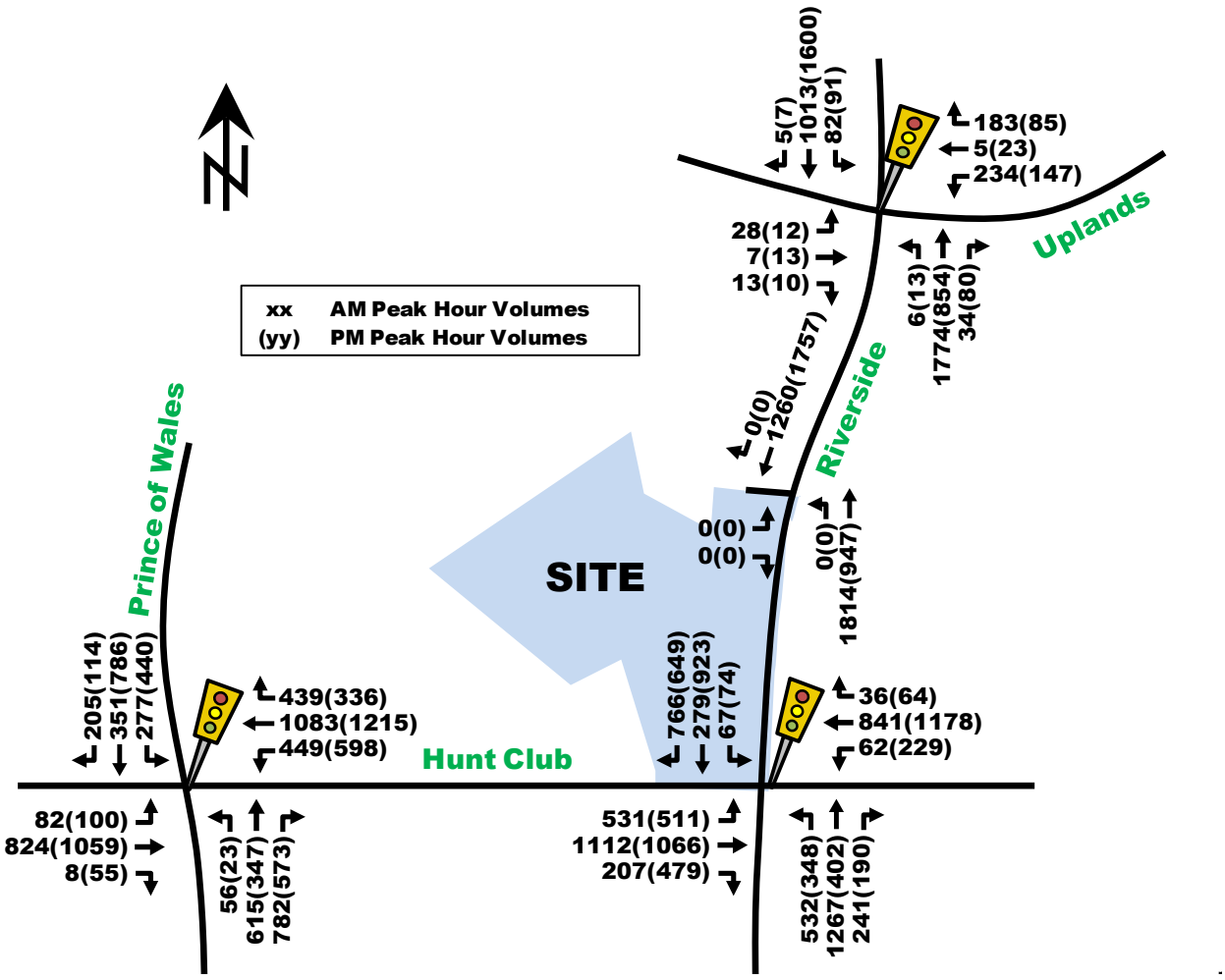
As shown in **Table 8**, the Riverside/Hunt Club intersection's traffic volumes overall have remained relatively constant over the years. The south leg has experienced an increase in traffic volumes and the east and west legs have experienced a decrease in traffic volumes. This change in traffic patterns is consistent with the timing of the Strandherd-Armstrong bridge opening.

Given the relatively consistent traffic volumes within the area, the low volume projections of vehicle traffic generated by other area developments (noted in Section 2.1.3), and the understood lack of availability peak hour capacity, no background traffic growth will be applied to the existing traffic volumes.

3.2.3. Other Developments

Refer to **Section 2.1.3.1**. The development at 3750 North Bowesville Road was added to the surrounding network along with a 0% annual growth rate as discussed in **Section 3.2.2.** The resulting background traffic volumes have been illustrated in **Figure 12**.

Figure 12: Future Background Traffic Volumes



3.3. Demand Rationalization

Based on the existing traffic volumes and site visits, there is an existing capacity constraint 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.

Section 0 provides for the existing and forecast background intersection capacity analysis for the study area. As confirmed by site observations, existing traffic demand well exceeds the hourly capacity of the Hunt Club/Riverside Drive intersection in the AM (EB, NB) and PM (WB, SB). As a critical arterial-to-arterial junction, the Hunt Club/Riverside Drive intersection traffic volumes likely reflect a saturated intersection.

Significant demand rationalization assumptions would need to be considered for the peak movements to result in satisfactory intersection operations. However, such measures as peak spreading, alternate routes and shift to existing transit routes has likely already taken place and is reflected within the existing traffic counts. By maintaining the existing traffic volumes layer, the analysis will likely better inform the proposed Riverside Drive RMA as part of this subdivision application. Limited additional background peak hour vehicle growth is envisioned as any additional background growth from outside the study area would simply result in additional peak spreading.

The total projected future traffic volumes can be determined by superimposing the site-generated traffic volumes in **Figure 10** and **Figure 11**, onto the future background traffic volumes shown in **Figure 12**. The total projected traffic volumes for Phase 1 and Phase 1 and 2 combined are illustrated in **Figure 13** and **Figure 14** respectively.

Figure 13: Phase 1 Total Projected Traffic Volumes

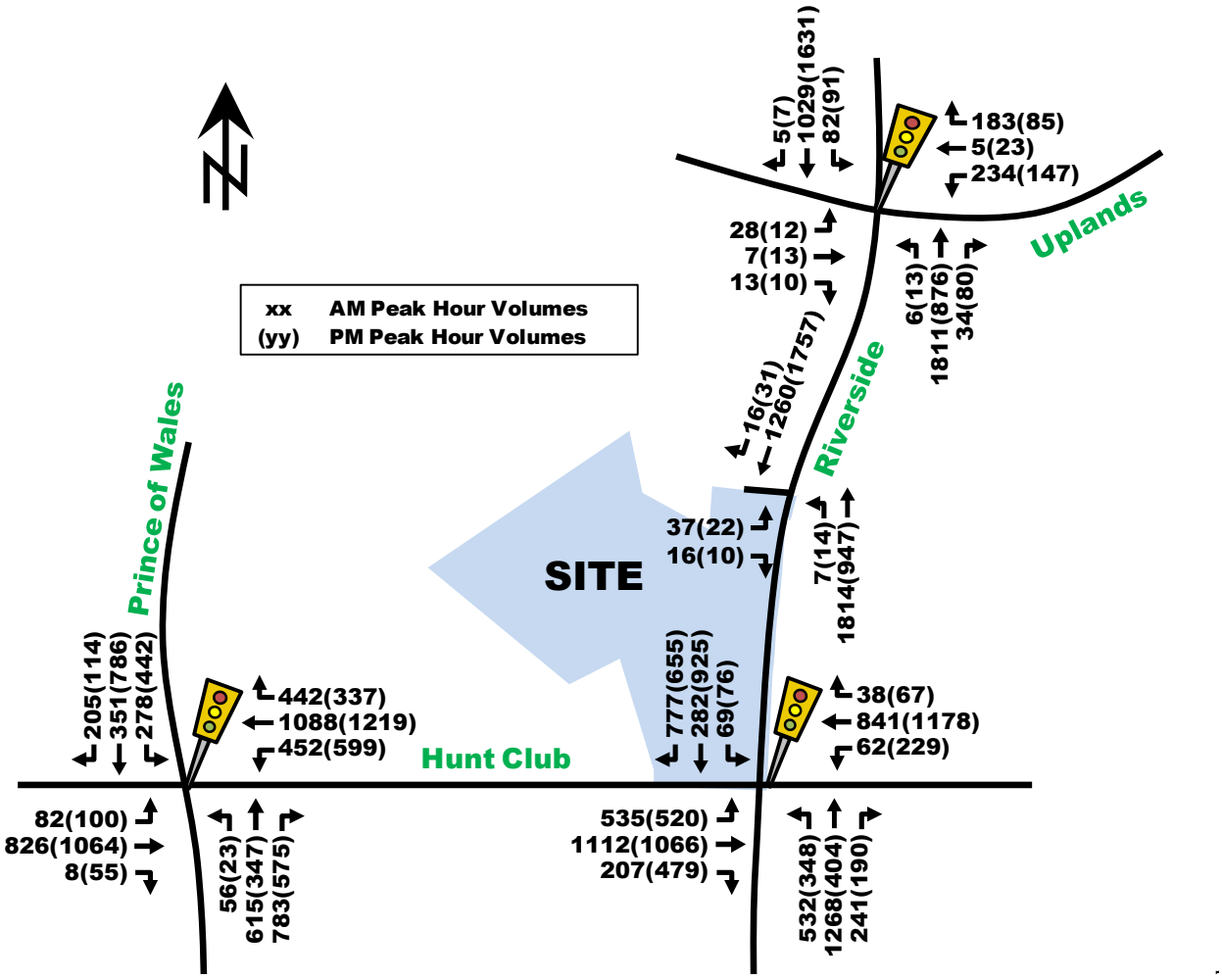
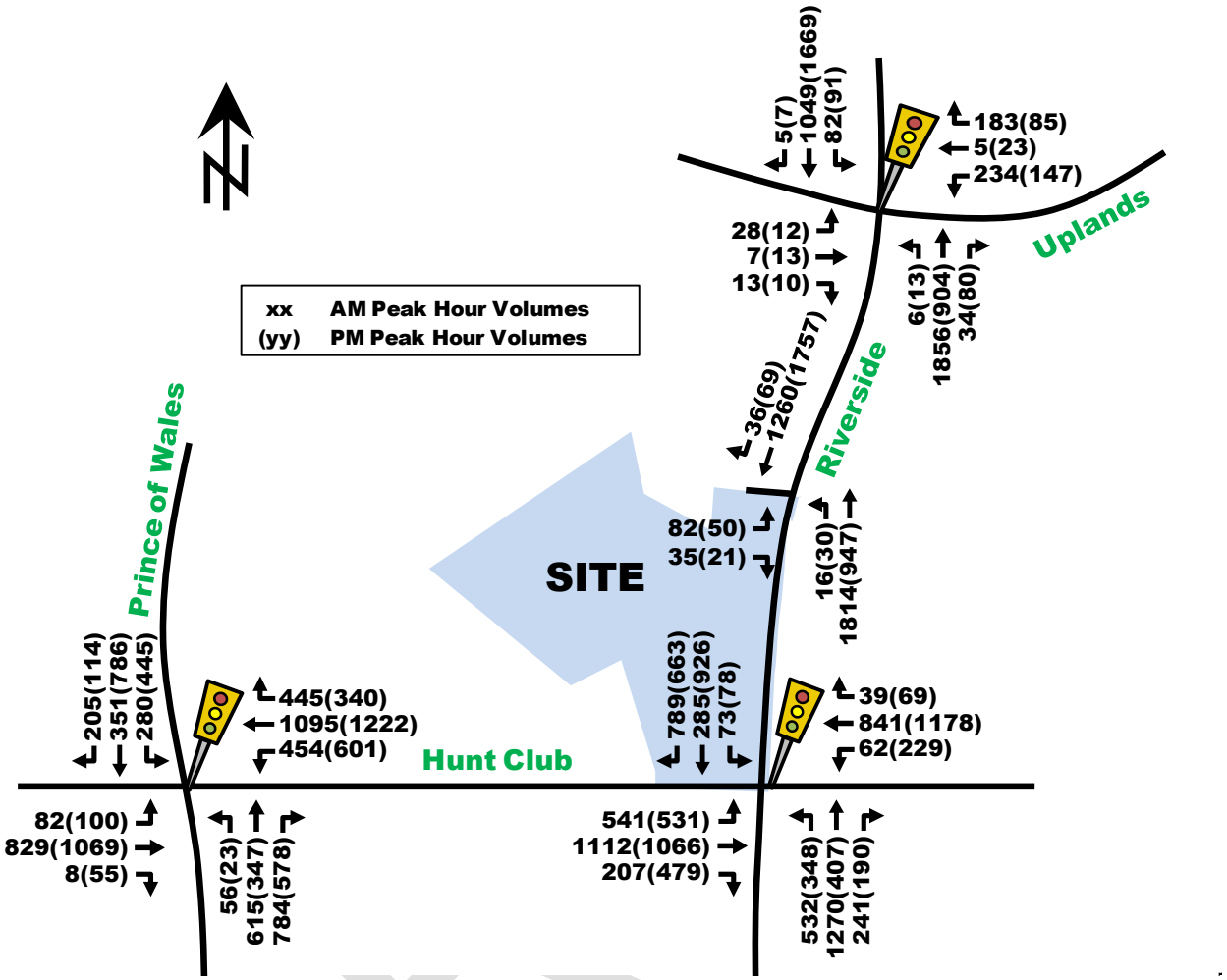


Figure 14: Phase 1 and 2 Total Projected Traffic Volumes



4.0 STRATEGY REPORT

4.1. Development Design

4.1.1. Design for Sustainable Modes

Pedestrian/Cycling Routes and Facilities

Limited pedestrian and cycling facilities currently exist to connect the proposed subdivision to the surround active mode transportation network. The plan of subdivision proposes a multi-use pathway on the west border, between the residential dwelling units and the Rideau River. **Figure 15** illustrates three proposed connections to the MUP from the site between townhomes Block 67 and Tower 4, between townhomes Block 56 and Singles 1 and between the park and Singles 17. Future pedestrian and cycling facilities are envisioned along Riverside Drive which include unidirectional cycle-tracks, a separate concrete sidewalk and boulevard. The access road and adjacent park provides for cycling and walking connections between Riverside Drive and the residential dwellings.

Internal to the site, the proponent envisions 2m wide sidewalks on at least one side of all roadway facilities, per the latest City of Ottawa approved cross sections, which connect to existing and proposed facilities on Riverside Drive and the new multi-use pathway (MUP) bordering the Rideau River and the site. There exists limitations with

the Riverside Drive embankment which have implications for sidewalks and cycle facilities on the east side of the access road corridor.

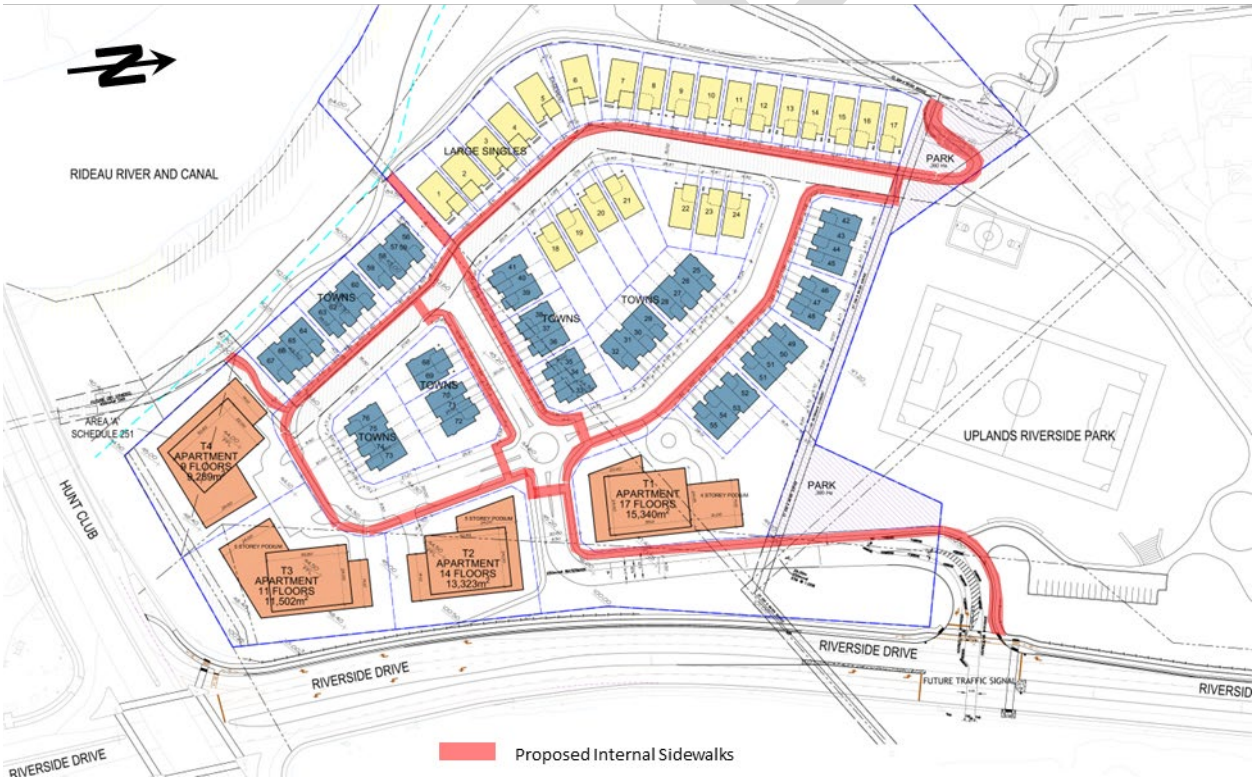
Figure 15 below illustrates proposed sidewalk and MUP connections within the site. The proposed sidewalk connections connect the singles, towns and residential towers to both the MUP and Riverside Drive. Specific cross-sectional elements remain to be determined in future detailed design efforts.

Considerations for residential tower pedestrian and cyclist facilities, and improved connections to Riverside Drive, will be reviewed as part of the Site Plan Control Application (SPA) for each phase of the proposed development.

Location of Transit Facilities

The nearest transit stops to the site are located on the east and south quadrants of Riverside Drive and Hunt Club Road (ID: #4849, #2124, #4197, #6124). These bus stops are located between 200 to 600 meters from the site, depending on where on the site the measurement was taken from and to which bus stop the person was headed to. Additional frequent route #90 is located approximately 800m from the site. Refer to **Figure 15** for a visual representation of how active transportation users could connect from their residencies to transit facilities.

Figure 15: Proposed Sidewalk Connections and Active Transportation Routes to Transit



Bicycle Parking

Bicycle parking has not yet been determined for the residential towers. The four towers are assumed to provide indoor or outdoor locations for patrons to store their bikes and are anticipated to exceed the minimum City of Ottawa Parking By-Law regulations. Bicycle parking for the four towers will be confirmed during the SPC for each tower.

4.1.2. Circulation and Access

Exempt. See **Table 1**.

4.1.3. New Streets Network

The purposes of a plan of subdivision is to identify public roadway right-of-way opportunities and develop a legal plan of subdivision. Therefore, specific road elements remain to be confirmed such as sidewalks, boulevards, parking and traffic calming measures.

The current proposed plan of subdivision envisions a series of internal roads composed of 18.0m and 20.0m ROW widths which are accessed via a single roadway connection to Riverside Drive. The roadway connection to Riverside Drive is proposed to be signalized and will be located approximately 270 meters north of the Hunt Club/Riverside signalized intersection. Internal to the site, the access roadway reaches a mini-roundabout intersection with a fully mountable median intended as a gateway to the community. The development has been designed to encourage horizontal curvatures to minimize vehicle speeds on the local road network.

The internal roads are envisioned to align with the approved August 2022 18.0m and 20.0m ROW City of Ottawa cross-sections, illustrated in **Figure 16** and **Figure 17**. In general, the internal roads envision a single travel lane per direction with an 8.5-meter paved width offering two-way vehicle travel with the potential for on-street parking. On-street parking bulbouts/curb extensions could be accommodated fronting the Phase 2 towers (Towers 2, 3 and 4); however, this will be confirmed during Site Plan Application. Typically, a right of way of 20 meters is proposed for the access roadway and the southeast quadrant adjacent to the towers, while an 18 meter right of way is proposed adjacent to townhomes and single homes. The plan also proposes 2m sidewalks and pathways throughout the site, including connectivity to the neighboring parcel to the north and a shortcut path from the roundabout to Riverside Drive headed southbound.

Internal intersections have been designed to allow for a WB-20 control vehicle to access and navigate the site. The intersection corner radii have been minimized to best reflect the turning movement requirements. A swept path of a design and control vehicle has been provided in **Appendix H.**

Local streets are to be designed to a 30 km/hr operating speed per the City of Ottawa's New Official Plan. The plan of subdivision arrangement is conducive to slower speeds by offering frequent curves, the opportunity for street parking and short street segments. The details of additional traffic calming measures will be identified during the subdivision design process to adhere to a 30 km/hr operating speed.

Figure 16: Approved City of Ottawa 18.0m Cross Section (December, 2022)

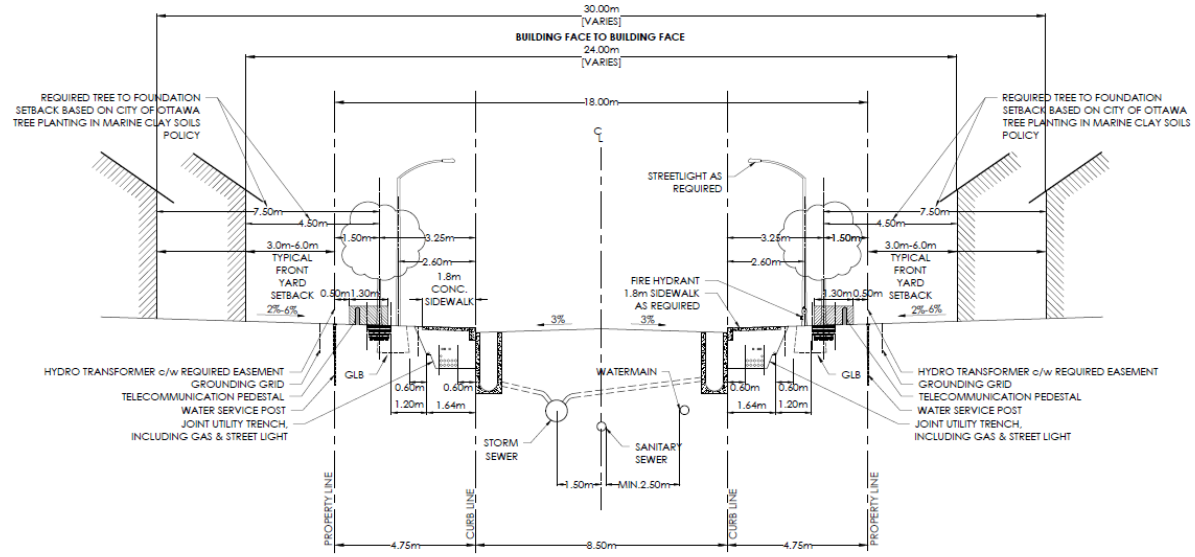
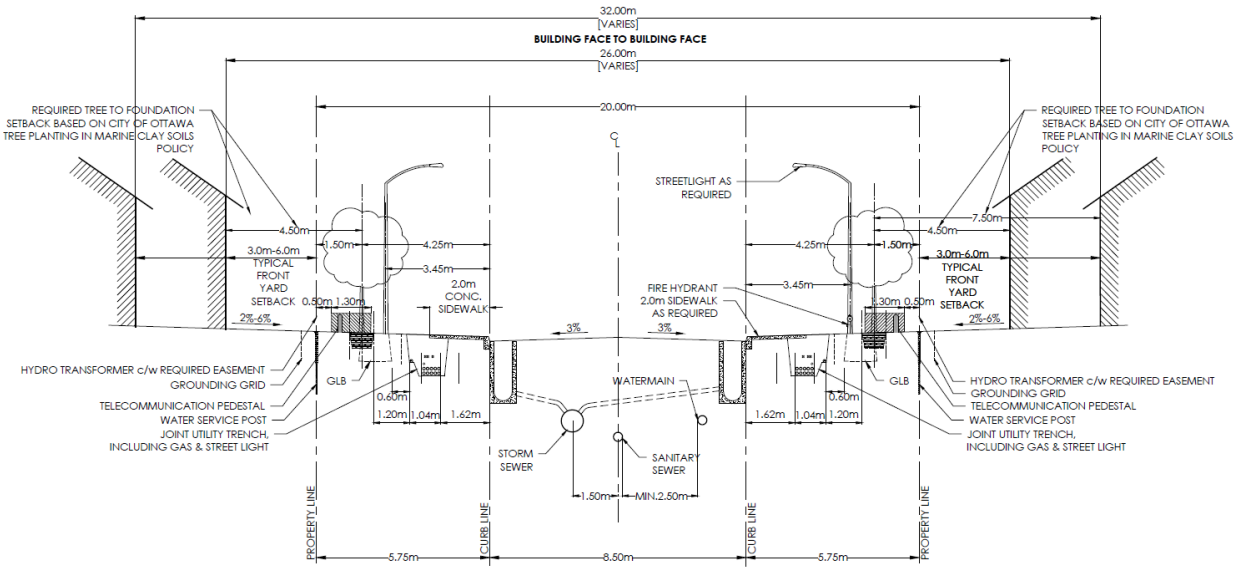


Figure 17: Approved City of Ottawa 20.0m Cross Section (December, 2022)



4.2. Parking

Exempt. Parking to be considered during site plan control for the apartment towers, see **Table 1**.

4.3. Boundary Street Design

4.3.1. Existing and Future Conditions

The boundary streets for the development are Hunt Club Road and Riverside Drive.

- *Hunt Club Road (existing and near future):*

- 2 vehicle travel lanes in each direction;
- 1.8m sidewalk with no boulevard;
- More than 3,000 vehicles per day;
- Posted speed 80km/h (used 90km/h) with no parking on either sides of road;
- Classified as arterial roadway;
- Classified as spine bike route; and,
- Identified as a Truck Route.

- *Riverside Drive (existing):*
  - 2 vehicle travel lanes in each direction;
  - 1.5m sidewalk with no boulevard west side, 1.8m sidewalk with greater than 2m boulevard on east side of road;
  - More than 3,000 vehicles per day;
  - Posted speed 60km/h (used 70km/h) with no parking on either sides of road;
  - Classified as arterial roadway;
  - Classified as spine bike route; and,
  - Identified as a Truck Route.

- *Riverside Drive (future):*
  - 2 vehicle travel lanes in each direction;
  - Assumed 2m sidewalk with cycle-track on both sides;
  - More than 3,000 vehicles per day;
  - Posted speed 60km/h (used 70km/h) with no parking on either sides of road;
  - Classified as arterial roadway;
  - Classified as spine bike route; and,
  - Identified as a Truck Route.

The proposed site is not located within 600m of a rapid transit and not within 300m of a school. Multi-modal Level of Service analysis for the subject road segments adjacent to the site is summarized in **Table 9** with detail analysis provided in **Appendix F**.

Table 9: MMLOS – Boundary Street Segments Existing and Future Proposed

Road Segment Level of Service (LoS)	Pedestrian PLoS		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLOS	TARGET	BLOS	TARGET	TLOS	TARGET	TKLOS	TARGET
Hunt Club both sides (E & F)	F	C	F	C	D	N/A	A	D
Riverside west side (E)	F	C	F	C	D	N/A	A	D
Riverside east side (E)	E	C	F	C	D	N/A	A	D
Riverside both sides (F)	D	C	A	C	D	N/A	A	D
(E) = existing; (F) = Future								

Pedestrian

- No road segment meets pedestrian PLoS desirable targets. Increasing the sidewalk width to greater than 2m wide with a greater than 2m boulevard, plus reducing and confirming the actual driven speeds on adjacent roadways to be 60km/h would meet the desirable pedestrian level of service.

Bicycle

- The cycling BLoS desirable targets were only met for future Riverside Drive road segment granted they build the proposed cycling facilities. No existing road segment met the desired BLoS due lack of cycling facilities and high operating speeds.

Transit

- The transit TLoS desirable targets were met for all applicable road segments.

Truck

- Riverside Drive and Hunt Club Road are truck routes, and the TkLoS desirable targets were met.

4.4. Access Intersection Design

4.4.1. Location and Design of Access

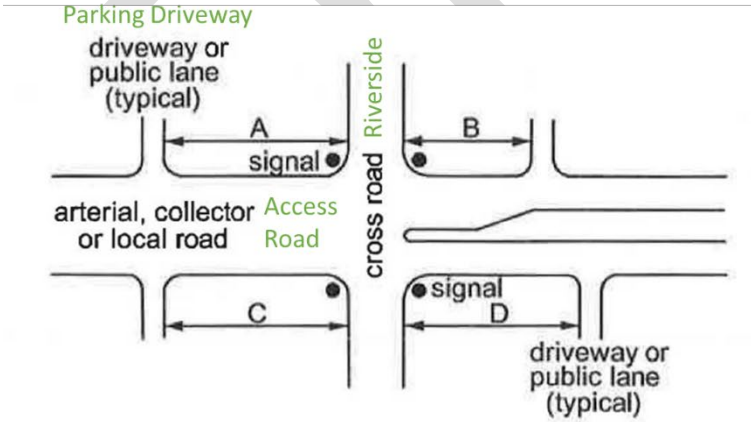
According to TAC Chapter 9, Section 9.4.2.1, a minimum signalized to signalized intersection separation of 200m is recommended. The nearest signalized intersection is Hunt Club/Riverside and which is located approximately 270m away, thus meeting the minimum recommended separation distance. However, it is recognized that southbound afternoon peak period queues can extend well north of the site access intersection from the Hunt Club/Riverside Drive.

Internal to the site, there are private approach driveways proposed from the apartment towers. In general, each building is anticipated to have less than 200 parking spaces each, which would require a distance from private approach to nearest intersection of 30 meters according to by-law (No. 2003-447) Section 25(m)(ii). The latest site concept generally meets these minimums, which will be confirmed during individual Site Plan Applications.

The connecting roadway to Riverside Drive has an access driveway to the Uplands Riverside Park parking lot, which is located approximately 25 meters from the newly proposed signalized intersection. The parking lot accommodates approximately 20 vehicle spaces. Due to having low volume demand, and limited alternative options available to provide parking to the Uplands Riverside Park, the available distance between Riverside Drive and the park parking lot is considered reasonable. Based on this design, it is anticipated that if any queues interfere with the ability to turn on to the parking lot, it would be of short duration. No spillback on to Riverside Drive is anticipated from internal congestion.

Furthermore, according to TAC Chapter 8 Figure 8.8.2 (as illustrated in **Figure 18**, a minimum clear distance between Riverside Road and the Uplands Riverside Park parking lot driveway of 15 meters is recommended, based on the access road being a local street. The location of the parking lot driveway is therefore considered reasonable given the circumstances.

Figure 18: TAC Corner Clearance Recommended Distance



item	min. clearance, m		
	arterial	collector [b]	local [b]
A	70 [c]	55	15
B	# [a]	25	15
C	70	55	15
D	70 [c]	55	15

4.4.2. Intersection Control

A traffic signal warrant at Riverside/Site Access was completed assuming peak hour forecast traffic volumes. The warrant for traffic signals was not met (66% achieved) due to low vehicle volumes forecasted to and from

the minor approach, predominantly eastbound left-turns. However, due to sightline concerns and historic high collisions recorded on this corridor, traffic signals are considered the preferred intersection control approach. The signal warrant analysis has been provided in **Appendix G**.

4.4.3. Intersection Design

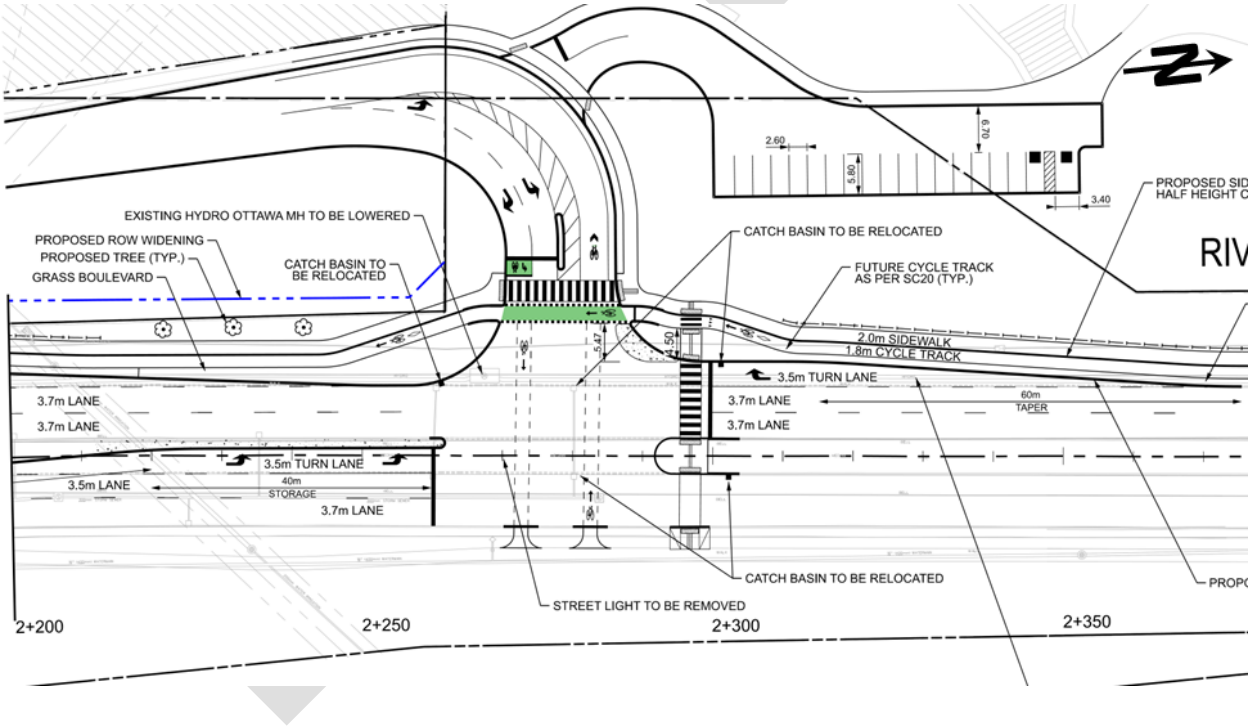
The proposed access road, to be designed to a local public road standard, will provide shared cycling and two-way vehicular access to Riverside Drive for the subdivision.

A conceptual intersection design drawing has been provided in **Figure 19** and submitted as a separate RMA package for City review. The outcome of the intersection capacity results in this study (**Section 4.9**) has confirmed the auxiliary lane requirements. **Appendix H** provides the intersection functional drawings, swept path maneuvers and sight line analysis.

The ultimate Riverside/Site intersection envisions a contemporary intersection design with crosswalks and uni-directional cycle facilities considered on the west leg of the future signalized intersection and a pedestrian crosswalk on the north leg. A south leg crosswalk has been omitted as there is little opportunity to connect pedestrians into the site on the east side of the entry road given the Riverside embankment requirements.

Cyclists will be provided signals to cross Riverside Drive opposite the eastbound approach. A left turn bike box facilitates this crossing ahead of the eastbound right turn, which will prohibit right-turns-on-red.

Figure 19: Future Riverside/Site Conceptual Sketch



4.5. Transportation Demand Management

4.5.1. Context for TDM

The subdivision is considered early in its development stages. Site plan control applications will be required for the respective apartment tower blocks which will provide a more fulsome representation of TDM measures to align the subdivision mode shares with area targets.

Sections 3.1.1 and **3.1.2** describe how many trips are anticipated per travel mode and anticipates the likely locations that they will travel to and from based on the OD-Survey 2011 for Hunt Club. The site is located within

600 meters of local bus routes near Hunt Club/Riverside intersection and within 800 meters of frequent bus route #90 near the Uplands/Riverside intersection, making it a viable candidate to promote transit use for residential trips.

4.5.2. Need and Opportunity

The proposed development will be accessed by Riverside Drive, which is currently operating above capacity during peak periods. With investments planned for new active transportation facilities on Riverside Drive, new opportunities for travel are immerging adjacent to the site. A focus on TDM measures to encourage sustainable active mode shares is recommended, to provide for an increase in non-auto modes that promote environmentally conscious ways of commuting. Such measures are described in more detail in **Section 4.5.3** below, but can include improvements to MMLOS conditions by providing improvements to pedestrian, cyclist and transit facilities as described in **Section 4.3** and **4.9** and safe and efficient connectivity to public transit as described in **Section 4.7**, to name a few.

4.5.3. TDM Program

The TDM infrastructure and measures checklist has been completed as a recommended draft list given that this application is to support a plan of subdivision. The draft measures have been provided in **Appendix I**. Some of the potential TDM measures that will be considered include:

- Unbundled car parking spot from monthly rent for apartment towers
- Easy and direct connection to sidewalks and proposed cycling facilities on Riverside Drive
- Provide local route maps and transit schedules
- Provide indoor bike parking for the apartment towers

4.6. Neighborhood Traffic Management

4.6.1. Adjacent Neighborhoods

The City of Ottawa TIA Guidelines has set vehicular thresholds for different classifications of roadways as follow:

- Local Roads: a maximum of 1,000 vehicles per day or 120 vehicles during the peak hour
- Collector Roads: a maximum of 2,500 vehicles per day or 300 vehicles during the peak hour
- Major Collector Roads: a maximum of 5,000 vehicles per day or 600 vehicles during the peak hour

The purpose of classifying roads is to assure that they are being used within their intention and design. Local roads for example are normally built to support slower travel speeds to accommodate safer movements of vehicles in and out of driveways, to accommodate for pedestrians or cyclists sharing the roads, and so forth. A collector road on the other hand is fed by various local roads to make a corridor with higher traffic volumes which feed into bigger major collectors and arterial roads.

The future projected 2029 volumes along the site access to Riverside Drive are anticipated to be approximately 170 peak hour volumes two-way during the AM and PM peak hours which is consistent with a minor collector road. Once passed the roundabout intersection internal to the site, the vehicle trips will dissipate and distribute within the internal roads, to be less than 120 vehicles per each segment, consistent with local roads. It is not anticipated that this development will impact internal local roadways to be higher than their denomination, nor the site access roadway to achieve major collector status, requiring upwards of 300 vehicles during peak hours.

It is also noteworthy that the access road and internal roads do not provide any connectivity to other neighbourhoods or roadway connections, and as such, they will not produce an increase in vehicular traffic from shortcutting or infiltrated vehicles into the community. Lastly, measures such as speed humps can be incorporated during Site Plan Application to promote 30km/h streets. For these reasons, the proposed internal roadways are all forecasted to operate as a local street classification.

4.7. Transit

4.7.1. Route Capacity

It is projected that approximately 60 'new' two-way transit trips by full buildout will be generated. The site is located within 600m of three different local transit routes and within 800m of frequent transit route #90 which operates in approximately 15-minute intervals during peak hours.

Given the high frequency of route #90 and the additional transit capacity available on nearby local routes, along with a relatively low transit ridership anticipated, there is expected sufficient capacity for transit routes near the site.

4.7.2. Transit Priority

There are no transit priority corridors near to the site and no transit routes operating through the newly proposed signalized Riverside/Site intersection.

4.8. Review of Network Concept

Exempt. See **Table 1**.

4.9. Intersection Design

4.9.1. Intersection Control

See **Section 4.4.2**.

4.9.2. Intersection Design

Multi-Modal Level of Service

As stated in the MMLOS Guidelines, only signalized intersections are considered for the intersection Level of Service measures. All intersections within the study area are signalized with the exception of the internal site intersections. The proposed access intersection connecting to Riverside Drive is also proposed as a signalized intersection. The MMLOS analysis is summarized in **Table 10**, with detailed analyses provided in **Appendix J**.

Table 10: MMLOS – Existing and Future Intersections

Intersection Level of Service (LoS)	Pedestrian PLoS		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLOS	TARGET	BLOS	TARGET	TLOS	TARGET	TKLOS	TARGET
Riverside/Uplands	F	C	F	B	C	D	-	N/A
Riverside/Hunt Club	F	C	F	C	F	D	A	D
Prince of Wales/Hunt Club	F	C	D	C	F	D	A	D
Riverside/Site	F	C	F	C	-	N/A	-	N/A

Pedestrian

- No intersection met the pedestrian minimum desirable target of PLoS 'C'. All intersections had a PLoS of 'F' predominantly based on the number of lanes that would need to be crossed for pedestrians crossing Riverside Drive or Hunt Club Road (note that the number of lanes was determined from dividing the crossing distance by 3.5m and not by actual visible lanes). No mitigation would lower the PLoS to a level close to the desired MMLOS target without significantly reducing the vehicle capacity on an already congested corridor.

Bicycle

- No intersections meet the cycling BLoS desirable target of 'C' or better due to the mixed cycling facilities with vehicles on a fast-operating road with various lanes to cross. Although Prince of Wales/Hunt Club offers improvements left-turning cyclists, cyclists are still expected to ride at grade with vehicles. Providing cycling facilities which are separated from vehicular circulation would meet the BLoS targets.

Transit

- Transit TLoS targets were met at Riverside/Uplands due to modest intersection delays for southbound left-turn and westbound right-turn bus movements.
- The remainder intersection had certain movements used by buses which surpassed 30 second delays and triggers the TLoS of 'E' or worse, exceeding the desired TLoS target of 'D' or better. There are no bus routes anticipated through Riverside/Site intersections.

Truck

- Only Riverside/Hunt Club and Prince of Wales/Hunt Club intersections has a truck route with possible turning movements. The TkLoS were met at both intersections.

Existing Conditions

The following **Table 11** provides a summary of the existing traffic operations at the study area intersection based on volumes from **Figure 7** and Synchro (V11) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The Synchro model outputs of existing conditions are provided within **Appendix K**.

Table 11: Existing Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LoS	Max Delay or v/c	Movement	Delay (s)	LoS	Max v/c
SIGNALIZED INTERSECTIONS						
Riverside/Hunt Club	F(F)	1.22(1.43)	EBL(EBL)	80.9(93.7)	F(F)	1.13(1.20)
Riverside/Uplands	F(C)	1.05(0.80)	NBT(WBT)	44.3(19.9)	E(C)	1.00(0.72)
Prince of Wales/Hunt Club	D(F)	0.89(1.29)	EBT(WBL)	39.4(60.8)	D(F)	0.87(1.01)
Note: Analysis of intersections assumes a PHF of 0.90 and a saturation flow rate of 1800 veh/h/lane						

As shown in **Table 11**, all the intersections within the subject area are currently operating 'as a whole' close to capacity or exceeding capacity during the AM and PM peak hours. All intersections have at least one or both peaks with a critical movement or more exceeding capacity, with an LoS 'F'.

Riverside/Hunt Club is of particular interest due to its heavier congestion and proximity to site access. Further analysis shows that the eastbound and westbound through movements and eastbound left-turn all operate at v/c of 0.99 or higher in both the AM and PM peaks. This shows heavy traffic volume travelling on Hunt Club, which is a major east-west arterial road with connections to Highway 417, Highway 416, Airport Parkway and other major links to name a few. Additionally, a heavy commuter northbound through movement was observed for the AM and a heavy southbound through for people returning from downtown to the suburbs in the PM is evident. Additionally, long queues have been observed, for both east-west movements during the AM and PM peak as well as the northbound movement in the AM and southbound movement in the PM. These regional commuter patterns from downtown to suburbs are unlikely to change.

Although congestion is shown to be heavy at times, particularly at Riverside/Hunt Club and Prince of Wales/Hunt Club, it is important to acknowledge that these intersections are major arterial to arterial connections and are generally accepted within the City of Ottawa to operate above capacity during the peak hours.

Background Conditions

As discussed in **Section 3.2**, a conservative 0% annual growth was implemented plus other area developments added to estimate background traffic conditions. As such, the 2025 and 2029 background volumes will be the same and future intersection performance is anticipated to remain similar. **Figure 12** shows the projected background volumes for future years. The projected operational results are shown in **Table 12**. The detailed Synchro results can be found in **Appendix L**.

Table 12: 2025 and 2029 Background Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LoS	Max Delay or v/c	Movement	Delay (s)	LoS	Max v/c
SIGNALIZED INTERSECTIONS						
Riverside/Hunt Club	F(F)	1.10(1.30)	EBL(EBL)	60.1(71.7)	F(F)	1.02(1.08)
Riverside/Uplands	E(C)	0.93(0.77)	NBT(WBT)	28.8(17.0)	D(B)	0.89(0.65)
Prince of Wales/Hunt Club	D(F)	0.82(1.02)	NBT(WBL)	36.3(46.6)	C(D)	0.79(0.90)
Note: Analysis of intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane						

As seen in **Table 12**, all intersections show a general improvement in operations, predominantly due to the reduction in peak hour factor from 0.90 for existing conditions to 1.00 for future conditions, as instructed by the City of Ottawa TIA Guidelines. Although all intersections show a general improvement, Riverside/Hunt Club continues to operate 'as a whole' above capacity and Prince of Wales/Hunt Club continues to have a critical movement over capacity. The trends observed for existing are still occurring for future background conditions.

Future Conditions Phase 1 - 2025

The future projected interim Phase 1 volumes for 2025 are illustrated in **Figure 20**, which assumes the layering of Phase 1 site generated traffic volumes on to the background volumes.

By this point, it is anticipated that the Riverside/Site intersection will be built to full buildout with a traffic signal. The Riverside/Site intersection has been modelled as follows:

- Two northbound and two southbound through lanes
- 40m northbound left-turn lane
- 15m southbound right-turn lane
- A single eastbound left-turn and a single right-turn lane
- Pedestrian phase for the north and east legs only
- No right on red for EBR movement and protected NBL phase

Additionally, the Riverside/Hunt Club intersection is anticipated to have its southbound storage lanes extended:

- Southbound right-turn lane extended to approximately 200 meters
- Southbound left-turn lane extended to approximately 150 meters

The projected traffic volumes are summarized in **Table 13**, with detailed Synchro results provided in **Appendix M**.

Figure 20: Phase 1 - 2025 Total Projected Peak Hour Traffic Volumes

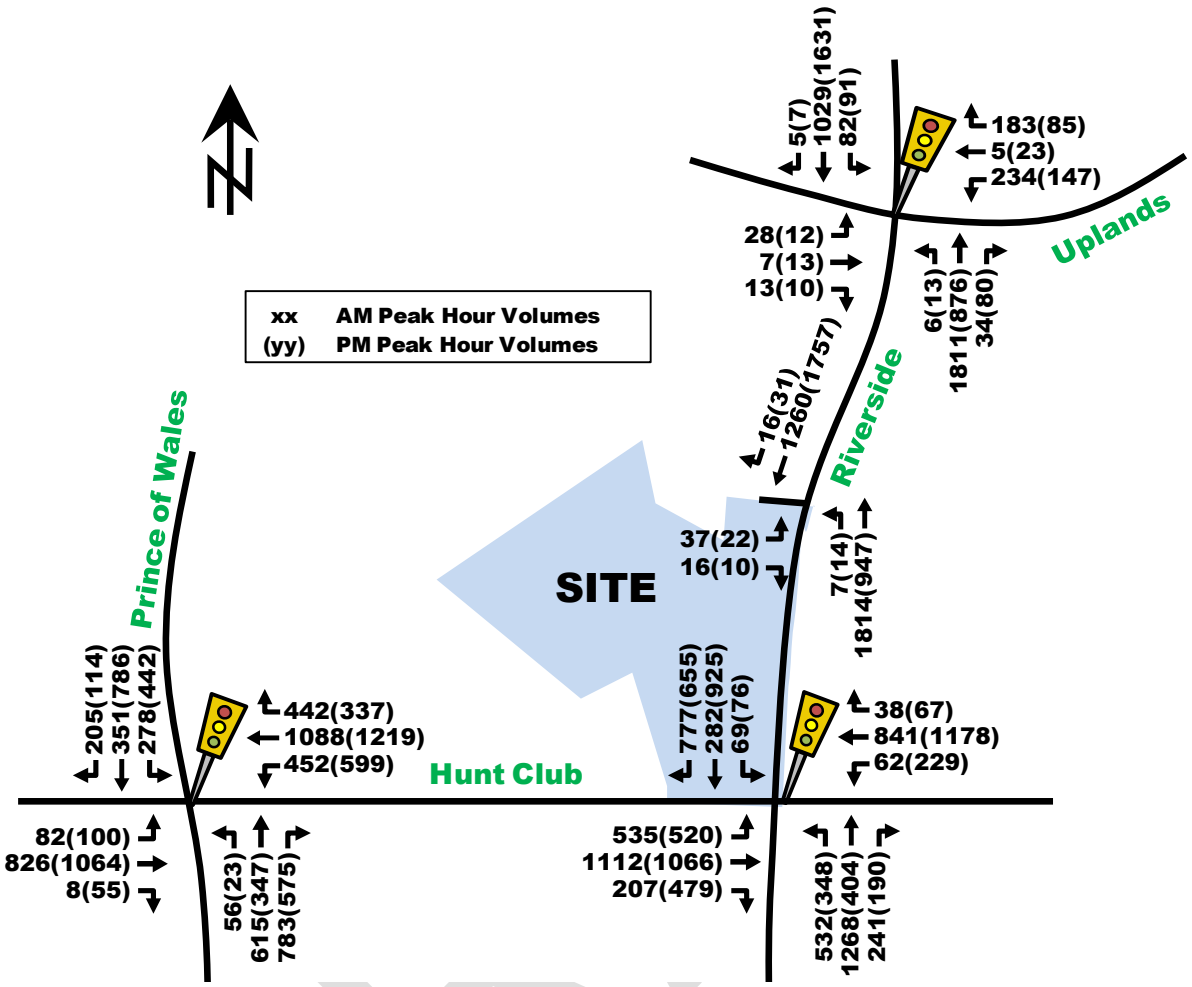


Table 13: Phase 1 - 2025 Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LoS	Max Delay or v/c	Movement	Delay (s)	LoS	Max v/c
SIGNALIZED INTERSECTIONS						
Riverside/Hunt Club	F(F)	1.03(1.08)	NBT(EBL)	59.2(69.2)	F(F)	1.01(1.08)
Riverside/Uplands	D(C)	0.90(0.77)	NBT(WBT)	26.4(15.8)	D(B)	0.88(0.66)
Riverside/Site	B(B)	0.65(0.65)	NBT(SBT)	9.1(16.0)	B(B)	0.64(0.64)
Prince of Wales/Hunt Club	D(E)	0.82(0.94)	NBT(SBL)	36.4(45.3)	C(D)	0.79(0.90)
Note: Analysis of intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane; signal timing optimized						

As seen in Table 13, all study area intersections are expected to operate similarly to background conditions. Note that the timing plan for Riverside/Hunt Club and Prince of Wales/Hunt Club was optimized to improve performance while maintaining the same cycle length and protected phasing. By optimizing the timing plan, Prince of Wales/Hunt Club no longer has a critical movement above capacity; however, Riverside/Hunt Club continues to operate slightly above capacity.

The new Riverside/Site intersection is shown to operate well, even though it was modelled with more conservative timing plan including no right on red for eastbound approach and protected northbound left-turn.

Overall, no modifications to intersection geometry are recommended on a capacity perspective.

Future Conditions Phase 2 – 2029 Full Buildout

The future projected interim Phase 2 Full-Buildout volumes for 2029 are illustrated in **Figure 21**, which assumes the layering of Phase 2 site generated traffic volumes on to the background volumes. The projected intersection performance is shown in **Table 14** with detailed output in **Appendix M**.

Figure 21: Phase 2 – 2029 Full-Buildout Total Projected Peak Hour Traffic Volumes

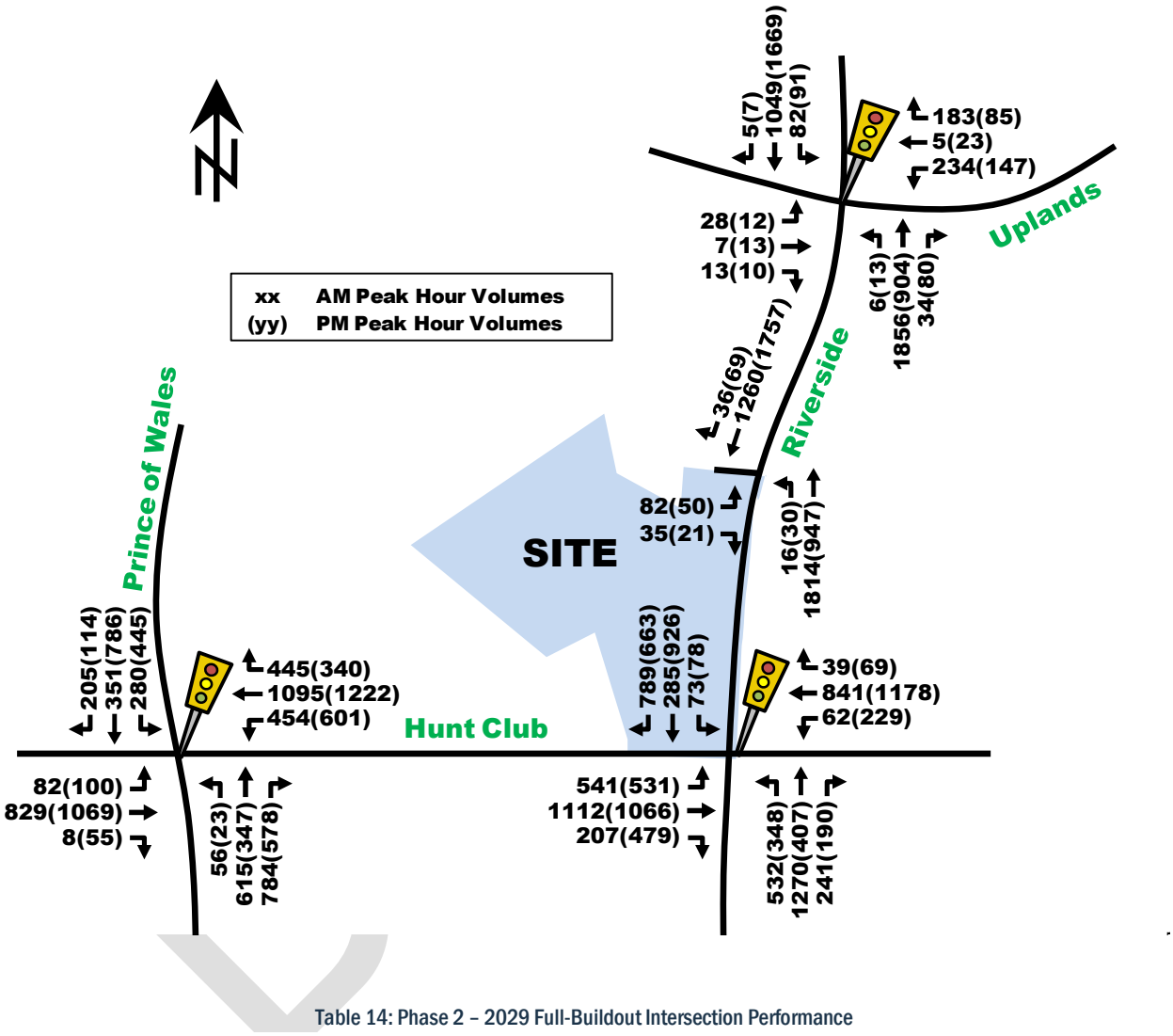


Table 14: Phase 2 – 2029 Full-Buildout Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LoS	Max Delay or v/c	Movement	Delay (s)	LoS	Max v/c
SIGNALIZED INTERSECTIONS						
Riverside/Hunt Club	F(F)	1.04(1.10)	NBT(EBL)	59.6(69.8)	F(F)	1.01(1.08)
Riverside/Uplands	E(C)	0.93(0.77)	NBT(WBT)	26.9(16.7)	D(B)	0.90(0.67)
Riverside/Site	B(B)	0.66(0.70)	NBT(SBT)	11.6(19.3)	B(B)	0.65(0.68)
Prince of Wales/Hunt Club	D(E)	0.82(0.94)	NBT(SBL)	36.5(45.5)	C(D)	0.79(0.90)

Note: Analysis of intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane; signal timing optimized

As seen in **Table 14**, the 2029 Phase 2 of the development is anticipated to operate similarly to the Phase 1 2025 horizon year and also the future background conditions.

As explained in existing conditions, Riverside/Hunt Club intersection connects two major commuter arterial roads, linking suburbs like Barrhaven and Riverside South to the downtown core and providing east-west major connectivity between Merivale District, Hunt Club District and major highways such as the 416 and 417. These commuter behaviors are unlikely to change; however, when comparing existing conditions to future full buildout conditions, the overall intersection performance is forecasted to operate similarly to better in the future.

Overall, no modifications to intersection geometry are recommended on a capacity perspective.

Queueing Analysis

The following analysis focuses on queueing at the newly proposed signalized intersection as well as the downstream Riverside/Hunt Club southbound right-turn and southbound through movement, to assure that spillback doesn't occur on to the site access intersection.

The queueing results were based on Synchro and SimTraffic outputs, using the most critical 2029 Phase 2 full-buildout horizon. The following **Table 15** summarizes queuing results. The SimTraffic outputs have been provided in **Appendix N**.

Table 15: Queueing Analysis for 2029 Full-Buildout of Development

Movement	Weekday AM Peak (PM Peak) Queueing Analysis			
	Capacity	95th % Synchro	50th % SimTraffic	95th % SimTraffic
Riverside/Site NBL	40m	11 (#19)	2 (9)	9 (23)
Riverside/Site SBR	15m	m4 (m17)	4 (9)	18 (26)
Riverside/Site EBRL	-	30 (22)	9 (15)	22 (29)
Riverside/Hunt Club SBR	200m[1]	0 (0)	202 (200)	232 (242)
Riverside/Hunt Club SBT	270m	53 (#203)	217 (239)	326 (296)

1. The Riverside/Hunt Club SBR is currently approximately 110m but is proposed to be extended to approximately 200m.

As seen in **Table 15**, the Riverside/Site southbound right-turn appears to be above its storage capacity for the PM peak; however, a closer inspection of the simulations show that these higher readings are an effect of queueing overspill from Riverside/Hunt Club southbound. It was observed that once a vehicle advances through the through moving southbound flow on Riverside Drive to the beginning of the right-turn storage lane, that vehicles would enter the lane and quickly turned right, producing no actual queues on the southbound right-turn storage lane.

The existing Riverside/Hunt Club southbound right-turn is approximately 110 meters but proposed to increase to 200 meters. During the peak hours, queues are occasionally forecasted to exceed its capacity, even with the increase in storage length. It is recommended that the storage length do not extend all the way to the new Riverside/Site access as that could promote vehicles using the Riverside/Site southbound right-turn storage lane to continue straight.

5.0 FINDINGS AND RECOMMENDATIONS

Based on the results summarized herein the following findings and recommendations are provided:

Existing Conditions

- The site is currently a vacant lot with a small gravel roadway to a golfing range pumping station.

- Bus stops for frequent transit route #90 are located approximately 800-meter walk from the subject site and closer local transit routes #96, #197, #198 and #199 are located between 300 to 600-meter walk from the site.
- Historical collision records confirm elevated incident typical of major urban arterial to arterial intersections in the City. The Riverside/Hunt Club intersection was noted as a sensitive location, with a high level of collisions per million entering vehicles. Given that the new site access will be located close to this sensitive intersection, it has been recommended that a signalized intersection for the site be built and measures such as protected northbound left-turns into the site and protected site access egress be considered (such as no right on red entering Riverside Drive from the site).
- All existing study area intersections have at least one critical movement in the AM or PM peak hour, or both, operating above capacity LoS 'F'. Additionally, the Riverside/Hunt Club and Prince of Wales/Hunt Club both operate overall above capacity, which is considered acceptable given their major corridor arterial to arterial intersection.

Proposed Development

- The proposed development is envisioned in two phases:
    - Phase 1 (2025): proposes approximately 24 single homes, 53 townhomes and a single 17-storey apartment block with 183 units.
    - Phase 2 (2029): proposes the addition of approximately 407 additional apartment units.
- Phase 1 is forecasted to generate approximately 75 'new' two-way vehicle trips, 30 'new' two-way transit trips and 15 'new' two-way active transportation trips.
- Phase 2 is forecasted to generate approximately 170 'new' two-way vehicle trips, 60 'new' two-way transit trips and 35 'new' two-way active transportation trips.
- The site proposes an access road connecting to Riverside Drive that will be classified a local road. The internal roads propose 2m wide sidewalks which connect to future proposed sidewalk and cycling facilities on Riverside Drive, along with a new pathway fronting the Rideau River to the west.
- TDM measures are encouraged for the site, including but not limited to unbundled car parking spots from monthly rent for apartment towers.

Future Conditions

- Peak hour traffic volumes from nearby adjacent developments were incorporated into the future traffic volume projections and a background growth rate of 0% on study area intersections was applied.
- Pedestrian and cycling facilities are proposed within the site which connect to existing and proposd facilities on Riverside Drive.
- The MMLOS road segment analysis confirmed boundary streets conditions did not meet MMLOS area targets for pedestrians due to the narrow existing sidewalks, lack of boulevard and posted speeds. The bike BLoS target was only met on future Riverside Drive if cycling facilities are built. The lack of existing cycling facilities produces an undesirable BLoS.

  The transit TLoS and truck TkLoS targets for MMLOS road segment categories were met.
- The MMLOS intersection analysis showed that all truck target goals were met. Transit targets were met at Riverside/Uplands intersection only, given the estimated delays for existing movements.

  Bicycle targets were not met at any intersection due to shared cycling and vehicular facilities.

The pedestrian targets were not met at any intersection due to the quantity of lanes required to cross Riverside Drive, Hunt Club Road and Prince of Wales Drive.

- A traffic signal warrant was completed, and a traffic signal was found not to be warranted; however, due to sight line issues, potential for significant vehicle turning delays, and general collision history sensitivity, a traffic signal is recommended at this location. The traffic signal is recommended to have a protected northbound left-turn phase and no right on red for the eastbound approach.
- All study area intersections were shown to operate better than existing conditions, in part due to the reduction in peak hour factor from 0.9 to 1.0 as outlined by TIA guidelines for future conditions and due to signal cycle phase optimization in future conditions. Despite these improvements, the intersection of Riverside/Hunt Club will continue to operate at capacity, while all other intersections are forecasted to operate acceptably to well.
- The 2029 full buildout queuing analysis confirmed the following:
    - A 15m for southbound right-turn at site access is sufficient,
    - A 40m for northbound left-turn lane at site access is sufficient, and
    - Extending the southbound right-turn lane as far as possible at Riverside/Hunt Club is recommended, without reaching the Riverside/Site access.
- The traffic implications will be revisited during the site plan control for future phases of the proposed subdivision development.

Overall, based on the preceding report, the proposed development can be supported by the transportation network at the 2025 and 2029 horizon years. The development shall consider various TDM initiatives to promote sustainable travel choices for its residents and reduce the vehicular impacts on the adjacent network. Based on the preceding report, the proposed St. Mary's Development located at 3930-3960 Riverside Drive is recommended from a transportation perspective.

Prepared By:

Juan Lavin, E.I.T.

Transportation Analyst

Reviewed By:

Jake Berube, P.Eng.

Transportation Engineer

Appendix A:

Screening Form

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9 December 2022

City of Ottawa
Development Review Services
110 Laurier Avenue West
Ottawa, ON K1P 1J1

Attention: Wally Dubyk, P.Eng.

Dear Mr. Dubyk:

Re: 3930-3960 Riverside Drive, St. Mary's Plan of Subdivision TIA Forecasting Report Review – Response to City Comments

The following response form has been prepared to address City of Ottawa Step 3: Forecasting (November 7th, 2022) comments received on November 28, 2022. City comments are noted in black with the corresponding responses from Parsons in Blue.

Transportation Engineering

Initial Concept Plan Comments:

Comment 1. Review the location of the proposed parking lot access for Uplands Riverside Park in relation to its proximity to the proposed signalized intersection. Reference the Private Approach By-Law and the TAC Geometric Design Guide for Canadian Roads by TAC.
Noted. The Uplands Riverside Park parking lot location is based on prior City of Ottawa consultation with the Parks and Recreation group. It conforms to the existing park layout for a what amounts to a relatively small parking lot. It is recognized that, in terms of access spacing, additional distance would be ideal.

Comment 2. Identify additional connection points between the multi-use pathway on the west side of the development and the internal road network.

- Between the towns (Block 56) and large singles (Block 1)
- Between the apartment building in the southwest corner of the site and the towns (Block 67)

MUP connections have been identified, as noted. An additional connection nearest the park (Singles Block 17) is also envisioned.
Note that the connection between Block 56 and Block 1 will also need to provide for infrequent vehicle access (pick-up truck / passenger car) to allow the adjacent Golf Course access to the pump house located east of the site.

Comment 3. Per Element 4.1.1 of the TIA Guidelines, OC Transpo's service design guideline for peak period service is to provide service within a 400m walk of the home of 95% of urban residents. The walking route between the development and bus stops at the Hunt Club Road and Riverside Drive intersection is in-direct and does not meet this standard. While it is understood that the site grades are challenging, a more direct pedestrian connection between the internal road network and the Hunt Club Road and Riverside Drive intersection must be explored. Options may include ramps, stairs, and/or a public lobby and elevator within one of the 12-storey apartment buildings.
Noted within the TIA. There may remain the opportunity to bring transit nearest the site access intersection per a previous OC Transpo comment. Additional options can be reviewed at the time of site plan.

Comment 4. Additional cycling connectivity should be provided along the main access road (between the proposed roundabout and Riverside Drive) and east-west across Riverside Drive. Additional comments will be provided as part of the circulation of the draft general arrangement drawings for the 3930 & 3960 Riverside Drive roadway modifications.

The access road is intended to be a local, shared facility. The intersection design has incorporated features to improve the connection from Riverside to the site. Additionally, cycling connections are envisioned to be available through the park on the north side of the site.

Section 2.1.2 Existing Conditions:

Comment 5. Road Safety:

- Please provide a summary table for the collision type, direction of travel, etc.
- At Hunt Club Road and Riverside Drive, it is noted that the number of collisions per million entering vehicles (MEV) is greater than 1, in additional to threshold of 6 events/5-year cumulative data. With such a high collision rate in the area, consider an independent Road Safety Audit for the proposed Riverside Drive modifications.

Summary tables have been provided in the appendix.

Comment 6. Pedestrian/Cycling Network: Approximately 125m north of Hunt Club Road, the Riverside Drive northbound bike lane ends (as noted in the TIA). Please also note that at that same point there is a curb depression that allows northbound cyclists to access either the asphalt maintenance strip or the sidewalk, which is signed as a "shared sidewalk".

Text and figure updated in report.

Section 2.1.3.1 Other Area Developments:

Comment 7. The last sentence of this section references Jamie Avenue and Merivale Road. It appears to be a copy-paste error and should be updated.

Noted, text fixed.

Section 2.2 Study Area and Time Periods:

Comment 8. Justify why full build-out + 5 years (2034) is not included as a horizon year.

The TIA assumptions reflect the previous 2018 submission. Given that the known area developments are assumed to be completed by the 2029 horizon and that peak-hour future background growth is limited, then the 2029 analysis would be identical to that of a build-out + 5-years (2034).

Section 2.3 Exemption Review:

Comment 9. Provide more detail on what elements of Modules 4.1-4.4 are exempt. Only Element 4.1.2, 4.2.1, and 4.2.2 should be exempt.

Table adjusted to reflect the 2018 submission and the nature of the submission being to support a Plan of Subdivision.

Comment 10. Discuss whether Module 4.5 and Module 4.6 are exempt or whether they will be included in the TIA Strategy submission.

Modules 4.5 and 4.6 were included in the report.

Section 3.1.1 Trip Generation and Mode Share:

Table 2, Column 3 (Data Source): please correct to show ITE code, not TRANS code.

Text updated in report.

Comment 11. Rationale for the reduction in transit mode share is provided. However, there is no rationale for why the walking mode share was reduced. Please clarify.

Noted, revised mode shares that reflect the TRANS mode shares for Hunt Club more closely with respect to walking and cycling. As noted previously, a conservative assumption has been made regarding forecast auto and transit mode shares.

Section 3.3 Demand Rationalization:

Comment 12. The demand rationalization section should include an initial traffic analysis to determine where total auto demand is projected to exceed capacity, and by how much. The demand rationalization module is therefore incomplete.

As per the 2018, site observations and the analysis undertaken in Section 4.9, peak hour movements are considered to have demands that far exceed capacity. While demand rationalization typically identifies targets of mode shifts, peak period spreading, and alternate route choices, it is likely that people travelling through this junction have made the necessary shifts. Therefore, there is little opportunity to adjust demand that can reflect reality. The TIA assumes limited background growth in the peak hour as any further peak-directional traffic would likely cause additional peak spreading.

Traffic Signal Design

Comment 13. Based on the information provided in the TIA Forecasting Report, the installation of a new traffic control signal at Riverside Drive & 270m North of Hunt Club Road and modifications to existing traffic control signal at Riverside Drive & Hunt Club Road will be required to facilitate the proposed development at 3930-3960 Riverside Drive.

The City's Traffic Signal Design & Coordination Unit will be required to be engaged during the development and planning of the functional design, to determine requirements at traffic signals (existing & proposed). An agreement on the functional design of must be met prior to an RMA submittal and prior to a request to initiate signal design activities.

Please contact Jon Pach: at 613-806-0142 or jon.pach@ottawa.ca and/or Christopher Geen: 613-227-0674 or Christopher.Geen@ottawa.ca to discuss traffic control signal requirements related to the proposed development and subsequent road modifications adjacent to the site.

Please note that the City's Traffic Signal Design & Coordination Unit staff prepare the detail design of traffic plant and interconnect for all traffic signal-related work and any pedestrian crossover (PXO) Type B or C designs. City Traffic Operations staff perform signal installation work pertaining to all above-ground signal infrastructure and wiring. For commencement of signal design, please forward the approved geometry detail design drawings in .dwg digital format and in NAD 83 coordinates, along with the items listed below, each in separate .dwg format files:

- base mapping,
- new underground utilities/sewers, and catch basin locations,
- existing underground utilities/sewers, and catch basin locations
- AutoTurn-Radius Modeling for approved vehicles and
- signs & pavement markings drawings

*No Xref files are to be attached in each master file(s) and files must be in 2D.

Please note that final approval for traffic signal layout, regulatory signage and pavement markings at signalized intersections rest with the Traffic Signal Design & Coordination Unit.

Noted. As the design progress beyond the RMA to a detailed design phase, Traffic Signal Design & Coordination will be contacted throughout the process, including regarding the design of the site access intersection.

Traffic Engineering

Comment 14. Concerns with proposed signal at site entrance. This has been reviewed previously and found to be problematic with Hunt Club & Riverside.

The intersection configuration thus far has undergone significant review with the City of Ottawa. The design configuration will be continued to be refined through the City RMA and detailed design processes.

Comment 15. All traffic signals within 1 km of site should be included in analysis.
Noted. For this study, the study area selected was based on the previously approved Steps 1-thru-5 St. Mary's Subdivision TIA (June 2018). The current TIA efforts represent an update to the previous study methodology and assumptions.

Comment 16. Pedestrians and transit users should be included in any future synchro analysis as there are no transit stops fronting the site, they will need to access transit stops which are walking distance.
Noted, active transportation trips added to Synchro files.

Comment 17. 55% modal split for auto driver is reasonable, but consideration should be given if targets are not met considering that this area is currently not served by transit on the frontage.
Noted. The modal split was justified with a significant primary driver mode share based on the site context and proposed residential use, which is well above the existing auto mode share of 38% / (43%). During the site plan control applications, specific TDM measures can be reviewed to mitigate an increased reliance on the auto trip.

Comment 18. - Are there opportunities in the future to see about extending southbound right-turn storage given existing issues and future 20% destination west on Hunt Club Road?
The current RMA lane arrangement has significant history with City staff, of which an extended right turn was considered as an option with merit. However, following the review process, the present option which does not allow for the right turn to queue through the site intersection was selected.

Comment 19. - Please provide clarification on future traffic signal design i.e.: cycling facilities & pedestrian facilities. Operation will need to be reviewed for storage lengths, etc., and how that will operate in existing road network.

The proposed intersection design was first established in 2018 based on a plan of subdivision that was considered more intense for auto demand. The design has since been refined based on the PIDG/OTM latest guidelines and submitted for City of Ottawa comment in early November 2022. Comments have since been received and address under a separate letterhead submitted with the Strategy Report.

The Strategy Report includes additional operational details to inform the site access intersection design. The storage lengths have been selected based on the forecast travel demand, with particular attention to queues extending from Riverside/Hunt Club road and an understanding of existing peak hour conditions.

PARSONS

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City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date	11.4.2022
Project	St. Mary's Plan of Subdivision
Project Number	478418 - 01000

Results of Screening	Yes/No
Development Satisfies the Trip Generation Trigger	Yes
Development Satisfies the Location Trigger	Yes
Development Satisfies the Safety Trigger	Yes

Module 1.1 - Description of Proposed Development	
Municipal Address	3690 & 3630 Riverside Drive
Description of location	Northwest quadrant of Riverside Drive/Hunt Club Road
Land Use	Residential
Development Size	24 singles. 53 townhouses, approx. 590 apartment units
Number of Accesses and Locations	1 traffic signal acces to Riverside Drive
Development Phasing	Two Phases
Buildout Year	Estimated 2029
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	600	Units
Trip Generation Trigger Met?	Yes	

Module 1.3 - Location Triggers	
Development Proposes a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit, or Spine Bicycle Networks (See Sheet 3)	Yes
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	Yes
Location Trigger Met?	Yes

Module 1.4 - Safety Triggers		
Posted Speed Limit on any boundary road	<80	km/h
Horizontal / Vertical Curvature on a boundary street limits sight lines at a proposed driveway	No	
A proposed driveway is within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions) or within auxiliary lanes of an intersection;	No	
A proposed driveway makes use of an existing median break that serves an existing site	No	
There is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development	Yes	Known capacity constraints along Hunt Club, Riverside, Prince of Wales
The development includes a drive-thru facility	No	
Safety Trigger Met?	Yes	

RIDEAU RIVER AND CANAL

LARGE SINGLES

TOWNS

TOWNS

TOWNS

TOWNS

TOWNS

PARK
.380 Ha

PARK
.380 Ha

UPLANDS RIVERSIDE PARK

T4
APARTMENT
9 FLOORS
9,289m²

T3
APARTMENT
11 FLOORS
11,502m²

T2
APARTMENT
14 FLOORS
13,323m²

T1
APARTMENT
17 FLOORS
15,340m²

4 STOREY PODIUM

5 STOREY PODIUM

5 STOREY PODIUM

AREA 'A'
SCHEDULE 251

TO EXISTING

EASEMENT

FUTURE

FUTURE

HUNT CLUB

RIVERSIDE DRIVE

RIVERSIDE DRIVE

RIVERSIDE DRIVE

RIVERSIDE DRIVE

FUTURE TRAFFIC SIGNAL

20 40 60 80 100 200ft
0 10 20 30 40 50 60m

3930 & 3960 RIVERSIDE DRIVE

NEW RESIDENTIAL COMMUNITY SITEPLAN

SCALE 1:750

December 21, 2022

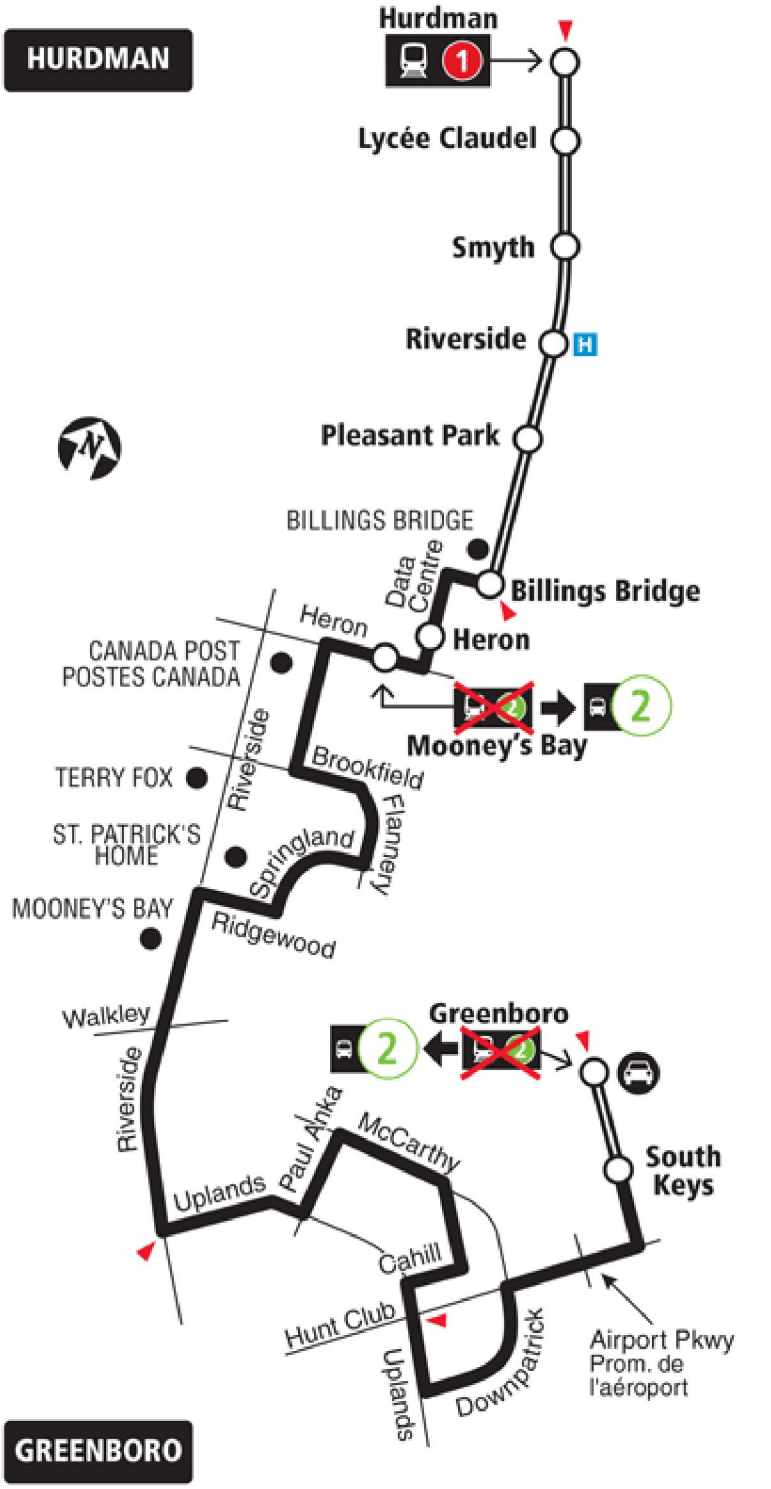
TAGGART REALTY MANAGEMENT

HOBIN ARCHITECTURE

Appendix B:

Transit Route Maps

OC Transpo Route #90

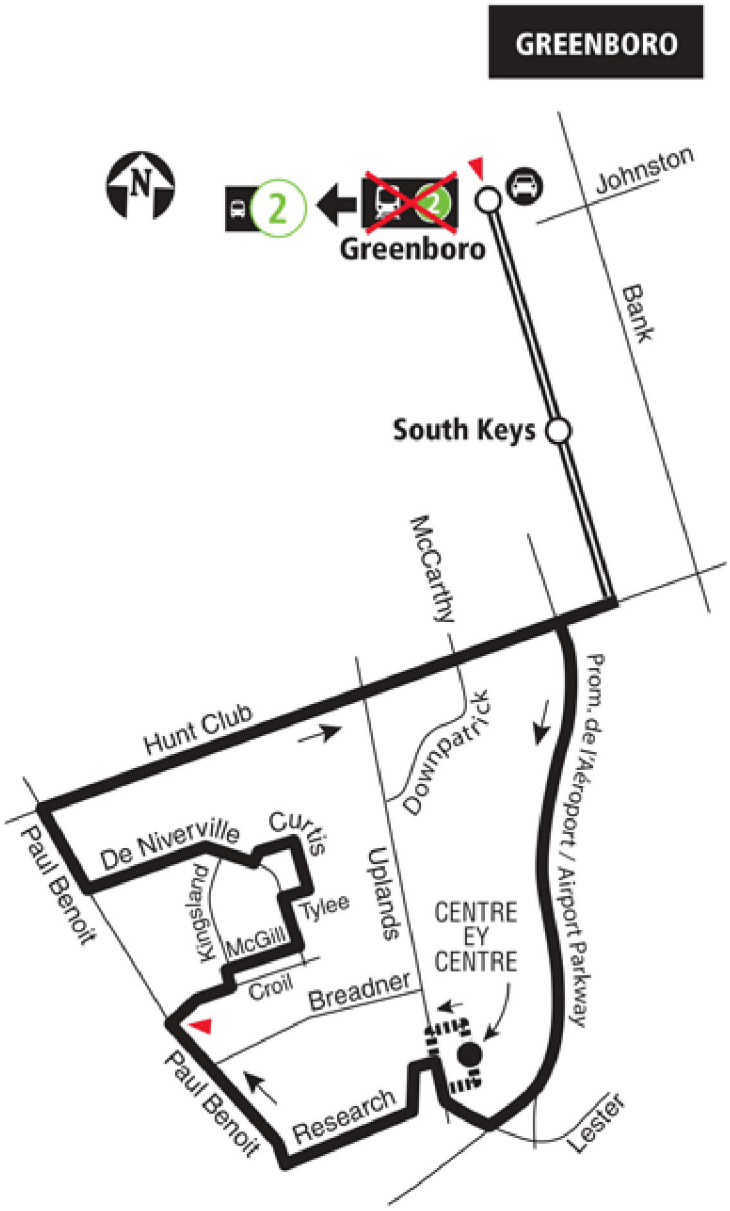


2020.04

OC Transpo Route #96

2019.06

OC Transpo Route #197



Transitway & Station

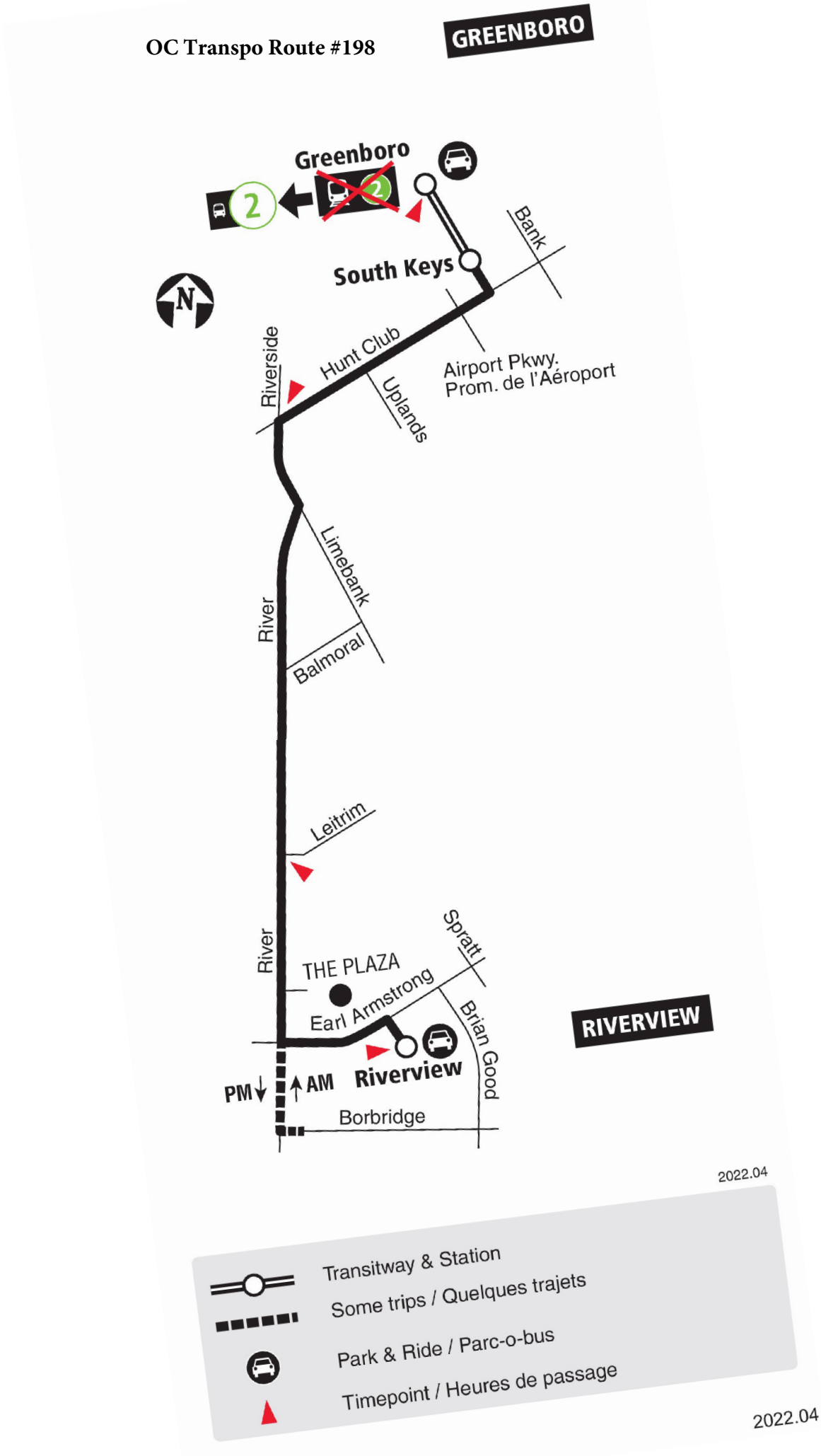
Monday to Friday after noon and all day
Saturday and Sunday / Lundi au vendredi après 12 h et toute la journée samedi et dimanche

Park & Ride / Parc-o-bus

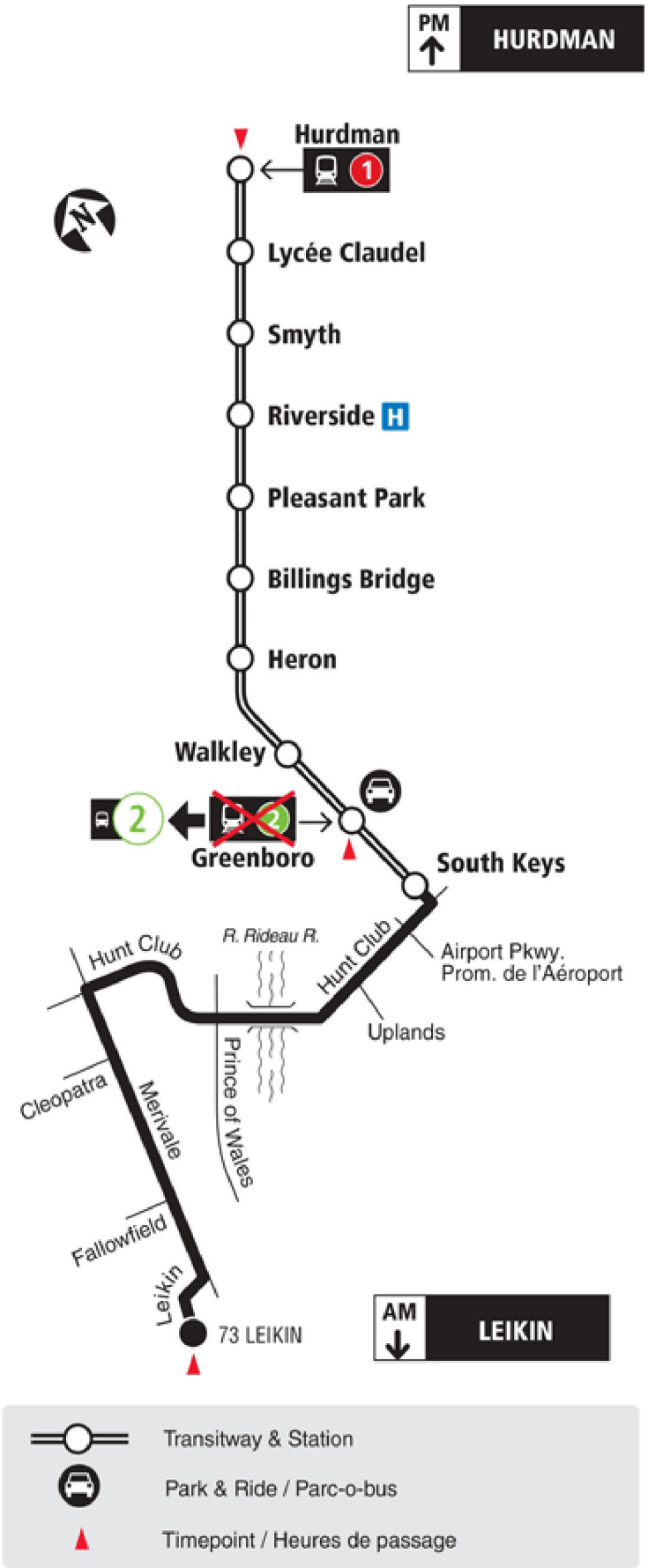
Timepoint / Heures de passage

2020.04

OC Transpo Route #198



OC Transpo Route #199



2020.04

Appendix C:

Traffic Data

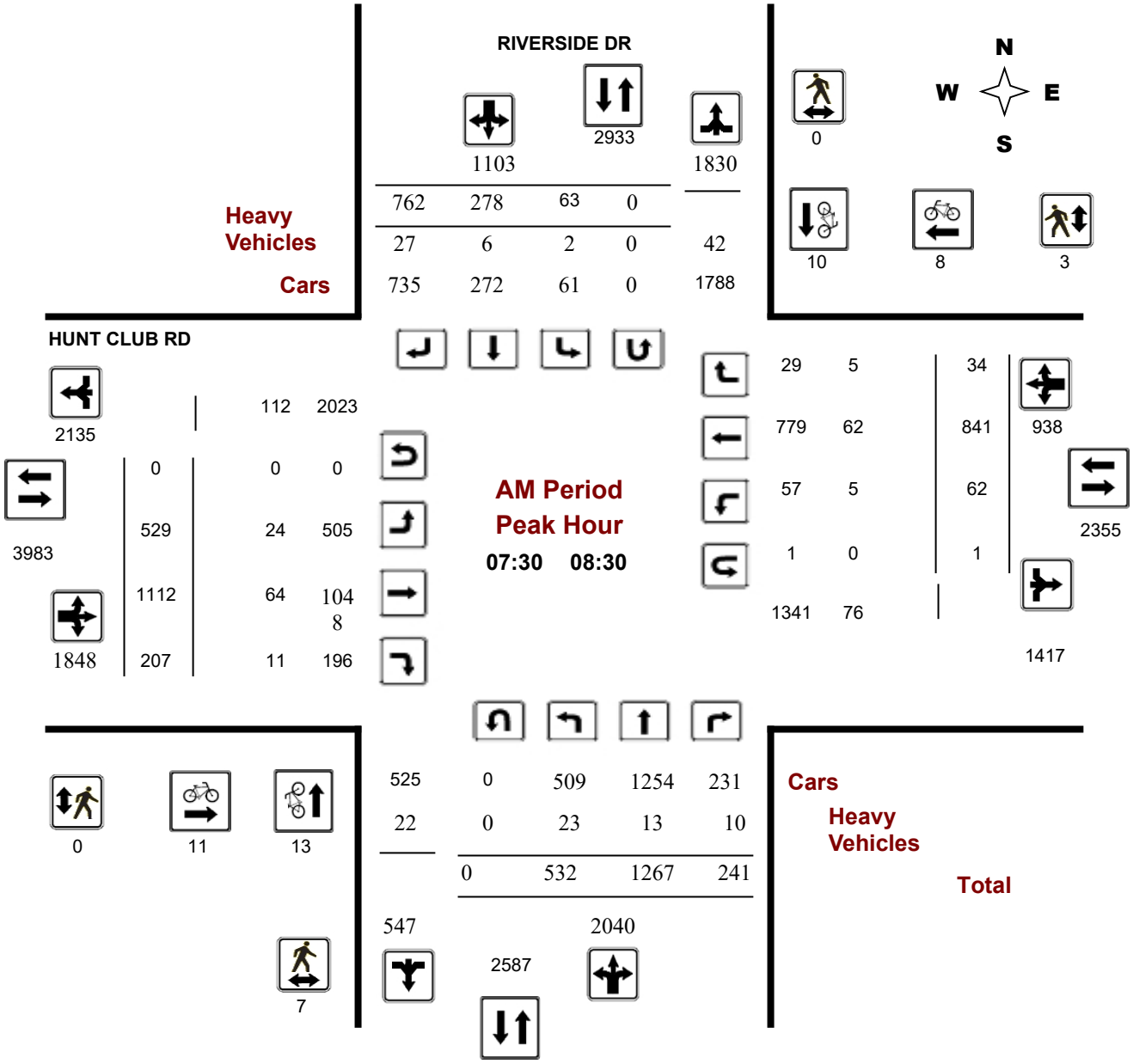
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HUNT CLUB RD @ RIVERSIDE DR

Survey Date: Wednesday, June 12, 2019 **WO No:** 38654

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



Comments

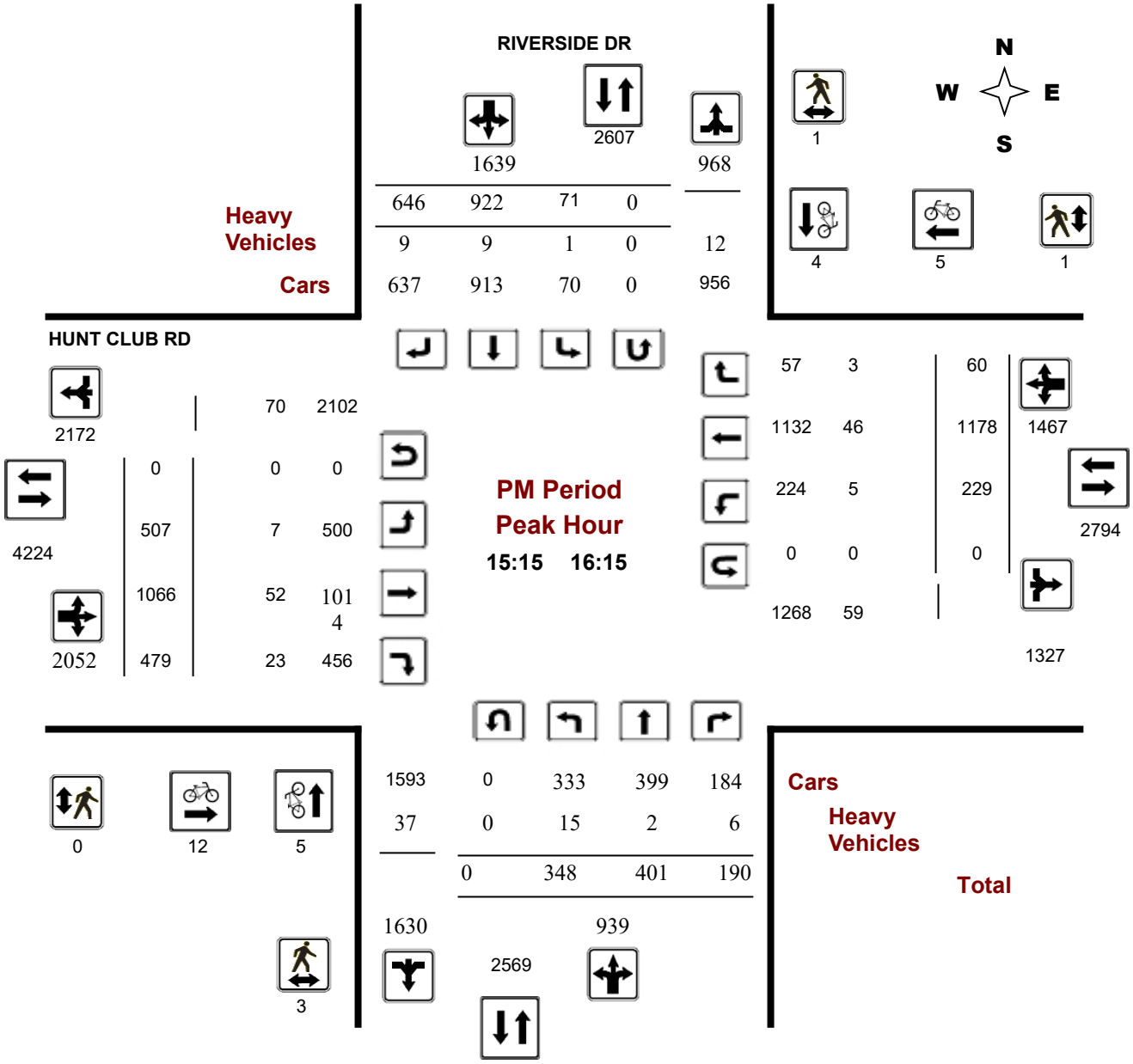
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HUNT CLUB RD @ RIVERSIDE DR

Survey Date: Wednesday, June 12, 2019 **WO No:** 38654

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



Comments

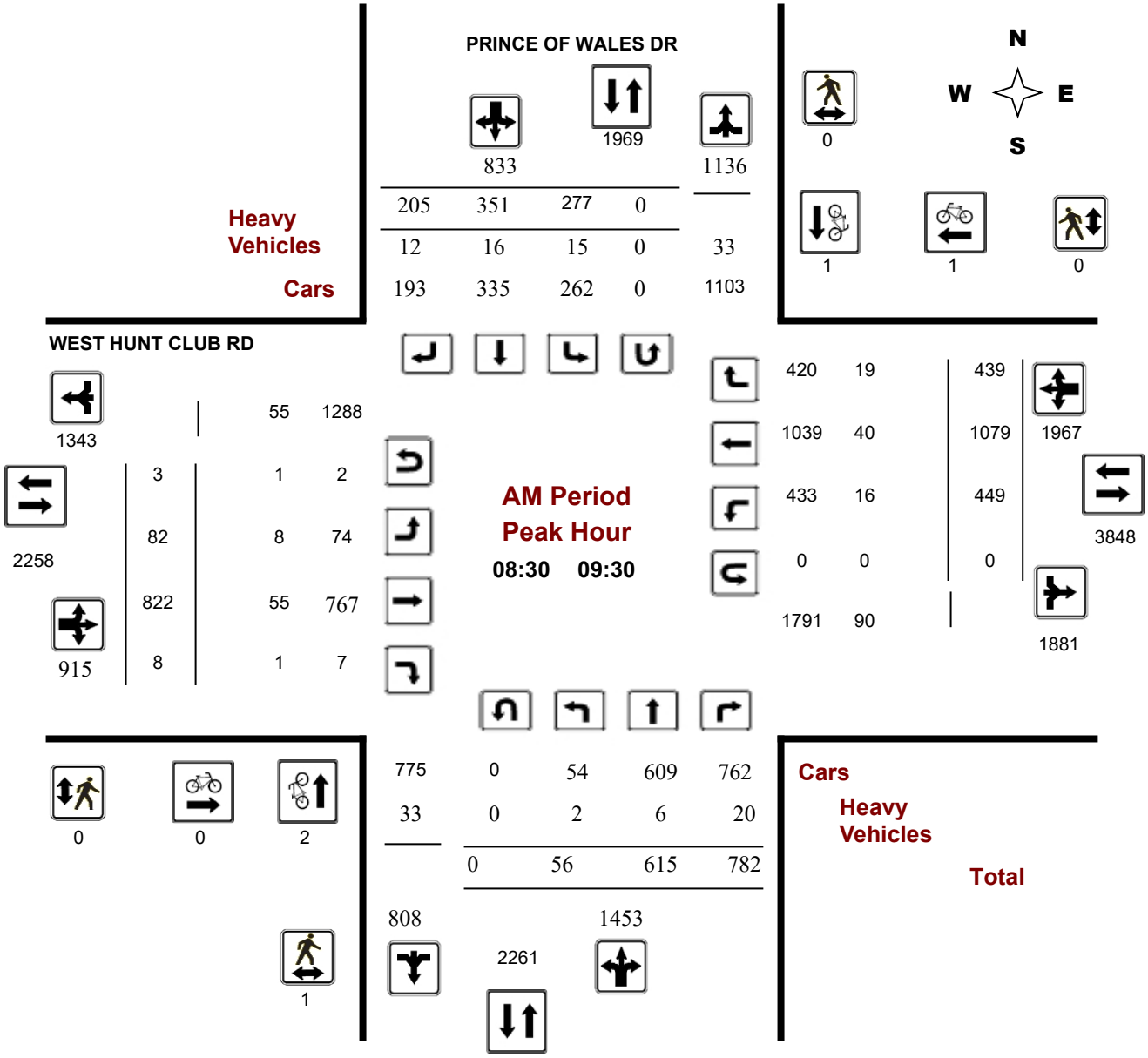
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

PRINCE OF WALES DR @ WEST HUNT CLUB RD

Survey Date: Monday, February 10, 2020 **WO No:** 39445

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



Comments

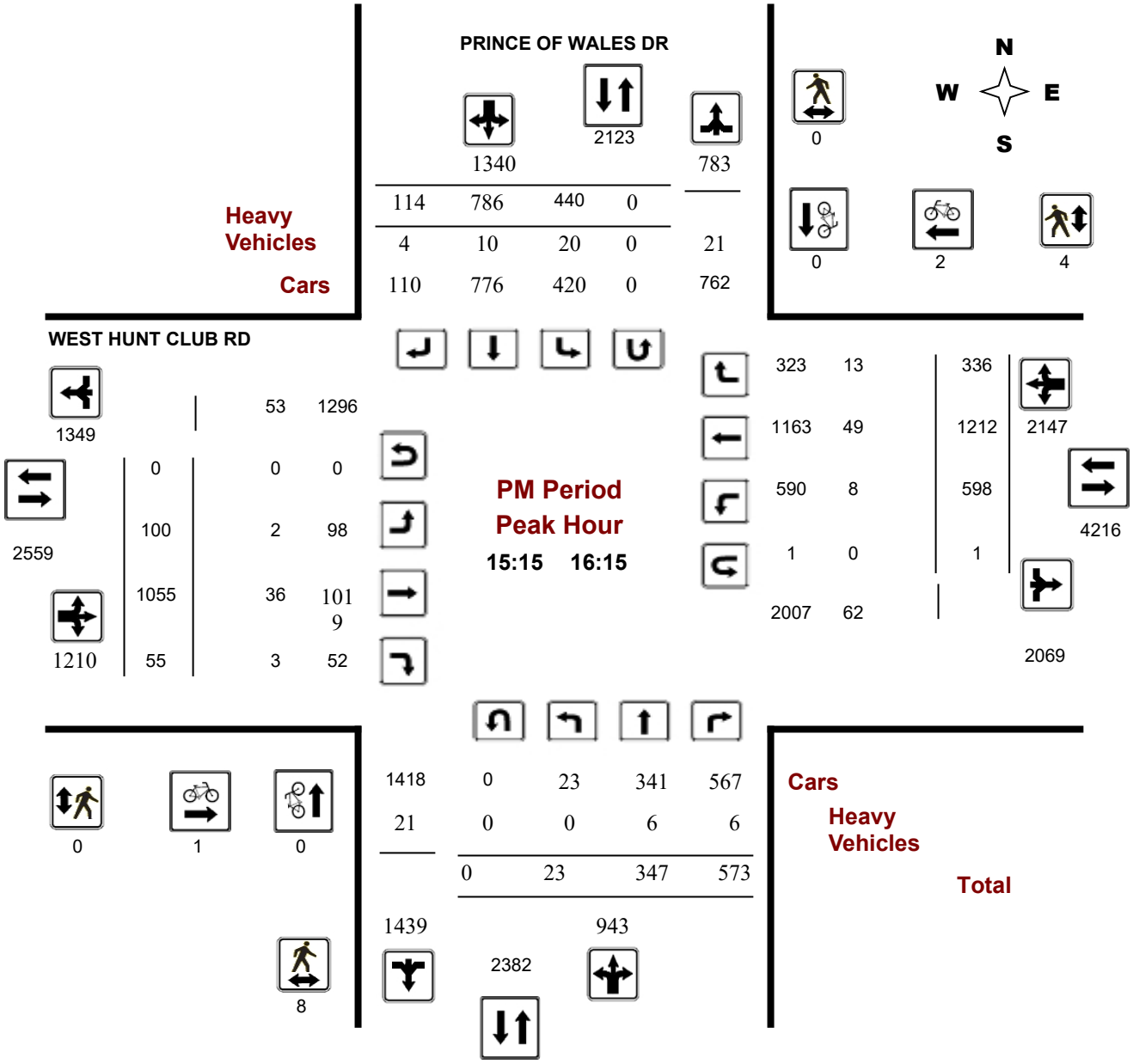
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

PRINCE OF WALES DR @ WEST HUNT CLUB RD

Survey Date: Monday, February 10, 2020 **WO No:** 39445

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



Comments

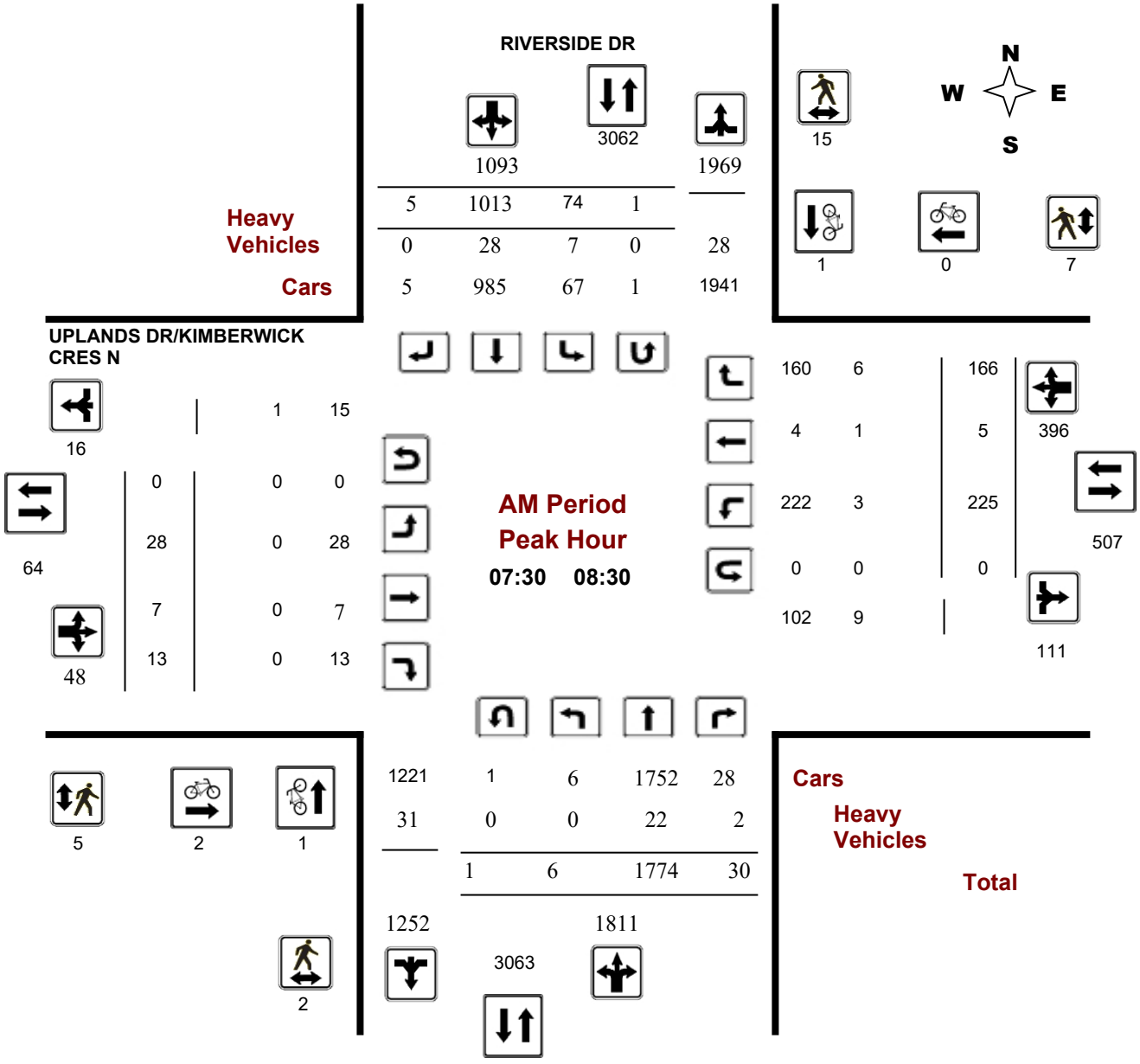
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

Survey Date: Wednesday, January 22, 2020 **WO No:** 39376

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



Comments 5472191 - WED JAN 22, 2020 - 8HRS - LORETTA

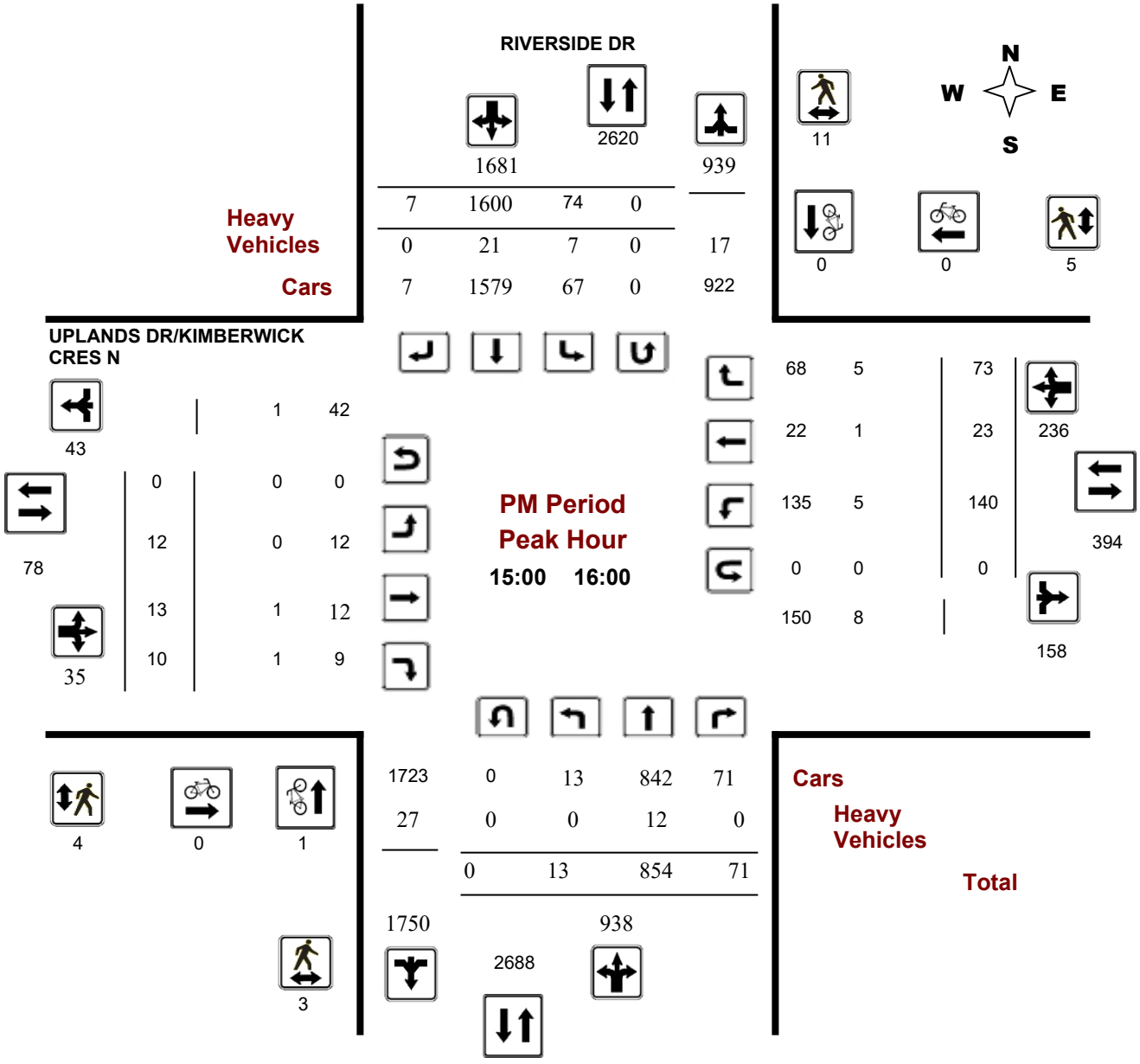
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

Survey Date: Wednesday, January 22, 2020 **WO No:** 39376

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



Comments 5472191 - WED JAN 22, 2020 - 8HRS - LORETTA

Appendix D:

Collision Data

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	253	13	79	20	1	8	0	6	380	83%
Non-fatal injury	60	2	2	10	0	4	0	1	79	17%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**313**	**15**	**81**	**30**	**1**	**12**	**0**	**7**	**459**	100%
	#1 or 68%	#4 or 3%	#2 or 18%	#3 or 7%	#7 or 0%	#5 or 3%	#8 or 0%	#6 or 2%		

HUNT CLUB RD/RIVERSIDE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	212	72,200	1825	**1.61**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	132	7	32	7	0	3	0	2	183	86%
Non-fatal injury	23	1	1	3	0	1	0	0	29	14%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**155**	**8**	**33**	**10**	**0**	**4**	**0**	**2**	**212**	100%
	73%	4%	16%	5%	0%	2%	0%	1%		

14.8387097 0.40645161

HUNT CLUB RD, RIVERSIDE DR to TURN LANE

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	3	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	0	0	2	0	0	0	0	0	2	67%
Non-fatal injury	0	0	0	0	0	1	0	0	1	33%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**3**	100%
	0%	0%	67%	0%	0%	33%	0%	0%		

HUNT CLUB RD, TURN LANE to WEST HUNT CLUB RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	18	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	7	0	5	1	0	0	0	0	13	72%
Non-fatal injury	5	0	0	0	0	0	0	0	5	28%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**12**	**0**	**5**	**1**	**0**	**0**	**0**	**0**	**18**	100%
	67%	0%	28%	6%	0%	0%	0%	0%		

KIMBERWICK CRES S/RIVERSIDE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	4	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	3	0	0	0	0	0	0	0	3	75%
Non-fatal injury	0	0	0	1	0	0	0	0	1	25%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**3**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**4**	100%
	75%	0%	0%	25%	0%	0%	0%	0%		

PRINCE OF WALES DR/WEST HUNT CLUB RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	153	72,000	1825	**1.16**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	80	1	28	10	1	3	0	2	125	82%
Non-fatal injury	22	0	0	5	0	1	0	0	28	18%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**102**	**1**	**28**	**15**	**1**	**4**	**0**	**2**	**153**	100%
	67%	1%	18%	10%	1%	3%	0%	1%		

RIVERSIDE DR/UPLANDS DR/KIMBERWICK CRES N

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	27	38,600	1825	**0.38**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	13	5	2	2	0	1	0	1	24	89%
Non-fatal injury	2	0	0	1	0	0	0	0	3	11%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**15**	**5**	**2**	**3**	**0**	**1**	**0**	**1**	**27**	100%
	56%	19%	7%	11%	0%	4%	0%	4%		

RIVERSIDE DR, HUNT CLUB RD to KIMBERWICK CRES

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	10	38,600	1825	**0.14**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	5	0	2	0	0	0	0	1	8	80%
Non-fatal injury	1	0	0	0	0	1	0	0	2	20%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**6**	**0**	**2**	**0**	**0**	**1**	**0**	**1**	**10**	100%
	60%	0%	20%	0%	0%	10%	0%	10%		

RIVERSIDE DR, KIMBERWICK CRES to KIMBERWICK CRES

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	4	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	0	0	3	0	0	0	0	0	3	75%
Non-fatal injury	1	0	0	0	0	0	0	0	1	25%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**1**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**4**	100%
	25%	0%	75%	0%	0%	0%	0%	0%		

WEST HUNT CLUB RD/HUNT CLUB RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	1	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	0	0	0	0	0	0	0	0	0	0%
Non-fatal injury	0	1	0	0	0	0	0	0	1	100%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	100%
	0%	100%	0%	0%	0%	0%	0%	0%		

WEST HUNT CLUB RD, HUNT CLUB RD to PRINCE OF WALES DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2016-2020	27	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	13	0	5	0	0	1	0	0	19	70%
Non-fatal injury	6	0	1	0	0	0	0	1	8	30%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**19**	**0**	**6**	**0**	**0**	**1**	**0**	**1**	**27**	100%
	70%	0%	22%	0%	0%	4%	0%	4%		

Appendix E:

Historic Background Growth

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
2019	12-Jun	9455	9304	9515	8215	9926	10484	15144	16037	88080

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%
2019	9304	9455	18759	88080	19.0%	15.1%	17.0%	10.0%

Regression Estimate	2008	7999	7557	15556
Regression Estimate	2019	8794	9299	18093
Average Annual Change		**0.87%**	**1.90%**	**1.38%**

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%
2019	15144	16037	31181	88080	4.7%	5.7%	5.2%	10.0%

Regression Estimate	2008	17100	15317	32418
Regression Estimate	2019	14277	15807	30084
Average Annual Change		**-1.63%**	**0.29%**	**-0.68%**

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%
2019	10484	9926	20410	88080	6.2%	4.6%	5.4%	10.0%

Regression Estimate	2008	11700	9020	20719
Regression Estimate	2019	9941	9883	19824
Average Annual Change		**-1.47%**	**0.83%**	**-0.40%**

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%
2019	9515	8215	17730	88080	20.8%	14.3%	17.7%	10.0%

Regression Estimate	2008	6731	6415	13147
Regression Estimate	2019	9336	7958	17295
Average Annual Change		**3.02%**	**1.98%**	**2.52%**

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
2019	44724	1103	1830	2040	547	938	1417	1848	2135	11858

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%
2019	1830	1103	2933	11858	27.9%	31.8%	29.3%	18.5%

Regression Estimate	2008	1603	887	2490
Regression Estimate	2019	1702	990	2693
Average Annual Change		**0.55%**	**1.01%**	**0.71%**

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%
2019	1848	2135	3983	11858	14.7%	13.5%	14.1%	18.5%

Regression Estimate	2008	2383	2309	4692
Regression Estimate	2019	1630	1975	3605
Average Annual Change		**-3.39%**	**-1.41%**	**-2.37%**

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%
2019	1417	938	2355	11858	12.5%	-6.2%	4.2%	18.5%

Regression Estimate	2008	1693	1188	2881
Regression Estimate	2019	1301	924	2225
Average Annual Change		**-2.37%**	**-2.26%**	**-2.32%**

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%
2019	2040	547	2587	11858	31.0%	26.0%	29.9%	18.5%

Regression Estimate	2008	1524	376	1900
Regression Estimate	2019	1959	525	2484
Average Annual Change		**2.31%**	**3.08%**	**2.47%**

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
2019	44724	1639	968	939	1630	1467	1327	2052	2172	12194

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%
2019	968	1639	2607	12194	18.0%	5.2%	9.6%	5.1%

Regression Estimate	2008	1053	1523	2576
Regression Estimate	2019	865	1645	2510
Average Annual Change		**-1.77%**	**0.70%**	**-0.24%**

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%
2019	2052	2172	4224	12194	0.8%	6.6%	3.7%	5.1%

Regression Estimate	2008	3025	2242	5267
Regression Estimate	2019	1841	2111	3952
Average Annual Change		**-4.42%**	**-0.54%**	**-2.58%**

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%
2019	1327	1467	2794	12194	1.2%	3.8%	2.6%	5.1%

Regression Estimate	2008	1877	1324	3201
Regression Estimate	2019	1226	1498	2723
Average Annual Change		**-3.80%**	**1.13%**	**-1.46%**

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%
2019	939	1630	2569	12194	18.4%	-0.1%	6.0%	5.1%

Regression Estimate	2008	687	1398	2085
Regression Estimate	2019	921	1699	2620
Average Annual Change		**2.70%**	**1.78%**	**2.09%**

Appendix F:

MMLOS Analysis: Road Segments

Multi-Modal Level of Service - Segments Form

Consultant	**Parsons**	**Project**	**478378**
Scenario	**3960 Riverside Drive**	**Date**	**30-Nov-22**
Comments	**St. Mary's Development**		

SEGMENTS		**Street A**	Hunt Club N Side	Hunt Club S Side	Riverside W Side	Riverside E Side	Riverside Future	Section 6	Section 7	Section 8	Section 9
Pedestrian	Sidewalk Width Boulevard Width	-	1.8 m < 0.5 m	≥ 2 m < 0.5	1.5 m < 0.5 m	1.8 m > 2 m	≥ 2 m > 2 m		≥ 2 m > 2 m		
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	> 3000	> 3000	> 3000		> 3000		
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	> 60 km/h no	> 60 km/h no	> 60 km/h no		> 50 to 60 km/h no		
	Exposure to Traffic PLoS		**F**	**F**	**F**	**E**	**D**	**-**	**C**	**-**	**-**
	Effective Sidewalk Width										
	Pedestrian Volume										
	Crowding PLoS		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Bicycle	Type of Cycling Facility	F	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Physically Separated				
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	2-3 lanes total	2-3 lanes total					
	Operating Speed		≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h					
	# of Lanes & Operating Speed LoS		**F**	**F**	**F**	**F**	**-**	**-**	**-**	**-**	**-**
	Bike Lane (+ Parking Lane) Width										
	Bike Lane Width LoS		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Bike Lane Blockages										
	Blockage LoS		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Median Refuge Width (no median = < 1.8 m)		≥ 1.8 m refuge	≥ 1.8 m refuge	≥ 1.8 m refuge	≥ 1.8 m refuge					
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes					
	Sidestreet Operating Speed		>40 to 50 km/h	>40 to 50 km/h	>40 to 50 km/h	>40 to 50 km/h					
	Unsignalized Crossing - Lowest LoS		**A**	**A**	**A**	**A**	**A**	**-**	**-**	**-**	**-**
	Level of Service		**F**	**F**	**F**	**F**	**A**	**-**	**-**	**-**	**-**
Transit	Facility Type	D	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic				
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8				
	Level of Service		**D**	**D**	**D**	**D**	**D**	**-**	**-**	**-**	**-**
Truck	Truck Lane Width	A	> 3.7 m	> 3.7 m	> 3.7 m	> 3.7 m	> 3.7 m				
	Travel Lanes per Direction		> 1	> 1	> 1	> 1	> 1				
	Level of Service		**A**	**A**	**A**	**A**	**A**	**-**	**-**	**-**	**-**

Appendix G:

Traffic Signal Warrant

Riverside/Site - (peak hour signal warrant)

Signal Warrant			Description	Minimum Requirement for Two-Lane Roadways	Compliance		
				Free Flow - Operating Speed Greater Than or Equal to 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	600	255%	26%	**66% No**
		(4) B	Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	180	26%		
	2. Delay to Cross Traffic	(1) A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	600	247%	66%	
		(2) B	Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours	50	66%		

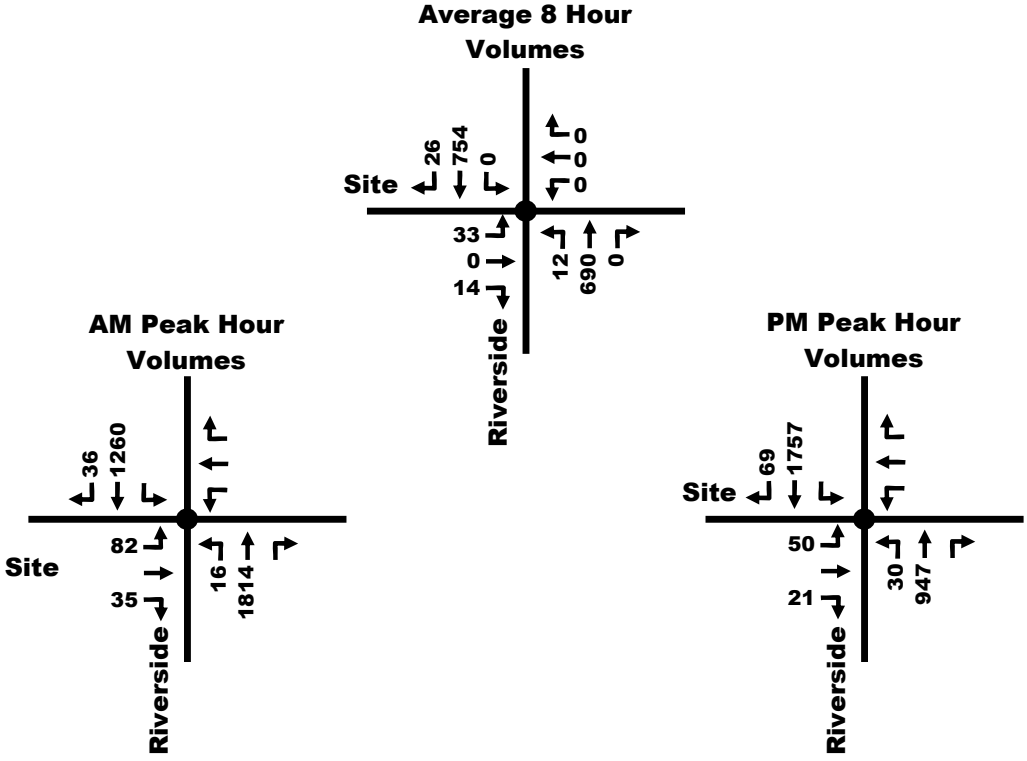
Notes

1 *Vehicle Volume Warrants (1A), (2A) and (5B) for Roadways Having Two or More Moving Lanes in one Direction Should Be 25% Higher Than Values Given Above* **Yes**

2 *For Definition of Crossing Volume Refer to Note 4 on the Signal Warrant Analysis Form B2.03.08*

3 *The Lowest Sectional Percentage Governs the Entire Warrant*

4 *For "T" Intersections the Warrant Values for Minor Street Should be Increased by 50% (Warrant 1B only)* **Yes**



Appendix H:

Intersection Functional Drawings and Sight Lines

HUNT CLUB ROAD - RIVERSIDE DRIVE SITE STUDY

HSU MOVEMENTS

HORIZONTAL
0m 7.5 15 37.5 75

October 14, 2022

PARSONS

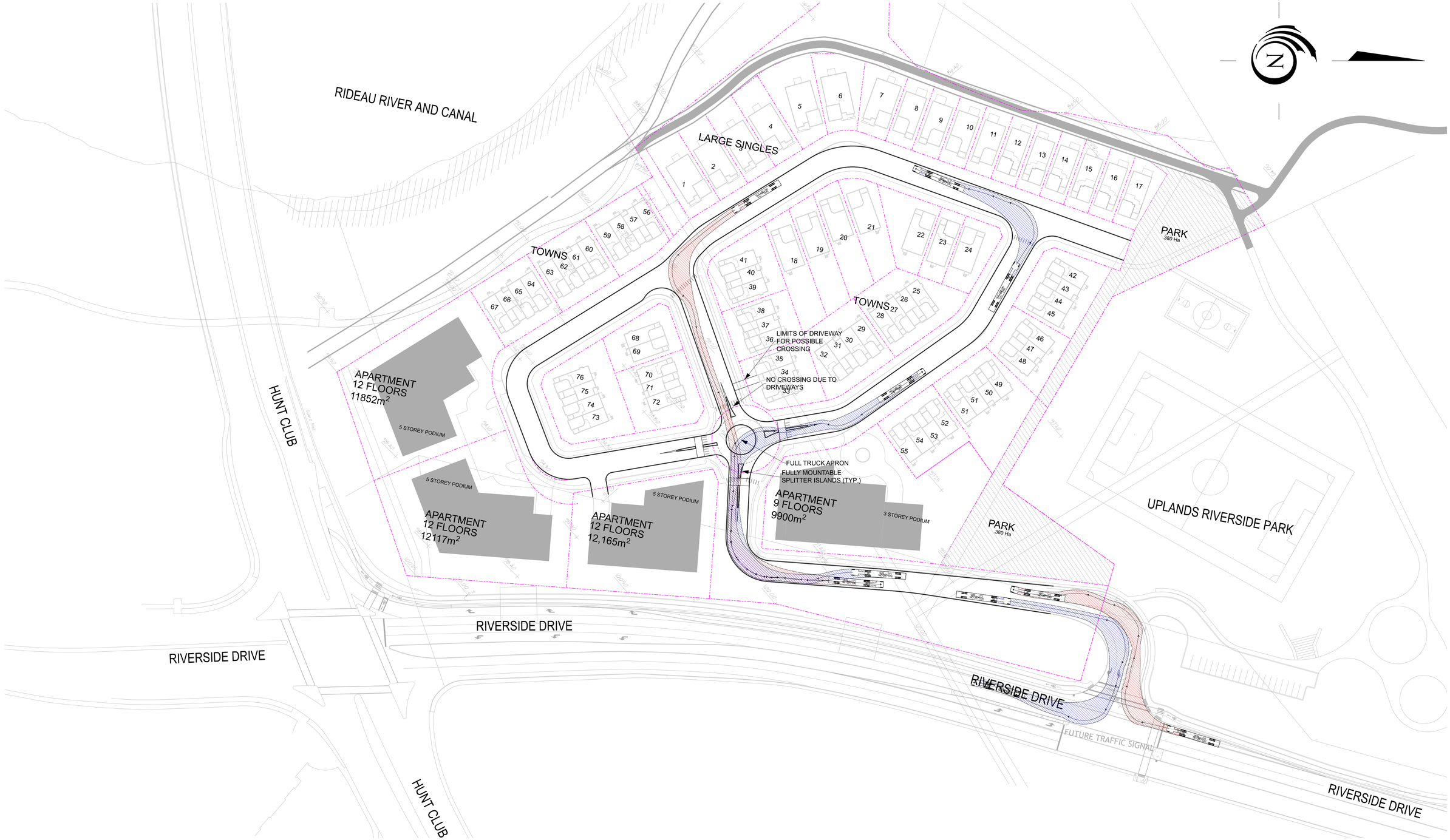
HUNT CLUB ROAD - RIVERSIDE DRIVE SITE STUDY

PASSENGER CAR MOVEMENTS

HORIZONTAL
0m 7.5 15 37.5 75

October 14, 2022

PARSONS



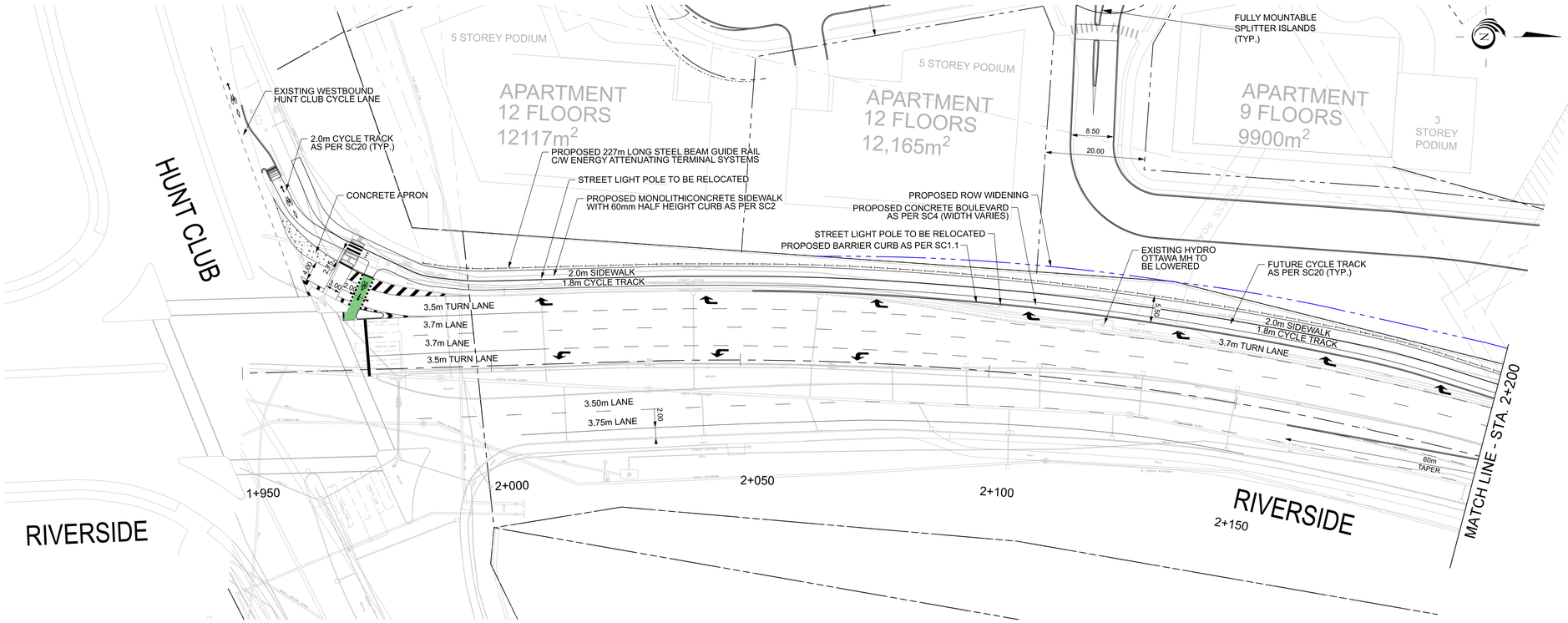
HUNT CLUB ROAD - RIVERSIDE DRIVE SITE STUDY

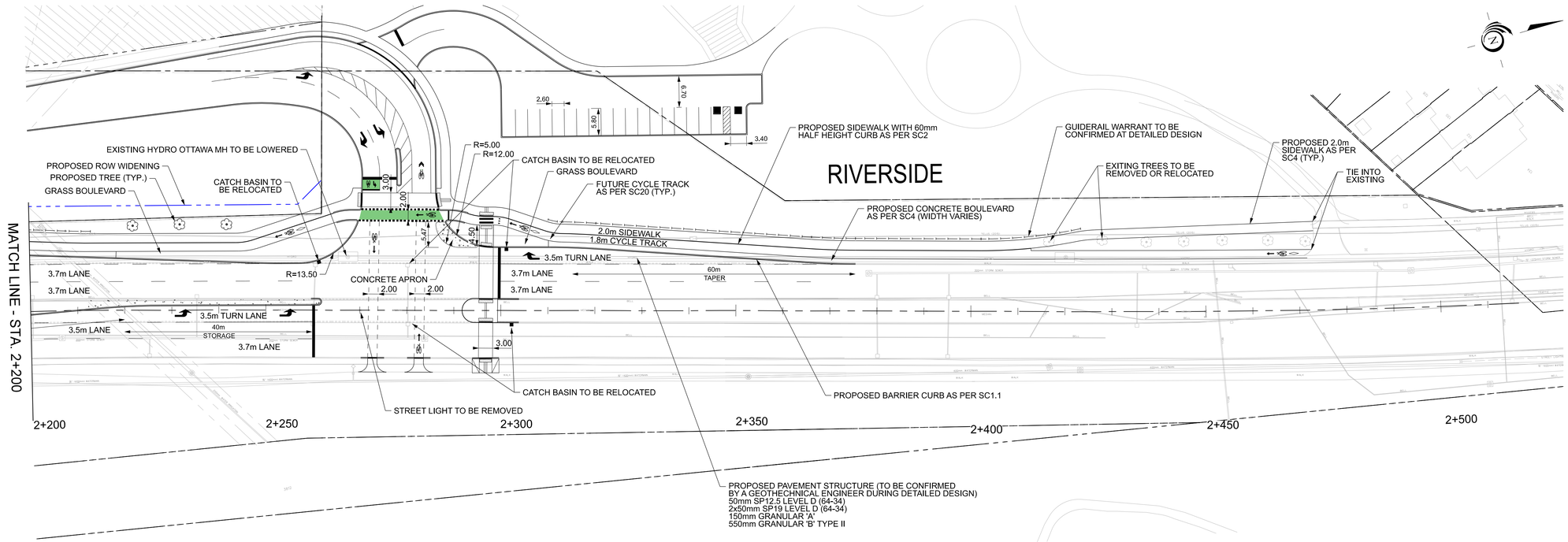
WB-20 MOVEMENTS

HORIZONTAL
0m 7.5 15 37.5 75

October 14, 2022

PARSONS





ST-MARY'S RIVERSIDE DRIVE SUBDIVISION
ROADWAY MODIFICATIONS
3930 & 3960 RIVERSIDE DRIVE

GENERAL ARRANGEMENT

PARSONS

TAGGART REALTY MANAGEMENT

Contract No.	Dwg. No.
478418	01

Sheet 1 of 1

Asset No. ---------

Asset Group ---

Des.	Chk'd.
M.J.P.	P.R.
Dwn.	Chk'd.
M.J.P.	P.R.
Utility Circ. No. ------	Index No. ---------

Const. Inspector .....

Scale: HORIZONTAL
0m 5 10 20

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

REVISIONS

No.	Description	By	Date (dd/mm/yy)
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02	ISSUED FOR PRELIMINARY DESIGN REV.1	PR	07/11/18
03	ISSUED FOR PRELIMINARY DESIGN REV.2	PR	09/11/22
04	ISSUED FOR PRELIMINARY DESIGN REV.3	PR	08/12/22

ST-MARY'S RIVERSIDE DRIVE SUBDIVISION ROADWAY MODIFICATIONS
3930 & 3960 RIVERSIDE DRIVE

GENERAL ARRANGEMENT

PARSONS

TAGGART REALTY MANAGEMENT

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Sheet 1 of 1

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Const. Inspector ----------

Scale: HORIZONTAL 0m 5 10 20

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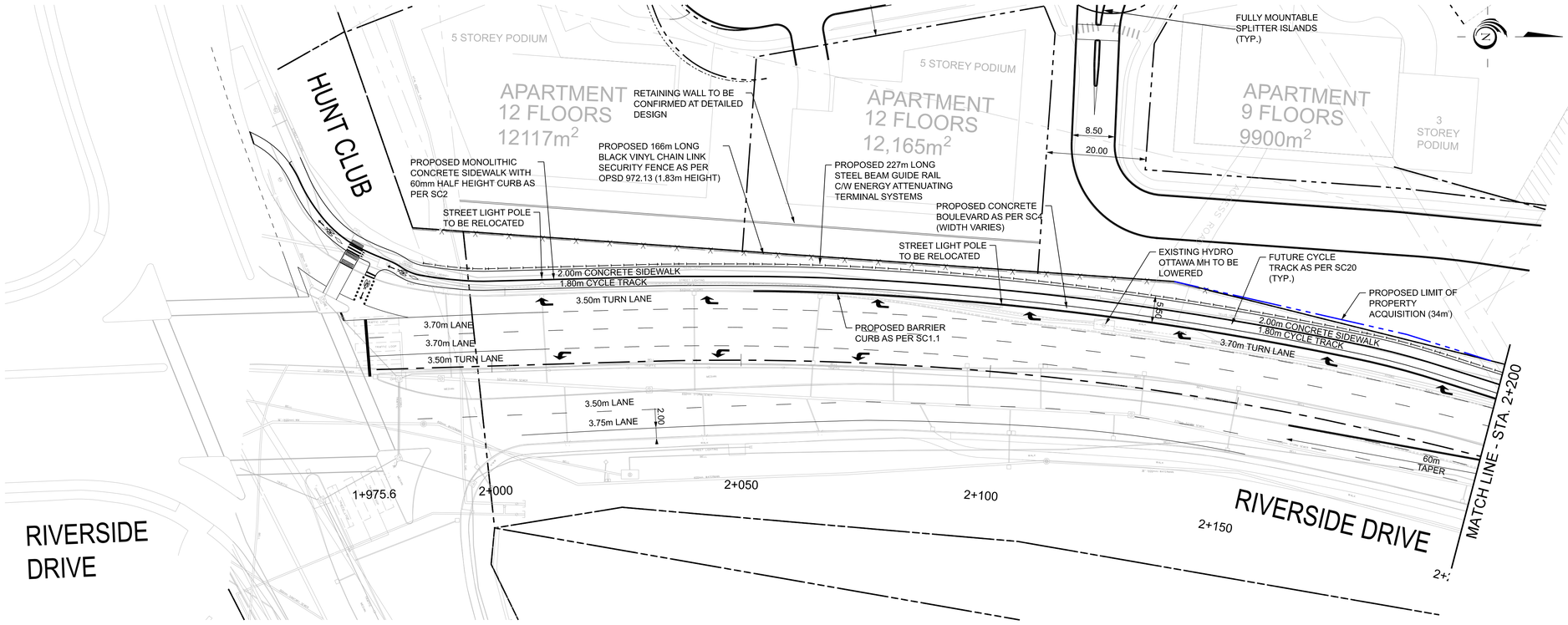

SIGHT LINES REVIEW

Geometric Design Guide for Canadian Roads
Chapter 9 – Intersections

Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	36.1	40
30	35	54.2	55
40	50	72.3	75
50	65	90.4	95
60	85	108.4	110
70	105	126.5	130
80	130	144.6	145
90	160	162.6	165
100	185	180.7	185
110	220	198.8	200
120	250	216.8	220
130	285	234.9	235

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or to cross a two-lane highway with no median and with grades of 3% or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

CAD FILES OF SIGHT LINE CHECK OVER VERTICAL PROFILE CAN BE PROVIDED UPON REQUEST.

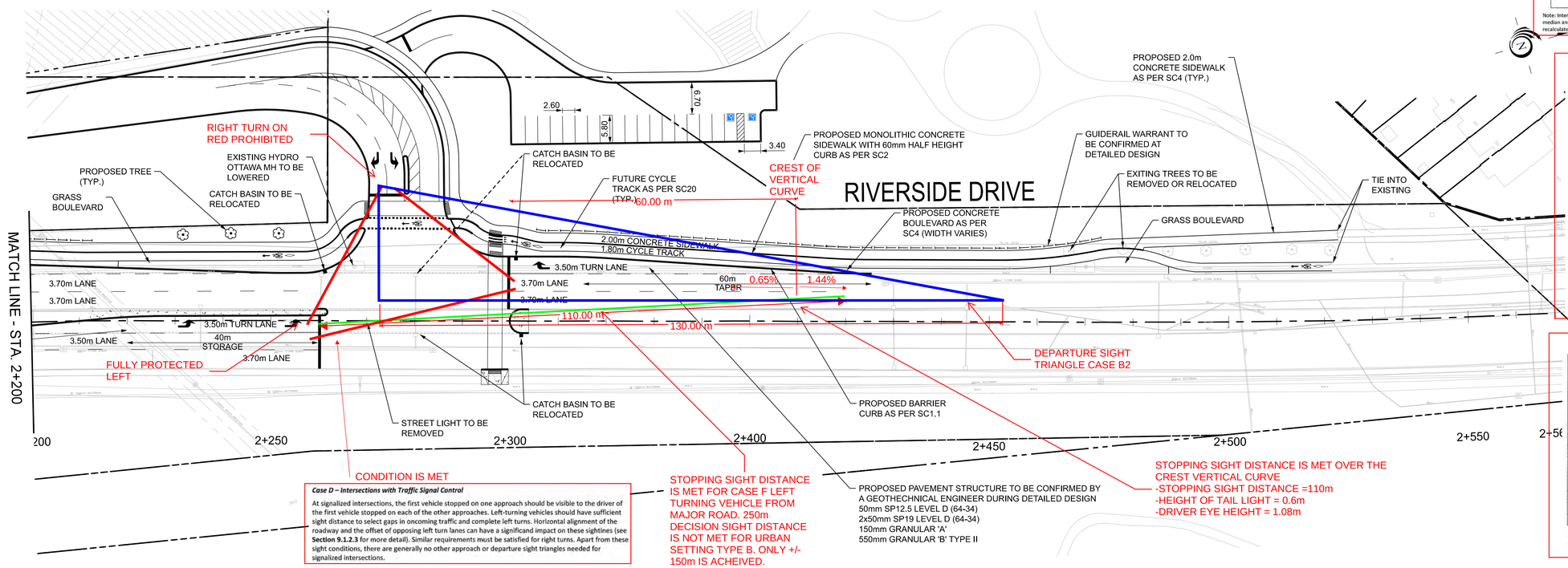

Table 2.5.2: Stopping Sight Distance on level roadways for Automobiles[34]

Design speed (km/h)	Brake reaction distance (m)	Braking distance on level (m)	Stopping sight distance	
			Calculated (m)	Design (m)
20	13.9	4.6	18.5	20
30	20.9	10.3	31.2	35
40	27.8	18.4	46.2	50
50	34.8	28.7	63.5	65
60	41.7	41.3	83.0	85
70	48.7	56.2	104.9	105
80	55.6	73.4	129.0	130
90	62.6	92.9	155.5	160
100	69.5	114.7	184.2	185
110	76.5	138.8	215.3	220
120	83.4	165.2	248.6	250
130	90.4	193.8	284.2	285

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s² used to determine calculated sight distance.

Table 9.9.12: Intersection Sight Distance – Case F, Left Turn from the Major Road

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance	
		Passenger Cars	
		Calculated (m)	Design (m)
20	20	30.6	35
30	35	45.9	50
40	50	61.2	65
50	65	76.5	80
60	85	91.7	95
70	105	107.0	110
80	130	122.3	125
90	160	137.6	140
100	185	152.9	155
110	220	168.2	170
120	250	183.5	185
130	285	198.8	200

Note: Intersection sight distance shown is for a passenger car making a left turn from an undivided highway. For other conditions and design vehicles, the time gap should be adjusted and the sight distance recalculated.

CONDITION IS MET

Case D – Intersections with Traffic Signal Control

At signalized intersections, the first vehicle stopped on one approach should be visible to the driver of the first vehicle stopped on each of the other approaches. Left-turning vehicles should have sufficient sight distance to select gaps in oncoming traffic and complete left turns. Horizontal alignment of the roadway and the offset of opposing left turn lanes can have a significant impact on these sightlines (see **Section 9.1.2.3** for more detail). Similar requirements must be satisfied for right turns. Apart from these sight conditions, there are generally no other approach or departure sight triangles needed for signalized intersections.

STOPPING SIGHT DISTANCE IS MET FOR CASE F LEFT TURNING VEHICLE FROM MAJOR ROAD. 250m DECISION SIGHT DISTANCE IS NOT MET FOR URBAN SETTING TYPE B. ONLY +/- 150m IS ACHEIVED.

PROPOSED PAVEMENT STRUCTURE TO BE CONFIRMED BY A GEOTHECHNICAL ENGINEER DURING DETAILED DESIGN
50mm SP12.5 LEVEL D (64-34)
2x50mm SP19 LEVEL D (64-34)
150mm GRANULAR 'A'
550mm GRANULAR 'B' TYPE II

STOPPING SIGHT DISTANCE IS MET OVER THE CREST VERTICAL CURVE
-STOPPING SIGHT DISTANCE =110m
-HEIGHT OF TAIL LIGHT = 0.6m
-DRIVER EYE HEIGHT = 1.08m

EXISTING HYDRO OTTAWA MH TO BE LOWERED
PROPOSED ROW WIDENING
PROPOSED TREE (TYP.)
GRASS BOULEVARD
CATCH BASIN TO BE RELOCATED
R=5.00
R=12.00
CATCH BASIN TO BE RELOCATED
GRASS BOULEVARD
FUTURE CYCLE TRACK AS PER SC20 (TYP.)
2.0m SIDEWALK
1.8m CYCLE TRACK
3.5m TURN LANE
3.7m LANE
3.7m LANE
60m TAPER
3.7m LANE
3.7m LANE
R=13.50
CONCRETE APRON
2.00
2.00
3.5m TURN LANE
40m STORAGE
3.5m LANE
3.7m LANE
3.00
CATCH BASIN TO BE RELOCATED
STREET LIGHT TO BE REMOVED
2+200
2+250
2+300
2+350
WB-20 TAC-2017 (CA)
2.60
5.80
6.70
3.00
2.00
5.47
4.50

ST-MARY'S RIVERSIDE DRIVE SUBDIVISION ROADWAY MODIFICATIONS

3930 & 3960 RIVERSIDE DRIVE

GENERAL ARRANGEMENT

TAGGART REALTY MANAGEMENT

PARSONS

Contract No. 478418	Dwg. No. 01
Sheet 1 of 1	
Asset No. ----------	
Asset Group ---	
Des. M.J.P.	Chk'd. P.R.
Dwn. M.J.P.	Chk'd. P.R.
Utility Circ. No. ------	Index No. --------
Const. Inspector ----------	

Scale: HORIZONTAL 0m 5 10 20

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CITY OF OTTAWA COST

DEVELOPER COST

HUNT CLUB

RIVERSIDE

5 STOREY PODIUM

APARTMENT 12 FLOORS 12117m²

APARTMENT 12 FLOORS 12,165m²

APARTMENT 9 FLOORS 9900m²

3 STOREY PODIUM

FULLY MOUNTABLE SPLITTER ISLANDS (TYP.)

2.0m CYCLE TRACK AS PER SC20 (TYP.)

CONCRETE APRON

PROPOSED 227m LONG STEEL BEAM GUIDE RAIL C/W ENERGY ATTENUATING TERMINAL SYSTEMS

STREET LIGHT POLE TO BE RELOCATED

PROPOSED MONOLITHICONCRETE SIDEWALK WITH 60mm HALF HEIGHT CURB AS PER SC2

PROPOSED ROW WIDENING

PROPOSED CONCRETE BOULEVARD AS PER SC4 (WIDTH VARIES)

STREET LIGHT POLE TO BE RELOCATED

PROPOSED BARRIER CURB AS PER SC1.1

EXISTING HYDRO OTTAWA MH TO BE LOWERED

EMBANKMENT WIDENING

FUTURE CYCLE TRACK AS PER SC20 (TYP.)

TRUCK APRON AND CYCLIST ISLAND AS PER CITY OF OTTAWA RFP NO. 3552-92593-P01

2.0m SIDEWALK

1.8m CYCLE TRACK

3.5m TURN LANE

3.7m LANE

3.7m LANE

3.5m TURN LANE

3.50m LANE

3.75m LANE

3.7m TURN LANE

8.50

20.00

2.00

1+950

2+000

2+050

2+100

2+150

MATCH LINE - STA. 2+200

60m TAPER

EXISTING HYDRO OTTAWA MH TO BE LOWERED

PROPOSED ROW WIDENING

PROPOSED TREE (TYP.)

GRASS BOULEVARD

CATCH BASIN TO BE RELOCATED

CONCRETE APRON

3.7m LANE

3.7m LANE

3.5m LANE

3.5m TURN LANE

40m STORAGE

3.7m LANE

2.60

6.70

5.80

3.40

CATCH BASIN TO BE RELOCATED

FUTURE CYCLE TRACK AS PER SC20 (TYP.)

PROPOSED SIDEWALK WITH 60mm HALF HEIGHT CURB AS PER SC2

GUIDERAIL WARRANT TO BE CONFIRMED AT DETAILED DESIGN

EXITING TREES TO BE REMOVED OR RELOCATED

PROPOSED 2.0m SIDEWALK AS PER SC4 (TYP.)

TIE INTO EXISTING

RIVERSIDE

PROPOSED CONCRETE BOULEVARD AS PER SC4 (WIDTH VARIES)

2.0m SIDEWALK

1.8m CYCLE TRACK

3.5m TURN LANE

3.7m LANE

3.7m LANE

60m TAPER

CATCH BASIN TO BE RELOCATED

STREET LIGHT TO BE REMOVED

PROPOSED BARRIER CURB AS PER SC1.1

MATCH LINE - STA. 2+200

2+200

2+250

2+300

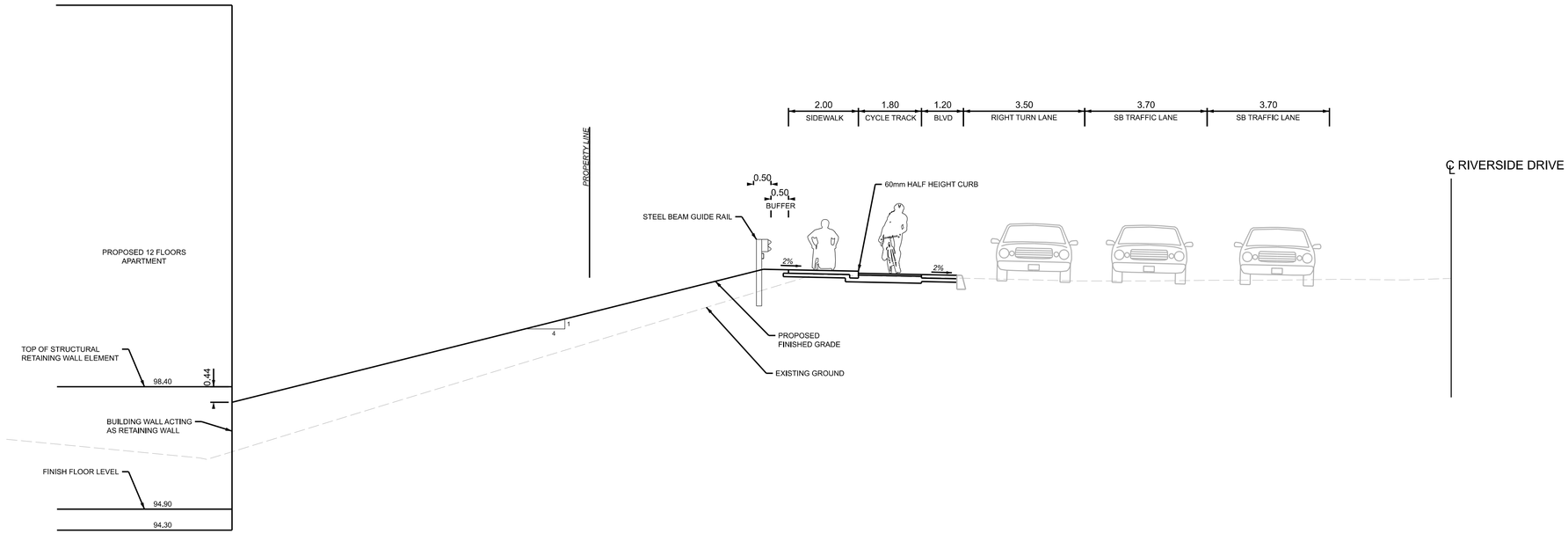
2+350

2+400

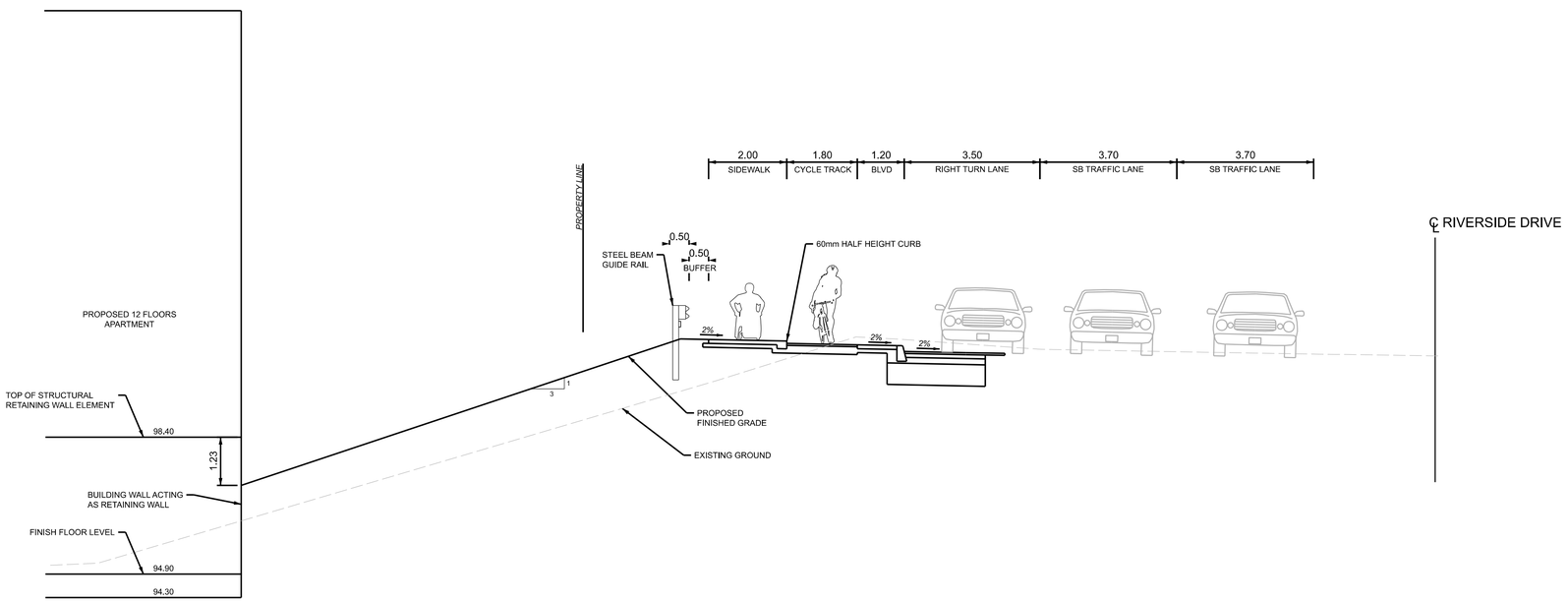
2+450

2+500

PROPOSED PAVEMENT STRUCTURE (TO BE CONFIRMED BY A GEOTECHNICAL ENGINEER DURING DETAILED DESIGN)
50mm SP12.5 LEVEL D (64-34)
2x50mm SP19 LEVEL D (64-34)
150mm GRANULAR 'A'
550mm GRANULAR 'B' TYPE II



RIVERSIDE DRIVE
2+020 TYPICAL SECTION



RIVERSIDE DRIVE
2+090 TYPICAL SECTION

ST-MARY'S RIVERSIDE DRIVE SUBDIVISION
ROADWAY MODIFICATIONS
3930 & 3960 RIVERSIDE DRIVE

TYPICAL SECTION

PARSONS

TAGGART REALTY MANAGEMENT

Contract No. 478418	Dwg. No. 02
Sheet 2 of 2	
Asset No. ----------	
Asset Group ---	
Des. M.J.P.	Chk'd, P.R.
Dwn, M.J.P.	Chk'd, P.R.
Utility Circ. No. ------	Index No. ------
Const. Inspector ----------	
Scale: N.T.S.	

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NOTE:

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE INDICATED.

PARSONS

CONSTRUCTION CLASS 'C' COST ESTIMATE

Project No. 478418

Contract No. -

Subject: **Roadway Modifications St-Mary's Development**

Location: **3930 and 3960 Riverside Drive**

Client: **Taggart Realty Management**

By: Patrick Roger Date: December 12, 2022

Item No.	Description	Unit	Estimated Quantity	Unit Price	Amount
8.1	Removal of Asphalt Sidewalk	m²	143.0	$ 18.00	$ 2,574.00
8.2	Removal of Concrete Sidewalk	m²	112.0	$ 48.00	$ 5,376.00
8.3	Saw-Cutting of Asphalt	m	40.0	$ 15.00	$ 600.00
8.4	Remove Asphalt Pavement by Dry Grinding	m²	121.5	$ 90.00	$ 10,935.00
8.5	Remove Asphalt Pavement Full Depth	m²	51.0	$ 62.00	$ 3,162.00
8.6	Earth Excavation - Grading	m³	531.0	$ 38.00	$ 20,178.00
8.7	Removal of tree	ea	2.0	$ 600.00	$ 1,200.00
8.8	Removal of Concrete Barrier Curb	m	200.0	$ 30.00	$ 6,000.00
				Section 8.0 Total	**$ 50,025.00**
9.0 - Roads					
9.1	Earth Borrow	m³	2,000.0	$ 32.00	$ 64,000.00
9.2	Select Subgrade Material	m³	480.0	$ 36.00	$ 17,280.00
9.3	Granular 'A'	t	621.0	$ 35.00	$ 21,735.00
9.4	Granular 'B' Type II	t	598.0	$ 30.00	$ 17,940.00
9.5	Concrete Sidewalks, Boulevards and Islands	m2	294.0	$ 190.00	$ 55,860.00
9.6	Monolithic Concrete Sidewalks, Boulevards and Islands	m2	308.0	$ 240.00	$ 73,920.00
9.7	Concrete boulevard south of intersection (includes earth ex. and granular 'A')	LS	1.0	$ 52,591.00	$ 52,591.00
9.8	Concrete Pavement for Truck Apron	m2	36.0	$ 250.00	$ 9,000.00
9.9	Concrete Barrier Curb as per SC1.1	m	231.0	$ 165.00	$ 38,115.00
9.10	TWSI	m2	5.5	$ 1,000.00	$ 5,500.00
9.11	Tactile Paver Strips	m²	1.2	$ 650.00	$ 780.00
9.12	HL3F mix with PGAC 58-34 for cycle track south of intersection (includes earth ex. and granular 'A')	LS	1.0	$ 40,320.00	$ 40,320.00
9.13	HL3F mix with PGAC 58-34 for Residential Driveways/Private Walks/Commercial Driveways	t	45.0	$ 350.00	$ 15,750.00
9.14	Performance Graded Superpave 12.5mm Level D (PG 64-34)	t	63.0	$ 308.00	$ 19,404.00
9.15	Performance Graded Superpave 19.0mm Level D (PG 64-34)	t	121.0	$ 290.00	$ 35,090.00
9.16	Single rail steel beam guiderail per OPSD 912.130	m	285.0	$ 200.00	$ 57,000.00
9.17	Steel Beam Guide Rail Energy Atenuating Terminal System	ea	4.0	$ 7,500.00	$ 30,000.00
				Section 9.0 Total	**$ 554,285.00**

PARSONS

CONSTRUCTION CLASS 'C' COST ESTIMATE

Project No. 478418

Contract No. -

Subject: **Roadway Modifications St-Mary's Development**

Location: **3930 and 3960 Riverside Drive**

Client: **Taggart Realty Management**

By: Patrick Roger Date: December 12, 2022

Item No.	Description	Unit	Estimated Quantity	Unit Price	Amount
10.0 - Streetlighitng					
10.1	Relocation of Streetlighting	ea	2.0	$ 9,000.00	$ 18,000.00
				Section 10.0 Total	**$ 18,000.00**
11.0 - Pavement Marking and Signage					
11.1	Pavement Markings (lines - symbols and thermoplastic)	LS	1.0	$ 7,500.00	$ 7,500.00
				Section 11.0 Total	**$ 7,500.00**
12.0 - Miscellaneous					
12.1	Topsoil - 100mm Thick imported	m^3	224.0	$ 75.00	$ 16,800.00
12.2	Sodding Including Watering	m^2	502.0	$ 24.00	$ 12,048.00
12.3	Hydraulic Seeding and mulching	m^2	1,740.0	$ 6.00	$ 10,440.00
12.4	Erosion Control Blanket	m^2	1,000.0	$ 11.00	$ 11,000.00
12.5	Park Parking Lot (All inclusive)	LS	1.0	$ 400,000.00	$ 400,000.00
				Section 12.0 Total	**$ 450,288.00**
	Subtotal Construction Costs (Sections 1-12)				**2,854,610.00**
	Utilities for Hydro MH Lowering				200,000.00
	Project Contingency		30%		856,383.00
				Total Project Cost (Rounded)	**3,911,000.00**

Notes and Assumptions

1. Costs are in 2022 dollars and exclude HST.
2. Unit rates are based on City of Ottawa historical unit prices for 2022
3. Does not include Engineering or Contract Administration Costs
4. Does not include City Internal Cost or Misc. Soft Costs.
5. Does not include servicing infrastructure costs
6. Does not include Landscaping elements beyond topsoil and seed
7. Construction contract initiation costs are assumed to be included in the general contingency
8. No property aquisition costs expected
9. Pavement structure to be confirmed by a Geotechnical Engineer during detailed design
10. Traffic Signal and Street-lighting costs are based on recent project costing and will be subject to change once the City of Ottawa has completed the design and costing for each.
11. Utilities cost is for lowering one Hydro Ottawa maintenance hole structure
Cost may be subject to change should relocation of these structure/duct bank be required as a result of consultation with Hydro Ottawa.
12. Estimate does not include the City of Ottawa parking lot NW of the intersection.
13. Quantity for earth borrow is approximate only and needs to be refined at the next stages of design
14. Estimate to be read in conjunction with the cost sharing sketch
15. City of Ottawa scope of work is assumed to be completed independently from the developer's work

ST-MARY'S RIVERSIDE DRIVE SUBDIVISION ROADWAY MODIFICATIONS

3930 & 3960 RIVERSIDE DRIVE

GENERAL ARRANGEMENT

TAGGART REALTY MANAGEMENT

PARSONS

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Sheet 1 of 1	
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Dwn. M.J.P.	Chk'd. P.R.
Utility Circ. No. ------	Index No. --------
Const. Inspector ----------	

Scale: HORIZONTAL 0m 5 10 20

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CITY OF OTTAWA COST

DEVELOPER COST

HUNT CLUB

RIVERSIDE

5 STOREY PODIUM

APARTMENT 12 FLOORS 12117m²

APARTMENT 12 FLOORS 12,165m²

APARTMENT 9 FLOORS 9900m²

3 STOREY PODIUM

FULLY MOUNTABLE SPLITTER ISLANDS (TYP.)

2.0m CYCLE TRACK AS PER SC20 (TYP.)

CONCRETE APRON

PROPOSED 227m LONG STEEL BEAM GUIDE RAIL C/W ENERGY ATTENUATING TERMINAL SYSTEMS

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PROPOSED MONOLITHICONCRETE SIDEWALK WITH 60mm HALF HEIGHT CURB AS PER SC2

PROPOSED ROW WIDENING

PROPOSED CONCRETE BOULEVARD AS PER SC4 (WIDTH VARIES)

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TRUCK APRON AND CYCLIST ISLAND AS PER CITY OF OTTAWA RFP NO. 3552-92593-P01

2.0m SIDEWALK

1.8m CYCLE TRACK

3.5m TURN LANE

3.7m LANE

3.7m LANE

3.5m TURN LANE

3.50m LANE

3.75m LANE

3.7m TURN LANE

8.50

20.00

2.00

1+950

2+000

2+050

2+100

2+150

MATCH LINE - STA. 2+200

60m TAPER

EXISTING HYDRO OTTAWA MH TO BE LOWERED

PROPOSED ROW WIDENING

PROPOSED TREE (TYP.)

GRASS BOULEVARD

CATCH BASIN TO BE RELOCATED

CONCRETE APRON

3.7m LANE

3.7m LANE

3.5m LANE

3.5m TURN LANE

40m STORAGE

3.7m LANE

2.60

6.70

5.80

3.40

CATCH BASIN TO BE RELOCATED

FUTURE CYCLE TRACK AS PER SC20 (TYP.)

PROPOSED SIDEWALK WITH 60mm HALF HEIGHT CURB AS PER SC2

GUIDERAIL WARRANT TO BE CONFIRMED AT DETAILED DESIGN

EXITING TREES TO BE REMOVED OR RELOCATED

PROPOSED 2.0m SIDEWALK AS PER SC4 (TYP.)

TIE INTO EXISTING

RIVERSIDE

PROPOSED CONCRETE BOULEVARD AS PER SC4 (WIDTH VARIES)

2.0m SIDEWALK

1.8m CYCLE TRACK

3.5m TURN LANE

3.7m LANE

3.7m LANE

60m TAPER

CATCH BASIN TO BE RELOCATED

STREET LIGHT TO BE REMOVED

PROPOSED BARRIER CURB AS PER SC1.1

MATCH LINE - STA. 2+200

2+200

2+250

2+300

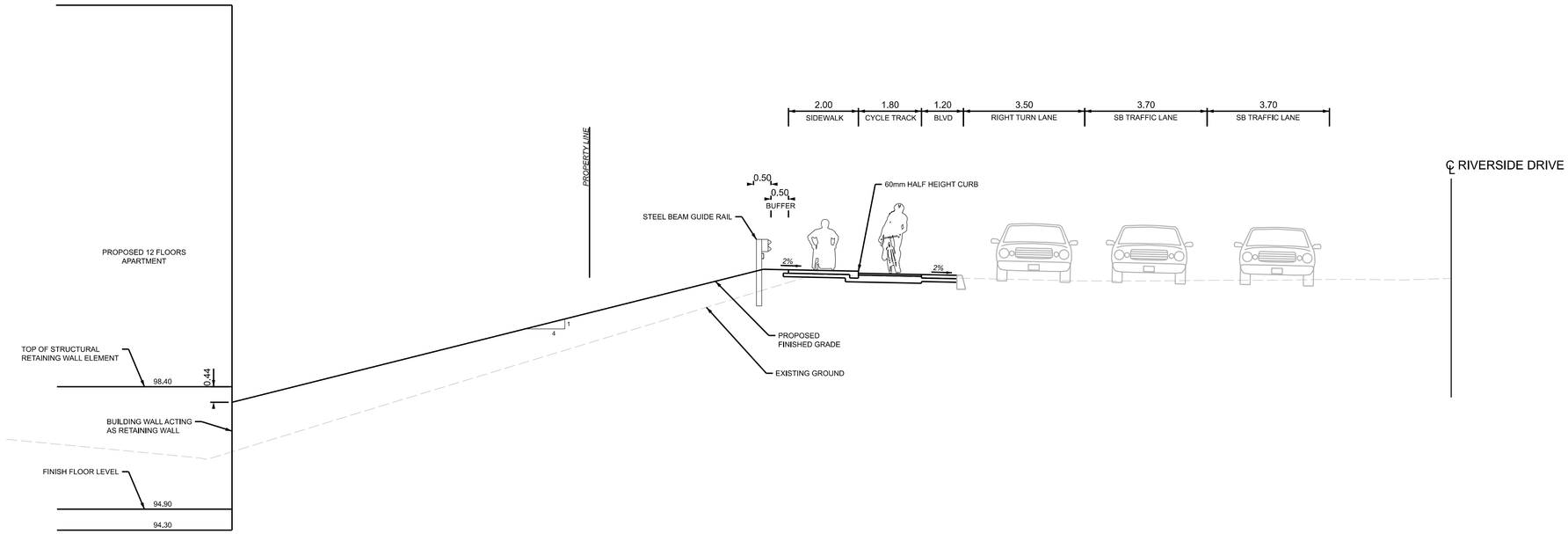
2+350

2+400

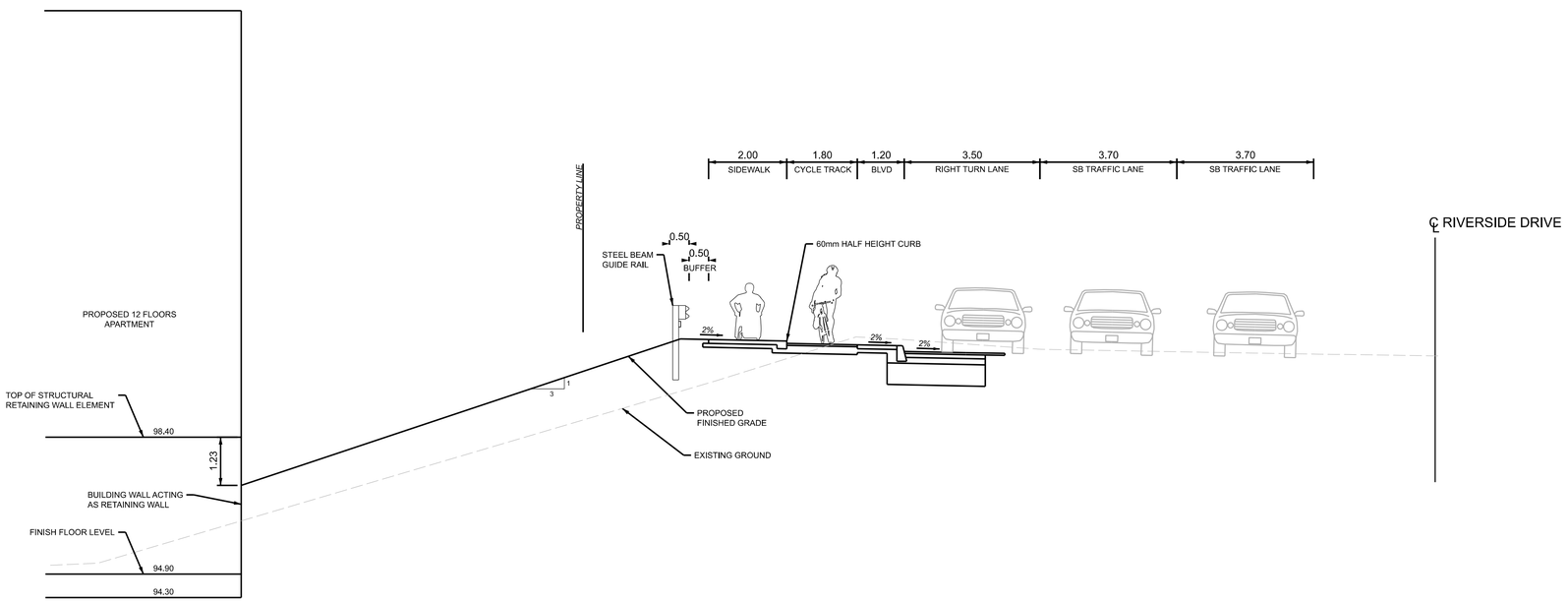
2+450

2+500

PROPOSED PAVEMENT STRUCTURE (TO BE CONFIRMED BY A GEOTECHNICAL ENGINEER DURING DETAILED DESIGN)
50mm SP12.5 LEVEL D (64-34)
2x50mm SP19 LEVEL D (64-34)
150mm GRANULAR 'A'
550mm GRANULAR 'B' TYPE II



RIVERSIDE DRIVE
2+020 TYPICAL SECTION



RIVERSIDE DRIVE
2+090 TYPICAL SECTION

ST-MARY'S RIVERSIDE DRIVE SUBDIVISION
ROADWAY MODIFICATIONS
3930 & 3960 RIVERSIDE DRIVE

TYPICAL SECTION

PARSONS

TAGGART REALTY MANAGEMENT

Contract No. 478418	Dwg. No. 02
Sheet 2 of 2	
Asset No. ----------	
Asset Group ---	
Des. M.J.P.	Chk'd, P.R.
Dwn, M.J.P.	Chk'd, P.R.
Utility Circ. No. ------	Index No. ------
Const. Inspector ----------	
Scale: N.T.S.	

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

REVISIONS

No.	Description	By	Date (dd/mm/yy)
01	ISSUED FOR PRELIMINARY DESIGN	PR	05/09/18
02	ISSUED FOR PRELIMINARY DESIGN REV.1	PR	07/11/18
03	ISSUED FOR PRELIMINARY DESIGN REV.3	PR	09/11/22

NOTE:

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE INDICATED.

PARSONS

CONSTRUCTION CLASS 'C' COST ESTIMATE

Project No. 478418

Contract No. -

Subject: **Roadway Modifications St-Mary's Development**

Location: **3930 and 3960 Riverside Drive**

Client: **Taggart Realty Management**

By: Patrick Roger Date: December 12, 2022

Item No.	Description	Unit	Estimated Quantity	Unit Price	Amount
16. The steel beam guiderail south of the intersection is assume to be a under the TRM scope of work 17. Park parking lot pavement structure needs to be confirmed by a geotechnical engineer during detailed design 18. Park parking lot excavation and fill requirements are approxiamte only and needs to be confirmed during detailed design					

Appendix I:

Traffic Demand Management

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑ Parking proposed underground
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑ Sidewalks to be determined in SPA
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑ Modern design buildings
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑ Not within 600m radius of rapid transit; however sidewalks are proposed which connect to existing pedestrian facilities which connect to local bus routes.
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑ Internal sidewalks for Phase 2 will be confirmed during SPA.

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑ Sidewalks to be built per City Standard
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑ to be build compliant to ODA
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☑ site plans to connect to proposed cycling facilities on Riverside Drive.
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☑ sidewalks to Riverside proposed
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☑ on-street lighting already exists on Riverside Drive and Hunt Club
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	☑ 30km/h streets proposed
	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	☐ lighting provided.
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑ apartment towers proposed indoor bike parking. To be confirmed in 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 Zoning By-law Section 111)*	☑ anticipated to meet parking by-law. To be confirmed during 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 Zoning By-law Section 111)*	☑ anticipated to meet parking by-law. To be confirmed during SPA.
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑ anticipated to meet parking by-law. To be confirmed during SPA.
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑ anticipated to meet parking by-law. To be confirmed during SPA.
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☑ Potential TDM measure
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☑ Potential TDM measure
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☑ proposed

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☑ Potential TDM measure
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Appendix J:

MMLOS Analysis: Intersections

Multi-Modal Level of Service - Segments Form

Consultant	**Parsons**	**Project**	**478378**
Scenario	**3960 Riverside Drive**	**Date**	**30-Nov-22**
Comments	**St. Mary's Development**		

SEGMENTS		**Street A**	Hunt Club N Side	Hunt Club Both Sides	Riverside W Side	Riverside E Side	Riverside Future	Section 6	Section 7	Section 8	Section 9
Pedestrian	Sidewalk Width Boulevard Width		1.8 m < 0.5 m	1.8 m < 0.5 m	1.5 m < 0.5 m	1.8 m > 2 m	≥ 2 m > 2 m		≥ 2 m > 2 m		
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	> 3000	> 3000	> 3000		> 3000		
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	> 60 km/h no	> 60 km/h no	> 60 km/h no		> 50 to 60 km/h no		
	Exposure to Traffic PLoS	**-**	**F**	**F**	**F**	**E**	**D**	**-**	**C**	**-**	**-**
	Effective Sidewalk Width										
	Pedestrian Volume										
	Crowding PLoS		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Bicycle	Type of Cycling Facility		Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Physically Separated				
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	2-3 lanes total	2-3 lanes total					
	Operating Speed		≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h					
	# of Lanes & Operating Speed LoS		**F**	**F**	**F**	**F**	**-**	**-**	**-**	**-**	**-**
	Bike Lane (+ Parking Lane) Width										
	Bike Lane Width LoS	**F**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Bike Lane Blockages										
	Blockage LoS		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Median Refuge Width (no median = < 1.8 m)		≥ 1.8 m refuge	≥ 1.8 m refuge	≥ 1.8 m refuge	≥ 1.8 m refuge					
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes					
	Sidestreet Operating Speed		>40 to 50 km/h	>40 to 50 km/h	>40 to 50 km/h	>40 to 50 km/h					
	Unsignalized Crossing - Lowest LoS		**A**	**A**	**A**	**A**	**A**	**-**	**-**	**-**	**-**
	Level of Service		**F**	**F**	**F**	**F**	**A**	**-**	**-**	**-**	**-**
Transit	Facility Type		Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic				
	Friction or Ratio Transit:Posted Speed	**D**	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8				
	Level of Service		**D**	**D**	**D**	**D**	**D**	**-**	**-**	**-**	**-**
Truck	Truck Lane Width		> 3.7 m	> 3.7 m	> 3.7 m	> 3.7 m	> 3.7 m				
	Travel Lanes per Direction	**A**	> 1	> 1	> 1	> 1	> 1				
	Level of Service		**A**	**A**	**A**	**A**	**A**	**-**	**-**	**-**	**-**

Appendix K:

Synchro Analysis: Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	529	1112	207	62	841	34	532	1267	241	63	278	762
Future Volume (vph)	529	1112	207	62	841	34	532	1267	241	63	278	762
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3286	3390	1494	1691	3390	1498	3288	3390	1498	1694	3390	1517
Satd. Flow (RTOR)			267			267			267			457
Lane Group Flow (vph)	588	1236	230	69	934	38	591	1408	268	70	309	847
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	29.0	58.0		17.0	46.0		38.0	60.9		14.1	37.0	
Total Split (%)	19.3%	38.7%		11.3%	30.7%		25.3%	40.6%		9.4%	24.7%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	22.0	51.8	150.0	9.4	39.2	150.0	30.2	54.2	150.0	8.0	32.0	150.0
Actuated g/C Ratio	0.15	0.35	1.00	0.06	0.26	1.00	0.20	0.36	1.00	0.05	0.21	1.00
v/c Ratio	1.22	1.06	0.15	0.65	1.06	0.03	0.89	1.15	0.18	0.78	0.43	0.56
Control Delay	151.4	85.6	0.1	95.9	98.2	0.0	74.9	120.4	0.3	116.8	53.7	1.5
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	151.4	85.6	0.1	95.9	98.2	0.0	74.9	120.4	0.3	116.8	53.7	1.5
LOS	F	F	A	F	F	A	E	F	A	F	D	A
Approach Delay		94.9			94.5			94.3			21.2	
Approach LOS		F			F			F			C	
Queue Length 50th (m)	~108.1	~217.1	0.0	20.3	~159.3	0.0	87.8	~258.2	0.0	21.0	42.9	0.0
Queue Length 95th (m)	m#141.3	#260.1	m0.0	#40.4	#200.8	0.0	#111.9	#300.7	0.0	#48.0	58.2	0.0
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)	482	1171	1494	113	885	1498	699	1224	1498	90	722	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	1.22	1.06	0.15	0.61	1.06	0.03	0.85	1.15	0.18	0.78	0.43	0.56

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

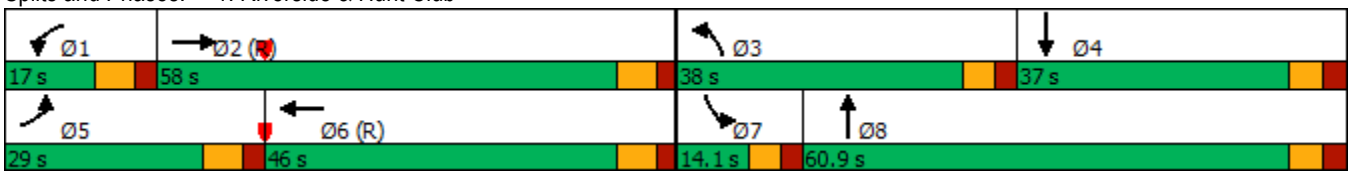
Intersection Signal Delay: 80.9	Intersection LOS: F
Intersection Capacity Utilization 104.2%	ICU Level of Service G
Analysis Period (min) 15	

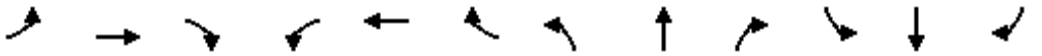
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	225	5	166	6	1774	30	74	1013	5
Future Volume (vph)	28	7	13	225	5	166	6	1774	30	74	1013	5
Satd. Flow (prot)	1695	1600	0	0	1700	1517	1695	3382	0	1695	3387	0
Flt Permitted	0.421				0.715		0.197			0.055		
Satd. Flow (perm)	751	1600	0	0	1273	1517	352	3382	0	98	3387	0
Satd. Flow (RTOR)		14				184		2			1	
Lane Group Flow (vph)	31	22	0	0	256	184	7	2004	0	82	1132	0
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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	28.8	28.8			28.8	28.8	67.4	67.4		79.7	78.6	
Actuated g/C Ratio	0.24	0.24			0.24	0.24	0.56	0.56		0.66	0.66	
v/c Ratio	0.17	0.06			0.84	0.37	0.04	1.05		0.50	0.51	
Control Delay	37.0	19.3			66.7	7.0	21.5	63.6		42.3	12.2	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	37.0	19.3			66.7	7.0	21.5	63.6		42.3	12.2	
LOS	D	B			E	A	C	E		D	B	
Approach Delay		29.7			41.7			63.4			14.3	
Approach LOS		C			D			E			B	
Queue Length 50th (m)	5.7	1.4			56.2	0.0	0.8	~285.2		6.8	70.8	
Queue Length 95th (m)	14.1	7.9			#95.1	16.9	m2.0	#341.6		20.6	87.8	
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)	191	418			324	524	197	1901		255	2279	
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	0.16	0.05			0.79	0.35	0.04	1.05		0.32	0.50	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

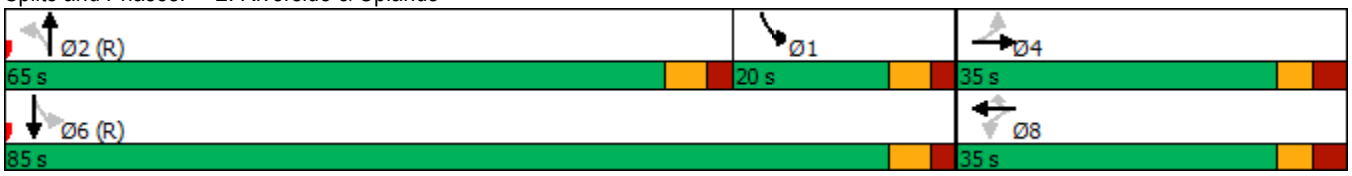
Intersection Signal Delay: 44.3	Intersection LOS: D
Intersection Capacity Utilization 92.8%	ICU Level of Service F
Analysis Period (min) 15	

~ 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: 2: Riverside & Uplands



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	1810	1251	0
Future Volume (vph)	0	0	0	1810	1251	0
Satd. Flow (prot)	1784	0	1784	3390	3390	1784
Flt Permitted						
Satd. Flow (perm)	1784	0	1784	3390	3390	1784
Satd. Flow (RTOR)						
Lane Group Flow (vph)	0	0	0	2011	1390	0
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)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.1	6.1	6.1	6.1
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)				111.9	111.9	
Actuated g/C Ratio				0.93	0.93	
v/c Ratio				0.64	0.44	
Control Delay				6.0	2.3	
Queue Delay				0.0	0.0	
Total Delay				6.0	2.3	
LOS				A	A	
Approach Delay				6.0	2.3	
Approach LOS				A	A	
Queue Length 50th (m)				0.0	0.0	
Queue Length 95th (m)				233.2	62.2	
Internal Link Dist (m)	114.7			245.6	580.6	
Turn Bay Length (m)						
Base Capacity (vph)				3161	3161	
Starvation Cap Reductn				34	0	
Spillback Cap Reductn				0	0	
Storage Cap Reductn				0	0	
Reduced v/c Ratio				0.64	0.44	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 4.5	Intersection LOS: A
Intersection Capacity Utilization 57.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Riverside & Site

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	822	8	449	1079	439	56	615	782	277	351	205
Future Volume (vph)	82	822	8	449	1079	439	56	615	782	277	351	205
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3275	3390	1496	3275	3390	1495	1677	3390	1497	3273	3390	1493
Satd. Flow (RTOR)			223			223			440			228
Lane Group Flow (vph)	91	913	9	499	1199	488	62	683	869	308	390	228
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		21.6	47.0		22.0	47.4	
Total Split (%)	12.0%	36.0%		18.0%	42.0%		14.4%	31.3%		14.7%	31.6%	
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	9.3	45.3	150.0	26.2	62.2	150.0	10.8	35.8	150.0	15.9	43.5	150.0
Actuated g/C Ratio	0.06	0.30	1.00	0.17	0.41	1.00	0.07	0.24	1.00	0.11	0.29	1.00
v/c Ratio	0.45	0.89	0.01	0.87	0.85	0.33	0.51	0.85	0.58	0.89	0.40	0.15
Control Delay	74.5	61.7	0.0	71.1	25.9	0.3	80.6	64.8	1.6	91.8	44.9	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	74.5	61.7	0.0	71.1	25.9	0.3	80.6	64.8	1.6	91.8	44.9	0.2
LOS	E	E	A	E	C	A	F	E	A	F	D	A
Approach Delay		62.3			30.5			31.4			49.5	
Approach LOS		E			C			C			D	
Queue Length 50th (m)	13.7	134.3	0.0	70.8	148.4	0.0	18.1	102.4	0.0	47.5	50.5	0.0
Queue Length 95th (m)	22.8	161.5	0.0	m#103.4	m189.0	m0.0	33.0	121.6	0.0	#74.7	66.3	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)	245	1066	1496	574	1406	1495	169	913	1497	348	983	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	0.37	0.86	0.01	0.87	0.85	0.33	0.37	0.75	0.58	0.89	0.40	0.15

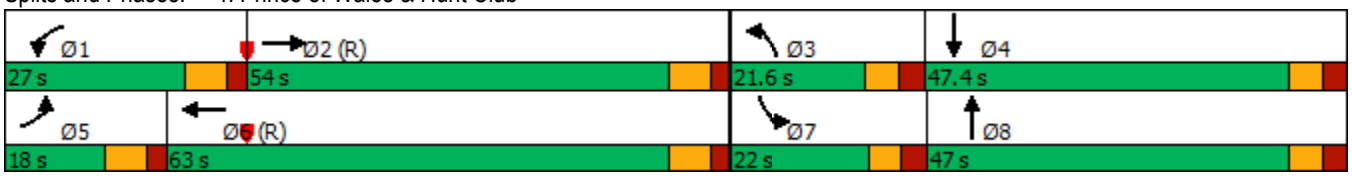
Intersection Summary
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 68 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

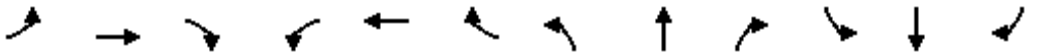
Maximum v/c Ratio: 0.89

Intersection Signal Delay: 39.4	Intersection LOS: D
Intersection Capacity Utilization 86.4%	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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 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)	507	1066	479	229	1178	60	348	401	190	71	922	646
Future Volume (vph)	507	1066	479	229	1178	60	348	401	190	71	922	646
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1494	1690	3390	1517	3283	3390	1496	1687	3390	1497
Satd. Flow (RTOR)			172			172			211			453
Lane Group Flow (vph)	563	1184	532	254	1309	67	387	446	211	79	1024	718
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	25.0	60.0		25.0	60.0		20.0	45.0		20.0	45.0	
Total Split (%)	16.7%	40.0%		16.7%	40.0%		13.3%	30.0%		13.3%	30.0%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	18.0	53.2	150.0	18.0	53.2	150.0	13.9	40.6	150.0	11.6	38.3	150.0
Actuated g/C Ratio	0.12	0.35	1.00	0.12	0.35	1.00	0.09	0.27	1.00	0.08	0.26	1.00
v/c Ratio	1.43	0.99	0.36	1.25	1.09	0.04	1.27	0.49	0.14	0.61	1.18	0.48
Control Delay	242.7	56.2	0.4	198.4	98.8	0.1	197.9	48.5	0.2	85.9	142.1	1.1
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	242.7	56.2	0.4	198.4	98.8	0.1	197.9	48.5	0.2	85.9	142.1	1.1
LOS	F	E	A	F	F	A	F	D	A	F	F	A
Approach Delay		89.2			110.3			94.1			84.0	
Approach LOS		F			F			F			F	
Queue Length 50th (m)	~115.1	194.5	0.0	~93.9	~229.7	0.0	~74.5	59.4	0.0	23.0	~191.8	0.0
Queue Length 95th (m)	m#133.5	m#222.3	m0.0	#149.4	#272.5	0.0	#107.6	77.7	0.0	40.6	#234.1	0.0
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)	394	1202	1494	203	1202	1517	304	918	1496	157	865	1497
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	1.43	0.99	0.36	1.25	1.09	0.04	1.27	0.49	0.14	0.50	1.18	0.48

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: 1.43

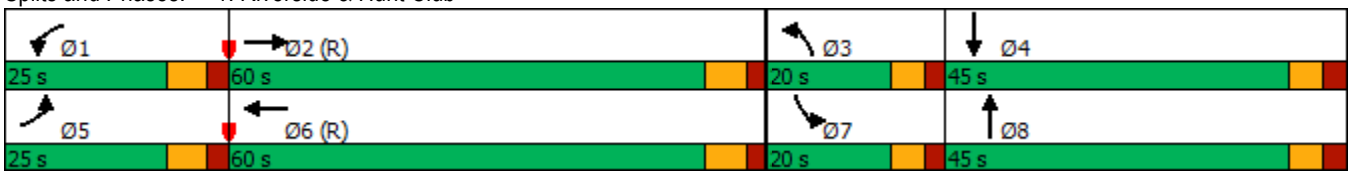
Intersection Signal Delay: 93.7	Intersection LOS: F
Intersection Capacity Utilization 109.2%	ICU Level of Service H
Analysis Period (min) 15	

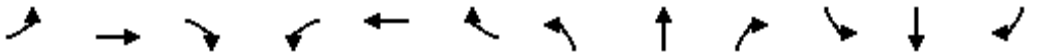
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	140	23	73	13	854	71	74	1600	7
Future Volume (vph)	12	13	10	140	23	73	13	854	71	74	1600	7
Satd. Flow (prot)	1695	1656	0	0	1711	1517	1695	3336	0	1695	3387	0
Flt Permitted	0.483				0.739		0.071			0.209		
Satd. Flow (perm)	843	1656	0	0	1316	1455	127	3336	0	371	3387	0
Satd. Flow (RTOR)		11				81		9			1	
Lane Group Flow (vph)	13	25	0	0	182	81	14	1028	0	82	1786	0
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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	22.5	22.5			22.5	22.5	71.1	71.1		94.9	94.9	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.55	0.55		0.73	0.73	
v/c Ratio	0.09	0.08			0.80	0.25	0.20	0.56		0.18	0.72	
Control Delay	43.6	28.5			76.1	10.7	27.2	22.8		8.8	13.0	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	43.6	28.5			76.1	10.7	27.2	22.8		8.8	13.0	
LOS	D	C			E	B	C	C		A	B	
Approach Delay		33.7			55.9			22.9			12.8	
Approach LOS		C			E			C			B	
Queue Length 50th (m)	2.8	3.0			45.0	0.0	1.7	85.6		5.4	125.2	
Queue Length 95th (m)	8.5	10.4			68.2	13.1	m8.0	130.1		11.7	176.3	
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)	184	371			288	382	70	1856		486	2473	
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	0.07	0.07			0.63	0.21	0.20	0.55		0.17	0.72	

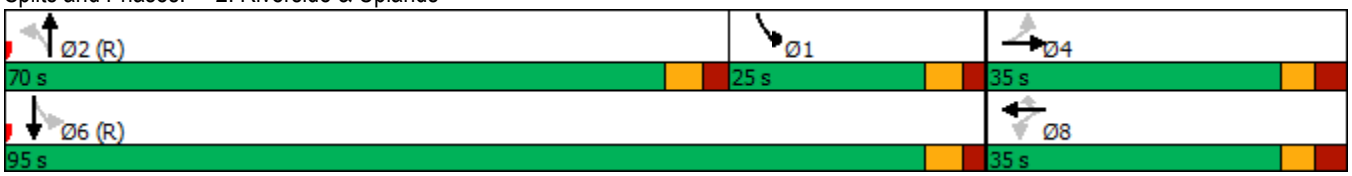
Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

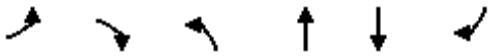
Maximum v/c Ratio: 0.80

Intersection Signal Delay: 19.9	Intersection LOS: B
Intersection Capacity Utilization 90.6%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 2: Riverside & Uplands





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	938	1750	0
Future Volume (vph)	0	0	0	938	1750	0
Satd. Flow (prot)	1784	0	1784	3390	3390	1784
Flt Permitted						
Satd. Flow (perm)	1784	0	1784	3390	3390	1784
Satd. Flow (RTOR)						
Lane Group Flow (vph)	0	0	0	1042	1944	0
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)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.1	6.1	6.1	6.1
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)				113.8	113.8	
Actuated g/C Ratio				0.88	0.88	
v/c Ratio				0.35	0.66	
Control Delay				4.8	10.9	
Queue Delay				0.0	0.0	
Total Delay				4.8	10.9	
LOS				A	B	
Approach Delay				4.8	10.9	
Approach LOS				A	B	
Queue Length 50th (m)				0.0	0.0	
Queue Length 95th (m)				70.4	258.7	
Internal Link Dist (m)	162.0			256.3	569.8	
Turn Bay Length (m)						
Base Capacity (vph)				2966	2966	
Starvation Cap Reductn				0	0	
Spillback Cap Reductn				0	0	
Storage Cap Reductn				0	0	
Reduced v/c Ratio				0.35	0.66	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 56.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Riverside & Site

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1055	55	598	1212	336	23	347	573	440	786	114
Future Volume (vph)	100	1055	55	598	1212	336	23	347	573	440	786	114
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3282	3390	1497	3281	3390	1497	1689	3390	1517	3258	3390	1517
Satd. Flow (RTOR)			271			271			394			271
Lane Group Flow (vph)	111	1172	61	664	1347	373	26	386	637	489	873	127
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	8.3	55.3	150.0	23.6	70.6	150.0	6.2	22.0	150.0	22.3	43.2	150.0
Actuated g/C Ratio	0.06	0.37	1.00	0.16	0.47	1.00	0.04	0.15	1.00	0.15	0.29	1.00
v/c Ratio	0.62	0.94	0.04	1.29	0.85	0.25	0.37	0.78	0.42	1.00	0.90	0.08
Control Delay	84.4	60.2	0.1	175.7	34.9	0.1	84.8	72.7	0.9	103.1	64.0	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	84.4	60.2	0.1	175.7	34.9	0.1	84.8	72.7	0.9	103.1	64.0	0.1
LOS	F	E	A	F	C	A	F	E	A	F	E	A
Approach Delay		59.4			68.7			29.4			71.4	
Approach LOS		E			E			C			E	
Queue Length 50th (m)	16.9	174.8	0.0	~135.6	216.8	0.0	7.7	57.8	0.0	~80.8	136.6	0.0
Queue Length 95th (m)	27.5	#216.7	0.0	m#130.8	m204.7	m0.0	18.1	76.1	0.0	#116.1	#180.0	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)	183	1270	1497	516	1594	1497	72	551	1517	489	975	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	0.92	0.04	1.29	0.85	0.25	0.36	0.70	0.42	1.00	0.90	0.08

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.29

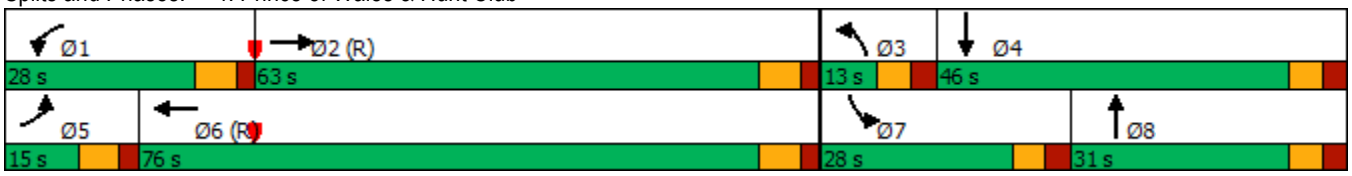
Intersection Signal Delay: 60.8	Intersection LOS: E
Intersection Capacity Utilization 98.2%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

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



Appendix L:

Synchro Analysis: Background Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	531	1112	207	62	841	36	532	1267	241	67	279	766
Future Volume (vph)	531	1112	207	62	841	36	532	1267	241	67	279	766
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3286	3390	1494	1690	3390	1498	3288	3390	1498	1694	3390	1517
Satd. Flow (RTOR)			267			267			267			461
Lane Group Flow (vph)	531	1112	207	62	841	36	532	1267	241	67	279	766
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	29.0	58.0		17.0	46.0		38.0	60.9		14.1	37.0	
Total Split (%)	19.3%	38.7%		11.3%	30.7%		25.3%	40.6%		9.4%	24.7%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	22.0	54.5	150.0	9.1	38.9	150.0	28.6	54.6	150.0	7.9	33.9	150.0
Actuated g/C Ratio	0.15	0.36	1.00	0.06	0.26	1.00	0.19	0.36	1.00	0.05	0.23	1.00
v/c Ratio	1.10	0.90	0.14	0.60	0.96	0.02	0.85	1.03	0.16	0.75	0.36	0.50
Control Delay	111.3	59.6	0.1	92.2	76.0	0.0	72.1	79.4	0.2	113.5	51.5	1.2
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	111.3	59.6	0.1	92.2	76.0	0.0	72.1	79.4	0.2	113.5	51.5	1.2
LOS	F	E	A	F	E	A	E	E	A	F	D	A
Approach Delay		67.8			74.2			68.1			20.6	
Approach LOS		E			E			E			C	
Queue Length 50th (m)	~90.0	180.8	0.0	18.2	130.2	0.0	79.1	~212.4	0.0	20.0	37.5	0.0
Queue Length 95th (m)	#126.8	#219.2	m0.0	34.3	#170.4	0.0	98.0	#255.2	0.0	#46.1	52.9	0.0
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)	482	1231	1494	113	885	1498	699	1233	1498	90	767	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	1.10	0.90	0.14	0.55	0.95	0.02	0.76	1.03	0.16	0.74	0.36	0.50

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.10

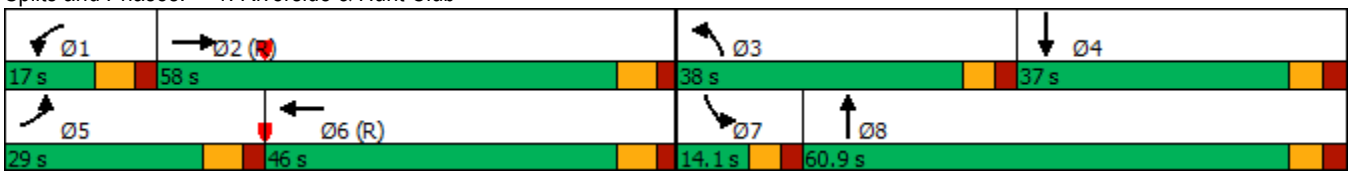
Intersection Signal Delay: 60.1	Intersection LOS: E
Intersection Capacity Utilization 104.3%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	234	5	183	6	1774	34	82	1013	5
Future Volume (vph)	28	7	13	234	5	183	6	1774	34	82	1013	5
Satd. Flow (prot)	1695	1594	0	0	1700	1517	1695	3378	0	1695	3387	0
Flt Permitted	0.437				0.716		0.237			0.054		
Satd. Flow (perm)	780	1594	0	0	1274	1517	423	3378	0	96	3387	0
Satd. Flow (RTOR)		13				183		2			1	
Lane Group Flow (vph)	28	20	0	0	239	183	6	1808	0	82	1018	0
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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	27.2	27.2			27.2	27.2	69.1	69.1		81.3	80.2	
Actuated g/C Ratio	0.23	0.23			0.23	0.23	0.58	0.58		0.68	0.67	
v/c Ratio	0.16	0.05			0.83	0.38	0.02	0.93		0.51	0.45	
Control Delay	37.3	19.8			67.0	7.3	20.8	35.4		42.1	10.8	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	37.3	19.8			67.0	7.3	20.8	35.4		42.1	10.8	
LOS	D	B			E	A	C	D		D	B	
Approach Delay		30.0			41.1			35.4			13.1	
Approach LOS		C			D			D			B	
Queue Length 50th (m)	5.3	1.3			53.1	0.0	0.6	204.6		6.4	56.7	
Queue Length 95th (m)	13.0	7.3			#85.2	17.1	m1.7	#290.6		20.9	75.7	
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)	194	407			318	515	243	1945		255	2305	
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	0.14	0.05			0.75	0.36	0.02	0.93		0.32	0.44	

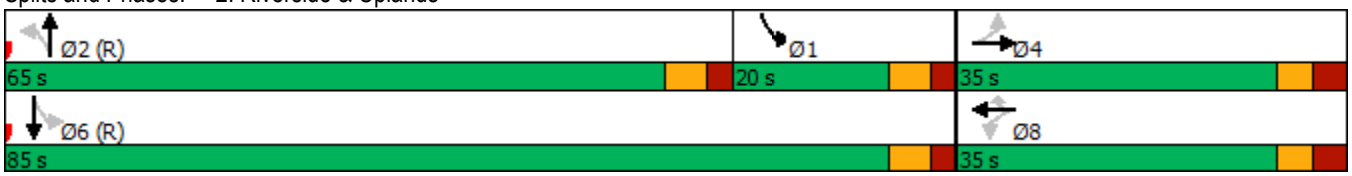
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

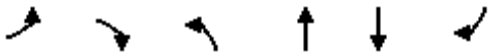
Maximum v/c Ratio: 0.93

Intersection Signal Delay: 28.8	Intersection LOS: C
Intersection Capacity Utilization 93.9%	ICU Level of Service F
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside & Uplands





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	1814	1260	0
Future Volume (vph)	0	0	0	1814	1260	0
Satd. Flow (prot)	1784	0	1784	3390	3390	1784
Flt Permitted						
Satd. Flow (perm)	1784	0	1784	3390	3390	1784
Satd. Flow (RTOR)						
Lane Group Flow (vph)	0	0	0	1814	1260	0
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)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.1	6.1	6.1	6.1
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)				111.9	111.9	
Actuated g/C Ratio				0.93	0.93	
v/c Ratio				0.57	0.40	
Control Delay				5.0	2.2	
Queue Delay				0.0	0.0	
Total Delay				5.0	2.2	
LOS				A	A	
Approach Delay				5.0	2.2	
Approach LOS				A	A	
Queue Length 50th (m)				0.0	0.0	
Queue Length 95th (m)				182.7	54.8	
Internal Link Dist (m)	114.7			245.6	580.6	
Turn Bay Length (m)						
Base Capacity (vph)				3161	3161	
Starvation Cap Reductn				40	0	
Spillback Cap Reductn				0	0	
Storage Cap Reductn				0	0	
Reduced v/c Ratio				0.58	0.40	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 3.8	Intersection LOS: A
Intersection Capacity Utilization 58.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Riverside & Site

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	824	8	449	1083	439	56	615	782	277	351	205
Future Volume (vph)	82	824	8	449	1083	439	56	615	782	277	351	205
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3271	3390	1496	3273	3390	1495	1672	3390	1497	3271	3390	1493
Satd. Flow (RTOR)			223			223			439			223
Lane Group Flow (vph)	82	824	8	449	1083	439	56	615	782	277	351	205
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		21.6	47.0		22.0	47.4	
Total Split (%)	12.0%	36.0%		18.0%	42.0%		14.4%	31.3%		14.7%	31.6%	
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	9.0	48.6	150.0	25.6	65.1	150.0	10.3	33.2	150.0	15.9	41.3	150.0
Actuated g/C Ratio	0.06	0.32	1.00	0.17	0.43	1.00	0.07	0.22	1.00	0.11	0.28	1.00
v/c Ratio	0.42	0.75	0.01	0.80	0.74	0.29	0.48	0.82	0.52	0.80	0.38	0.14
Control Delay	73.9	51.1	0.0	74.7	20.1	0.3	80.1	64.9	1.3	82.5	45.6	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	73.9	51.1	0.0	74.7	20.1	0.3	80.1	64.9	1.3	82.5	45.6	0.2
LOS	E	D	A	E	C	A	F	E	A	F	D	A
Approach Delay		52.7			28.1			31.2			46.7	
Approach LOS		D			C			C			D	
Queue Length 50th (m)	12.3	122.2	0.0	55.2	119.8	0.0	16.4	92.4	0.0	41.3	44.6	0.0
Queue Length 95th (m)	21.1	142.0	0.0	m#95.0	m167.8	m0.0	30.3	107.8	0.0	#63.9	59.4	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)	245	1116	1496	560	1471	1495	169	913	1497	355	951	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	0.33	0.74	0.01	0.80	0.74	0.29	0.33	0.67	0.52	0.78	0.37	0.14

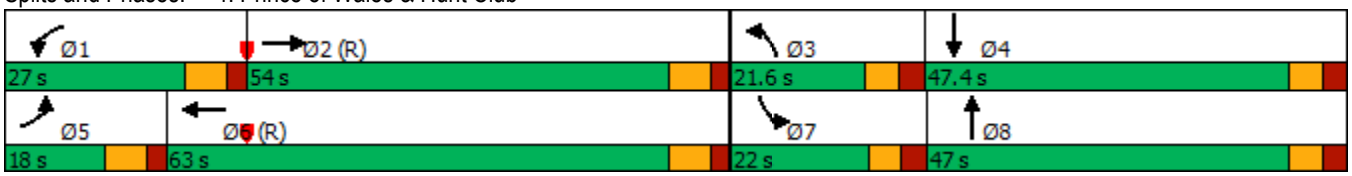
Intersection Summary
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 68 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 36.3	Intersection LOS: D
Intersection Capacity Utilization 86.4%	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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 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)	511	1066	479	229	1178	64	348	402	190	74	923	649
Future Volume (vph)	511	1066	479	229	1178	64	348	402	190	74	923	649
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3288	3390	1494	1689	3390	1517	3282	3390	1496	1686	3390	1497
Satd. Flow (RTOR)			172			172			190			454
Lane Group Flow (vph)	511	1066	479	229	1178	64	348	402	190	74	923	649
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	25.0	60.0		25.0	60.0		20.0	45.0		20.0	45.0	
Total Split (%)	16.7%	40.0%		16.7%	40.0%		13.3%	30.0%		13.3%	30.0%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	18.0	53.2	150.0	18.0	53.2	150.0	13.9	40.8	150.0	11.4	38.3	150.0
Actuated g/C Ratio	0.12	0.35	1.00	0.12	0.35	1.00	0.09	0.27	1.00	0.08	0.26	1.00
v/c Ratio	1.30	0.89	0.32	1.13	0.98	0.04	1.14	0.44	0.13	0.58	1.07	0.43
Control Delay	190.0	46.1	0.4	158.9	69.2	0.0	154.7	47.4	0.2	84.2	102.3	0.9
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	190.0	46.1	0.4	158.9	69.2	0.0	154.7	47.4	0.2	84.2	102.3	0.9
LOS	F	D	A	F	E	A	F	D	A	F	F	A
Approach Delay		71.2			80.1			77.6			61.5	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	~98.2	173.5	0.0	~78.5	182.1	0.0	~62.2	52.5	0.0	21.6	~159.1	0.0
Queue Length 95th (m)	m#129.7	196.9	m0.0	#132.2	#230.0	0.0	#93.9	70.2	0.0	38.4	#200.6	0.0
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)	394	1202	1494	203	1202	1517	304	922	1496	157	865	1497
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	1.30	0.89	0.32	1.13	0.98	0.04	1.14	0.44	0.13	0.47	1.07	0.43

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: 1.30

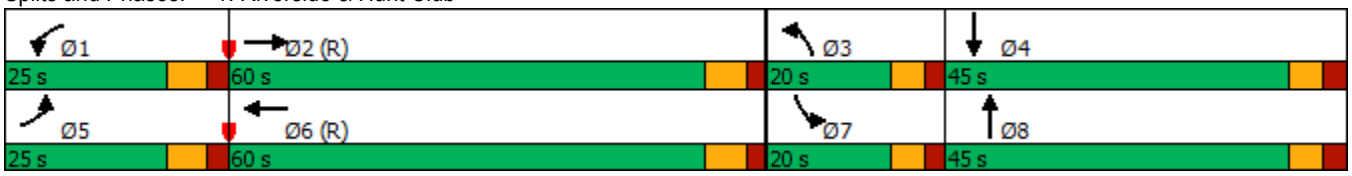
Intersection Signal Delay: 71.7	Intersection LOS: E
Intersection Capacity Utilization 109.3%	ICU Level of Service H
Analysis Period (min) 15	

~ 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



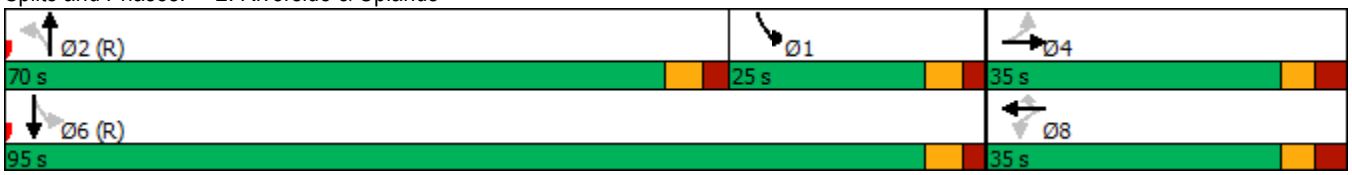
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	147	23	85	13	854	80	91	1600	7
Future Volume (vph)	12	13	10	147	23	85	13	854	80	91	1600	7
Satd. Flow (prot)	1695	1658	0	0	1711	1517	1695	3332	0	1695	3387	0
Flt Permitted	0.508				0.739		0.105			0.253		
Satd. Flow (perm)	887	1658	0	0	1316	1455	187	3332	0	449	3387	0
Satd. Flow (RTOR)		10				85		11			1	
Lane Group Flow (vph)	12	23	0	0	170	85	13	934	0	91	1607	0
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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	21.9	21.9			21.9	21.9	76.0	76.0		95.5	95.5	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.58	0.58		0.73	0.73	
v/c Ratio	0.08	0.08			0.77	0.27	0.12	0.48		0.20	0.65	
Control Delay	43.1	28.5			72.8	10.4	17.9	17.7		8.5	11.1	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	43.1	28.5			72.8	10.4	17.9	17.7		8.5	11.1	
LOS	D	C			E	B	B	B		A	B	
Approach Delay		33.5			52.0			17.7			11.0	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	2.6	2.8			42.1	0.0	1.4	67.0		5.8	97.2	
Queue Length 95th (m)	7.9	10.0			62.6	13.2	7.2	116.5		13.5	150.1	
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)	196	376			292	389	111	1985		541	2497	
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	0.06	0.06			0.58	0.22	0.12	0.47		0.17	0.64	

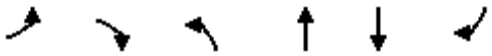
Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 17.0	Intersection LOS: B
Intersection Capacity Utilization 90.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Riverside & Uplands





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	947	1757	0
Future Volume (vph)	0	0	0	947	1757	0
Satd. Flow (prot)	1784	0	1784	3390	3390	1784
Flt Permitted						
Satd. Flow (perm)	1784	0	1784	3390	3390	1784
Satd. Flow (RTOR)						
Lane Group Flow (vph)	0	0	0	947	1757	0
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)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.1	6.1	6.1	6.1
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)				113.8	113.8	
Actuated g/C Ratio				0.88	0.88	
v/c Ratio				0.32	0.59	
Control Delay				4.6	11.6	
Queue Delay				0.0	0.0	
Total Delay				4.6	11.6	
LOS				A	B	
Approach Delay				4.6	11.6	
Approach LOS				A	B	
Queue Length 50th (m)				0.0	0.0	
Queue Length 95th (m)				61.9	233.0	
Internal Link Dist (m)	162.0			256.3	569.8	
Turn Bay Length (m)						
Base Capacity (vph)				2966	2966	
Starvation Cap Reductn				0	0	
Spillback Cap Reductn				0	0	
Storage Cap Reductn				0	0	
Reduced v/c Ratio				0.32	0.59	

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 56.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Riverside & Site

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1059	55	598	1215	336	23	347	573	440	786	114
Future Volume (vph)	100	1059	55	598	1215	336	23	347	573	440	786	114
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3281	3390	1497	3279	3390	1497	1690	3390	1517	3257	3390	1517
Satd. Flow (RTOR)			271			271			399			271
Lane Group Flow (vph)	100	1059	55	598	1215	336	23	347	573	440	786	114
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	8.1	52.5	150.0	26.7	71.1	150.0	6.4	21.4	150.0	22.6	42.6	150.0
Actuated g/C Ratio	0.05	0.35	1.00	0.18	0.47	1.00	0.04	0.14	1.00	0.15	0.28	1.00
v/c Ratio	0.56	0.89	0.04	1.02	0.76	0.22	0.32	0.72	0.38	0.89	0.82	0.08
Control Delay	82.0	56.3	0.1	81.9	30.6	0.2	81.4	69.8	0.7	82.8	58.3	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	82.0	56.3	0.1	81.9	30.6	0.2	81.4	69.8	0.7	82.8	58.3	0.1
LOS	F	E	A	F	C	A	F	E	A	F	E	A
Approach Delay		55.9			40.1			28.1			61.4	
Approach LOS		E			D			C			E	
Queue Length 50th (m)	15.2	154.1	0.0	~114.5	194.0	0.0	6.7	51.3	0.0	66.5	117.5	0.0
Queue Length 95th (m)	25.3	178.6	0.0	m#124.7	m198.0	m0.0	16.8	68.4	0.0	#99.6	#151.1	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)	182	1270	1497	584	1616	1497	74	551	1517	494	962	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	0.55	0.83	0.04	1.02	0.75	0.22	0.31	0.63	0.38	0.89	0.82	0.08

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

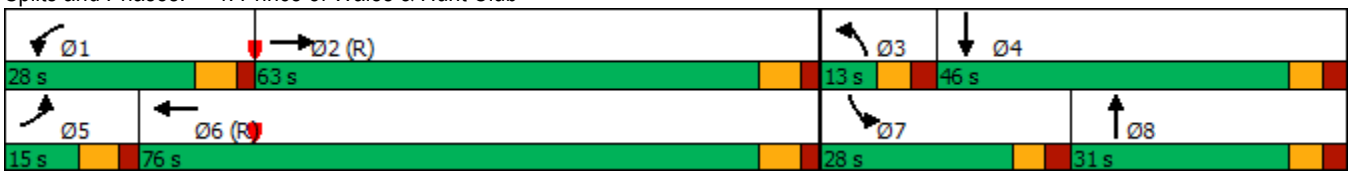
Intersection Signal Delay: 46.6	Intersection LOS: D
Intersection Capacity Utilization 98.3%	ICU Level of Service F
Analysis Period (min) 15	

~ 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.

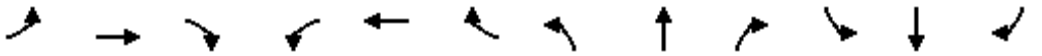
m Volume for 95th percentile queue is metered by upstream signal.

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



Appendix M:

Synchro Analysis: Future Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	535	1112	207	62	841	38	532	1268	241	69	282	777
Future Volume (vph)	535	1112	207	62	841	38	532	1268	241	69	282	777
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3263	3390	1494	1690	3390	1494	3233	3390	1494	1691	3390	1494
Satd. Flow (RTOR)			267			267			267			500
Lane Group Flow (vph)	535	1112	207	62	841	38	532	1268	241	69	282	777
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	31.0	63.1		13.0	45.1		34.5	61.0		12.9	39.4	
Total Split (%)	20.7%	42.1%		8.7%	30.1%		23.0%	40.7%		8.6%	26.3%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	24.0	56.3	150.0	6.0	38.3	150.0	27.2	54.3	150.0	6.8	33.9	150.0
Actuated g/C Ratio	0.16	0.38	1.00	0.04	0.26	1.00	0.18	0.36	1.00	0.05	0.23	1.00
v/c Ratio	1.02	0.87	0.14	0.93	0.97	0.03	0.89	1.03	0.16	0.91	0.37	0.52
Control Delay	84.7	55.1	0.1	159.7	79.4	0.0	78.0	81.0	0.2	149.0	51.0	1.3
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	84.7	55.1	0.1	159.7	79.4	0.0	78.0	81.0	0.2	149.0	51.0	1.3
LOS	F	E	A	F	E	A	E	F	A	F	D	A
Approach Delay		57.5			81.5			70.7			22.8	
Approach LOS		E			F			E			C	
Queue Length 50th (m)	~78.7	177.5	0.0	18.8	131.3	0.0	79.7	~212.4	0.0	20.8	38.0	0.0
Queue Length 95th (m)	#120.8	202.3	m0.0	#48.8	#173.7	0.0	#106.3	#255.2	0.0	#51.5	52.1	0.0
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	150.0		200.0
Base Capacity (vph)	526	1272	1494	67	865	1494	622	1227	1494	76	766	1494
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	1.02	0.87	0.14	0.93	0.97	0.03	0.86	1.03	0.16	0.91	0.37	0.52

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

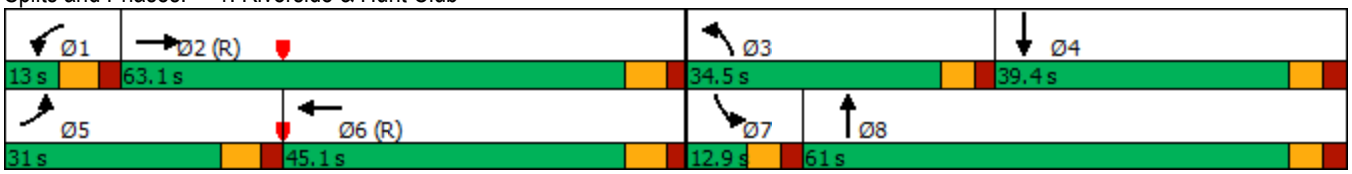
Intersection Signal Delay: 59.2	Intersection LOS: E
Intersection Capacity Utilization 104.4%	ICU Level of Service G
Analysis Period (min) 15	

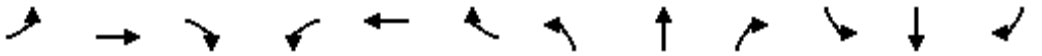
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	234	5	183	6	1811	34	82	1029	5
Future Volume (vph)	28	7	13	234	5	183	6	1811	34	82	1029	5
Satd. Flow (prot)	1695	1594	0	0	1700	1517	1695	3377	0	1695	3386	0
Flt Permitted	0.422				0.716		0.236			0.052		
Satd. Flow (perm)	753	1594	0	0	1274	1517	419	3377	0	93	3386	0
Satd. Flow (RTOR)		13				91		2			1	
Lane Group Flow (vph)	28	20	0	0	239	183	6	1845	0	82	1034	0
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	73.6	73.6		11.4	85.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%	29.2%	61.3%	61.3%		9.5%	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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	25.7	25.7			25.7	25.7	72.5	72.5		82.8	81.7	
Actuated g/C Ratio	0.21	0.21			0.21	0.21	0.60	0.60		0.69	0.68	
v/c Ratio	0.17	0.06			0.88	0.46	0.02	0.90		0.61	0.45	
Control Delay	39.8	21.1			75.8	23.6	12.7	28.9		51.1	10.0	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	39.8	21.1			75.8	23.6	12.7	28.9		51.1	10.0	
LOS	D	C			E	C	B	C		D	A	
Approach Delay		32.0			53.1			28.8			13.0	
Approach LOS		C			D			C			B	
Queue Length 50th (m)	5.3	1.3			53.1	17.7	0.6	215.5		6.4	58.0	
Queue Length 95th (m)	13.5	7.6			#92.5	39.2	m1.1	#133.9		#25.9	71.7	
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)	178	388			302	429	253	2042		135	2304	
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	0.16	0.05			0.79	0.43	0.02	0.90		0.61	0.45	

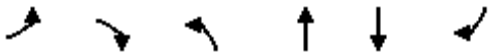
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 26.7	Intersection LOS: C
Intersection Capacity Utilization 95.0%	ICU Level of Service F
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside & Uplands



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	37	16	7	1814	1260	16
Future Volume (vph)	37	16	7	1814	1260	16
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1673	1517	1688	3390	3390	1448
Satd. Flow (RTOR)						5
Lane Group Flow (vph)	37	16	7	1814	1260	16
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				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	11.0	31.1	31.1	31.1
Total Split (s)	34.5	34.5	11.0	85.5	74.5	74.5
Total Split (%)	28.8%	28.8%	9.2%	71.3%	62.1%	62.1%
Yellow Time (s)	3.3	3.3	4.0	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	2.0	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.0	6.1	6.1	6.1
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effct Green (s)	13.6	13.6	5.7	98.3	96.1	96.1
Actuated g/C Ratio	0.11	0.11	0.05	0.82	0.80	0.80
v/c Ratio	0.19	0.09	0.09	0.65	0.46	0.01
Control Delay	47.8	45.1	57.3	8.2	8.3	5.9
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	47.8	45.1	57.3	8.4	8.3	5.9
LOS	D	D	E	A	A	A
Approach Delay	47.0			8.6	8.3	
Approach LOS	D			A	A	
Queue Length 50th (m)	8.3	3.6	1.6	72.2	83.8	0.9
Queue Length 95th (m)	15.9	8.8	6.6	182.7	77.6	m1.9
Internal Link Dist (m)	114.7			245.6	580.6	
Turn Bay Length (m)	50.0		40.0			15.0
Base Capacity (vph)	395	353	80	2777	2715	1161
Starvation Cap Reductn	0	0	0	298	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.05	0.09	0.73	0.46	0.01

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: 0.65

Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 71.8%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	826	8	452	1088	442	56	615	783	278	351	205
Future Volume (vph)	82	826	8	452	1088	442	56	615	783	278	351	205
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3271	3390	1496	3273	3390	1495	1672	3390	1497	3271	3390	1493
Satd. Flow (RTOR)			223			223			440			223
Lane Group Flow (vph)	82	826	8	452	1088	442	56	615	783	278	351	205
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		21.6	47.0		22.0	47.4	
Total Split (%)	12.0%	36.0%		18.0%	42.0%		14.4%	31.3%		14.7%	31.6%	
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	9.0	48.3	150.0	25.8	65.1	150.0	10.3	33.2	150.0	15.9	41.3	150.0
Actuated g/C Ratio	0.06	0.32	1.00	0.17	0.43	1.00	0.07	0.22	1.00	0.11	0.28	1.00
v/c Ratio	0.42	0.76	0.01	0.80	0.74	0.30	0.48	0.82	0.52	0.80	0.38	0.14
Control Delay	73.9	51.5	0.0	73.7	20.4	0.3	80.1	64.9	1.3	82.5	45.6	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	73.9	51.5	0.0	73.7	20.4	0.3	80.1	64.9	1.3	82.5	45.6	0.2
LOS	E	D	A	E	C	A	F	E	A	F	D	A
Approach Delay		53.1			28.1			31.2			46.7	
Approach LOS		D			C			C			D	
Queue Length 50th (m)	12.3	123.0	0.0	55.3	120.6	0.0	16.4	92.4	0.0	41.4	44.5	0.0
Queue Length 95th (m)	21.1	142.4	0.0	m#91.9	m176.1	m0.0	30.3	107.8	0.0	#64.2	59.4	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)	245	1111	1496	565	1470	1495	169	913	1497	355	951	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	0.33	0.74	0.01	0.80	0.74	0.30	0.33	0.67	0.52	0.78	0.37	0.14

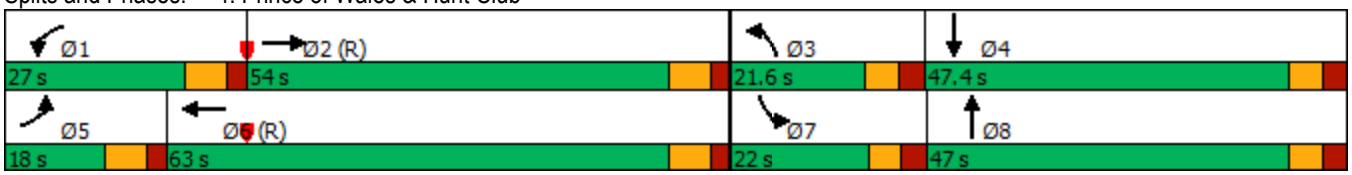
Intersection Summary
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 68 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 36.4	Intersection LOS: D
Intersection Capacity Utilization 86.6%	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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 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)	520	1066	479	229	1178	67	348	404	190	76	925	655
Future Volume (vph)	520	1066	479	229	1178	67	348	404	190	76	925	655
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3272	3390	1494	1689	3390	1494	3254	3390	1492	1673	3390	1492
Satd. Flow (RTOR)			172			172			190			536
Lane Group Flow (vph)	520	1066	479	229	1178	67	348	404	190	76	925	655
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	29.0	56.1		28.0	55.1		21.4	46.3		19.6	44.5	
Total Split (%)	19.3%	37.4%		18.7%	36.7%		14.3%	30.9%		13.1%	29.7%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	22.0	49.3	150.0	21.0	48.3	150.0	15.3	41.8	150.0	11.3	37.8	150.0
Actuated g/C Ratio	0.15	0.33	1.00	0.14	0.32	1.00	0.10	0.28	1.00	0.08	0.25	1.00
v/c Ratio	1.08	0.96	0.32	0.97	1.08	0.04	1.04	0.43	0.13	0.60	1.08	0.44
Control Delay	106.3	54.8	0.3	113.5	98.9	0.1	123.1	46.5	0.2	85.9	107.6	0.9
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	106.3	54.8	0.3	113.5	98.9	0.1	123.1	46.5	0.2	85.9	107.6	0.9
LOS	F	D	A	F	F	A	F	D	A	F	F	A
Approach Delay		55.1			96.7			65.5			64.4	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	~87.0	175.0	0.0	68.8	~205.2	0.0	~57.3	52.4	0.0	22.2	~161.5	0.0
Queue Length 95th (m)	m#106.6	m#201.2	m0.0	#121.7	#248.0	0.0	#89.1	69.5	0.0	39.1	#203.1	0.0
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	150.0		200.0
Base Capacity (vph)	482	1114	1494	237	1091	1494	335	944	1492	152	854	1492
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	0.96	0.32	0.97	1.08	0.04	1.04	0.43	0.13	0.50	1.08	0.44

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: 1.08

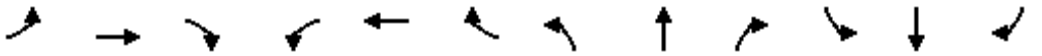
Intersection Signal Delay: 69.2	Intersection LOS: E
Intersection Capacity Utilization 109.7%	ICU Level of Service H
Analysis Period (min) 15	

~ 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



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	147	23	85	13	876	80	91	1631	7
Future Volume (vph)	12	13	10	147	23	85	13	876	80	91	1631	7
Satd. Flow (prot)	1695	1658	0	0	1711	1517	1695	3330	0	1695	3386	0
Flt Permitted	0.509				0.739		0.101			0.249		
Satd. Flow (perm)	889	1658	0	0	1316	1455	180	3330	0	441	3386	0
Satd. Flow (RTOR)		10				85		12			1	
Lane Group Flow (vph)	12	23	0	0	170	85	13	956	0	91	1638	0
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)	38.0	38.0		38.0	38.0	38.0	77.0	77.0		15.0	92.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%	29.2%	59.2%	59.2%		11.5%	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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	22.0	22.0			22.0	22.0	78.0	78.0		95.4	95.4	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.60	0.60		0.73	0.73	
v/c Ratio	0.08	0.08			0.77	0.27	0.12	0.48		0.21	0.66	
Control Delay	42.9	28.4			72.4	10.4	13.2	13.1		8.8	11.4	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.9	28.4			72.4	10.4	13.2	13.1		8.8	11.4	
LOS	D	C			E	B	B	B		A	B	
Approach Delay		33.4			51.7			13.1			11.3	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	2.6	2.8			42.0	0.0	1.4	70.4		5.8	101.2	
Queue Length 95th (m)	7.9	10.0			62.5	13.2	m6.7	114.4		13.5	155.8	
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)	215	409			318	416	110	2050		444	2485	
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	0.06	0.06			0.53	0.20	0.12	0.47		0.20	0.66	

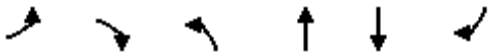
Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 15.6	Intersection LOS: B
Intersection Capacity Utilization 91.7%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 2: Riverside & Uplands



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	22	10	14	947	1757	31
Future Volume (vph)	22	10	14	947	1757	31
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1671	1517	1691	3390	3390	1445
Satd. Flow (RTOR)						7
Lane Group Flow (vph)	22	10	14	947	1757	31
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				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	11.0	31.1	31.1	31.1
Total Split (s)	34.5	34.5	11.0	95.5	84.5	84.5
Total Split (%)	26.5%	26.5%	8.5%	73.5%	65.0%	65.0%
Yellow Time (s)	3.3	3.3	4.0	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	2.0	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.0	6.1	6.1	6.1
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effct Green (s)	17.2	17.2	6.0	109.2	104.4	104.4
Actuated g/C Ratio	0.13	0.13	0.05	0.84	0.80	0.80
v/c Ratio	0.10	0.05	0.18	0.33	0.65	0.03
Control Delay	45.8	43.9	65.3	5.2	21.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.8	43.9	65.3	5.2	21.0	12.6
LOS	D	D	E	A	C	B
Approach Delay	45.2			6.1	20.9	
Approach LOS	D			A	C	
Queue Length 50th (m)	5.4	2.4	3.5	24.2	151.1	1.9
Queue Length 95th (m)	12.0	6.9	10.6	61.9	254.7	m7.2
Internal Link Dist (m)	162.0			256.3	569.8	
Turn Bay Length (m)	50.0		40.0			15.0
Base Capacity (vph)	365	326	77	2848	2734	1167
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.03	0.18	0.33	0.64	0.03

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: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 70.1%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1064	55	599	1219	337	23	347	575	442	786	114
Future Volume (vph)	100	1064	55	599	1219	337	23	347	575	442	786	114
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3281	3390	1497	3279	3390	1497	1690	3390	1517	3257	3390	1517
Satd. Flow (RTOR)			271			271			460			271
Lane Group Flow (vph)	100	1064	55	599	1219	337	23	347	575	442	786	114
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)	15.9	56.3		35.1	75.5		11.6	30.6		28.0	47.0	
Total Split (%)	10.6%	37.5%		23.4%	50.3%		7.7%	20.4%		18.7%	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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	8.6	51.2	150.0	29.3	71.9	150.0	5.1	21.2	150.0	21.5	42.3	150.0
Actuated g/C Ratio	0.06	0.34	1.00	0.20	0.48	1.00	0.03	0.14	1.00	0.14	0.28	1.00
v/c Ratio	0.53	0.92	0.04	0.93	0.75	0.23	0.40	0.72	0.38	0.94	0.82	0.08
Control Delay	79.1	60.7	0.1	59.2	28.1	0.2	91.4	70.5	0.7	92.0	58.9	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	79.1	60.7	0.1	59.2	28.1	0.2	91.4	70.5	0.7	92.0	58.9	0.1
LOS	E	E	A	E	C	A	F	E	A	F	E	A
Approach Delay		59.5			32.3			28.5			64.8	
Approach LOS		E			C			C			E	
Queue Length 50th (m)	15.1	162.8	0.0	83.9	193.7	0.0	6.9	51.5	0.0	68.1	117.7	0.0
Queue Length 95th (m)	25.2	#206.0	0.0	m85.5	m190.7	m0.0	17.0	68.6	0.0	#100.2	143.3	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)	199	1157	1497	642	1624	1497	57	542	1517	470	956	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	0.50	0.92	0.04	0.93	0.75	0.23	0.40	0.64	0.38	0.94	0.82	0.08

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 45.3	Intersection LOS: D
Intersection Capacity Utilization 98.5%	ICU Level of Service F
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 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)	541	1112	207	62	841	39	532	1270	241	73	285	789
Future Volume (vph)	541	1112	207	62	841	39	532	1270	241	73	285	789
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3212	3390	1494	1690	3390	1485	3122	3390	1483	1680	3390	1485
Satd. Flow (RTOR)			267			267			267			499
Lane Group Flow (vph)	541	1112	207	62	841	39	532	1270	241	73	285	789
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	31.0	63.1		13.0	45.1		34.5	61.0		12.9	39.4	
Total Split (%)	20.7%	42.1%		8.7%	30.1%		23.0%	40.7%		8.6%	26.3%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	24.0	56.3	150.0	6.0	38.3	150.0	27.2	54.3	150.0	6.8	33.9	150.0
Actuated g/C Ratio	0.16	0.38	1.00	0.04	0.26	1.00	0.18	0.36	1.00	0.05	0.23	1.00
v/c Ratio	1.03	0.87	0.14	0.93	0.97	0.03	0.89	1.04	0.16	0.96	0.37	0.53
Control Delay	87.3	54.9	0.1	159.7	79.4	0.0	78.0	81.4	0.2	161.7	51.1	1.4
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	87.3	54.9	0.1	159.7	79.4	0.0	78.0	81.4	0.2	161.7	51.1	1.4
LOS	F	D	A	F	E	A	E	F	A	F	D	A
Approach Delay		58.2			81.4			71.0			23.9	
Approach LOS		E			F			E			C	
Queue Length 50th (m)	~82.0	177.7	0.0	18.8	131.3	0.0	79.7	~213.0	0.0	22.1	38.4	0.0
Queue Length 95th (m)	#122.7	202.4	m0.0	#48.8	#173.7	0.0	#106.3	#255.5	0.0	#55.3	52.7	0.0
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	150.0		200.0
Base Capacity (vph)	526	1272	1494	67	865	1485	622	1227	1483	76	766	1485
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	0.87	0.14	0.93	0.97	0.03	0.86	1.04	0.16	0.96	0.37	0.53

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

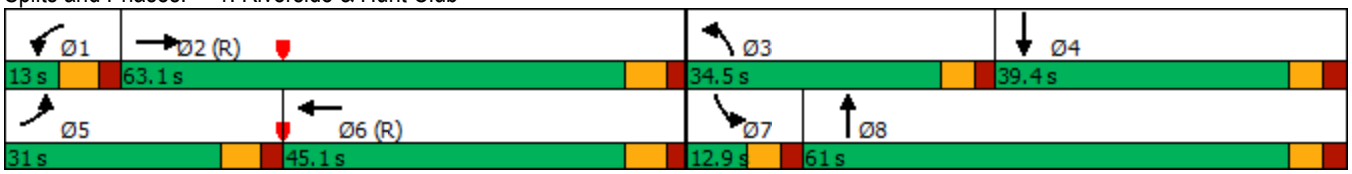
Intersection Signal Delay: 59.7	Intersection LOS: E
Intersection Capacity Utilization 104.8%	ICU Level of Service G
Analysis Period (min) 15	

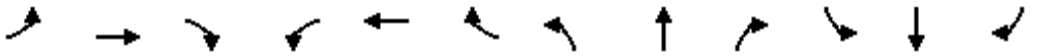
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Riverside & Hunt Club





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	234	5	183	6	1856	34	82	1049	5
Future Volume (vph)	28	7	13	234	5	183	6	1856	34	82	1049	5
Satd. Flow (prot)	1695	1594	0	0	1700	1517	1695	3378	0	1695	3386	0
Flt Permitted	0.422				0.716		0.230			0.052		
Satd. Flow (perm)	747	1594	0	0	1274	1479	407	3378	0	93	3386	0
Satd. Flow (RTOR)		13				90		2			1	
Lane Group Flow (vph)	28	20	0	0	239	183	6	1890	0	82	1054	0
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	73.6	73.6		11.4	85.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%	29.2%	61.3%	61.3%		9.5%	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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	25.7	25.7			25.7	25.7	72.5	72.5		82.8	81.7	
Actuated g/C Ratio	0.21	0.21			0.21	0.21	0.60	0.60		0.69	0.68	
v/c Ratio	0.17	0.06			0.88	0.47	0.02	0.93		0.61	0.46	
Control Delay	39.9	21.1			75.8	24.1	12.7	29.1		51.1	10.1	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	39.9	21.1			75.8	24.1	12.7	29.1		51.1	10.1	
LOS	D	C			E	C	B	C		D	B	
Approach Delay		32.1			53.4			29.1			13.0	
Approach LOS		C			D			C			B	
Queue Length 50th (m)	5.3	1.3			53.1	17.9	0.6	226.7		6.4	59.6	
Queue Length 95th (m)	13.5	7.6			#92.5	39.7	m1.1	#146.1		#25.9	73.5	
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)	177	388			302	419	245	2043		135	2304	
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	0.16	0.05			0.79	0.44	0.02	0.93		0.61	0.46	

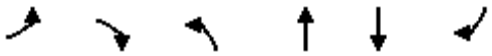
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 26.8	Intersection LOS: C
Intersection Capacity Utilization 97.1%	ICU Level of Service F
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside & Uplands



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	82	35	16	1814	1260	36
Future Volume (vph)	82	35	16	1814	1260	36
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1652	1517	1674	3390	3390	1374
Satd. Flow (RTOR)						11
Lane Group Flow (vph)	82	35	16	1814	1260	36
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				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	11.0	31.1	31.1	31.1
Total Split (s)	34.5	34.5	11.0	85.5	74.5	74.5
Total Split (%)	28.8%	28.8%	9.2%	71.3%	62.1%	62.1%
Yellow Time (s)	3.3	3.3	4.0	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	2.0	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.0	6.1	6.1	6.1
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effct Green (s)	14.4	14.4	6.0	97.5	92.6	92.6
Actuated g/C Ratio	0.12	0.12	0.05	0.81	0.77	0.77
v/c Ratio	0.40	0.19	0.19	0.66	0.48	0.03
Control Delay	52.7	46.9	60.0	8.7	11.4	7.6
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	52.7	46.9	60.0	8.9	11.4	7.6
LOS	D	D	E	A	B	A
Approach Delay	51.0			9.3	11.3	
Approach LOS	D			A	B	
Queue Length 50th (m)	18.7	7.8	3.7	77.3	87.2	2.3
Queue Length 95th (m)	29.5	15.1	11.1	182.7	76.7	m4.4
Internal Link Dist (m)	114.7			245.6	580.6	
Turn Bay Length (m)	50.0		40.0			15.0
Base Capacity (vph)	395	353	85	2753	2616	1062
Starvation Cap Reductn	0	0	0	287	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.10	0.19	0.74	0.48	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: 0.66

Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 71.8%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	829	8	454	1095	445	56	615	784	280	351	205
Future Volume (vph)	82	829	8	454	1095	445	56	615	784	280	351	205
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3271	3390	1496	3273	3390	1495	1672	3390	1497	3271	3390	1493
Satd. Flow (RTOR)			223			223			440			223
Lane Group Flow (vph)	82	829	8	454	1095	445	56	615	784	280	351	205
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		21.6	47.0		22.0	47.4	
Total Split (%)	12.0%	36.0%		18.0%	42.0%		14.4%	31.3%		14.7%	31.6%	
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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	9.0	48.0	150.0	26.0	65.0	150.0	10.3	33.2	150.0	16.0	41.4	150.0
Actuated g/C Ratio	0.06	0.32	1.00	0.17	0.43	1.00	0.07	0.22	1.00	0.11	0.28	1.00
v/c Ratio	0.42	0.76	0.01	0.80	0.75	0.30	0.48	0.82	0.52	0.80	0.38	0.14
Control Delay	73.9	52.0	0.0	73.2	20.7	0.3	80.1	64.9	1.3	82.4	45.5	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	73.9	52.0	0.0	73.2	20.7	0.3	80.1	64.9	1.3	82.4	45.5	0.2
LOS	E	D	A	E	C	A	F	E	A	F	D	A
Approach Delay		53.5			28.1			31.2			46.8	
Approach LOS		D			C			C			D	
Queue Length 50th (m)	12.3	124.1	0.0	55.6	121.8	0.0	16.4	92.4	0.0	41.7	44.4	0.0
Queue Length 95th (m)	21.1	143.1	0.0	m#92.7	m178.3	m0.0	30.3	107.8	0.0	#65.2	59.4	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)	245	1107	1496	569	1468	1495	169	913	1497	357	953	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	0.33	0.75	0.01	0.80	0.75	0.30	0.33	0.67	0.52	0.78	0.37	0.14

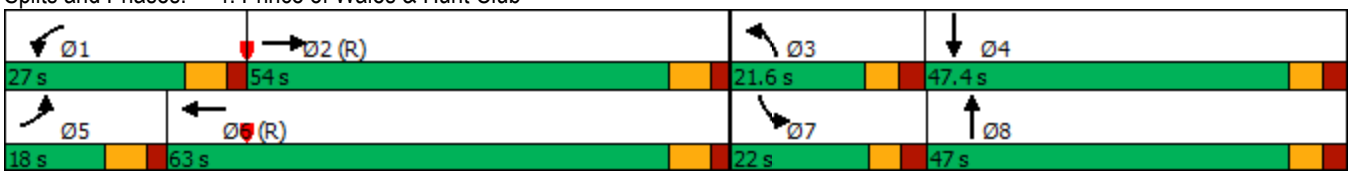
Intersection Summary
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 68 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

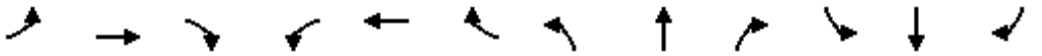
Maximum v/c Ratio: 0.82

Intersection Signal Delay: 36.5	Intersection LOS: D
Intersection Capacity Utilization 86.8%	ICU Level of Service E
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 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)	531	1066	479	229	1178	69	348	407	190	78	926	663
Future Volume (vph)	531	1066	479	229	1178	69	348	407	190	78	926	663
Satd. Flow (prot)	3288	3390	1517	1695	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3240	3390	1494	1689	3390	1485	3209	3390	1483	1645	3390	1483
Satd. Flow (RTOR)			172			172			190			535
Lane Group Flow (vph)	531	1066	479	229	1178	69	348	407	190	78	926	663
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)	12.0	36.8		12.0	36.8		11.2	36.7		11.2	36.7	
Total Split (s)	29.0	56.1		28.0	55.1		21.4	46.3		19.6	44.5	
Total Split (%)	19.3%	37.4%		18.7%	36.7%		14.3%	30.9%		13.1%	29.7%	
Yellow Time (s)	4.6	4.6		4.6	4.6		3.7	3.7		3.7	3.7	
All-Red Time (s)	2.4	2.2		2.4	2.2		2.4	3.0		2.4	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	6.8		7.0	6.8		6.1	6.7		6.1	6.7	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	22.0	49.3	150.0	21.0	48.3	150.0	15.3	41.7	150.0	11.4	37.8	150.0
Actuated g/C Ratio	0.15	0.33	1.00	0.14	0.32	1.00	0.10	0.28	1.00	0.08	0.25	1.00
v/c Ratio	1.10	0.96	0.32	0.97	1.08	0.05	1.04	0.43	0.13	0.61	1.08	0.45
Control Delay	113.3	54.5	0.3	113.5	98.9	0.1	123.1	46.6	0.2	86.7	107.9	1.0
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	113.3	54.5	0.3	113.5	98.9	0.1	123.1	46.6	0.2	86.7	107.9	1.0
LOS	F	D	A	F	F	A	F	D	A	F	F	A
Approach Delay		57.0			96.6			65.4			64.4	
Approach LOS		E			F			E			E	
Queue Length 50th (m)	~90.4	174.9	0.0	68.8	~205.2	0.0	~57.3	53.0	0.0	22.8	~161.8	0.0
Queue Length 95th (m)	m#109.5	m#199.3	m0.0	#121.7	#248.0	0.0	#89.1	70.1	0.0	40.1	#203.4	0.0
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	150.0		200.0
Base Capacity (vph)	482	1114	1494	237	1091	1485	335	943	1483	152	854	1483
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	1.10	0.96	0.32	0.97	1.08	0.05	1.04	0.43	0.13	0.51	1.08	0.45

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: 1.10

Intersection Signal Delay: 69.8	Intersection LOS: E
Intersection Capacity Utilization 110.0%	ICU Level of Service H
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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	147	23	85	13	904	80	91	1669	7
Future Volume (vph)	12	13	10	147	23	85	13	904	80	91	1669	7
Satd. Flow (prot)	1695	1658	0	0	1711	1517	1695	3335	0	1695	3386	0
Flt Permitted	0.509				0.739		0.094			0.239		
Satd. Flow (perm)	880	1658	0	0	1316	1436	168	3335	0	424	3386	0
Satd. Flow (RTOR)		10				85		11			1	
Lane Group Flow (vph)	12	23	0	0	170	85	13	984	0	91	1676	0
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)	38.0	38.0		38.0	38.0	38.0	77.0	77.0		15.0	92.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%	29.2%	59.2%	59.2%		11.5%	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)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lead	Lead		Lag		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	22.0	22.0			22.0	22.0	77.5	77.5		95.4	95.4	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.60	0.60		0.73	0.73	
v/c Ratio	0.08	0.08			0.77	0.27	0.13	0.49		0.21	0.67	
Control Delay	43.0	28.4			72.4	10.5	15.5	14.5		8.9	11.8	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	43.0	28.4			72.4	10.5	15.5	14.5		8.9	11.8	
LOS	D	C			E	B	B	B		A	B	
Approach Delay		33.4			51.7			14.5			11.6	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	2.6	2.8			42.0	0.0	1.5	74.2		5.8	105.8	
Queue Length 95th (m)	7.9	10.0			62.5	13.2	m6.9	123.6		13.5	163.0	
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)	213	409			318	412	102	2048		438	2485	
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	0.06	0.06			0.53	0.21	0.13	0.48		0.21	0.67	

Intersection Summary

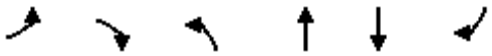
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 93.7%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 2: Riverside & Uplands



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	21	30	947	1757	69
Future Volume (vph)	50	21	30	947	1757	69
Satd. Flow (prot)	1695	1517	1695	3390	3390	1517
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1648	1517	1684	3390	3390	1365
Satd. Flow (RTOR)						15
Lane Group Flow (vph)	50	21	30	947	1757	69
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				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	11.0	31.1	31.1	31.1
Total Split (s)	34.5	34.5	11.0	95.5	84.5	84.5
Total Split (%)	26.5%	26.5%	8.5%	73.5%	65.0%	65.0%
Yellow Time (s)	3.3	3.3	4.0	3.7	3.7	3.7
All-Red Time (s)	3.2	3.2	2.0	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.0	6.1	6.1	6.1
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effct Green (s)	17.2	17.2	6.7	104.7	96.8	96.8
Actuated g/C Ratio	0.13	0.13	0.05	0.81	0.74	0.74
v/c Ratio	0.22	0.10	0.34	0.35	0.70	0.07
Control Delay	49.2	46.0	70.4	5.7	24.8	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.2	46.0	70.4	5.7	24.8	13.1
LOS	D	D	E	A	C	B
Approach Delay	48.3			7.7	24.4	
Approach LOS	D			A	C	
Queue Length 50th (m)	12.4	5.1	7.5	24.2	156.8	5.3
Queue Length 95th (m)	21.5	11.6	#19.4	61.9	271.6	m16.6
Internal Link Dist (m)	162.0			256.3	569.8	
Turn Bay Length (m)	50.0		40.0			15.0
Base Capacity (vph)	365	326	88	2730	2544	1028
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	0.06	0.34	0.35	0.69	0.07

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: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 19.3	Intersection LOS: B
Intersection Capacity Utilization 70.1%	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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1069	55	601	1222	340	23	347	578	445	786	114
Future Volume (vph)	100	1069	55	601	1222	340	23	347	578	445	786	114
Satd. Flow (prot)	3288	3390	1517	3288	3390	1517	1695	3390	1517	3288	3390	1517
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3281	3390	1497	3280	3390	1497	1690	3390	1517	3257	3390	1517
Satd. Flow (RTOR)			271			271			460			271
Lane Group Flow (vph)	100	1069	55	601	1222	340	23	347	578	445	786	114
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)	15.9	56.3		35.1	75.5		11.6	30.6		28.0	47.0	
Total Split (%)	10.6%	37.5%		23.4%	50.3%		7.7%	20.4%		18.7%	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)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8		6.6	6.6		6.6	6.6	
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-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	8.6	51.1	150.0	29.4	71.8	150.0	5.1	21.2	150.0	21.5	42.4	150.0
Actuated g/C Ratio	0.06	0.34	1.00	0.20	0.48	1.00	0.03	0.14	1.00	0.14	0.28	1.00
v/c Ratio	0.53	0.93	0.04	0.93	0.75	0.23	0.40	0.72	0.38	0.94	0.82	0.08
Control Delay	79.1	61.7	0.1	58.8	28.3	0.2	91.4	70.5	0.7	92.6	58.8	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	79.1	61.7	0.1	58.8	28.3	0.2	91.4	70.5	0.7	92.6	58.8	0.1
LOS	E	E	A	E	C	A	F	E	A	F	E	A
Approach Delay		60.4			32.3			28.5			65.0	
Approach LOS		E			C			C			E	
Queue Length 50th (m)	15.1	164.0	0.0	84.3	194.2	0.0	6.9	51.5	0.0	68.7	117.7	0.0
Queue Length 95th (m)	25.2	#207.5	0.0	m86.3	m191.6	m0.0	17.0	68.6	0.0	#101.5	143.3	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)	199	1154	1497	644	1623	1497	57	542	1517	472	957	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	0.50	0.93	0.04	0.93	0.75	0.23	0.40	0.64	0.38	0.94	0.82	0.08

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 45.5	Intersection LOS: D
Intersection Capacity Utilization 98.7%	ICU Level of Service F
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

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

Appendix N:

SimTraffic Analysis: Queueing

Intersection: 1: Riverside & Hunt Club

Movement	EB	EB	EB	EB	EB	B13	B13	B13	B12	B12	WB	WB
Directions Served	L	L	T	T	R	T	T	T	T	T	L	T
Maximum Queue (m)	62.4	107.3	106.0	106.8	62.5	151.2	124.2	105.3	35.4	141.0	82.4	274.8
Average Queue (m)	59.8	90.7	94.2	97.8	36.8	69.8	35.1	34.2	1.2	12.0	42.0	186.2
95th Queue (m)	70.2	120.5	111.7	113.3	86.9	190.3	130.1	105.8	24.5	90.0	93.1	350.9
Link Distance (m)		78.9	78.9	78.9		211.5	211.5	211.5	177.4	177.4		1204.7
Upstream Blk Time (%)		43	17	21		1	0	0	0	0		
Queuing Penalty (veh)		272	109	130		6	0	0	0	1		
Storage Bay Dist (m)	55.0				55.0						75.0	
Storage Blk Time (%)	31	52		29	0						0	47
Queuing Penalty (veh)	83	139		60	1						0	29

Intersection: 1: Riverside & Hunt Club

Movement	WB	WB	NB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	T	R	L	L	T	T	R	L	T	T	R	
Maximum Queue (m)	288.3	107.5	73.7	77.4	406.5	405.4	157.5	49.3	126.0	242.6	207.5	
Average Queue (m)	201.2	28.9	64.1	75.6	395.4	394.3	127.8	21.2	29.4	216.8	202.3	
95th Queue (m)	363.1	107.4	84.7	85.1	417.5	417.6	219.8	45.7	87.9	325.9	232.3	
Link Distance (m)	1204.7				390.8	390.8			238.1	238.1		
Upstream Blk Time (%)					53	32			0	22		
Queuing Penalty (veh)					0	0			0	138		
Storage Bay Dist (m)		100.0	70.0	70.0			150.0	150.0			200.0	
Storage Blk Time (%)	50	0	8	29	37	48	0			2	52	
Queuing Penalty (veh)	19	0	48	186	199	116	1			12	73	

Intersection: 2: Riverside & Uplands

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB		
Directions Served	L	TR	LT	R	L	T	TR	L	T	TR		
Maximum Queue (m)	21.7	17.3	99.0	56.9	30.6	193.8	197.3	55.6	106.0	112.7		
Average Queue (m)	5.5	4.0	48.6	28.1	1.9	86.6	93.8	23.4	45.5	55.3		
95th Queue (m)	15.6	12.4	83.6	50.0	14.4	171.2	177.8	74.7	139.6	148.6		
Link Distance (m)		144.1	152.8	152.8		585.2	585.2		326.2	326.2		
Upstream Blk Time (%)									1	2		
Queuing Penalty (veh)									0	0		
Storage Bay Dist (m)	30.0				55.0			175.0				
Storage Blk Time (%)	0	0				15		0	3			
Queuing Penalty (veh)	0	0				1		0	2			

Intersection: 3: Riverside & Site

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	T	T	R
Maximum Queue (m)	30.8	22.2	17.0	150.4	156.9	515.5	518.0	22.5
Average Queue (m)	9.0	5.1	1.8	41.2	46.3	289.0	317.5	4.2
95th Queue (m)	21.6	15.8	9.2	119.6	126.6	639.7	641.3	18.3
Link Distance (m)		121.6		238.1	238.1	585.2	585.2	
Upstream Blk Time (%)				0	0	3	5	
Queuing Penalty (veh)				0	0	17	32	
Storage Bay Dist (m)	50.0		40.0					15.0
Storage Blk Time (%)	0			5			54	0
Queuing Penalty (veh)	0			0			9	0

Intersection: 4: Prince of Wales & Hunt Club

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B13	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	T	L
Maximum Queue (m)	28.4	66.8	129.8	133.8	46.9	85.0	92.0	95.9	104.8	87.1	23.6	52.4
Average Queue (m)	7.4	19.3	81.7	88.4	1.6	51.6	57.7	63.9	67.3	15.3	0.8	29.0
95th Queue (m)	19.7	41.8	118.5	126.2	23.7	78.4	83.8	88.6	95.0	67.3	16.0	61.2
Link Distance (m)			461.6	461.6			177.4	177.4	177.4		78.9	
Upstream Blk Time (%)											0	
Queuing Penalty (veh)											0	
Storage Bay Dist (m)	125.0	125.0			110.0	158.0				80.0		45.0
Storage Blk Time (%)			0	3	0				2	0		0
Queuing Penalty (veh)			0	0	0				10	0		0

Intersection: 4: Prince of Wales & Hunt Club

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (m)	288.1	295.6	57.5	71.0	82.8	75.1	66.8	44.1
Average Queue (m)	223.5	261.3	57.5	38.2	45.5	38.2	32.9	9.9
95th Queue (m)	334.2	338.9	57.7	63.1	70.2	63.3	57.4	31.9
Link Distance (m)	281.1	281.1				345.3	345.3	
Upstream Blk Time (%)	4	42						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (m)			50.0	120.0	120.0			170.0
Storage Blk Time (%)	44	12	56					
Queuing Penalty (veh)	25	91	172					

Network Summary

Network wide Queuing Penalty: 1984

Intersection: 1: Riverside & Hunt Club

Movement	EB	EB	EB	EB	EB	B13	B13	B13	B12	B12	WB	WB
Directions Served	L	L	T	T	R	T	T	T	T	T	L	T
Maximum Queue (m)	62.4	109.0	106.9	108.7	62.5	223.9	215.2	211.4	139.1	178.8	82.4	1007.4
Average Queue (m)	61.4	98.9	96.4	99.2	55.5	162.8	141.4	132.5	53.5	72.3	75.2	685.1
95th Queue (m)	66.0	114.0	115.1	114.1	84.7	296.0	277.0	255.5	170.1	211.0	99.3	1151.9
Link Distance (m)		78.9	78.9	78.9		211.5	211.5	211.5	177.4	177.4		1206.1
Upstream Blk Time (%)		66	42	44		22	5	6	1	4		6
Queuing Penalty (veh)		463	289	306		155	35	39	10	45		0
Storage Bay Dist (m)	55.0				55.0						75.0	
Storage Blk Time (%)	45	70		48	5						15	54
Queuing Penalty (veh)	119	186		231	26						90	123

Intersection: 1: Riverside & Hunt Club

Movement	WB	WB	NB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	T	R	L	L	T	T	R	L	T	T	R	
Maximum Queue (m)	1007.1	107.5	73.7	77.3	175.4	151.5	34.9	157.4	254.4	259.8	207.5	
Average Queue (m)	685.6	43.2	62.5	66.6	84.3	65.3	9.2	68.2	229.6	239.0	199.6	
95th Queue (m)	1145.9	129.8	85.1	87.6	176.4	144.0	27.5	178.6	296.4	290.9	242.3	
Link Distance (m)	1206.1				390.8	390.8			249.0	249.0		
Upstream Blk Time (%)	6								13	16		
Queuing Penalty (veh)	0								115	147		
Storage Bay Dist (m)		100.0	70.0	70.0			150.0	150.0			200.0	
Storage Blk Time (%)	60	0	9	27	0	0		0	49	29	12	
Queuing Penalty (veh)	42	0	19	55	2	0		0	38	191	55	

Intersection: 2: Riverside & Uplands

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB		
Directions Served	L	TR	LT	R	L	T	TR	L	T	TR		
Maximum Queue (m)	13.3	20.5	74.6	25.3	13.9	114.9	122.7	107.2	235.5	238.6		
Average Queue (m)	3.5	5.6	36.1	11.0	3.6	40.3	46.0	29.1	106.6	112.1		
95th Queue (m)	11.0	15.8	63.6	20.7	11.2	91.0	98.3	114.3	265.1	268.0		
Link Distance (m)		143.4	152.8	152.8		573.3	573.3		326.2	326.2		
Upstream Blk Time (%)									6	8		
Queuing Penalty (veh)									0	0		
Storage Bay Dist (m)	30.0				55.0			175.0				
Storage Blk Time (%)		0				6			10			
Queuing Penalty (veh)		0				1			9			

Intersection: 3: Riverside & Site

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	T	T	R
Maximum Queue (m)	35.8	30.5	35.4	84.7	105.5	547.3	548.9	22.6
Average Queue (m)	14.5	8.0	9.2	18.0	22.2	321.4	334.2	8.9
95th Queue (m)	29.3	21.7	23.3	57.9	69.6	657.4	660.7	26.0
Link Distance (m)		168.9		249.0	249.0	573.3	573.3	
Upstream Blk Time (%)					0	2	3	
Queuing Penalty (veh)					0	15	25	
Storage Bay Dist (m)	50.0		40.0					15.0
Storage Blk Time (%)	0	0		2			46	0
Queuing Penalty (veh)	0	0		1			32	1

Intersection: 4: Prince of Wales & Hunt Club

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B13	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	T	L
Maximum Queue (m)	31.2	132.4	447.5	453.1	117.5	104.6	104.1	87.5	94.4	86.7	69.5	49.2
Average Queue (m)	10.6	65.2	323.2	337.0	56.9	65.4	68.7	56.3	61.3	8.5	5.2	10.4
95th Queue (m)	23.7	160.2	512.5	517.3	152.7	95.1	99.3	83.0	89.2	50.7	41.8	34.2
Link Distance (m)			461.6	461.6			177.4	177.4	177.4		78.9	
Upstream Blk Time (%)			16	20							1	
Queuing Penalty (veh)			0	0							10	
Storage Bay Dist (m)	125.0	125.0			110.0	158.0				80.0		45.0
Storage Blk Time (%)		0	52	68	0				1	0		
Queuing Penalty (veh)		0	52	37	0				5	0		

Intersection: 4: Prince of Wales & Hunt Club

Movement	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	R
Maximum Queue (m)	187.8	232.2	57.5	122.0	125.7	311.2	299.7	41.0
Average Queue (m)	93.9	141.8	56.9	104.1	111.2	209.8	191.7	5.2
95th Queue (m)	195.8	252.6	60.7	146.7	149.3	411.0	391.1	26.9
Link Distance (m)	281.1	281.1				345.3	345.3	
Upstream Blk Time (%)	0	5				27	5	
Queuing Penalty (veh)	0	0				0	0	
Storage Bay Dist (m)			50.0	120.0	120.0			170.0
Storage Blk Time (%)	20	3	50	6	42	2	1	
Queuing Penalty (veh)	5	17	86	25	164	8	1	

Network Summary

Network wide Queuing Penalty: 3275