



3930 & 3960 Riverside Drive

Transportation Impact Report

FINAL

September 29, 2023

3930 & 3960 Riverside Drive

Transportation Impact Assessment Report

prepared for:
St. Mary's Land Corporation
c/o Taggart Realty Management
225 Metcalfe Street, Suite 708
Ottawa, ON
K2P 1P9

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

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| ORIGINATOR | Juan Lavin, P.Eng |
| REVIEWER: | Jake Berube, P.Eng. |
| AUTHORIZATION: | |
| CIRCULATION LIST: | Wally Dubyk, C.E.T |
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TABLE OF CONTENTS

| | | |
|----------|---|----|
| 1.0 | SCREENING FORM | 1 |
| 2.0 | SCOPING REPORT | 1 |
| 2.1. | EXISTING AND PLANNED CONDITIONS | 1 |
| 2.1.1. | PROPOSED DEVELOPMENT..... | 1 |
| 2.1.2. | EXISTING CONDITIONS..... | 3 |
| 2.1.3. | PLANNED CONDITIONS | 10 |
| 2.1.3.1. | Future Transportation Network Changes | 10 |
| 2.1.3.1 | Other Study Area Developments..... | 11 |
| 2.2. | STUDY AREA AND TIME PERIODS..... | 11 |
| 2.3. | EXEMPTION REVIEW | 12 |
| 3.0 | FORECASTING | 13 |
| 3.1. | DEVELOPMENT GENERATED TRAVEL DEMAND | 13 |
| 3.1.1. | TRIP GENERATION AND MODE SHARES..... | 13 |
| 3.1.2. | TRIP DISTRIBUTION AND ASSIGNMENT | 15 |
| 3.2. | BACKGROUND NETWORK TRAFFIC..... | 17 |
| 3.2.1. | TRANSPORTATION NETWORK PLANS..... | 17 |
| 3.2.2. | BACKGROUND GROWTH | 17 |
| 3.2.3. | OTHER DEVELOPMENTS | 18 |
| 3.3. | DEMAND RATIONALIZATION..... | 19 |
| 4.0 | STRATEGY REPORT | 21 |
| 4.1. | DEVELOPMENT DESIGN..... | 21 |
| 4.1.1. | DESIGN FOR SUSTAINABLE MODES..... | 21 |
| 4.1.2. | CIRCULATION AND ACCESS..... | 23 |
| 4.1.3. | NEW STREETS NETWORK | 23 |
| 4.2. | PARKING | 25 |
| 4.3. | BOUNDARY STREET DESIGN..... | 25 |
| 4.3.1. | EXISTING AND FUTURE CONDITIONS | 25 |
| 4.4. | ACCESS INTERSECTION DESIGN | 26 |
| 4.4.1. | LOCATION AND DESIGN OF ACCESS | 26 |
| 4.4.2. | INTERSECTION CONTROL..... | 27 |
| 4.4.3. | INTERSECTION DESIGN..... | 27 |
| 4.5. | TRANSPORTATION DEMAND MANAGEMENT..... | 28 |
| 4.5.1. | CONTEXT FOR TDM | 28 |

| | |
|--|----|
| 4.5.2. NEED AND OPPORTUNITY | 28 |
| 4.5.3. TDM PROGRAM | 28 |
| 4.6. NEIGHBORHOOD TRAFFIC MANAGEMENT | 29 |
| 4.6.1. ADJACENT NEIGHBORHOODS | 29 |
| 4.7. TRANSIT | 30 |
| 4.7.1. ROUTE CAPACITY..... | 30 |
| 4.7.2. TRANSIT PRIORITY..... | 30 |
| 4.8. REVIEW OF NETWORK CONCEPT | 30 |
| 4.9. INTERSECTION DESIGN..... | 30 |
| 4.9.1. INTERSECTION CONTROL..... | 30 |
| 4.9.2. INTERSECTION DESIGN..... | 30 |
| 5.0 FINDINGS AND RECOMMENDATIONS | 36 |

LIST OF FIGURES

| | |
|--|----|
| FIGURE 1: LOCAL TRANSPORTATION CONTEXT | 2 |
| FIGURE 2: PRELIMINARY ST. MARY'S PLAN OF SUBDIVISION (NOVEMBER, 2022) | 2 |
| FIGURE 3: CYCLIST OPTION TO SHARE FACILITIES WITH PEDESTRIANS OR VEHICLES ON RIVERSIDE DRIVE...5 | |
| FIGURE 4: STUDY AREA ACTIVE TRANSPORTATION NETWORK | 6 |
| FIGURE 5: EXTENDED AREA TRANSIT NETWORK (OCTOBER, 2022)..... | 7 |
| FIGURE 6: ADJACENT TRANSIT STOPS SURROUNDING THE ST. MARY'S SUBDIVISION | 7 |
| FIGURE 7: EXISTING PEAK HOUR TRAFFIC VOLUMES | 8 |
| FIGURE 8: OPTION 3 SKETCH OF RIVERSIDE/HUNT CLUB ROADWAY MODIFICATIONS, OCTOBER 2022..... | 10 |
| FIGURE 9: STUDY AREA | 12 |
| FIGURE 10: SITE-GENERATED TRAFFIC VOLUMES – PHASE 1 | 16 |
| FIGURE 11: SITE-GENERATED TRAFFIC VOLUMES – PHASE 2 | 17 |
| FIGURE 12: FUTURE BACKGROUND TRAFFIC VOLUMES | 19 |
| FIGURE 13: PHASE 1 TOTAL PROJECTED TRAFFIC VOLUMES | 20 |
| FIGURE 14: PHASE 1 AND 2 TOTAL PROJECTED TRAFFIC VOLUMES | 21 |
| FIGURE 15: PROPOSED SIDEWALK CONNECTIONS AND ACTIVE TRANSPORTATION ROUTES TO TRANSIT..... | 22 |
| FIGURE 16: APPROVED CITY OF OTTAWA 18.0M CROSS SECTION (DECEMBER, 2022)..... | 24 |
| FIGURE 17: APPROVED CITY OF OTTAWA 20.0M CROSS SECTION (DECEMBER, 2022)..... | 25 |
| FIGURE 18: TAC CORNER CLEARANCE RECOMMENDED DISTANCE | 27 |
| FIGURE 19: FUTURE RIVERSIDE/SITE CONCEPTUAL SKETCH..... | 28 |
| FIGURE 20: PHASE 1 - 2025 TOTAL PROJECTED PEAK HOUR TRAFFIC VOLUMES..... | 33 |
| FIGURE 21: PHASE 2 – 2029 FULL-BUILDOUT TOTAL PROJECTED PEAK HOUR TRAFFIC VOLUMES | 34 |

LIST OF TABLES

| | |
|--|----|
| TABLE 1: EXEMPTIONS REVIEW SUMMARY..... | 12 |
| TABLE 2: PROPOSED DEVELOPMENT TRIP RATES | 13 |
| TABLE 3: RESIDENTIAL PEAK PERIOD TO PEAK HOUR CONVERSION FACTORS (2020 TRANS MANUAL) | 13 |
| TABLE 4: PHASE 1 AND PHASE 2 PEAK HOUR PERSON TRIPS – AM PEAK AND PM PEAK | 14 |
| TABLE 5: TRANS MODE SHARES FOR HUNT CLUB DISTRICT | 14 |

| | |
|---|----|
| TABLE 6: RESIDENTIAL PEAK HOUR TRIPS MODE SHARES BREAKDOWN – PHASE 1 | 14 |
| TABLE 7: RESIDENTIAL PEAK HOUR TRIPS MODE SHARE BREAKDOWN – PHASE 1 AND 2 | 15 |
| TABLE 8: RIVERSIDE/HUNT CLUB HISTORICAL BACKGROUND GROWTH (2008 – 2019)..... | 18 |
| TABLE 9: MMLOS – BOUNDARY STREET SEGMENTS EXISTING AND FUTURE PROPOSED | 26 |
| TABLE 11: MMLOS – EXISTING AND FUTURE INTERSECTIONS..... | 30 |
| TABLE 12: EXISTING INTERSECTION PERFORMANCE | 31 |
| TABLE 13: 2025 AND 2029 BACKGROUND INTERSECTION PERFORMANCE | 32 |
| TABLE 14: PHASE 1 - 2025 INTERSECTION PERFORMANCE..... | 33 |
| TABLE 15: PHASE 2 – 2029 FULL-BUILDOUT INTERSECTION PERFORMANCE | 35 |
| TABLE 16: QUEUEING ANALYSIS FOR 2029 FULL-BUILDOUT OF DEVELOPMENT | 35 |

LIST OF APPENDICES

APPENDIX A: SCREENING FORM, PLAN OF SUBDIVISION AND RESPONSE TO CITY COMMENTS

APPENDIX B: TRANSIT ROUTE MAPS

APPENDIX C: TRAFFIC DATA

APPENDIX D: COLLISION DATA

APPENDIX E: HISTORIC BACKGROUND GROWTH

APPENDIX F: MMLOS ANALYSIS: ROAD SEGMENTS AND INTERSECTIONS

APPENDIX G: TRAFFIC SIGNAL WARRANT

APPENDIX H: INTERNAL SUBDIVISION TURNING MOVEMENTS

APPENDIX I: FUNCTIONAL DESIGN DRAWINGS, SIGHTLINE ANALYSIS AND COSTING

APPENDIX J: TRAFFIC DEMAND MANAGEMENT

APPENDIX K: SYNCHRO ANALYSIS: EXISTING CONDITIONS

APPENDIX L: SYNCHRO ANALYSIS: BACKGROUND CONDITIONS

APPENDIX M: SYNCHRO ANALYSIS: FUTURE CONDITIONS

APPENDIX N: SIMTRAFFIC ANALYSIS: QUEUEING

TRANSPORTATION IMPACT STUDY 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 ft² of office and 400 retirement units. As part of this earlier work a new signalized intersection to Riverside Drive was proposed to provide access to the development, and a functional sketch of the intersection was prepared featuring traffic signal control, northbound left-turn lane, southbound right-turn lane, and southbound acceleration lane departing the intersection and extending to Hunt Club Road. 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 the Transportation Impact Assessment Report. The Screening Form and City comment correspondence to the latest submission have 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.

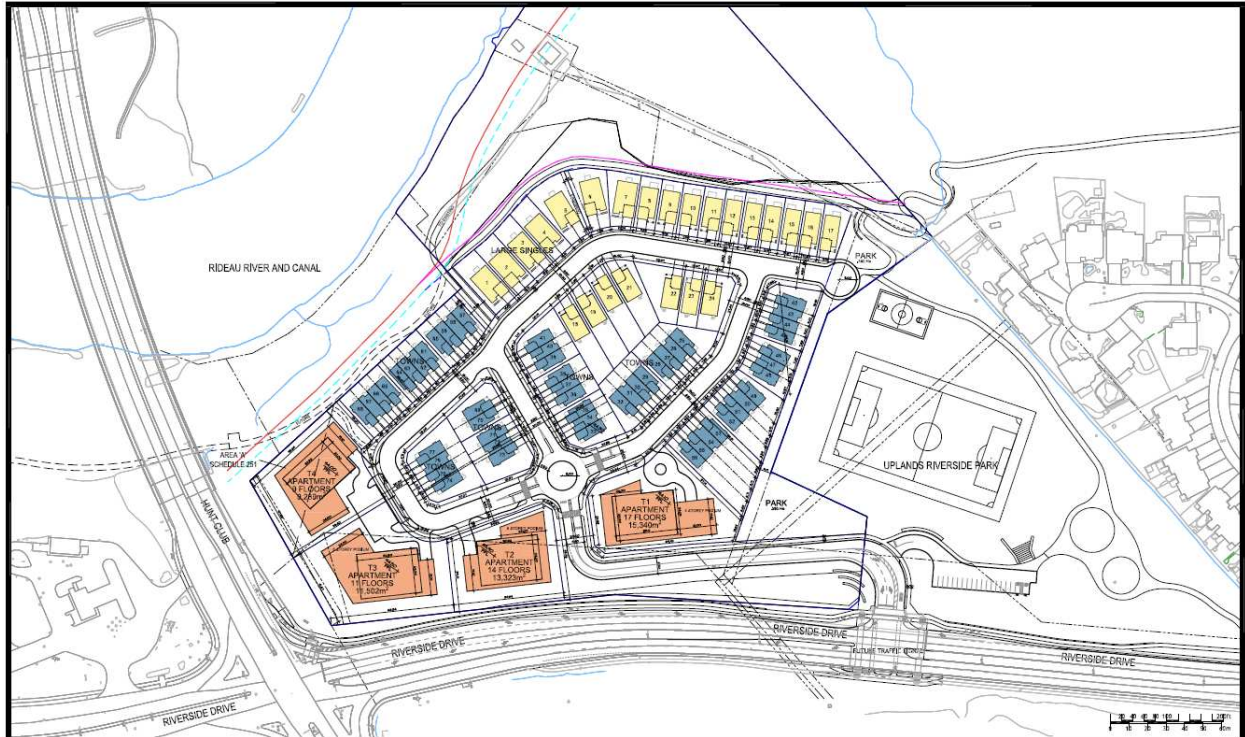
Phase 1 is anticipated to include approximately include 24 single dwelling units, 53 townhouse dwelling units and a single 17-storey apartment block (T1) consisting of an estimated 183 apartment units. Phase 2 is anticipated to include an estimated 407 additional apartment units within three towers ranging 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: St. Mary's Plan of Subdivision (September, 2023)



3930 & 3960 RIVERSIDE DRIVE
NEW RESIDENTIAL COMMUNITY SITEPLAN

SCALE 1:750

September 29, 2023



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.

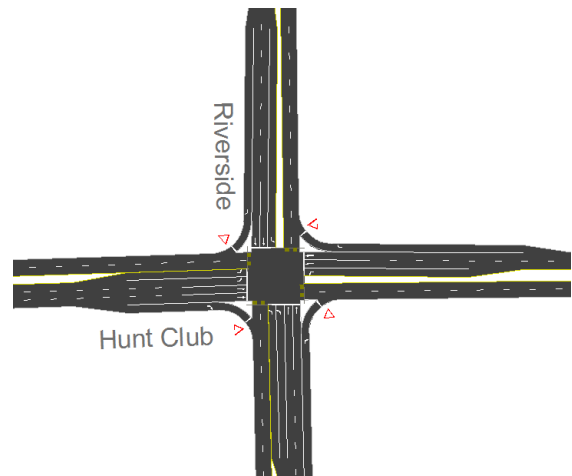
Prince of Wales Drive is a north-south arterial, which extends from Preston Street in the north to Fourth Line Road in the south. Within the study area, Prince of Wales Drive has a four-lane cross-section with auxiliary turn-lanes provided at major intersections. The posted speed limit is 60 km/h.

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

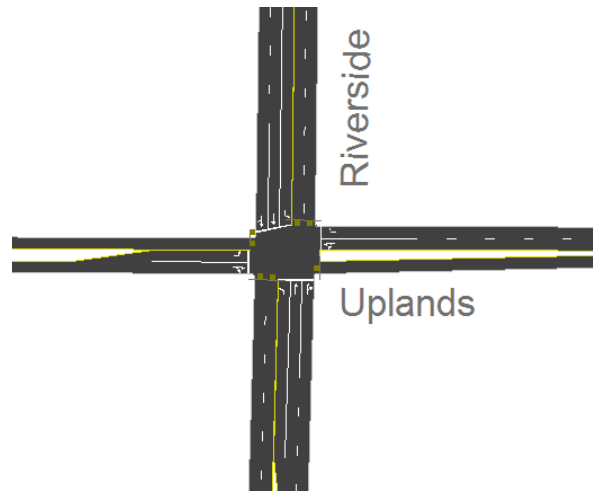
Riverside/Hunt Club

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.



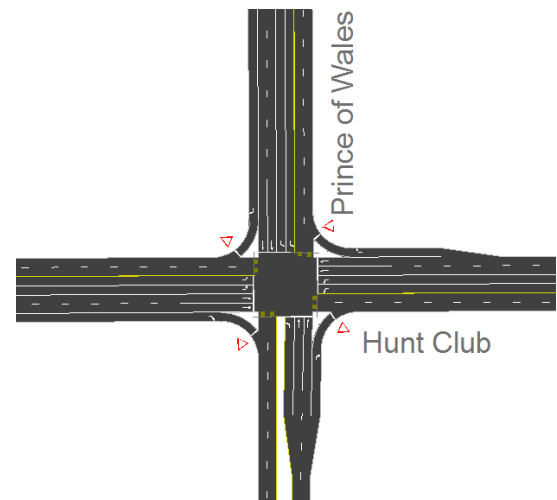
Riverside/Uplands

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.

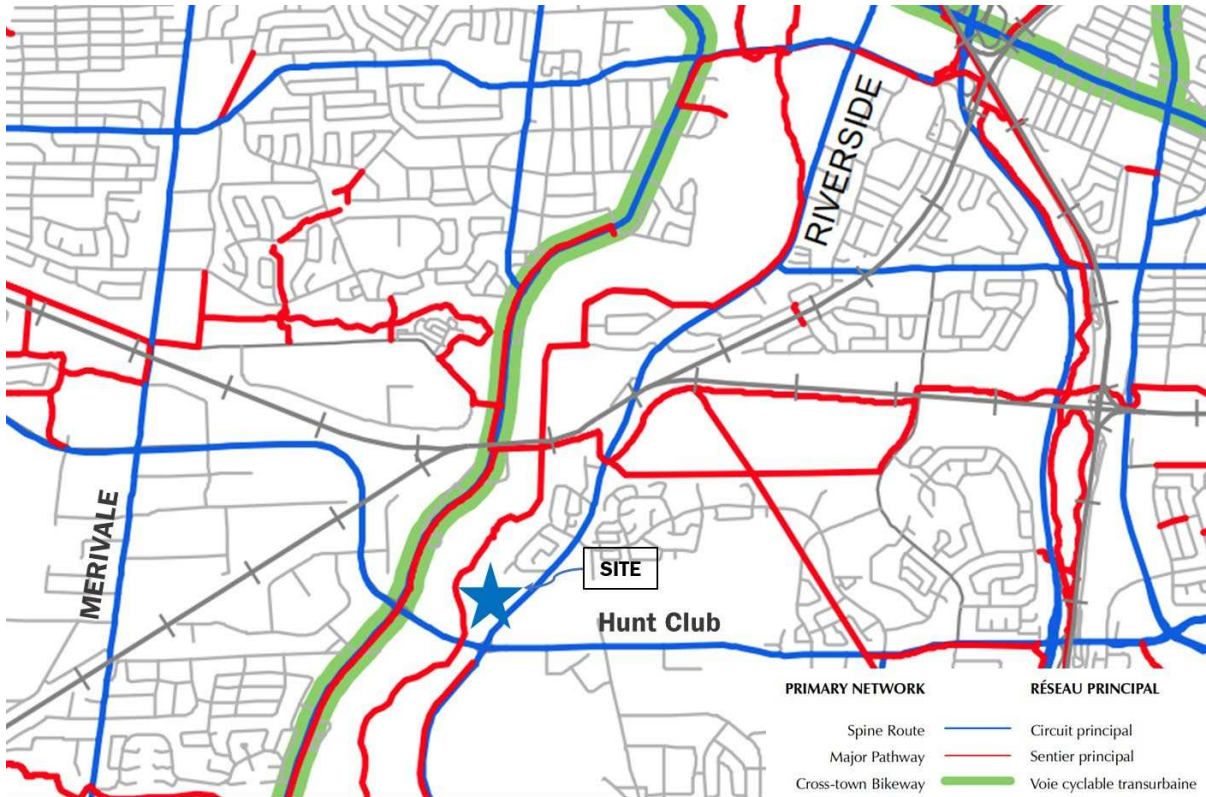
Figure 3: Cyclist Option to Share Facilities with Pedestrians or Vehicles on Riverside Drive



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**.

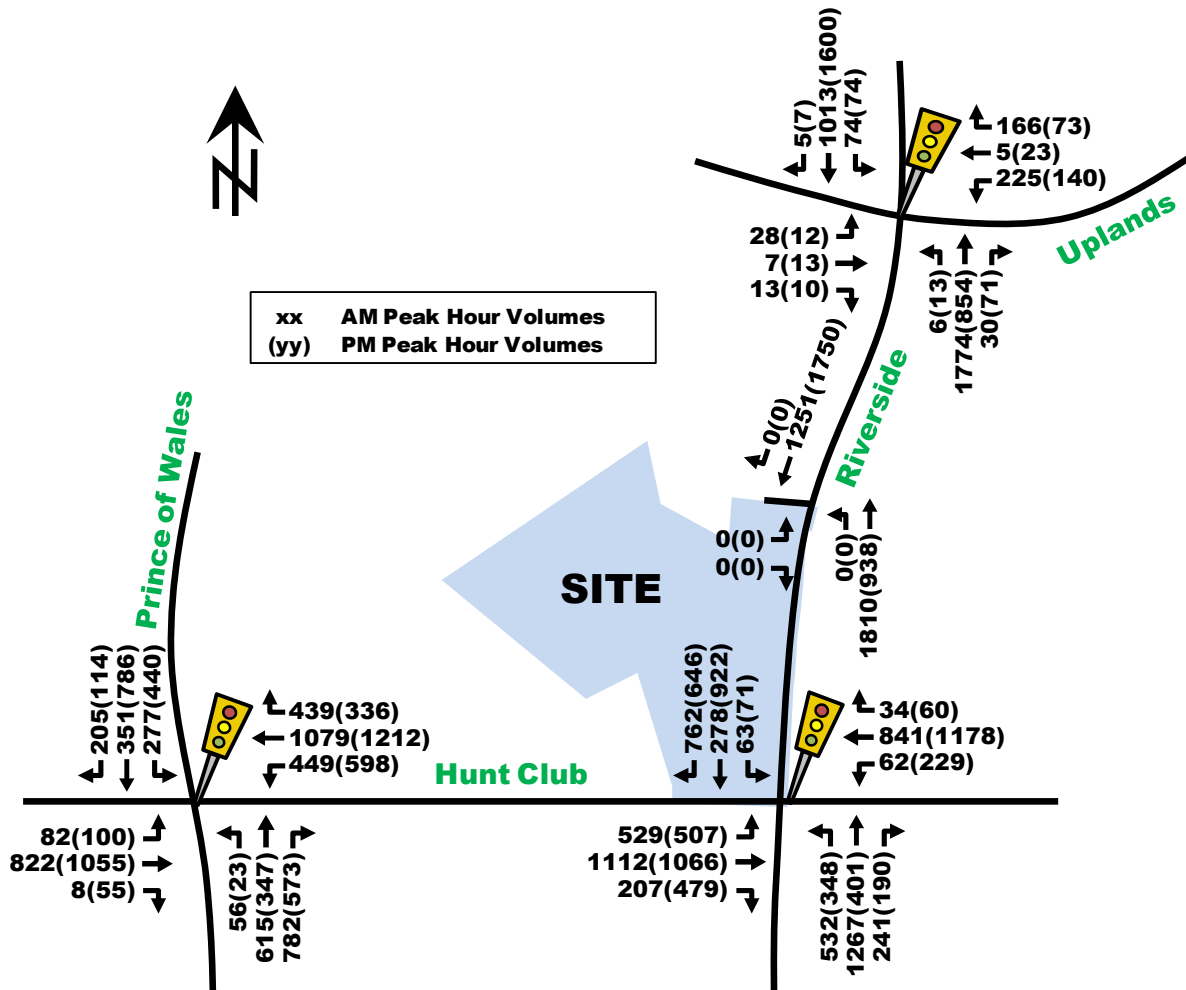
Peak Hour Travel Demands

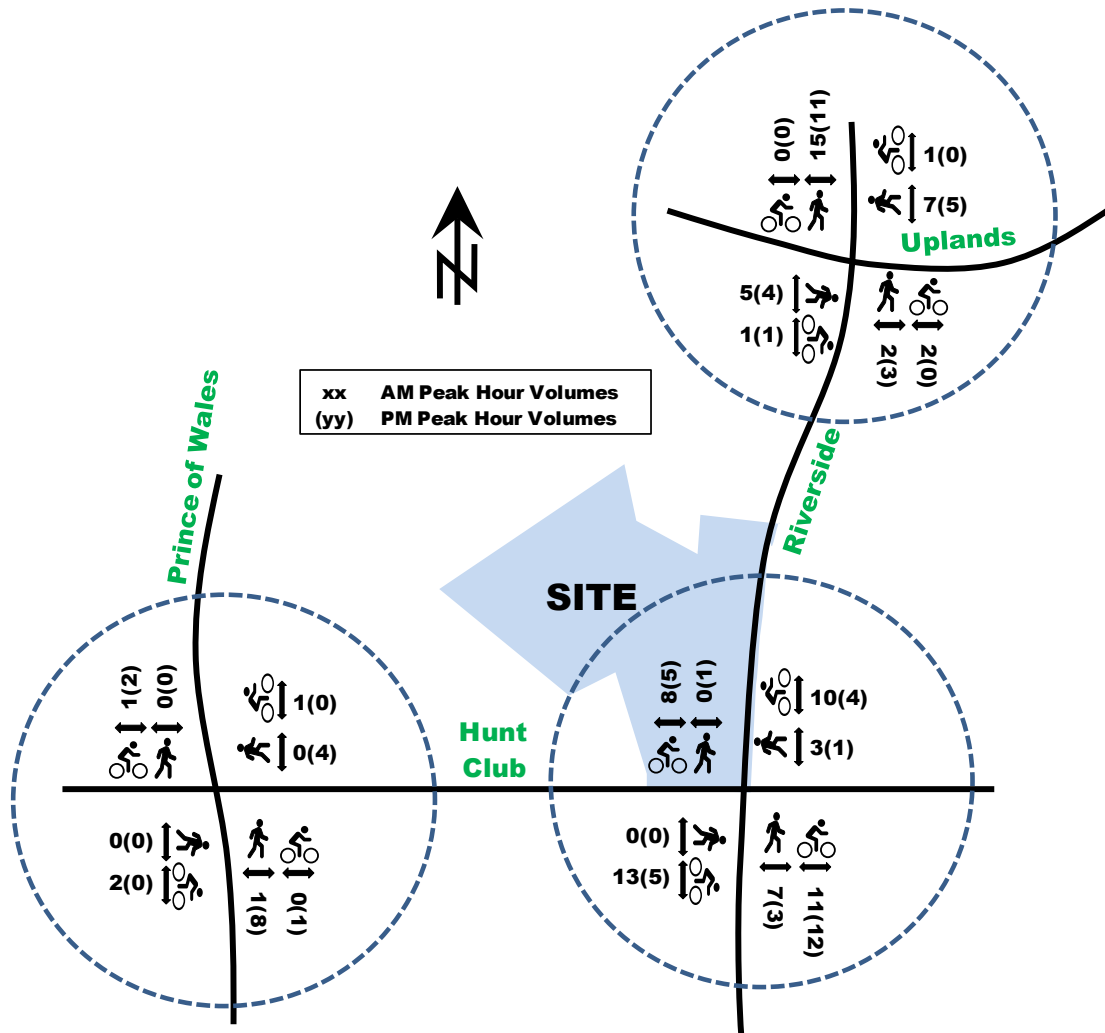
Updated existing peak hour traffic volumes at the signalized intersections within the study area were obtained from the City of Ottawa for the following intersections:

- 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

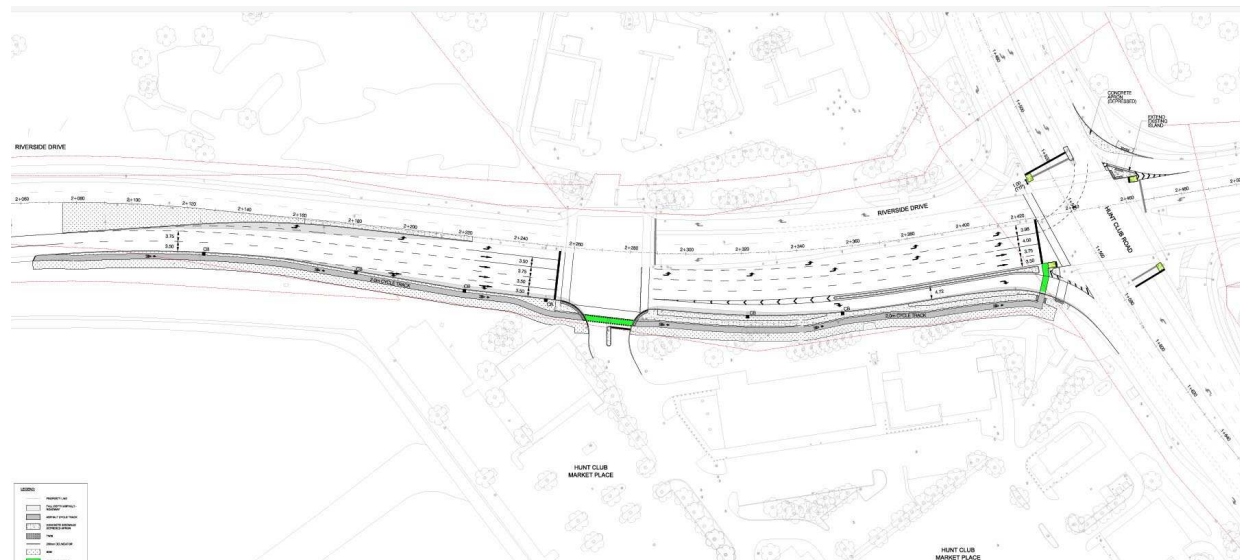
2.1.3.1. Future Transportation Network Changes

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.

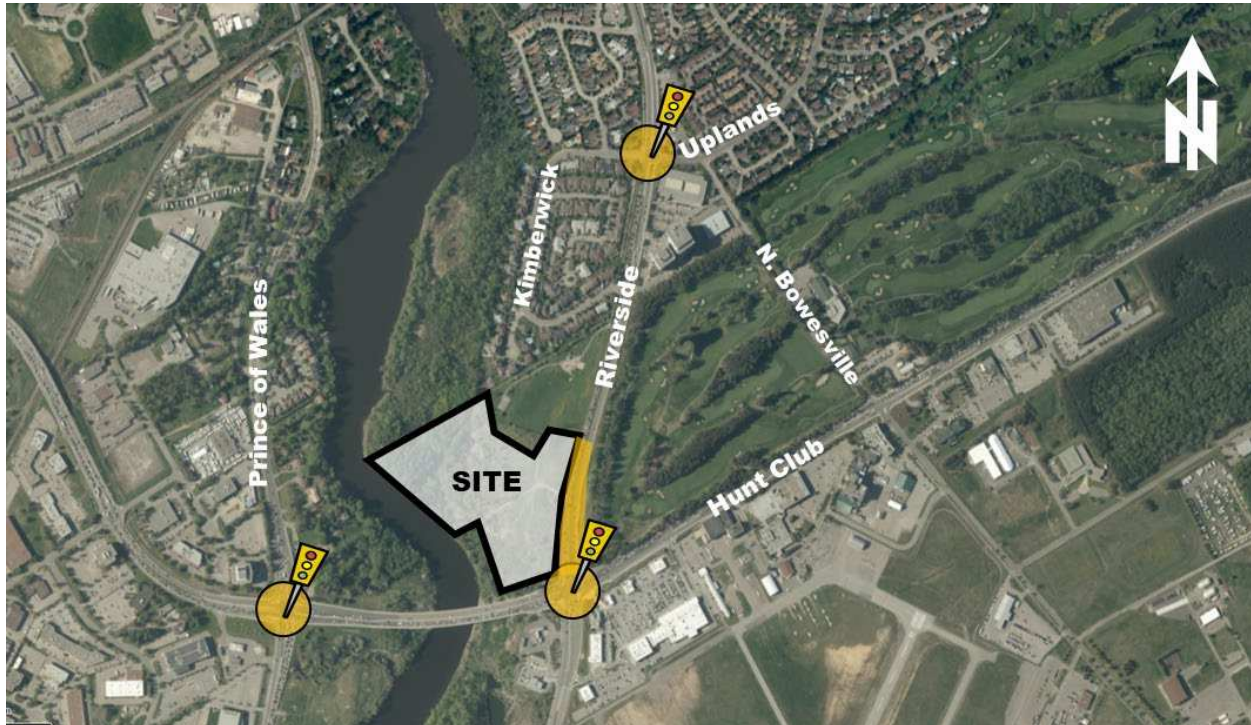
2.2. Study Area and Time Periods

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 | 14% | 6 | 13 | 19 | 11 | 8 | 20 |
| Transit | 20% | 8 | 19 | 28 | 16 | 12 | 28 |
| Cycling | 2% | 1 | 2 | 3 | 2 | 1 | 3 |
| Walking | 9% | 4 | 9 | 12 | 7 | 5 | 13 |
| Total Person Trips | 55% | 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 | 14% | 13 | 30 | 43 | 25 | 18 | 43 |
| Transit | 20% | 19 | 43 | 62 | 36 | 26 | 62 |
| Cycling | 2% | 2 | 4 | 6 | 4 | 3 | 6 |
| Walking | 9% | 9 | 19 | 28 | 16 | 12 | 28 |
| Total Person Trips | 55% | 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

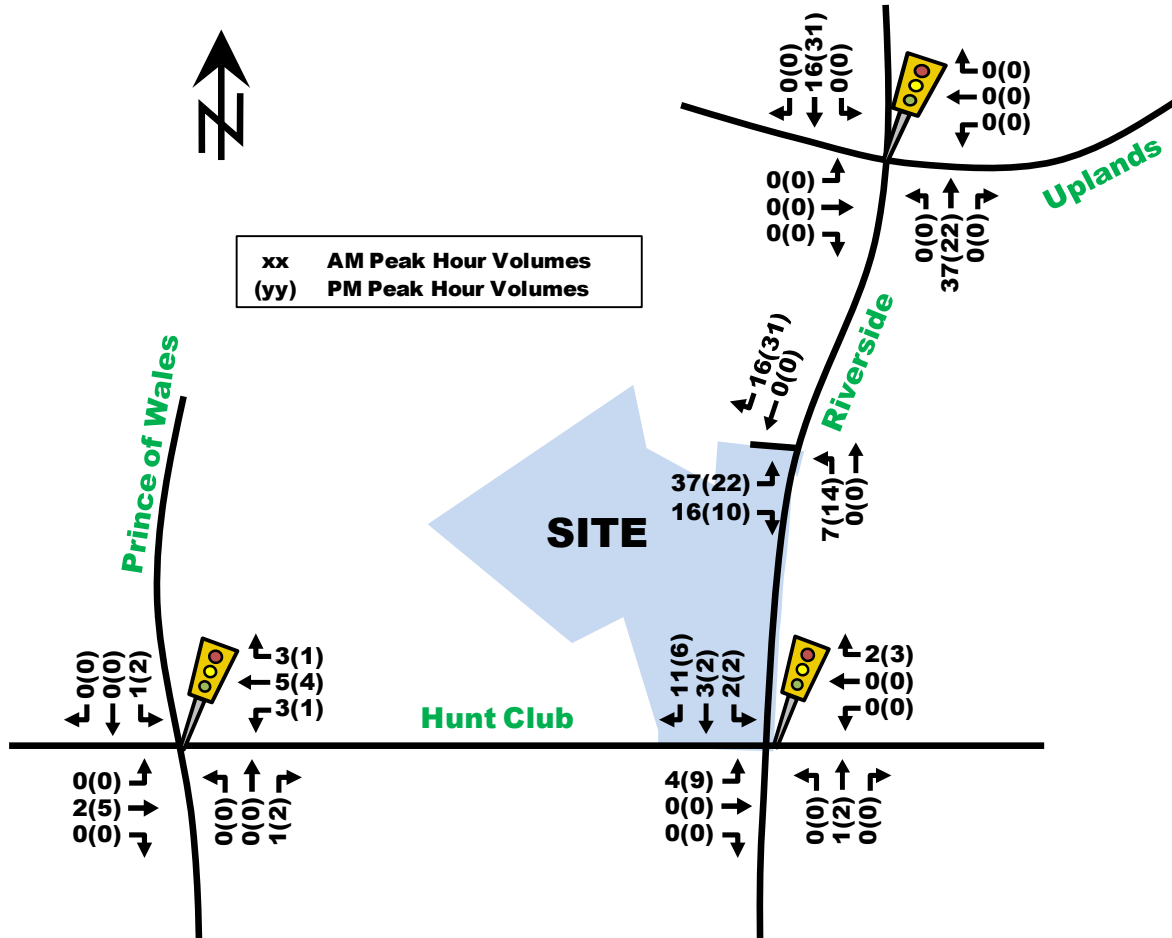
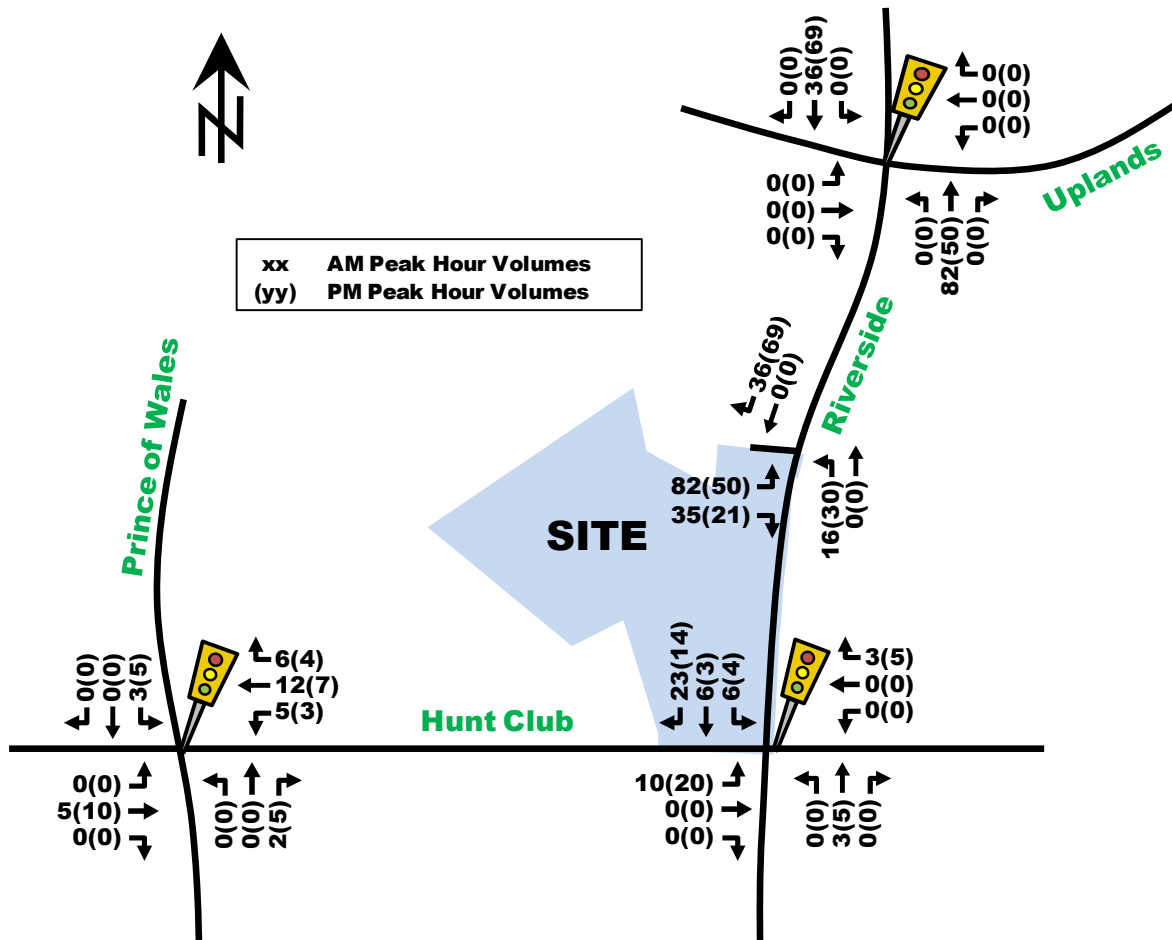


Figure 11: Site-Generated Traffic Volumes – Phase 2



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

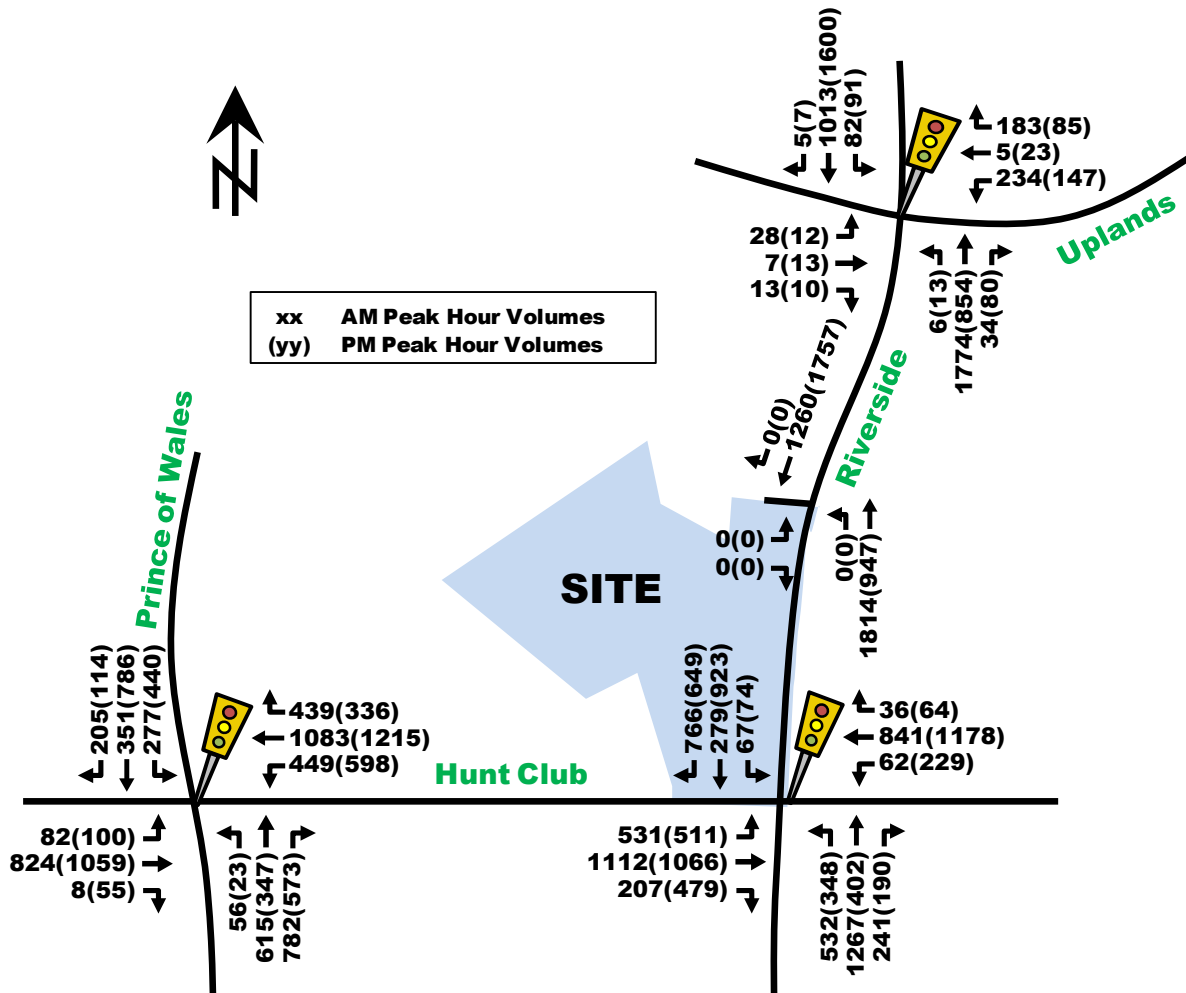
As shown in **Table 8**, the Riverside/Hunt Club intersection's traffic volumes overall have remained relatively constant over the years. The south leg has experienced an increase in traffic volumes and the east and west legs have experienced a decrease in traffic volumes. This change in traffic patterns 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 4.9.2 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. The COVID pandemic may have lasting impacts on peak spreading and flexible work arrangements, however peak hour traffic volumes are anticipated to remain elevated. 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

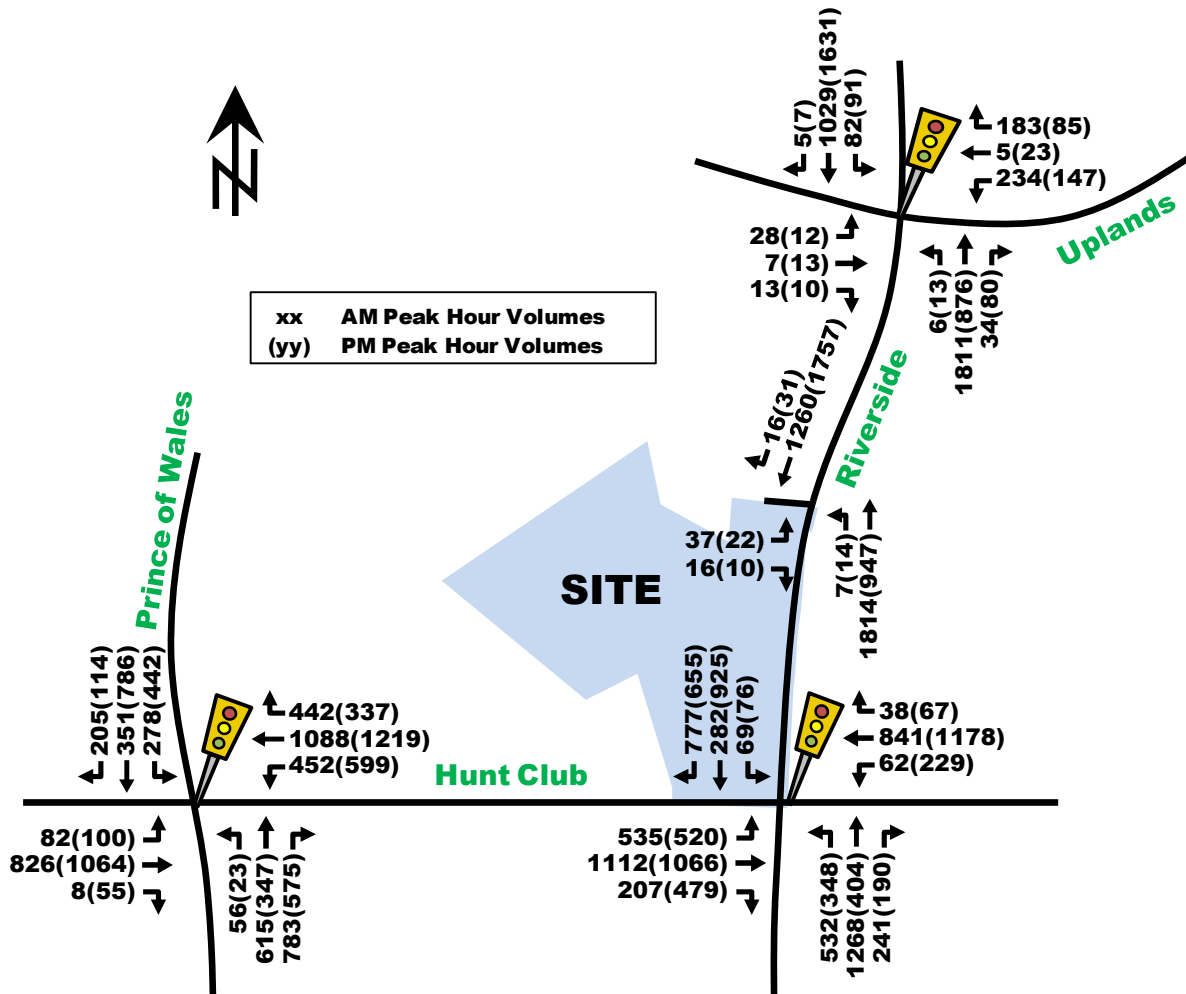
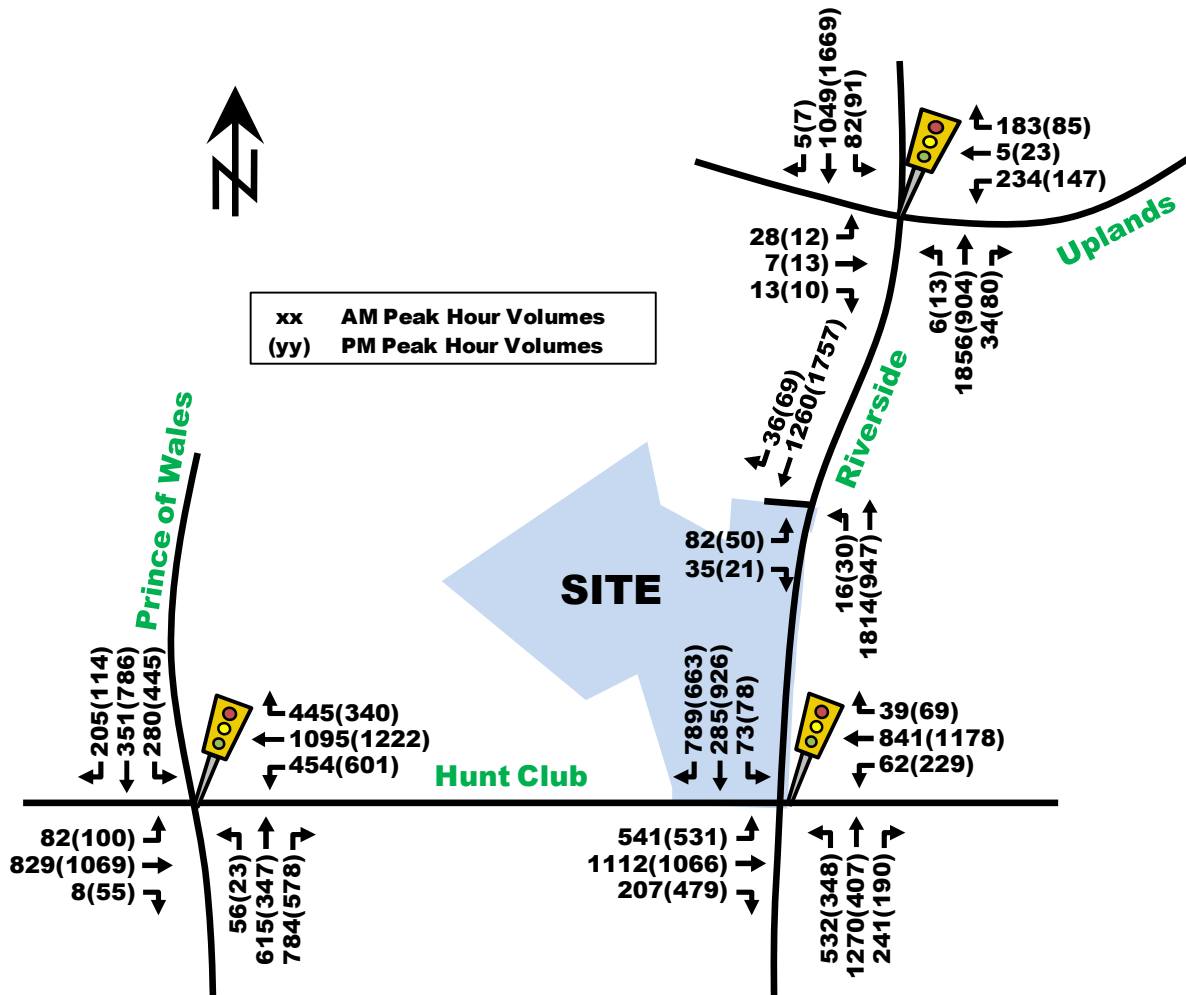


Figure 14: Phase 1 and 2 Total Projected Traffic Volumes



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.

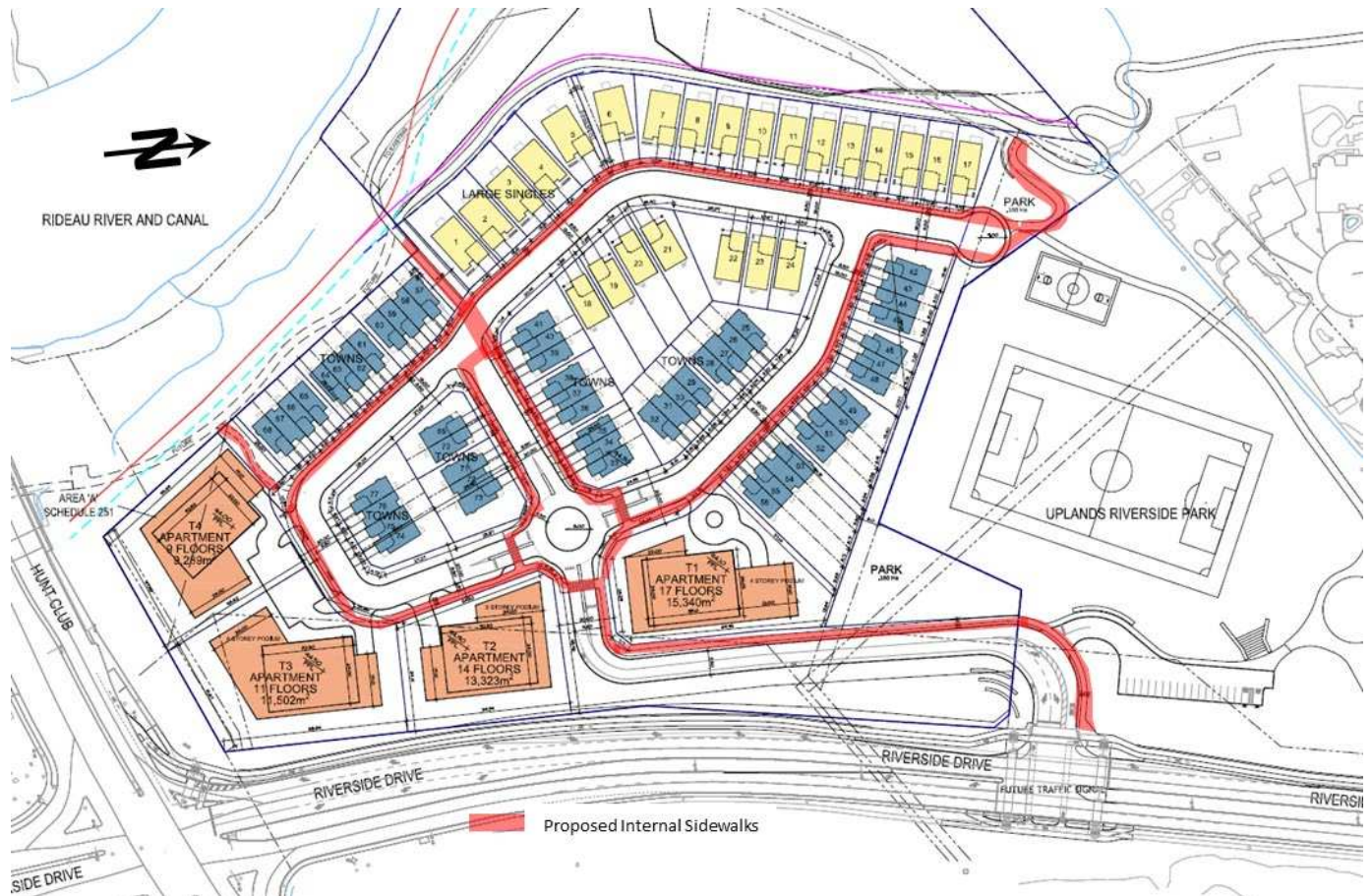
Figure 15 below illustrates proposed sidewalk and MUP connections within the site. The proposed sidewalk connections connect the singles, towns and residential towers to both the MUP and Riverside Drive. Specific cross-sectional elements remain to be determined in future detailed design efforts.

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**.

Traffic Calming Measures

Local streets are to be designed to a 30 km/hr operating speed per the City of Ottawa's New Official Plan and the Local Residential Streets 30 km/g Design Toolbox (September, 2021). The plan of subdivision arrangement is conducive to slower speeds by offering frequent curves, a gateway feature via the entry roundabout, the opportunity for street parking and short street segments that are typically less than 70m. The subdivision has been designed to an HSU control vehicle per City of Ottawa comments with intersection narrowings within the subdivision.

Figure 16 illustrates traffic calming elements recommended for the subdivision design. Speed humps have been allocated on blocks that exceed 50m in length.

Figure 16: Proposed Traffic Calming Measures to Achieve 30 km/h Streets

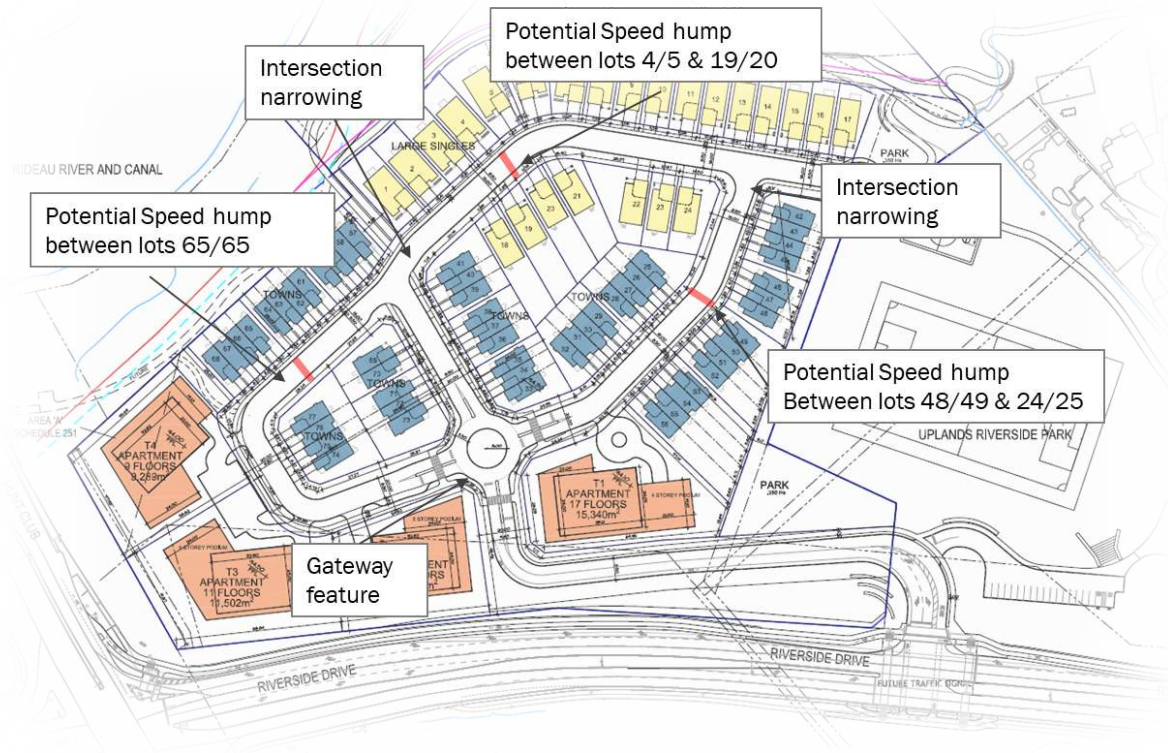


Figure 17: Approved City of Ottawa 18.0m Cross Section (December, 2022)

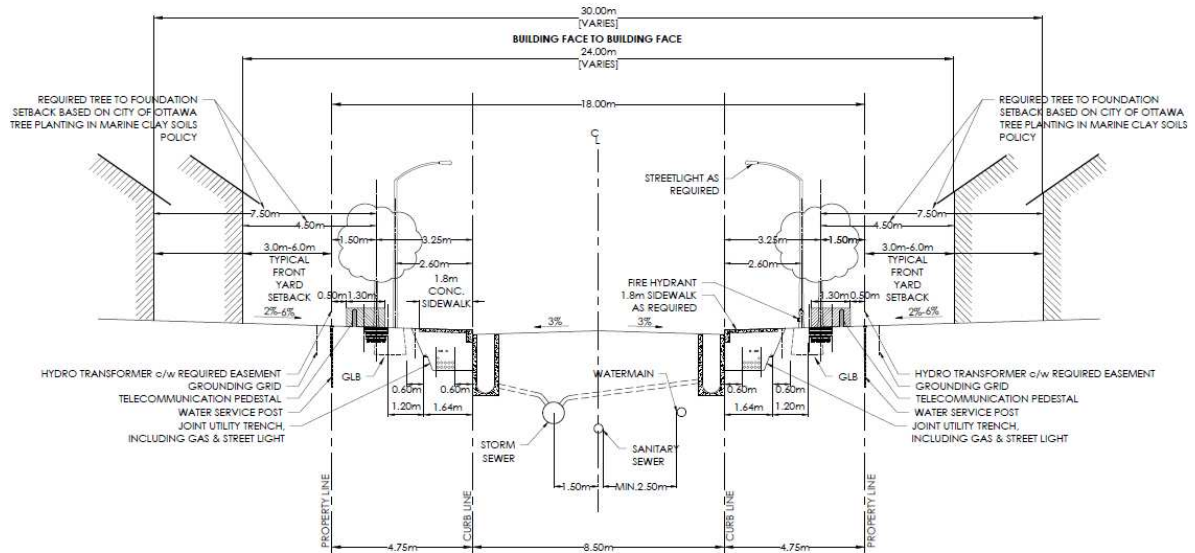
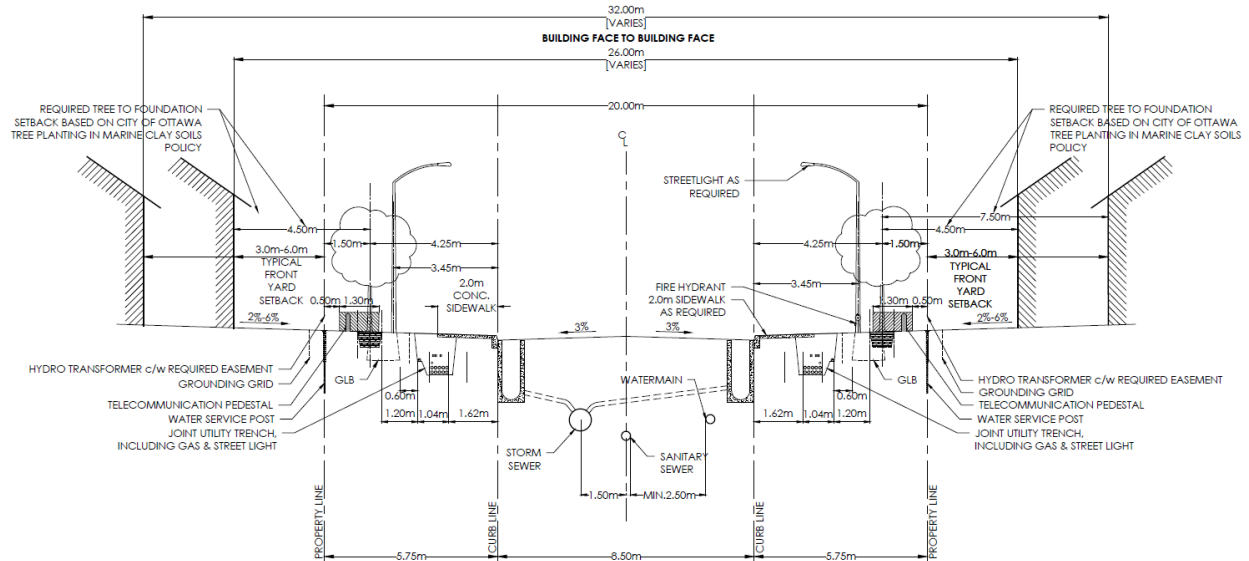


Figure 18: Approved City of Ottawa 20.0m Cross Section (December, 2022)



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

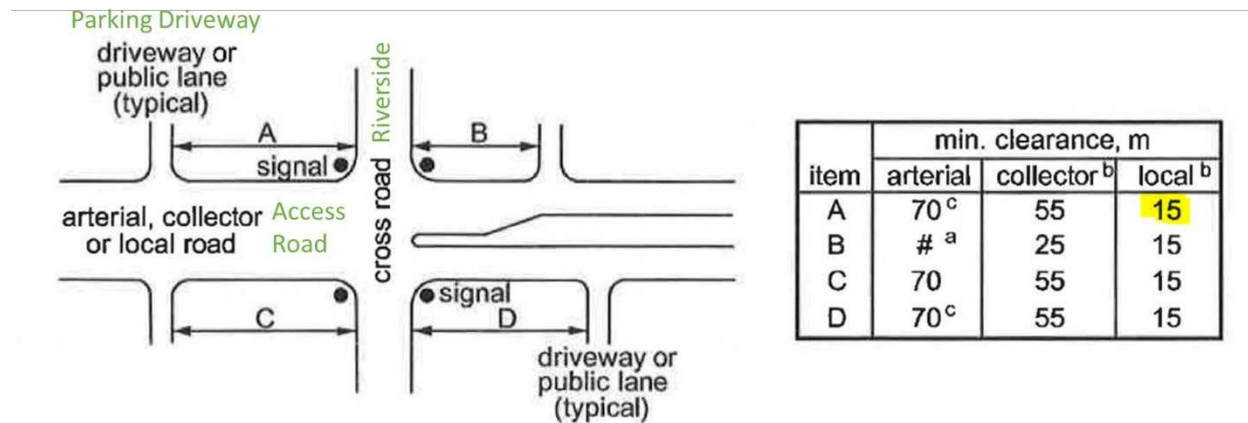
According to TAC Chapter 9, Section 9.4.2.1, a minimum signalized to signalized intersection separation of 200m is recommended. The nearest signalized intersection is Hunt Club/Riverside and which is located approximately 270m away, thus meeting the minimum recommended separation distance. However, it 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 19: TAC Corner Clearance Recommended Distance



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**.

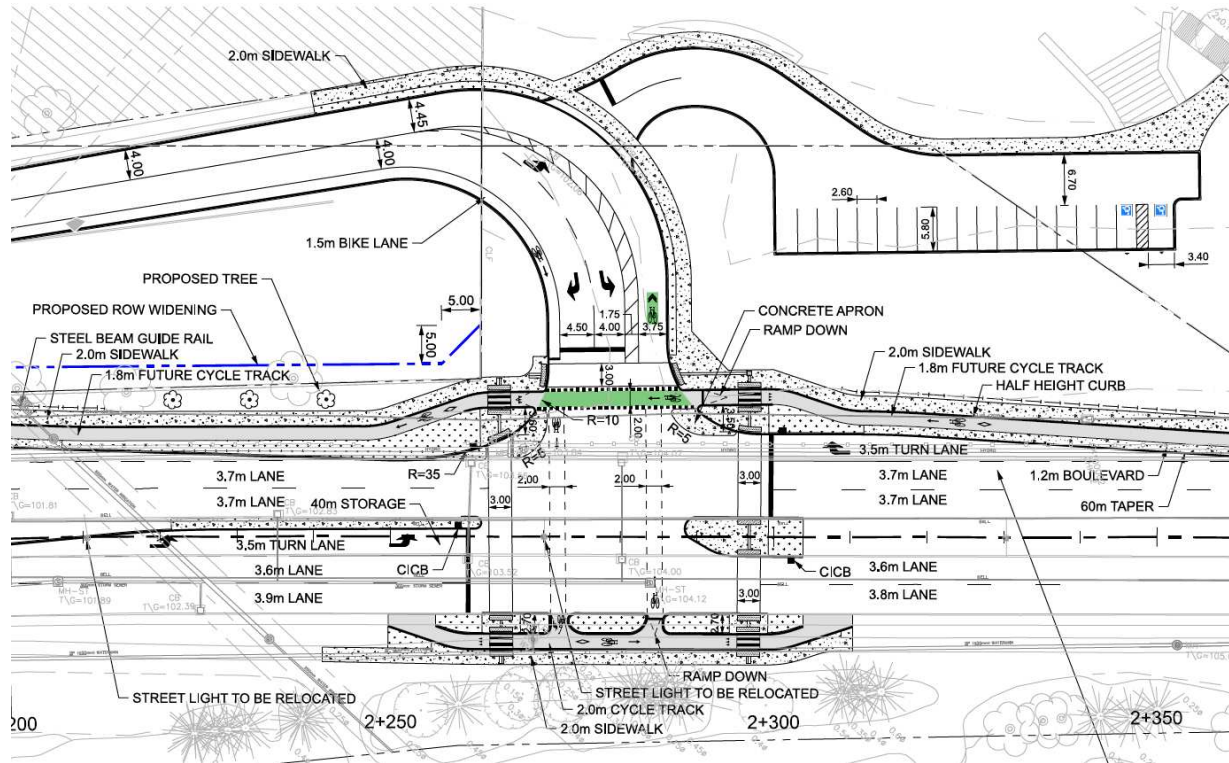
4.4.3. Intersection Design

The proposed access road, to be designed to a local public road standard, will provide a northbound bike lane 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 I** provides the intersection functional drawings, swept path maneuvers and sight line analysis.

The ultimate Riverside/Site Access intersection envisions a contemporary intersection design with crosswalks and uni-directional cycle facilities. Future north-south cycling is accommodated through protected intersection corners. At the request of the City of Ottawa, a cycle track has been developed for northbound cyclists.

Figure 20: Proposed Riverside/Site Functional Design (September, 2023)



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 emerging 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 -Supportive Development Design and 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 at a ratio of 1:1 bike stalls/unit in a secured, underground location.
- Provide a bike repair station within the secured underground bike parking.

With regards to the TDM -Supportive Development Design and Infrastructure checklist, the following design elements are recommended to be considered:

- Locate building close to the street, and do not locate parking areas between the street and building entrances.
- Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations.
- Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort.
- 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).
- 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).
- 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).
- Provide safe, direct and attractive walking routes from building entrances to nearby transit stops
- Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible.
- Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h.

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 F.

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 21: Phase 1 - 2025 Total Projected Peak Hour Traffic Volumes

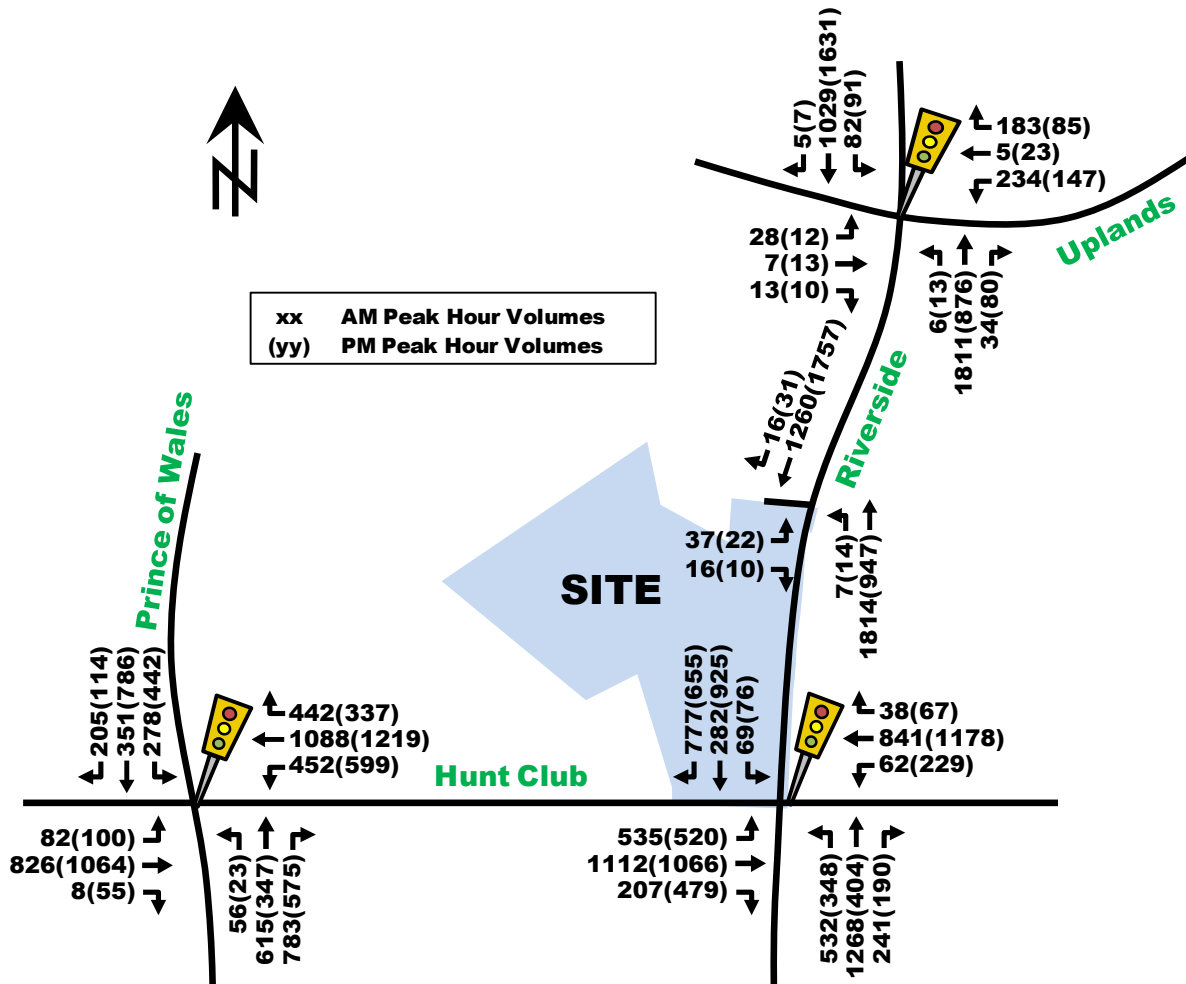


Table 13: Phase 1 - 2025 Intersection Performance

| 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 22: Phase 2 – 2029 Full-Buildout Total Projected Peak Hour Traffic Volumes

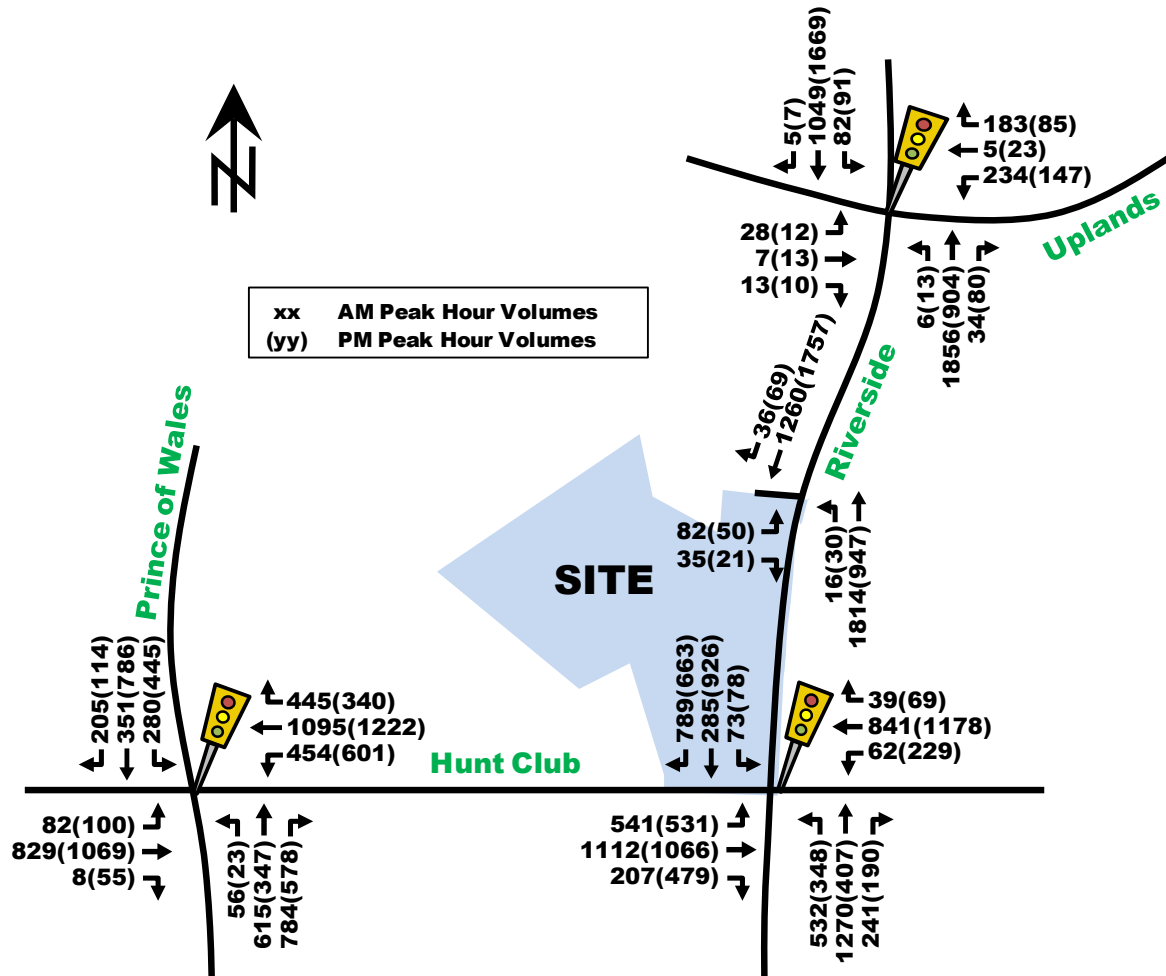


Table 14: Phase 2 – 2029 Full-Buildout Intersection Performance

| 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 queueing 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 | 95 th % Synchro | 50 th % SimTraffic | 95 th % 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 turn right, producing minimal queues on the southbound right-turn storage lane. The length of the storage lane intends to reduce the likelihood of non-site vehicles from using the right turn as a by-pass 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 proposed 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, P.Eng
Transportation Analyst

Reviewed By:



Jake Berube, P.Eng.
Transportation Engineer

Appendix A:

Screening Form, Plan of Subdivision and Response to City Comments

Appendix B:

Transit Route Maps

Appendix C:

Traffic Data

Appendix D:

Collision Data

Appendix E:

Historic Background Growth

Appendix F:

MMLOS Analysis: Road Segments and Intersections

Appendix G:

Traffic Signal Warrant

City of Ottawa 2017 TIA Guidelines

Date

11.4.2022

TIA Screening Form

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

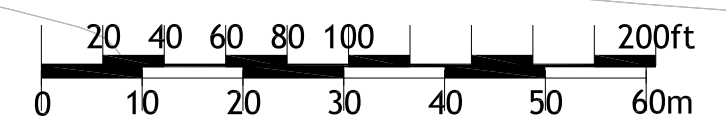
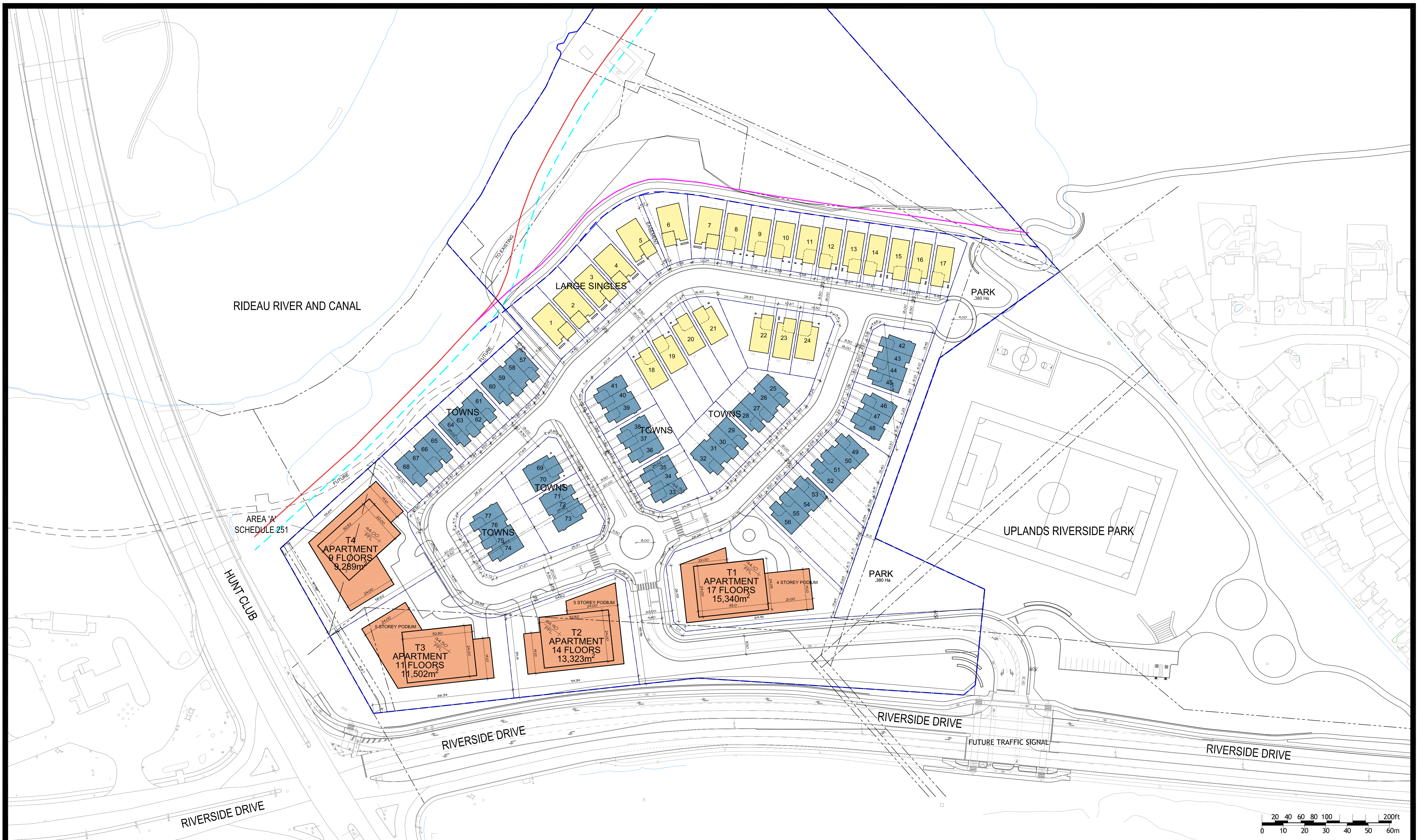
| | |
|------------------------------|-------------------------|
| Land Use Type | Townhomes or Apartments |
| Development Size | 600 Units |
| Trip Generation Trigger Met? | Yes |

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 | |



29 September 2023

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

Attention: Wally Dubyk, C.E.T

Dear Mr. Dubyk:

**Re: 3930-3960 Riverside Drive, St. Mary's Plan of Subdivision TIA
First Technical Circulation Comments – 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 Services

TIA Strategy Report – Parsons, Dated December 22, 2022
Site Plan, Dated December 21, 2022

General Comments

Comment 1. Riverside Drive is designated as an Arterial road within the City's Official Plan with a ROW protection of 44.5 metres. The ROW limits are to be dimensioned on all the drawings with the offset distance (22.25 metres) dimensioned from the existing centerline of pavement and shown on the drawings. The Certified Ontario Land Surveyor is to confirm the ROW protected limits and any portion that may fall within the private property to be conveyed to the City.
[Noted.](#)

Comment 2. Hunt Club Road is designated as an Arterial road within the City's Official Plan with a ROW protection of 44.5 metres. The ROW limits are to be dimensioned on all the drawings with the offset distance (22.25 metres) dimensioned from the existing centerline of pavement and shown on the drawings. The Certified Ontario Land Surveyor is to confirm the ROW protected limits and any portion that may fall within the private property to be conveyed to the City.
[Noted.](#)

Comment 3. ROW interpretation – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface.
[Noted.](#)

Comment 4. A 5.0 metres x 5.0 metres sight triangle is required at the intersection of Riverside Drive and Hunt Club Road and is to be dimensioned on all drawings. Dimensions are to be taken from the Right-of-Way (ROW) protection limits.
[Noted.](#)

Transportation Engineering

Section 3.1.1 Trip Generation and Mode Share:

Comment 5. Adjustments were made to Table 5 proposed walking and auto passenger mode shares following comments received after the forecasting submission. However, column 2 of Table 6 & 7 were not updated to match Table 5. Please correct.

Table 6 & 7 fixed. No change to analysis required.

Section 3.3 Demand Rationalization:

Comment 6. Paragraph 2 of Section 3.3 reference “Section 0”. Please fix error.

Report fixed.

Comment 7. Consider providing a brief discussion of potential impact of peak hour spreading arising from Covid and flexible work arrangements as it relates to demand rationalization.

Added short description noting that pandemic can have lasting impacts to peak period volume, however, peak hour volumes are anticipated to remain high during the commuter peak hour.

Section 4.1.1 Design for Sustainable Modes.

Comment 8. It is noted that the pathway connection between Block 57 and Block 1 will also need to provide for infrequent vehicle to the Golf Course pump house. Consider a gate to restrict vehicle access to authorized golf course vehicles only, while always maintaining access for cyclists and pedestrians. Consider alternative/additional measures to prevent motor vehicles from accessing the pathway network through this pump house driveway.

Noted for detailed design.

Comment 9. The conceptual design of the pathway network includes multiple switchbacks north of Block 17 and the park. Consider the addition of staircases that bypass the switchbacks to avoid “goat paths” from forming.

Noted for detailed design.

Comment 10. Continue to explore more direct pedestrian connections between the internal pedestrian network and the Riverside Drive and Hunt Club Road intersection. Such a connection would reduce walking distance to transit at the Riverside Drive and Hunt Club intersection and improve the ability to access commercial land uses on the south side of Hunt Club Road. It is acknowledged that some options for this connection will be explored during Site Plan Application, but other options are more suitably explored during the plan of subdivision application. Please provide several pathway/sidewalk alignment options with grading information and demonstrate opportunities and challenges. One such pathway alignment appears to be shown (but not highlighted) in Figure 15 on the north/east side of T2. Refer also to comments from Transit Services.

It is recognised that improved connections to Riverside and Hunt Club are beneficial. Preliminary grades between the planned apartment buildings and Riverside Drive make use of 4:1 and 3:1 slopes, making a pedestrian connection infeasible without major infrastructure on subdivision blocks that will be developed in the short-term. Locating additional pedestrian connections east of the buildings are faced with a similar challenge, including connecting a second sidewalk into the subdivision. For these reasons the appropriate time to provide additional connections is during Site Plan Application by integrating the connection with grade managing components of the apartment buildings.

Figure 15 has been updated to remove the connection on the north/east side of T2.

Comment 11. It is acknowledged that the Riverside embankment makes it difficult to provide sidewalks and cycle facilities on the east side of the access road corridor. However, the proposed 8.5m-wide access road provides sufficient space to provide a bike lane in a single direction. Provide a minimum 1.5m-wide bike lane in the northbound/eastbound (uphill) direction, from just east of the roundabout to the new signal. Provision of a bike lane is recommended due to the relatively high volume of traffic anticipated to use the access road (as discussed in Section 4.6 of the TIA). Uphill direction is preferred because of the greater speed differential between uphill cyclists and motor vehicles.

An uphill bike lane has been provided between the roundabout and the site intersection.

Comment 12. Reference and discuss the TDM-Supportive Development Design and Infrastructure Checklist included in Appendix I. For future site plan applications, consider TDM-supportive measure 2.3.1 (bike repair station).
[Appendix I \(Now Appendix J\) referenced and discussed in the report. Added measure 2.3.1 to report.](#)

4.1.3 New Streets Network

Comment 13. One appendix should be dedicated for the internal street network swept path analysis. Please separate Appendix H into separate appendices for the internal street network swept path analysis and for the sight line analysis / functional drawings / cost estimate to support the Riverside Drive roadway modification.
[Appendix H now includes the internal street swept paths, while Appendix I references the Functional Design, Sightline Analysis and Costing.](#)

Comment 14. Internal local intersections should be designed using an HSU control vehicle. Use of a WB-20 control vehicle is counter to the design of local residential streets with a 30km/h operating speed. Adjust internal intersection design as required. Re- design the signalized access road and Riverside Drive intersection with an HSU control vehicle.
[While the proponent has voiced opposition and the constraints on this request, the subdivision and access intersection has been designed using an HSU control vehicle.](#)

Comment 15. Show the HSU vehicle swept path analysis at the “elbows” of the access road, and at the access road intersection with Riverside Drive.
[Included in Appendix H.](#)

Comment 16. Indicate the size of corner sight triangles provided on new streets.
[To be shown on the site plan.](#)

Comment 17. The internal local streets must be designed per the Local Residential Streets 30km/h Design Toolbox. Location of parking bulb-outs/curb extensions, vertical measures, and other traffic calming measures is determined during the plan of subdivision application, not during site plan application. A plan indicating the draft design/location of proposed traffic calming measures should be provided for review with the TIA Strategy prior to submitting the geometric roadway design drawings (GRDD).
[Section 4.1.3 proposes a traffic calming plan in advance of the GRDD. Notably, the street segments are fairly short with frequent turns. Intersection narrowings have been applied.](#)

Comment 18. Regarding the proposed mini roundabout:

- a) Refer to Section 4.4.6 of Local Residential Streets 30km/h Design Toolbox, and the City of Ottawa’s 2017 Mini-Roundabout Guidelines.
- b) Provide fastest path analysis to confirm travel speed of managed vehicle (passenger car) is in the 25 to 30km/h range.
- c) Provide a Type D pedestrian crossover on each leg. Explore alternative driveway arrangements for Block 33 to avoid driveway conflicts with the west crossing of the mini roundabout.
- d) Additional comments will be provided during GRDD submission.

[Mini-roundabout guidelines reviewed and fastest path analysis included within this submission.](#)

4.4.3 Intersection Design:

Comment 19. As per preceding comments, re-design the signalized access road and Riverside Drive intersection with an HSU control vehicle (rather than WB-20). Tighten corner radii, etc.
[While the proponent has voiced opposition and the constraints on this request, the subdivision and access intersection has been designed using an HSU control vehicle.](#)

Comment 20. Shift median on west leg further north to provide space for the eastbound bike lane on the approach to the intersection. Shift eastbound bike crossing and receiving curb depression to be in-line with the approaching bike lane.
[Incorporated into the design.](#)

Comment 21. Remove the bike box. Cyclists not anticipated to perform a 2-stage left-turn maneuver. However, consider an advanced eastbound bicycle stop bar.
[Bike box removed. Advanced stop bar implemented.](#)

Comment 22. Provide small radii for cyclists turning right between the access road and the southbound cycle track. Refer to design feature 'B' on Figure 5.12 of the Protected Intersection Design Guide.
[Noted. There may be constraints with the corner, the future grading and an existing manhole. This comment will be reviewed during detailed design in further detail when these elements are known to a greater precision.](#)



Figure 5.12. Standard protected corner with transition to major road without cycling facilities

Design Features

- (A)** Space protected for future cycle track connection
- (B)** Curve to facilitate bicycle right turns

Comment 23. Provide a 4.5m southbound crossside offset (rather than 5.4m). Per Table 5.1 of the Protected intersection Design Guide, a setback range of 3.0-6.0m is acceptable for a curb (or truck apron) radius of 5.0m. A reduced setback simplifies northwest corner geometry and allows the eastbound vehicle stop bars to be moved closer to the intersection.
[This intersection quadrant was modified to accommodate an HSU control vehicle thus reducing the offset to 3.5m in combination with a truck apron.](#)

Comment 24. Move the north crosswalk approximately 1.5m further south for improved pedestrian path of travel from the north sidewalk of the access road to the crossing.
[Crosswalk adjusted.](#)

Comment 25. Expand the sidewalk on the northwest corner of the intersection to ensure east- west pedestrian path of travel meets straight path of travel (20-degree taper angle) requirements per Section 5.1 of the Protected Intersection Design Guide.
[Increased sidewalk size.](#)

Comment 26. Shape the north median to match the eastbound left turn swept path of the HSU design vehicle.
[Adjusted.](#)

Comment 27. Provide a crosswalk on the south leg of the intersection. Draft Transportation Master Plan policy includes language which states, “pedestrian crossings should be provided on all signalized intersection legs unless no feasible solution can be identified.” It is acknowledged that there is no sidewalk on the south/east side of the access road, but this is not sufficient rationale to not provide a crosswalk.
[Included.](#)

Comment 28. On the east side of the intersection:

- a) Assume northbound cyclists utilize the asphalt maintenance strip (i.e., that the maintenance strip is a narrow cycle track). While it is acknowledged that this is currently a substandard facility, it is a useful starting point to be upgraded over time.
- b) Widen this cycle track to 1.8m-wide and bend-out to 2.7m away from the curb.
- c) Slightly bend-out the sidewalk locally to accommodate the cycle track bend- out.
- d) Provide 2.7m-deep pedestrian refuges.

For illustration of the above signalized intersection design comments, refer to below markup:
[Incorporated into the design per City comment.](#)

Comment 29. Within Section 4.4.3, state sources for calculation of taper ratio and taper lengths. Confirm 15m parallel southbound right turn lane length meets requirements of Section 9.14 of the TAC Geometric Design Guide.
[Taper ratio equals 17:1 \(60m\). 15m parallel lane length was implemented per City comments.](#)

Table 9.14.2: Right-Turn Taper with Parallel Deceleration Lane Design

| Design Speed (km/h) | Taper Ratio ^a Design Domain | Radius for Reverse ^a Curves (m) | Parallel Lane Length ^b Design Domain |
|---------------------|---|---|--|
| 50 | 11:1–17:1 | 90–150 | 35–75 |
| 60 | 14:1–17:1 | 150 | 40–90 |
| 70 | 17:1–20:1 | 150–220 | 50–110 |
| 80 ^c | 17:1–24:1 | 150–300 | 60–130 |

- Notes:
- a) Taper may be straight line or may be symmetrical reverse curves; length is derived from design values calculated for a 3 s lane change criterion for the appropriate operating speed.
 - b) Additional parallel lane length may be required for storage.
 - c) For higher design speeds, refer to **Chapter 10**.

Section 4.9 Intersection Design:

Comment 30. The discussion of the Riverside Drive and Site southbound right-turn queue states that, “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.”

Comment on whether a longer parallel southbound right-turn length at the Riverside Drive and Site intersection would reduce the volume of southbound right-turning vehicles getting stuck within (and contributing to) the general southbound queue.

[Additional comment provided. “The length of the storage lane intends to reduce the likelihood of non-site vehicles from using the right turn as a by-pass lane.”](#)

[Providing a longer storage length would have a nominal effect on southbound queuing, but perhaps can contribute to undesirable driver behaviours such as using the right turn lane to pass.](#)

Comment 31. Cost sharing limits, unit rates and quantities are currently under review for the City Network Modification portion of the work along Riverside. Waiting for CAD drawings to finalize comments and meeting will be set up with Parsons once review has been completed.

[Noted. A revised costing has been completed with this submission.](#)

Traffic Signal Design

Comment 32. Look to reduce the distance of the southbound cycle track bend out (from Riverside Drive) and shift pedestrian & cycling facilities further east towards the intersection. The current eastbound vehicle stopbar location is within the curvature of the proposed roadway and would make it difficult for vehicles to be stopped perpendicular to Riverside Drive / traffic signal displays. When shifting the pedestrian & cycling facilities, look to shift the vehicle stopbar location as much as feasible to allow for vehicles to be perpendicular to Riverside Drive.

[Refinements included.](#)

Comment 33. Remove the bike box. Cyclists not anticipated to perform a 2-stage left-turn.

[Removed.](#)

Comment 34. Consider making the north leg east-west pedestrian crossing a full width crossing through the north median. Retain protective median bullnose on the south side of the north crossing.

[Refinements included.](#)

Comment 35. Provide a second east-west pedestrian crossing on the south leg of the intersection.

[Refinements included.](#)

Comment 36. The City's Traffic Signal Design & Coordination Unit must be engaged in the continued development and planning of the functional design, to determine requirements at traffic signals. An agreement on the functional design must be met, prior to RMA submittal and prior to the commencement of a traffic signal design.

[Noted on agreement to the functional design. The functional design will seek to address all comments prior to the RMA submission, however some details can be pushed to detailed design.](#)

Comment 37. 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:

- a) base mapping,
- b) new underground utilities/sewers, and catch basin locations,
- c) existing underground utilities/sewers, and catch basin locations
- d) AutoTurn-Radius Modeling for approved vehicles and
- e) 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.

Please contact Jon Pach: at 613-806-0142 or jon.pach@ottawa.ca and Christopher Geen: 613-227-0674 or Christopher.Geen@ottawa.ca to discuss traffic control signal requirements.

[Noted. Comments from May, 2023 received. Additional discussions are anticipated as project progresses.](#)

Traffic Engineering

Comment 38. Traffic engineering continues to have concerns with the expected southbound queue on the approach to Hunt Club Road, which will spill back to the proposed new signal access. This can present a safety and operational concern. With continued growth expected to the south (Riverside South/Barhaven area) there will be growth to the southbound vehicle volumes.

[Concerns noted.](#)

Comment 39. Transit modal split is unlikely to be achieved due to limited facilities within the area. Seeing as how any transit access requires walking, please ensure that pedestrian actuations at access signals reflect this.

[Noted, ped actuations reviewed.](#)

Comment 40. Analysis should include all traffic signals within 1km due to the sensitivity of operations and signals operating at or near capacity in the area of the proposed development.

Analysis reflects prior TIA's scope.

Comment 41. Design of the new traffic signal is to be refined by traffic signal design further as part of this review.
Noted.

Comment 42. Implementation of NRTOR will be reviewed upon finalization of signal design at the new traffic signal.
Noted.

Transit Services

Comment 43. As a general note on existing conditions in the area - the asphalt sidewalk on the north side of Hunt Club is substandard. This would be the path of travel between the westbound bus stop (#6124) and the proposed development. Improvements to these pedestrian facilities would improve the experience of transit customers accessing the stop to/from the proposed development.

Noted. However, this is not located on the proponent's frontage.

Comment 44. Figure 15 - There appears to be a sidewalk shown north of the T2 apartment building that angles towards the Riverside Drive and Hunt Club Road intersection. Is there a reason this is not highlighted "Proposed Internal Sidewalks"? This segment of sidewalk is also not shown in the separate attached Site Plan. A connection at this location should be provided to reduce walking distance between the proposed development and the nearest bus stops on Hunt Club. This would also improve convenience of access to nearby amenities at 'Hunt Club Market Place'.

Per previous comments, this link has been removed. Additional linkages can be contemplated at future site plan control.

Comment 45. Further considering ways to reduce the walking distances between the proposed development and nearest bus stops, and acknowledging the challenging grades in the area:

- a) Can a pathway connection on the south side of T4 and T3 connect to/near the Riverside Drive and Hunt Club Road intersection?
- b) Would it be feasible to provide publicly accessible stairs / elevators / pedestrian bridge between T3 and the intersection to address the grade change and reduce the distance between the south part of the development and the nearest bus stops?

Noted to proponent for future design. See above response.

Section 4.5 Transportation Demand Management and Section 4.7.1 Route Capacity:

Comment 46. Concern with accepting / anticipating low transit ridership. Additional TDM measures should be considered to support increasing transit mode shares beyond the reduced targets set out in this TIA. Considering the noted capacity issues on the adjacent roadways, setting higher transit mode share targets (and associated TDM measures) would be beneficial.

See City comment 39 which notes concern regarding achieving the 'high' transit mode share. The mode shares reflect the available transit in the area and the challenges along the Riverside Drive-Hunt Club Road corridors. TDM Design/Measures on future residential buildings have been recommended to be supportive of non-auto mode shares.

Additional Comments on Class C Cost Estimate

The following comments were received on February 28th, 2023 with respect to the Class C Cost Estimate. City comments are noted in black with the corresponding responses from Parsons in Blue.

Comment 47. Can the southbound right turn lane be constructed by developer (with terms defined through a Roadway Modification Agreement as City funding).

Yes, given the appropriate agreements are in place.

Comment 48. The General items would need to be re-evaluated as one construction contract

The understanding was that some City work items would be completed at a future date thus requiring independent General items (referring to assumption #15 at the bottom of the cost estimate). For now, select independent items for maintained.

Comment 49. Channelized island at Hunt Club will be undertaken by the City in 2024 therefore items need to be removed from cost estimate as development is post 2024.

Noted, costs removed. Assumed connecting to the City design.

Comment 50. Remove parking lot cost at 400K, the design and construction will be carried out by the City at a future point in time.

Noted. Removed and cost maintained separately.

Comment 51. All City Lump Sum items must be broken into quantities.

Noted. We have broken down items where possible, however in some cases we simply do not have enough information to provide a further breakdown at this stage.

Comment 52. Steel beam guiderail should be shared between the City and Developer why is the entire length a City cost, 227m SBGR on drawing vs 285 m?

The cost of the guiderail has been assigned to the City cost as the right turn widening is resulting in the need to modify the guiderail south of the access intersection. The guiderail is assumed to be required by the City, as there is an existing box beam guiderail at this location on Riverside Drive. Lastly, the guiderail is likely still required as Riverside Drive is a significant arterial road with a notable collision rate, indicating that a guiderail would cost beneficial, and reduce overall liability.

Comment 53. TWSI and Tactile Pavers are sidewalk to be funded by developer.

Noted. Costs adjusted.

Comment 54. Provide clarification on item 9.13 (driveway for asphalt) why is item identified as City Cost?

Cost included for the cycle track north of the new intersection.

Comment 55. Provide further clarification for concrete sidewalk(sm), concrete sidewalk (lm), mono concrete sidewalk (sm) and concrete boulevard areas between City and Developer items 3.5/3.7/3.8/3.9/-9.5/9.6/9.7. Show each area on drawing for verification.

Additional notes provided.

Comment 56. Provide more details for earth borrow and subgrade quantities for City component. Cycle track does not require fill only sidewalk– what was the assumption for the area and depth?

Quantity for Earth Borrow and Select Subgrade material are order of magnitude estimates only. Quantity to be refined at detailed design once the development plan and location of building / building with soil retaining capabilities have been confirmed at the base of the embankment. The additional fill along the embankment is generated as a result of the increased plateau width required to add the cycle track and extended the right turn lane, which are both City items.

Comment 57. Please use the most current unit rates from City data base when a final roadway modification agreement is ready for completion between both parties.

Noted. Current rates applied.

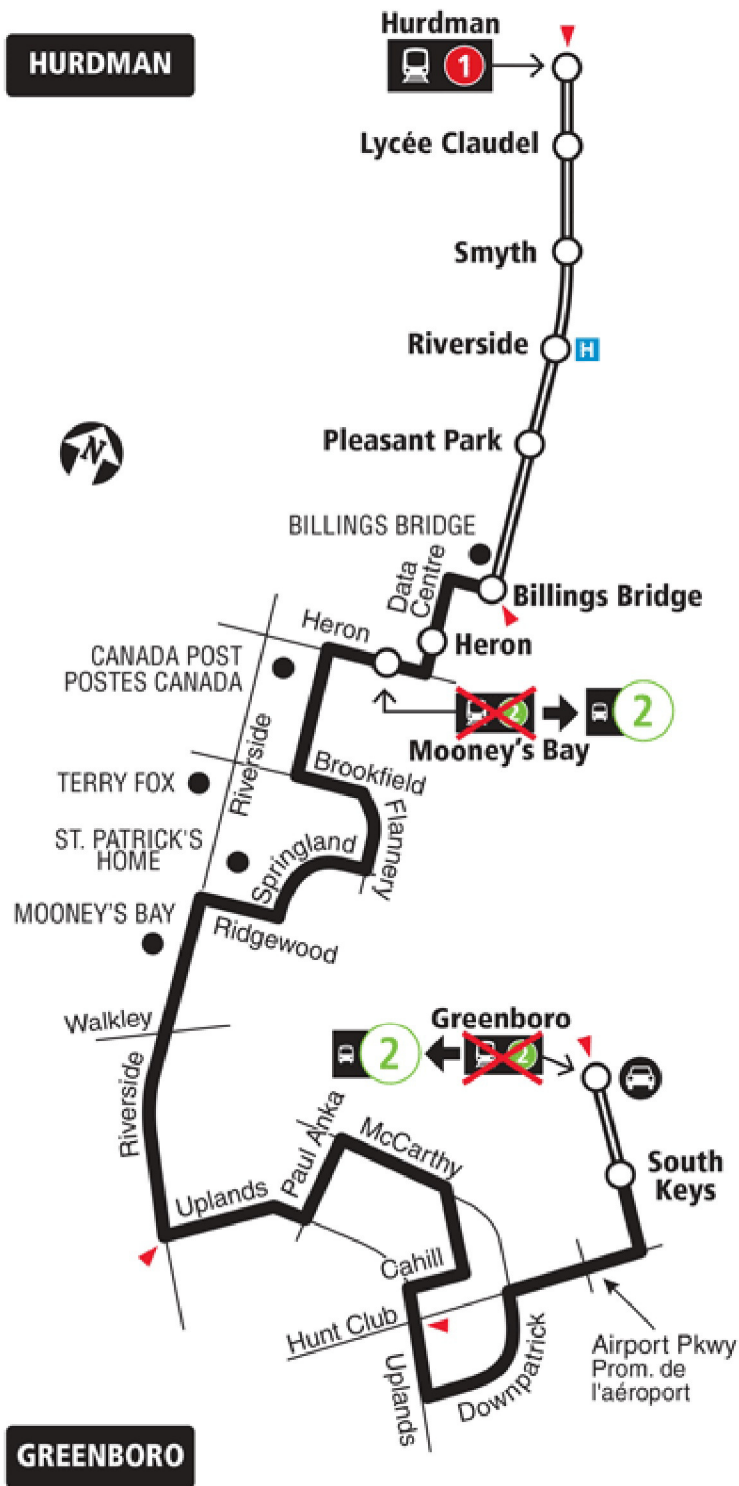
Comment 58. The SBR lane extension is DC eligible, as such soft costs of 40% is permitted (15 %engineering 15% contingency and 10% contract administration).

A 25% Engineering and Contract Administration soft cost has been applied. A 30% contingency has been maintained for both aspects of the work given the cost estimates are still at a planning level.

Appendix B:




Transit Route Maps

OC Transpo Route #90



HURDMAN

GREENBORO

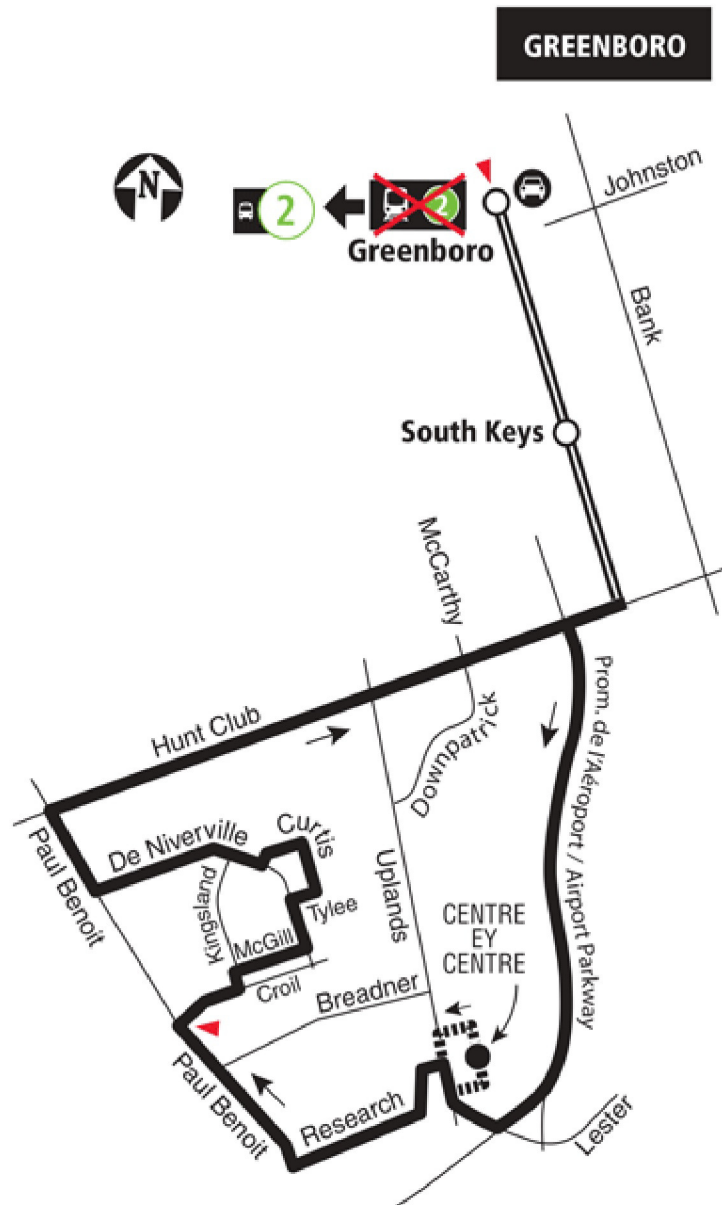
-  Transitway & Station
-  Park & Ride / Parc-o-bus
-  Timepoint / Heures de passage

OC Transpo Route #96







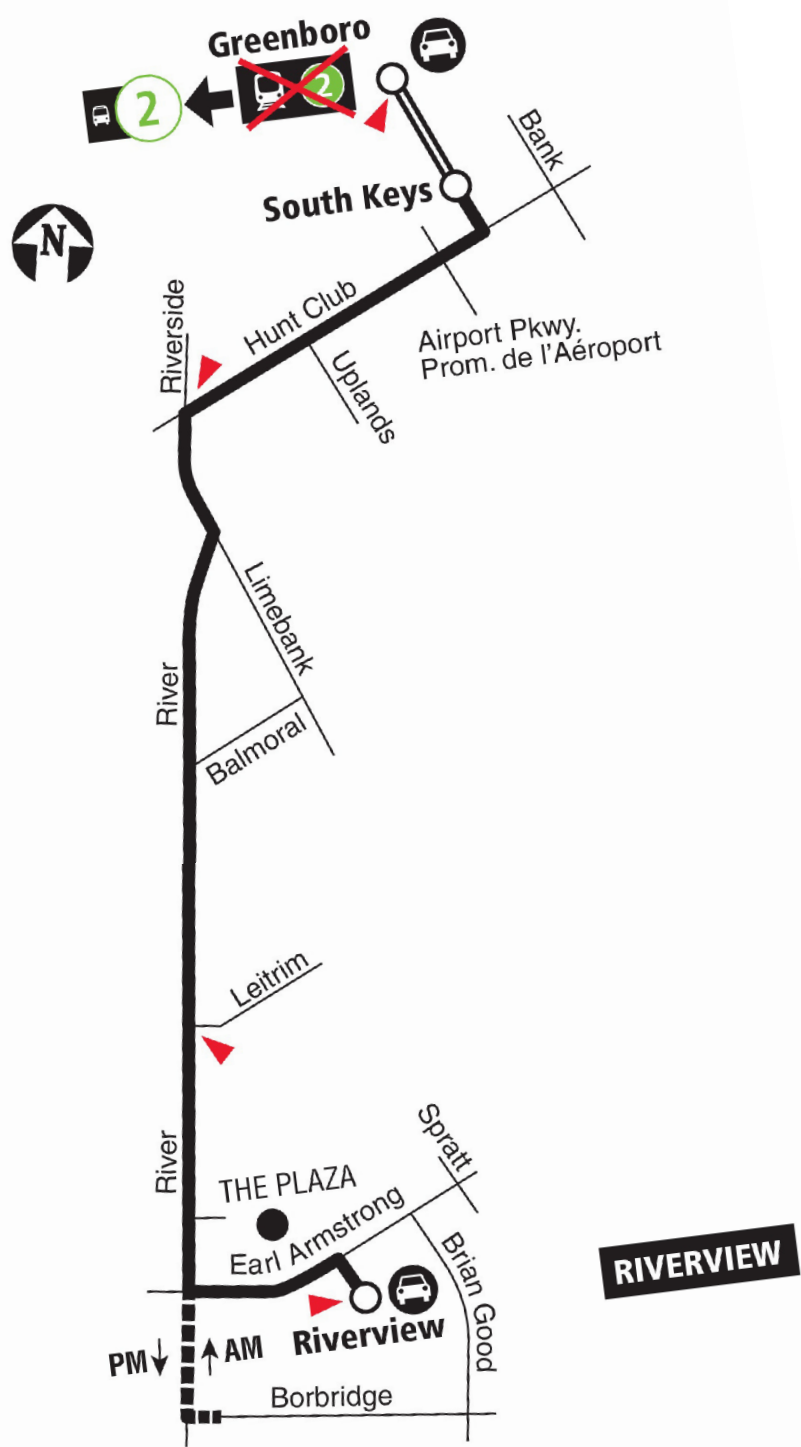
- Transitway & Station
- Transitway & Station (Peak periods only / Périodes de pointe seulement)
- 96B
- 96B Some trips / 96B Quelques trajets
- Some trips / Quelques trajets
- Park & Ride / Parc-o-bus
- Timepoint / Heures de passage

OC Transpo Route #197



UPLANDS

-  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



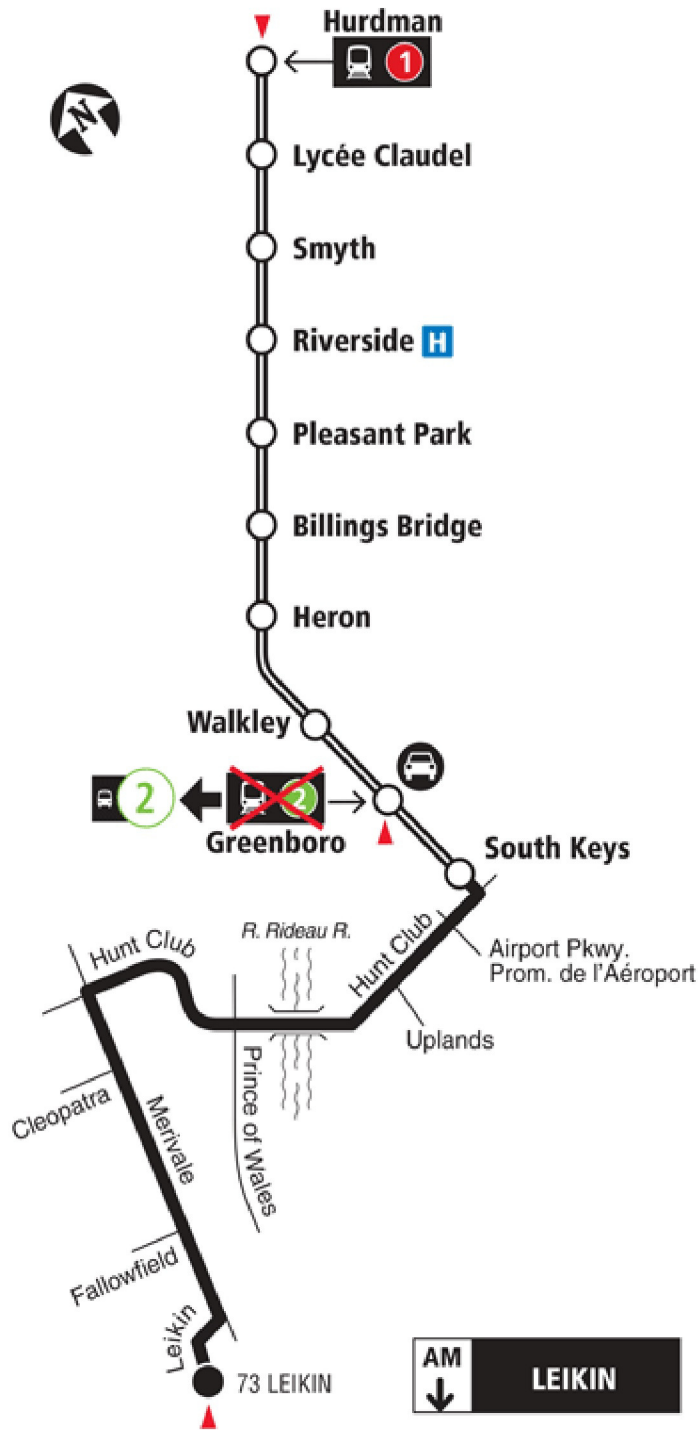
2022.04

-  Transitway & Station
-  Some trips / Quelques trajets
-  Park & Ride / Parc-o-bus
-  Timepoint / Heures de passage

2022.04

OC Transpo Route #199

PM
↑
HURDMAN



AM
↓
LEIKIN

-  Transitway & Station
-  Park & Ride / Parc-o-bus
-  Timepoint / Heures de passage

Appendix C:

Traffic Data

Turning Movement Count - Peak Hour Diagram

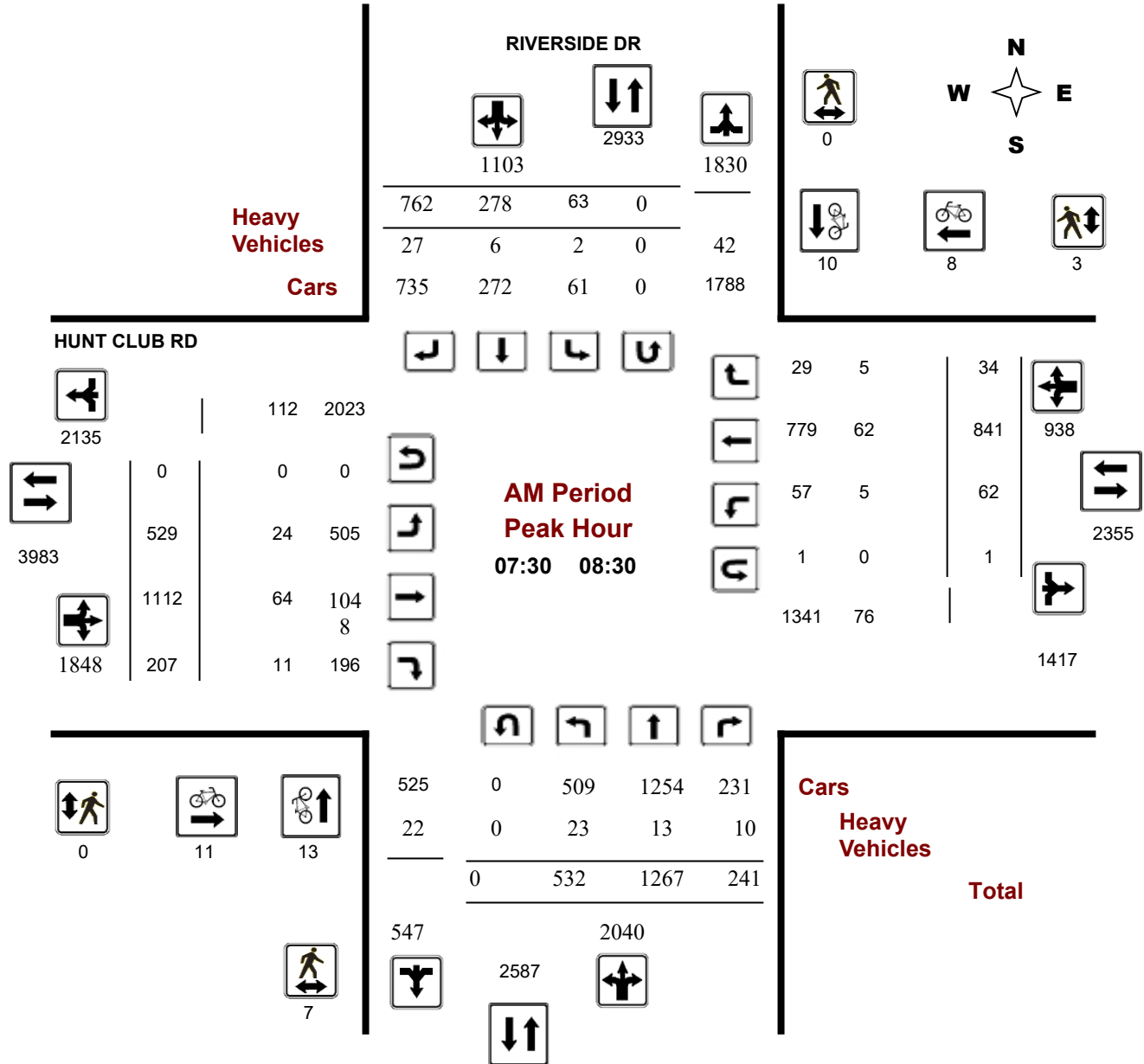
HUNT CLUB RD @ RIVERSIDE DR

Survey Date: Wednesday, June 12, 2019

Start Time: 07:00

WO No: 38654

Device: Miovision



Turning Movement Count - Peak Hour Diagram

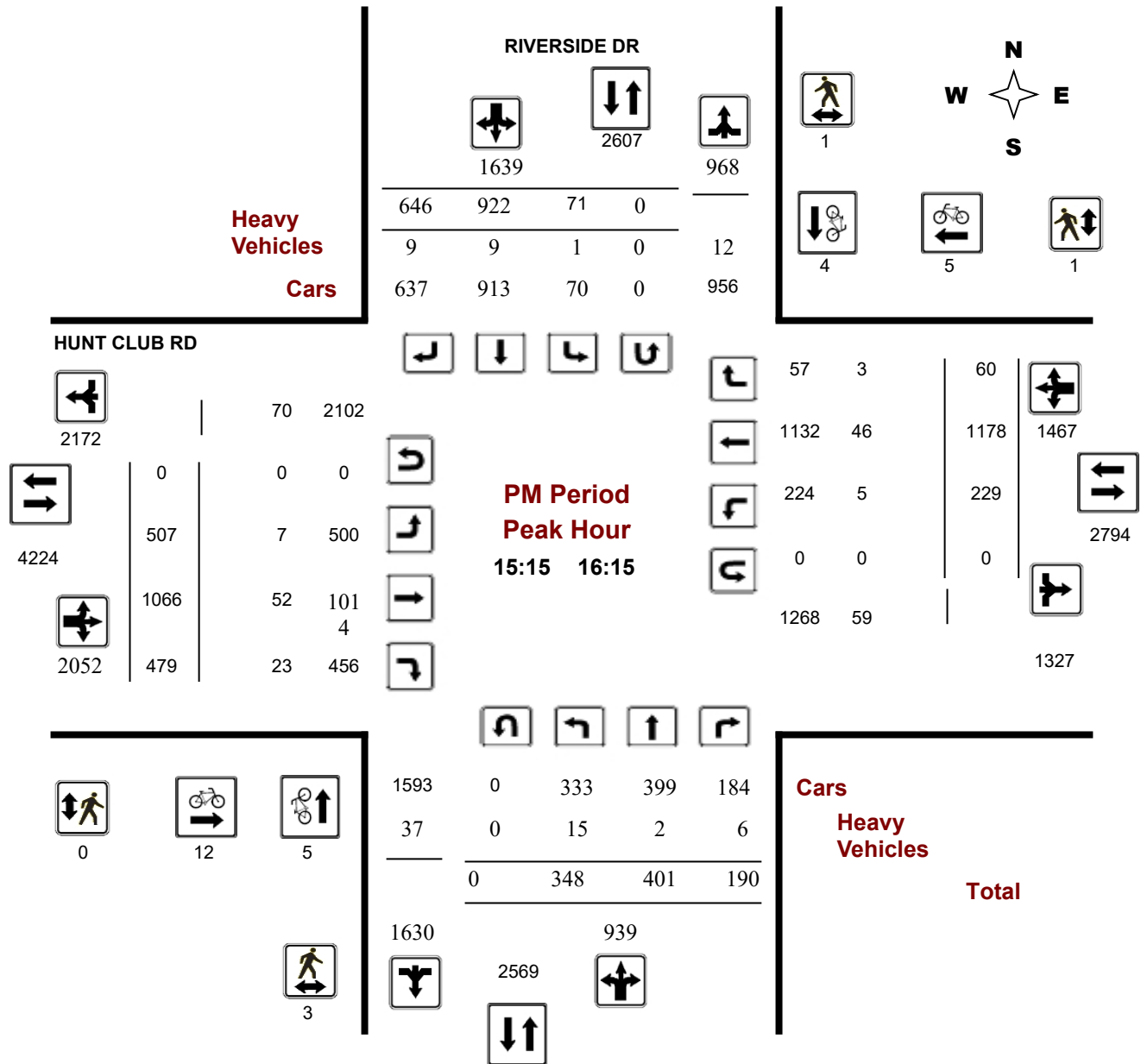
HUNT CLUB RD @ RIVERSIDE DR

Survey Date: Wednesday, June 12, 2019

Start Time: 07:00

WO No: 38654

Device: Miovision



Turning Movement Count - Peak Hour Diagram

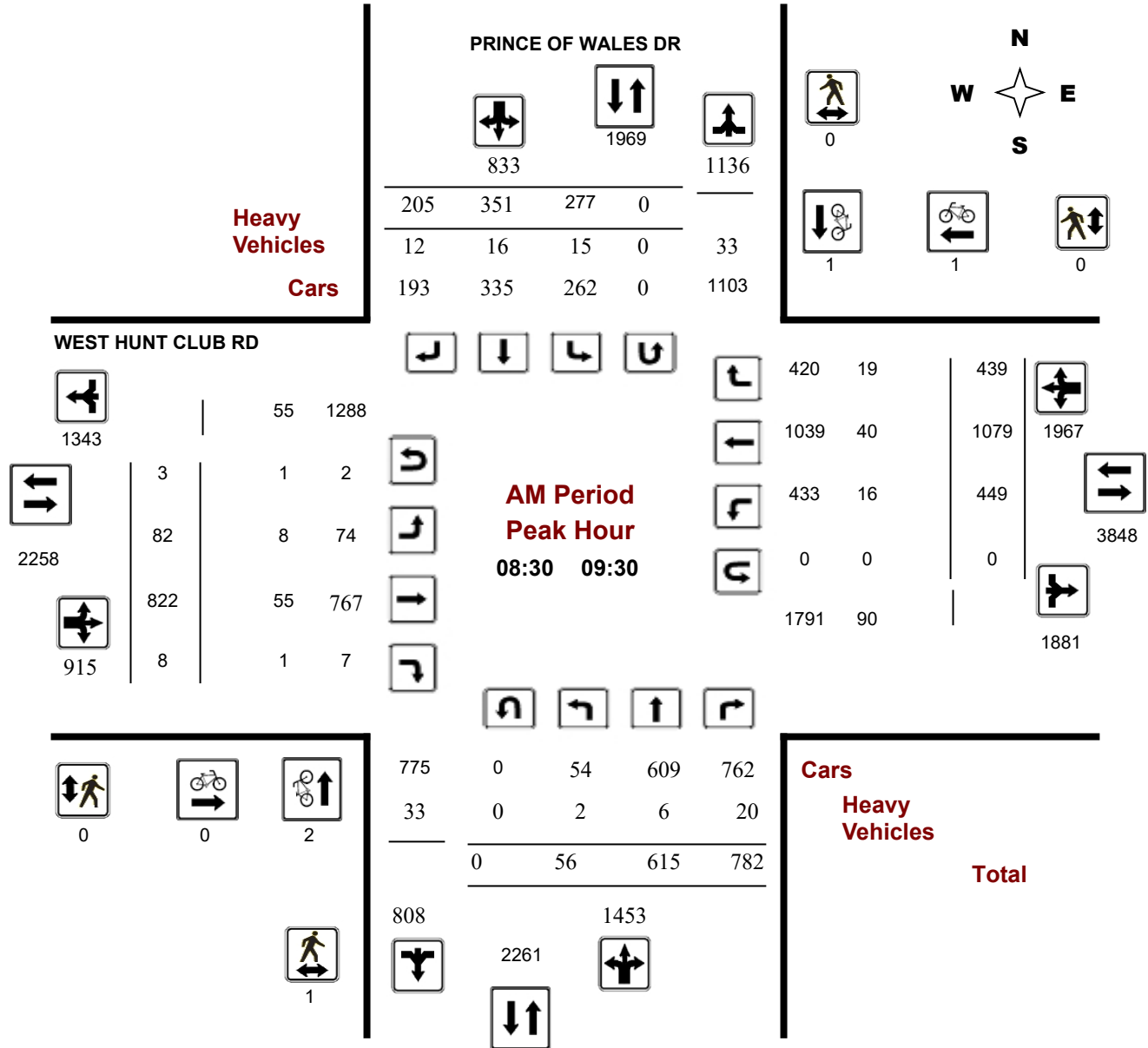
PRINCE OF WALES DR @ WEST HUNT CLUB RD

Survey Date: Monday, February 10, 2020

Start Time: 07:00

WO No: 39445

Device: Miovision



Turning Movement Count - Peak Hour Diagram

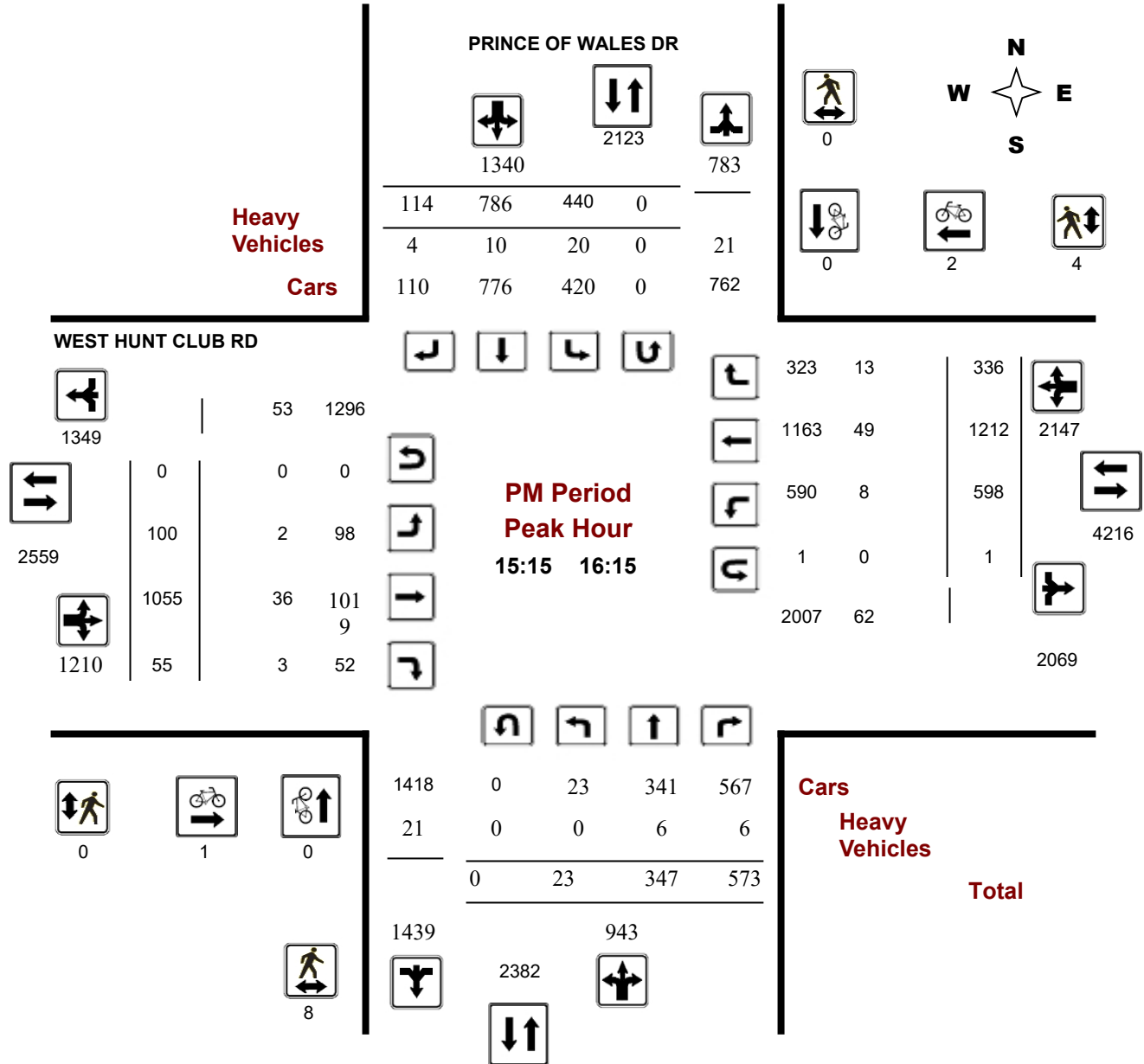
PRINCE OF WALES DR @ WEST HUNT CLUB RD

Survey Date: Monday, February 10, 2020

Start Time: 07:00

WO No: 39445

Device: Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

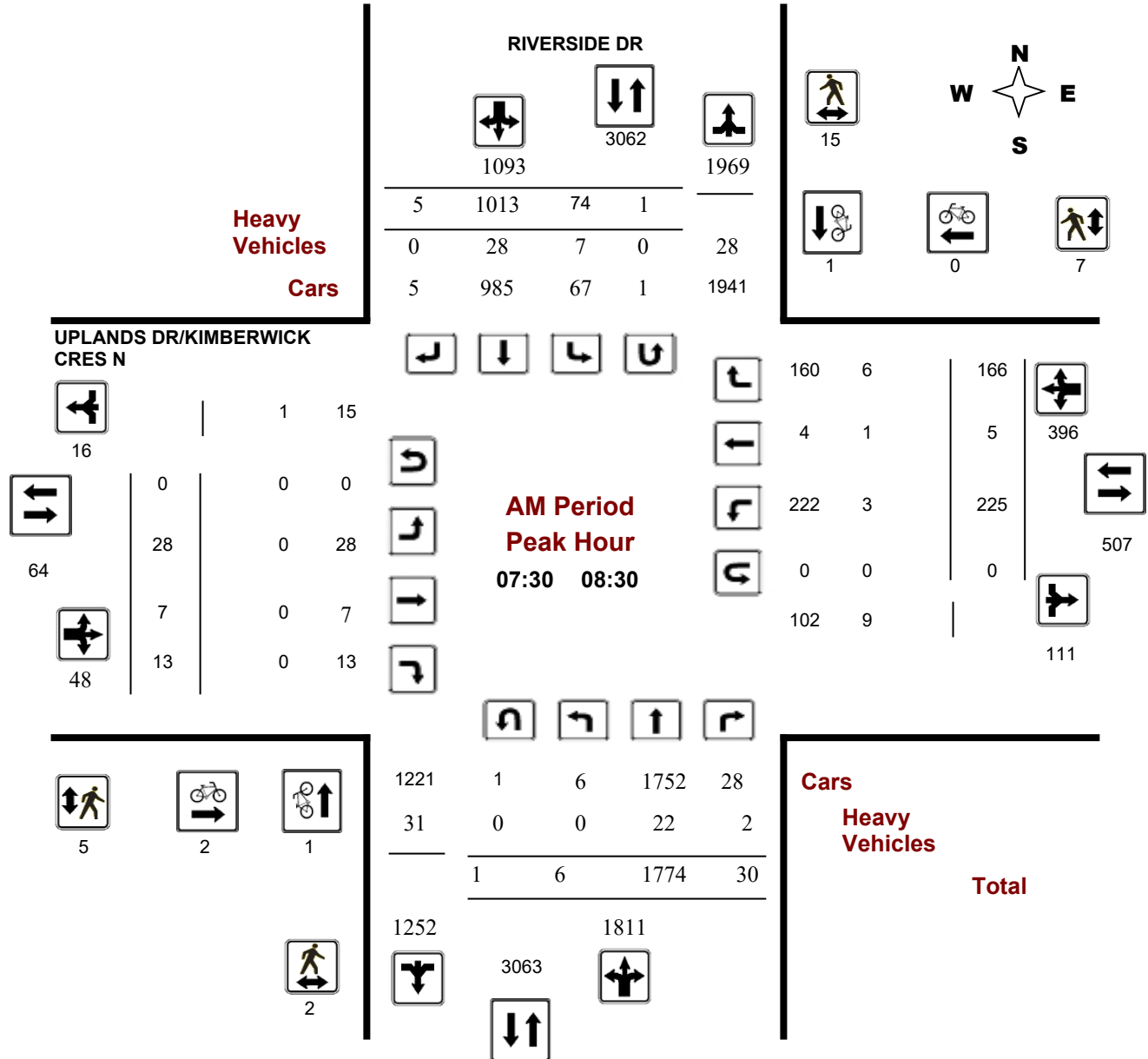
RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

Survey Date: Wednesday, January 22, 2020

Start Time: 07:00

WO No: 39376

Device: Miovision



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 |
| Non-fatal injury | 60 | 2 | 2 | 10 | 0 | 4 | 0 | 1 | 79 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 313 | 15 | 81 | 30 | 1 | 12 | 0 | 7 | 459 |

83%
17%
0%
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 |
| Non-fatal injury | 23 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 29 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 155 | 8 | 33 | 10 | 0 | 4 | 0 | 2 | 212 |

86%
14%
0%
100%

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 |
| Non-fatal injury | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 |

67%
33%
0%
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 |
| Non-fatal injury | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 12 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 18 |

72%
28%
0%
100%

67% 0% 28% 6% 0% 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 |
| Non-fatal injury | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 |

75%
25%
0%
100%

75% 0% 0% 25% 0% 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 |
| Non-fatal injury | 22 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 28 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 102 | 1 | 28 | 15 | 1 | 4 | 0 | 2 | 153 |

82%
18%
0%
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 |
| Non-fatal injury | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 15 | 5 | 2 | 3 | 0 | 1 | 0 | 1 | 27 |
| | 56% | 19% | 7% | 11% | 0% | 4% | 0% | 4% | |

89%
11%
0%
100%

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 |
| Non-fatal injury | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 6 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 10 |
| | 60% | 0% | 20% | 0% | 0% | 10% | 0% | 10% | |

80%
20%
0%
100%

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 |
| Non-fatal injury | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| | 25% | 0% | 75% | 0% | 0% | 0% | 0% | 0% | |

75%
25%
0%
100%

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 |
| Non-fatal injury | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 0% | 100% | 0% | 0% | 0% | 0% | 0% | 0% | |

0%
100%
0%
100%

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 |
| Non-fatal injury | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 8 |
| Non-reportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 19 | 0 | 6 | 0 | 0 | 1 | 0 | 1 | 27 |
| | 70% | 0% | 22% | 0% | 0% | 4% | 0% | 4% | |

70%
30%
0%
100%

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 |

| 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%

| 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%

| 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%

| 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 |

| 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%

| 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%

| 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%

| 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 |

| 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%

| 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%

| 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%

| 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 |
| Scenario | 3960 Riverside Drive |
| Comments | St. Mary's Development |
| | |

| | |
|---------|-----------|
| Project | 478378 |
| Date | 30-Nov-22 |
| | |
| | |

| 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 | - | 1.8 m | ≥ 2 m | 1.5 m | 1.8 m | ≥ 2 m | | ≥ 2 m | | |
| | Boulevard Width | | < 0.5 m | < 0.5 | < 0.5 m | > 2 m | > 2 m | | > 2 m | | |
| | Avg Daily Curb Lane Traffic Volume | | > 3000 | > 3000 | > 3000 | > 3000 | > 3000 | | > 3000 | | |
| | Operating Speed | | > 60 km/h | > 60 km/h | > 60 km/h | > 60 km/h | > 60 km/h | | > 50 to 60 km/h | | |
| | On-Street Parking | | no | no | no | no | no | | 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 | 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:

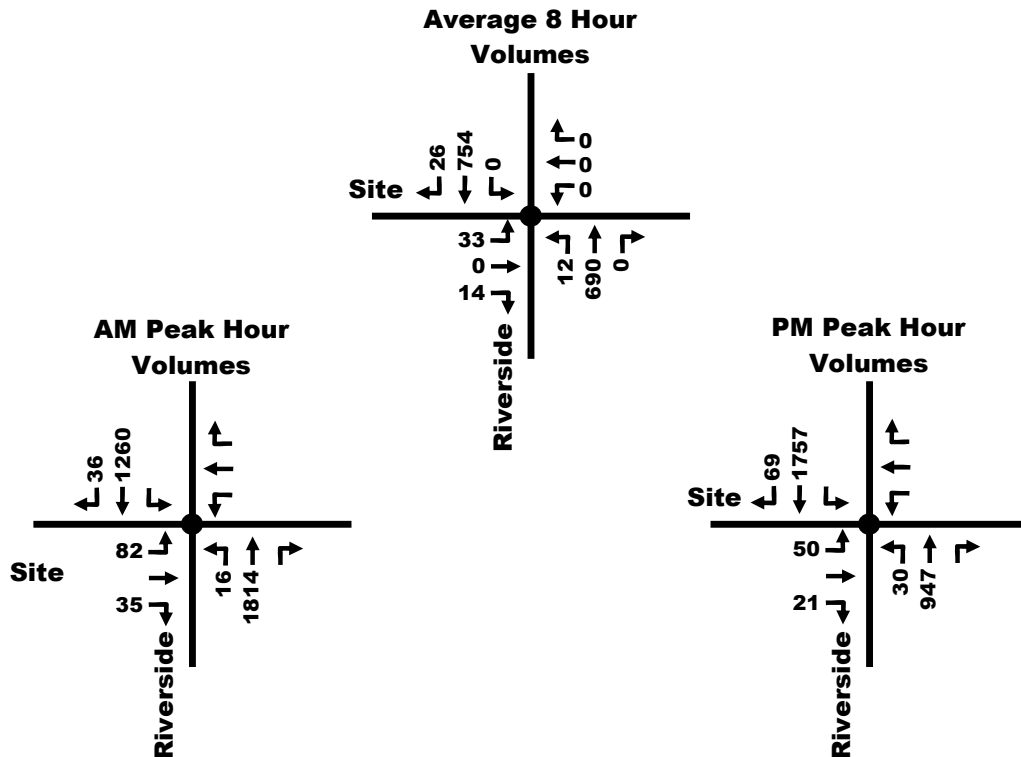
Traffic Signal Warrant

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 <u>Crossing</u> the Major Street for Each of the Same 8 Hours | 50 | 66% | | |

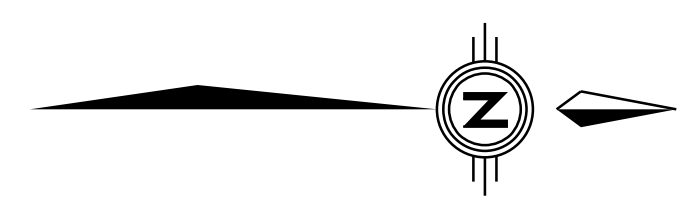
Notes

- 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**

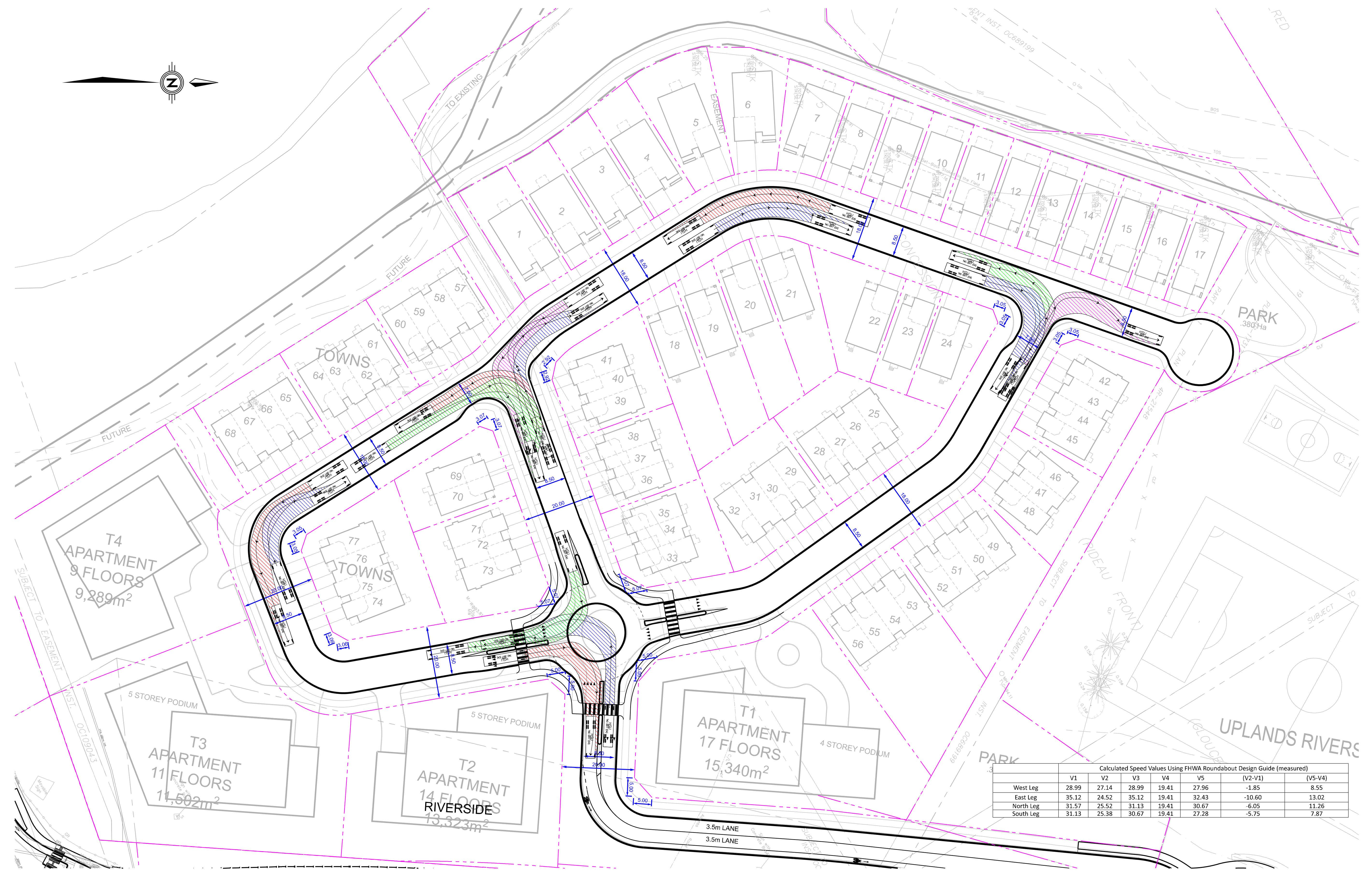


Appendix H:

Internal Subdivision Turning Movements



Consultant's Information: C:\pwworking\charlie.parsons\P0014661\Drawings\5726478416-Site Plans\Turning Movements\HSU.Dgn
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 Plot Date: 9/18/2023 7:08:02 PM

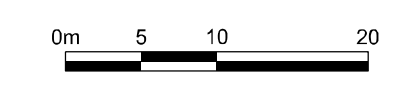


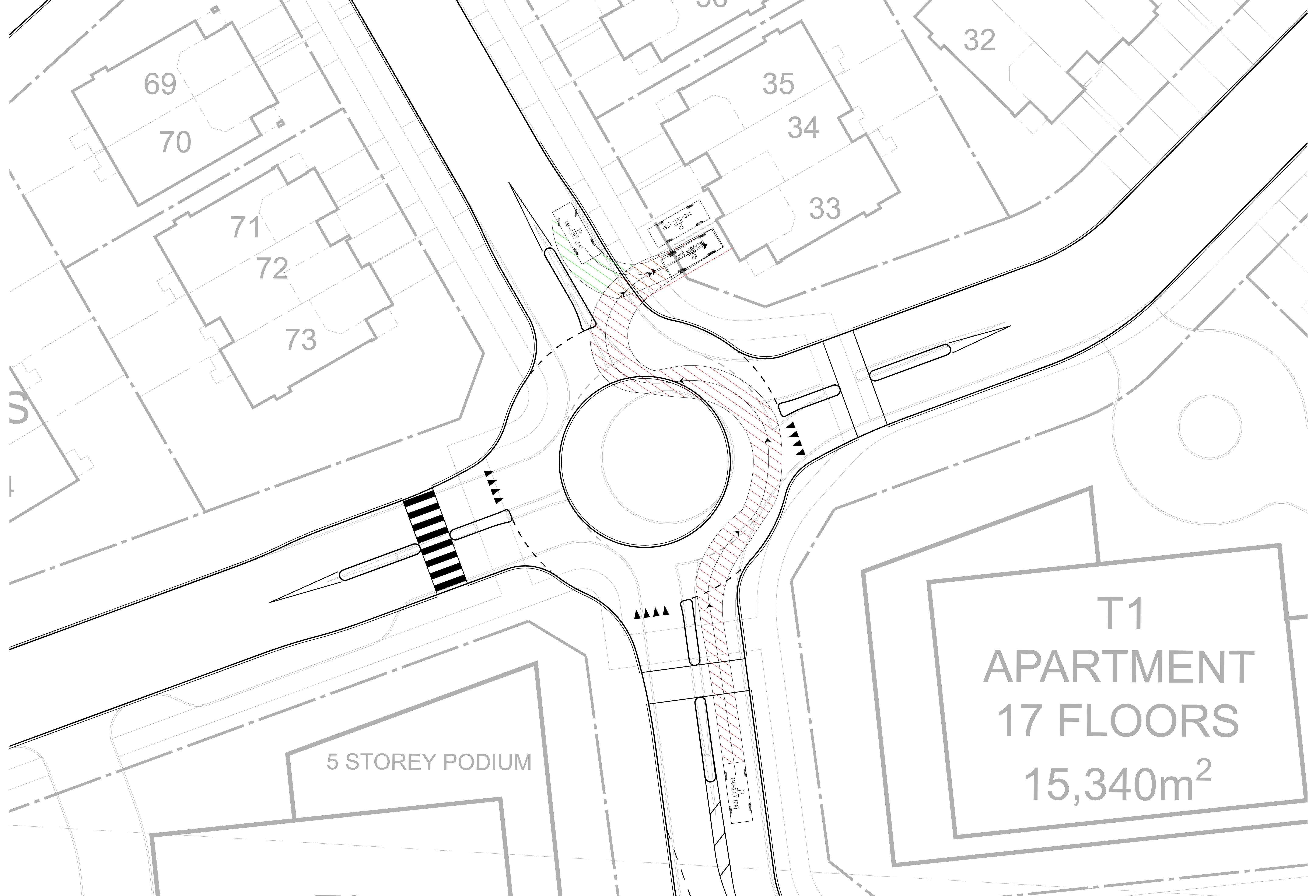
| Calculated Speed Values Using FHWA Roundabout Design Guide (measured) | | | | | | | |
|---|-------|-------|-------|-------|-------|---------|---------|
| | V1 | V2 | V3 | V4 | V5 | (V2-V1) | (V5-V4) |
| West Leg | 28.99 | 27.14 | 28.99 | 19.41 | 27.96 | -1.85 | 8.55 |
| East Leg | 35.12 | 24.52 | 35.12 | 19.41 | 32.43 | -10.60 | 13.02 |
| North Leg | 31.57 | 25.52 | 31.13 | 19.41 | 30.67 | -6.05 | 11.26 |
| South Leg | 31.13 | 25.38 | 30.67 | 19.41 | 27.28 | -5.75 | 7.87 |

HUNT CLUB ROAD - RIVERSIDE DRIVE SITE STUDY

HSU MOVEMENTS

September 18, 2023





69

70

71

72

73

35

34

33

32

5 STOREY PODIUM

T1
APARTMENT
17 FLOORS
15,340m²

Appendix I:

Functional Design Drawings, Sightline Analysis and Costing

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



Contract No. 478418 Dwg. No. 01

Sheet 1 of 1

GENERAL ARRANGEMENT

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. _____

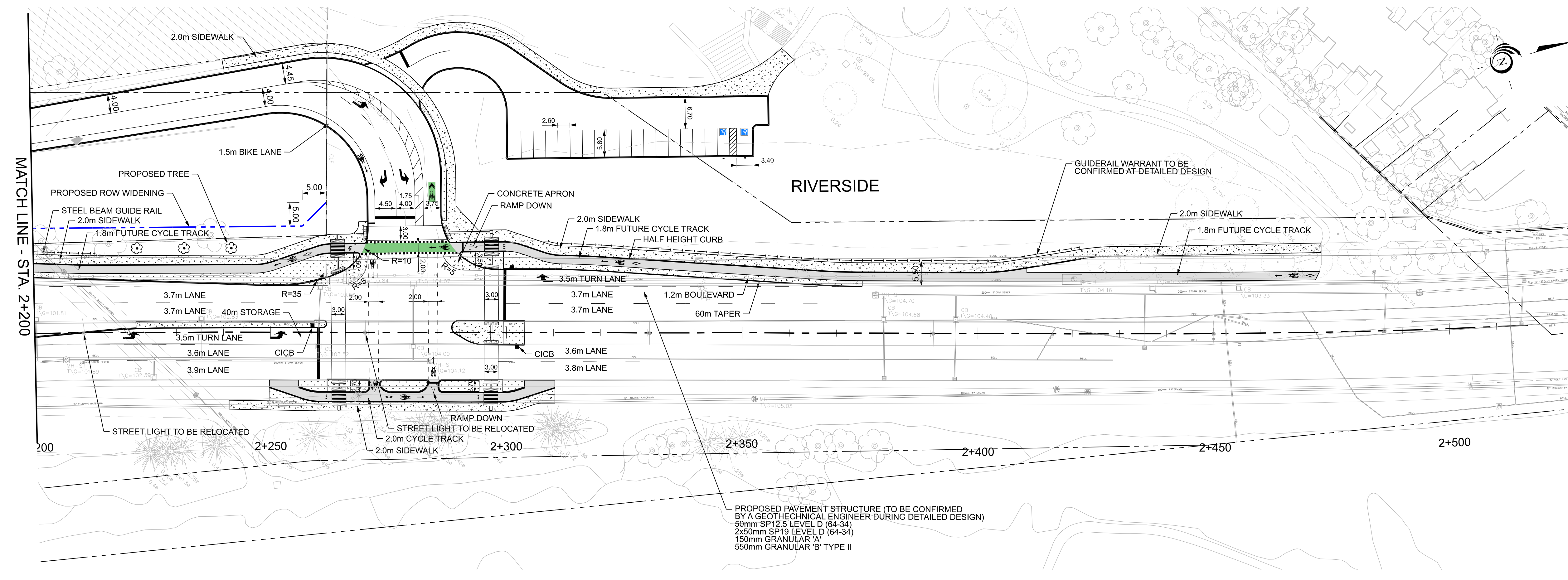
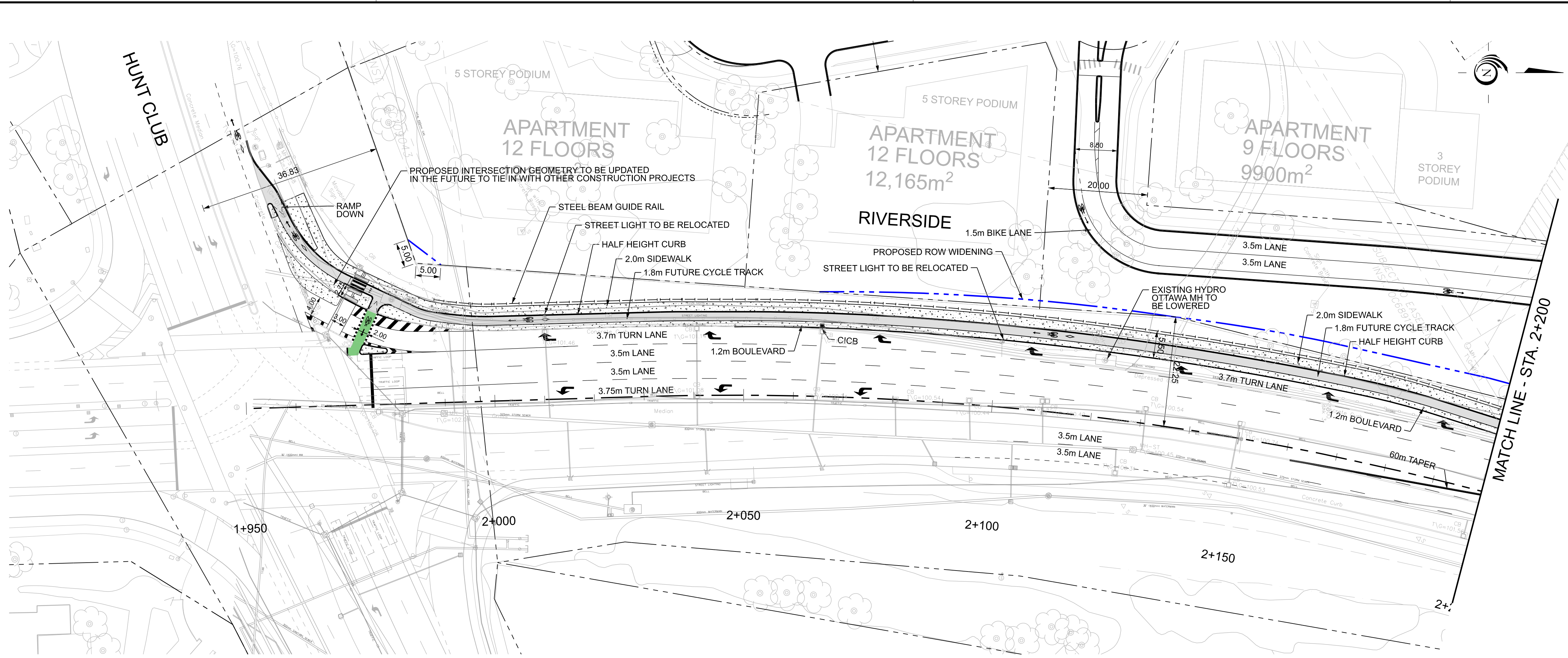
Const. Inspector _____

Scale: HORIZONTAL

0m 5 10 20

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.

| 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.2 | PR | 09/11/22 |
| 04 | ISSUED FOR PRELIMINARY DESIGN REV.3 | PR | 08/12/22 |
| 05 | ISSUED FOR PRELIMINARY DESIGN REV.4 | PR | 19/06/23 |



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

TITLE FRAME: 789mm x 534mm City of Ottawa 2008

Plot Date: 07/20/18 7:08:02 PM

Last Saved: 11/23/2022 9:45:59 AM

Consultant's Information: \\C:\CANS\7501\Drawings\7501-18\1000\DWGS\01 - Conceptual\7501-18-02-TYP.dgn

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



Contract No. **478418** Dwg. No. **02**
Sheet **2** of **2**

TYPICAL SECTION

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 _____

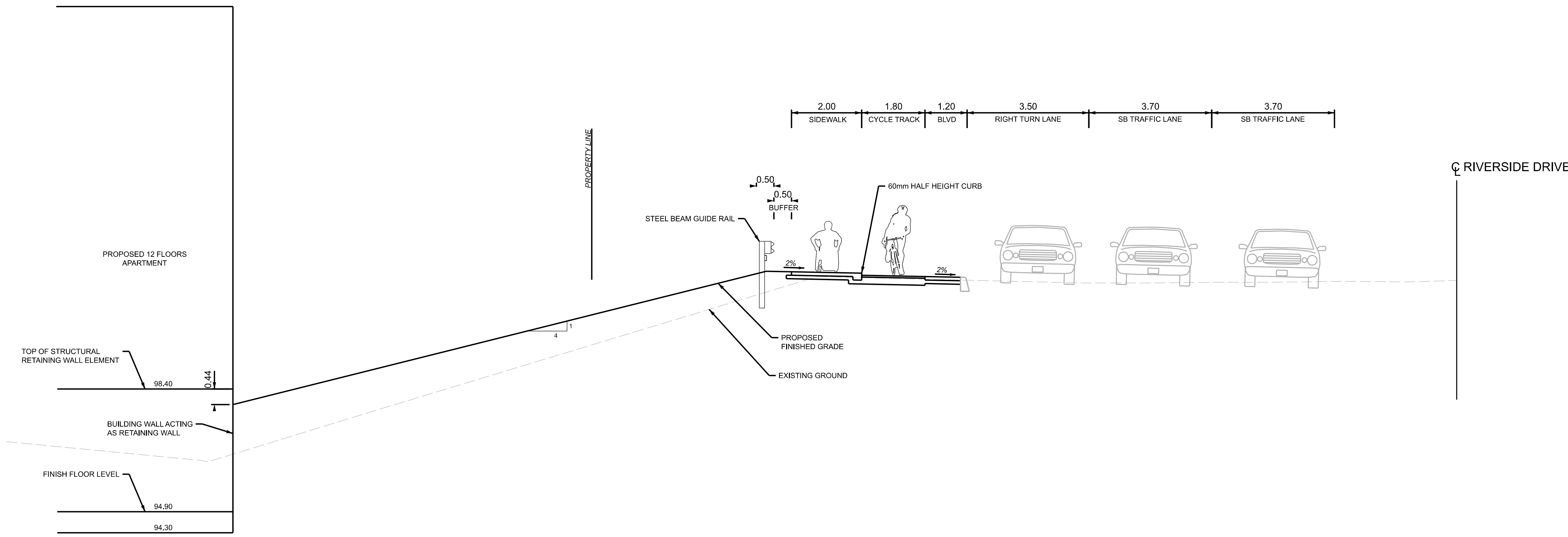
Scale: _____

N.T.S.

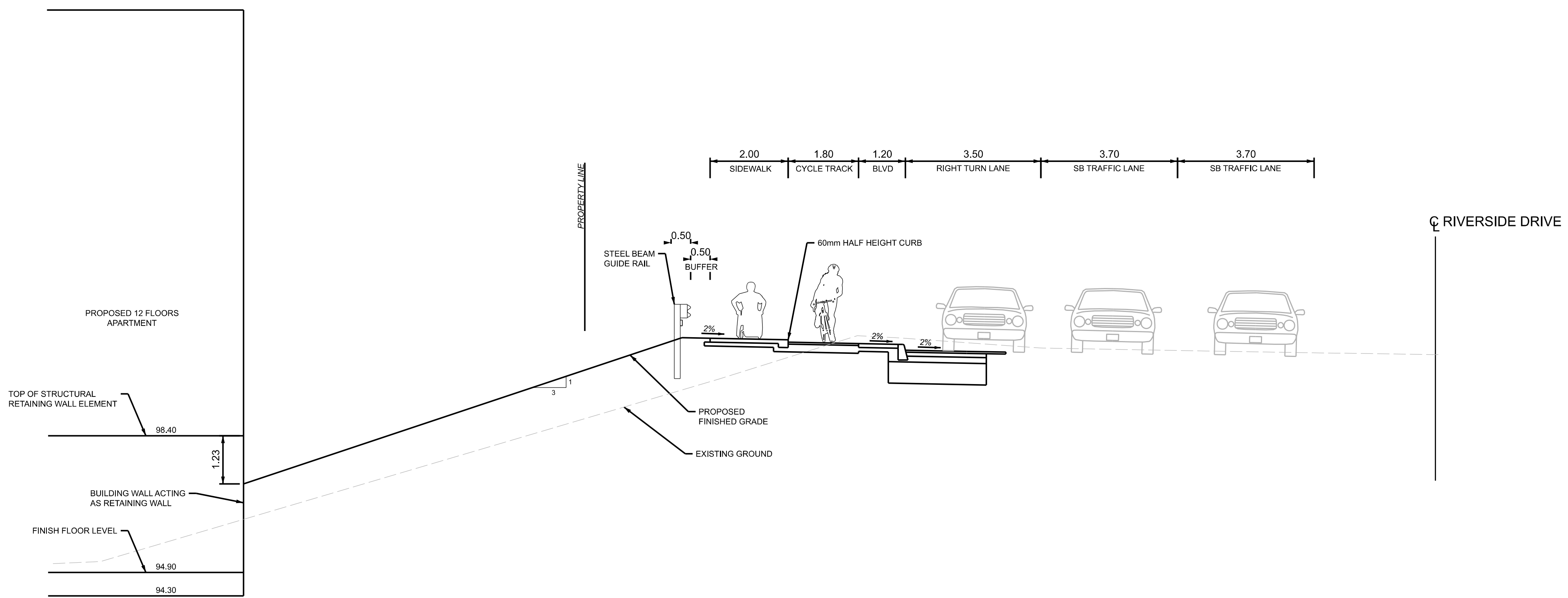
NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

| 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.



**RIVERSIDE DRIVE
2+020 TYPICAL SECTION**



**RIVERSIDE DRIVE
2+090 TYPICAL SECTION**

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 RogerDate: September 13, 2023

| Item No. | Description | Unit | Estimated Quantity | Unit Price | Amount |
|---|---|----------------|--------------------|--------------|------------------------|
| Developer Construction Cost (Does not include contingency) | | | | | \$ 1,945,549.80 |
| 1.0 - General | | | | | |
| 1.1 | Traffic Control Plan | LS | 1.0 | \$ 35,000.00 | \$ 35,000.00 |
| 1.2 | Police Assistance at Intersection | hr | 60.0 | \$ 260.53 | \$ 15,631.80 |
| 1.3 | Construction Site Pedestrian Control Plan | LS | 1.0 | \$ 6,000.00 | \$ 6,000.00 |
| 1.4 | Steel Interlocking Pedestrian Barrier | m | 100.0 | \$ 34.00 | \$ 3,400.00 |
| 1.5 | Erosion and sediment control | LS | 1.0 | \$ 10,000.00 | \$ 10,000.00 |
| Section 1.0 Total | | | | | \$ 70,031.80 |
| 2.0 - Removals | | | | | |
| 2.1 | Removal of Asphalt Sidewalk | m ² | 563.0 | \$ 42.00 | \$ 23,646.00 |
| 2.2 | Saw-Cutting of Asphalt | m | 250.0 | \$ 15.00 | \$ 3,750.00 |
| 2.3 | Saw-Cutting of Concrete | m | 10.0 | \$ 40.00 | \$ 400.00 |
| 2.4 | Remove Asphalt Pavement by Dry Grinding | m ² | 110.0 | \$ 100.00 | \$ 11,000.00 |
| 2.5 | Remove Asphalt Pavement Full Depth | m ² | 816.0 | \$ 50.00 | \$ 40,800.00 |
| 2.6 | Earth Excavation - Grading | m ³ | 1,832.0 | \$ 30.00 | \$ 54,960.00 |
| 2.7 | Disposal of Excess Soils | m ³ | 1,832.0 | \$ 50.00 | \$ 91,600.00 |
| 2.8 | Adjust or Rebuilding Catch Basins, any size, any type including twin | ea | 4.0 | \$ 1,000.00 | \$ 4,000.00 |
| 2.9 | Removal of Concrete Barrier Curb | m | 347.0 | \$ 30.00 | \$ 10,410.00 |
| 2.10 | Remove and Relocate Catch Basin | ea | 3.0 | \$ 10,000.00 | \$ 30,000.00 |
| 2.11 | Removal of Streetlighting | ea | 1.0 | \$ 10,000.00 | \$ 10,000.00 |
| 2.12 | Remove Existing Box Beam Guiderail | m | 415.0 | \$ 42.00 | \$ 17,430.00 |
| Section 2.0 Total | | | | | \$ 297,996.00 |
| 3.0 - Roads | | | | | |
| 3.1 | Earth Borrow | m ³ | 4,000.0 | \$ 39.72 | \$ 158,880.00 |
| 3.2 | Select Subgrade Material | m ³ | 1,485.0 | \$ 36.00 | \$ 53,460.00 |
| 3.3 | Granular 'A' | t | 1,472.0 | \$ 40.00 | \$ 58,880.00 |
| 3.4 | Granular 'B' Type II | t | 2,855.0 | \$ 30.00 | \$ 85,650.00 |
| 3.5 | Concrete Sidewalks, Boulevards and Islands | m ² | 159.0 | \$ 212.00 | \$ 33,708.00 |
| 3.6 | Concrete Pavement for Truck Apron | m ² | 41.0 | \$ 250.00 | \$ 10,250.00 |
| 3.7 | Monolithic Concrete Sidewalks, Boulevards and Islands | m ² | 771.0 | \$ 276.00 | \$ 212,796.00 |
| 3.8 | TWSI | m ² | 23.8 | \$ 1,300.00 | \$ 30,940.00 |
| 3.9 | Concrete Barrier Curb as per SC1.1 | m | 361.0 | \$ 165.00 | \$ 59,565.00 |
| 3.10 | HL3F mix with PGAC 58-34 for Residential Driveways/Private Walks/Commercial Driveways | t | 17.0 | \$ 390.00 | \$ 6,630.00 |
| 3.11 | Performance Graded Superpave 12.5mm Level D (PG 64-34) | t | 301.0 | \$ 350.00 | \$ 105,350.00 |

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: September 13, 2023

| Item No. | Description | Unit | Estimated Quantity | Unit Price | Amount |
|--|---|----------------|--------------------|---------------|----------------------|
| 3.12 | Performance Graded Superpave 19.0mm Level D (PG 64-34) | t | 578.0 | \$ 230.00 | \$ 132,940.00 |
| 3.13 | Tactile Paver Strips | m ² | 6.5 | \$ 650.00 | \$ 4,225.00 |
| Section 3.0 Total | | | | | \$ 953,274.00 |
| 4.0 - Traffic Signals | | | | | |
| 4.1 | Electrical work for new intersection (Above ground and underground including intersection lighting) | LS | 1.0 | \$ 435,000.00 | \$ 435,000.00 |
| Section 4.0 Total | | | | | \$ 435,000.00 |
| 5.0 - Pavement Marking and Signage | | | | | |
| 5.1 | Pavement Markings (lines - symbols and thermoplastic) | LS | 1.0 | \$ 15,000.00 | \$ 15,000.00 |
| 5.2 | New Signs on new posts | ea | 10.0 | \$ 400.00 | \$ 4,000.00 |
| Section 5.0 Total | | | | | \$ 19,000.00 |
| 6.0 - Miscellaneous | | | | | |
| 6.1 | Topsoil - 100mm Thick | m ³ | 380.0 | \$ 90.00 | \$ 34,200.00 |
| 6.2 | Sodding Including Watering | m ² | 735.0 | \$ 24.00 | \$ 17,640.00 |
| 6.3 | Hydraulic Seeding and mulching | m ² | 3,068.0 | \$ 6.00 | \$ 18,408.00 |
| 6.4 | Utilities (Lowering Hydro MH) | LS | 1.0 | \$ 100,000.00 | \$ 100,000.00 |
| Section 6.0 Total | | | | | \$ 170,248.00 |
| City of Ottawa Construction Cost (Does not include contingency) | | | | | \$ 884,688.20 |
| 7.0 - General | | | | | |
| 7.1 | Traffic Control Plan | LS | 1.0 | \$ 20,000.00 | \$ 20,000.00 |
| 7.2 | Police Assistance at Intersection | hr | 40.0 | \$ 260.53 | \$ 10,421.20 |
| 7.3 | Construction Site Pedestrian Control Plan | LS | 1.0 | \$ 6,000.00 | \$ 6,000.00 |
| 7.4 | Steel Interlocking Pedestrian Barrier | m | 30.0 | \$ 34.00 | \$ 1,020.00 |
| 7.5 | Erosion and sediment control | LS | 1.0 | \$ 5,000.00 | \$ 5,000.00 |
| Section 7.0 Total | | | | | \$ 42,441.20 |
| 8.0 - Removals | | | | | |
| 8.1 | Removal of Asphalt Sidewalk | m ² | 143.0 | \$ 42.00 | \$ 6,006.00 |
| 8.2 | Saw-Cutting of Asphalt | m | 40.0 | \$ 15.00 | \$ 600.00 |
| 8.3 | Remove Asphalt Pavement by Dry Grinding | m ² | 121.5 | \$ 100.00 | \$ 12,150.00 |
| 8.4 | Earth Excavation - Grading | m ³ | 598.0 | \$ 30.00 | \$ 17,940.00 |
| 8.5 | Disposal of Excess Soil | m ³ | 598.0 | \$ 50.00 | \$ 29,900.00 |
| 8.6 | Removal of tree | ea | 2.0 | \$ 600.00 | \$ 1,200.00 |
| 8.7 | Removal of Concrete Barrier Curb | m | 200.0 | \$ 30.00 | \$ 6,000.00 |

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 RogerDate: September 13, 2023

| Item No. | Description | Unit | Estimated Quantity | Unit Price | Amount |
|--|---|----------------|--------------------|-------------|----------------------|
| Section 8.0 Total | | | | | \$ 73,796.00 |
| 9.0 - Roads | | | | | |
| 9.1 | Earth Borrow | m ³ | 2,000.0 | \$ 39.72 | \$ 79,440.00 |
| 9.2 | Select Subgrade Material | m ³ | 480.0 | \$ 36.00 | \$ 17,280.00 |
| 9.3 | Granular 'A' | t | 861.0 | \$ 40.00 | \$ 34,440.00 |
| 9.4 | Granular 'B' Type II | t | 598.0 | \$ 30.00 | \$ 17,940.00 |
| 9.5 | Monolithic Concrete Sidewalks, Boulevards and Islands | m ² | 330.0 | \$ 276.00 | \$ 91,080.00 |
| 9.6 | TWSI | m ² | 3.7 | \$ 1,300.00 | \$ 4,810.00 |
| 9.7 | Concrete sidewalk boulevard and Islands | m ² | 503.0 | \$ 212.00 | \$ 106,636.00 |
| 9.8 | Concrete Barrier Curb as per SC1.1 | m | 209.0 | \$ 165.00 | \$ 34,485.00 |
| 9.9 | HL3F mix with PGAC 58-34 for Residential Driveways/Private Walks/Commercial Driveways | t | 129.0 | \$ 390.00 | \$ 50,310.00 |
| 9.10 | Performance Graded Superpave 12.5mm Level D (PG 64-34) | t | 63.0 | \$ 350.00 | \$ 22,050.00 |
| 9.11 | Performance Graded Superpave 19.0mm Level D (PG 64-34) | t | 121.0 | \$ 230.00 | \$ 27,830.00 |
| 9.12 | Single rail steel beam guiderail per OPSD 912.130 | m | 285.0 | \$ 270.00 | \$ 76,950.00 |
| 9.13 | Steel Beam Guide Rail Energy Attenuating Terminal System | ea | 4.0 | \$ 8,500.00 | \$ 34,000.00 |
| Section 9.0 Total | | | | | \$ 597,251.00 |
| 10.0 - Streetlighting | | | | | |
| 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) | LS | 1.0 | \$ 2,000.00 | \$ 2,000.00 |
| Section 11.0 Total | | | | | \$ 2,000.00 |
| 12.0 - Miscellaneous | | | | | |
| 12.1 | Topsoil - 100mm Thick imported | m ³ | 216.0 | \$ 90.00 | \$ 19,440.00 |
| 12.2 | Sodding Including Watering | m ² | 430.0 | \$ 24.00 | \$ 10,320.00 |
| 12.3 | Hydraulic Seeding and mulching | m ² | 1,740.0 | \$ 6.00 | \$ 10,440.00 |

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: September 13, 2023

| Item No. | Description | Unit | Estimated Quantity | Unit Price | Amount |
|-------------------------------------|--|----------------|--------------------|---------------|-----------------------|
| 12.4 | Erosion Control Blanket | m ² | 1,000.0 | \$ 11.00 | \$ 11,000.00 |
| 12.5 | Utilities (Lowering Hydro MH) | LS | 1.0 | \$ 100,000.00 | \$ 100,000.00 |
| Section 12.0 Total | | | | | \$ 151,200.00 |
| Developer Cost Summary | | | | | |
| | Subtotal Developer Construction Costs (Sections 1-6) | | | | \$1,945,549.80 |
| | Engineering and Contract Administration (Section 1-6) | | | 25% | \$486,387.45 |
| | Project Contingency (Section 1-6) | | | 30% | \$583,664.94 |
| | Total Developer Construction Costs (Sections 1-6) | | | | \$3,015,602.19 |
| City of Ottawa Cost Summary | | | | | |
| | Subtotal City Construction Costs (Sections 7-12) | | | | \$884,688.20 |
| | Engineering and Contract Administration (Section 7-12) | | | 25% | \$221,172.05 |
| | Project Contingency (Section 7-12) | | | 30% | \$265,406.46 |
| | Total City Construction Costs (Sections 7-12) | | | | \$1,371,266.71 |
| Total Project Cost (Rounded) | | | | | \$4,386,868.90 |

Notes and Assumptions

1. Costs are in 2023 dollars and exclude HST.
2. Unit rates are based on City of Ottawa historical unit prices for April 2023
3. Does not include City Internal Cost or Misc. Soft Costs.
4. Does not include servicing infrastructure costs
5. Does not include Landscaping elements beyond topsoil and seed
6. Construction contract initiation costs are assumed to be included in the general contingency
7. No property aquisition costs expected
8. Pavement structure to be confirmed by a Geotechnical Engineer during detailed design
9. 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.
10. 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.
11. Estimate does not include the City of Ottawa parking lot NW of the proposed intersection.
12. Quantity for earth borrow is approximate only and needs to be refined at the next stages of design
13. Estimate to be read in conjunction with the cost sharing sketch rev.3
14. City of Ottawa scope of work is assumed to be completed independently from the developer's work
15. Item for Disposal of Excess soils as per the O'Reg 406/19 is approximate only and needs to be refind at the next stage of the design

**ST-MARY'S DEVELOPMENT
COST SHARING SKETCH REV.3
SEPTEMBER 13TH, 2023**

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



GENERAL ARRANGEMENT

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 _____

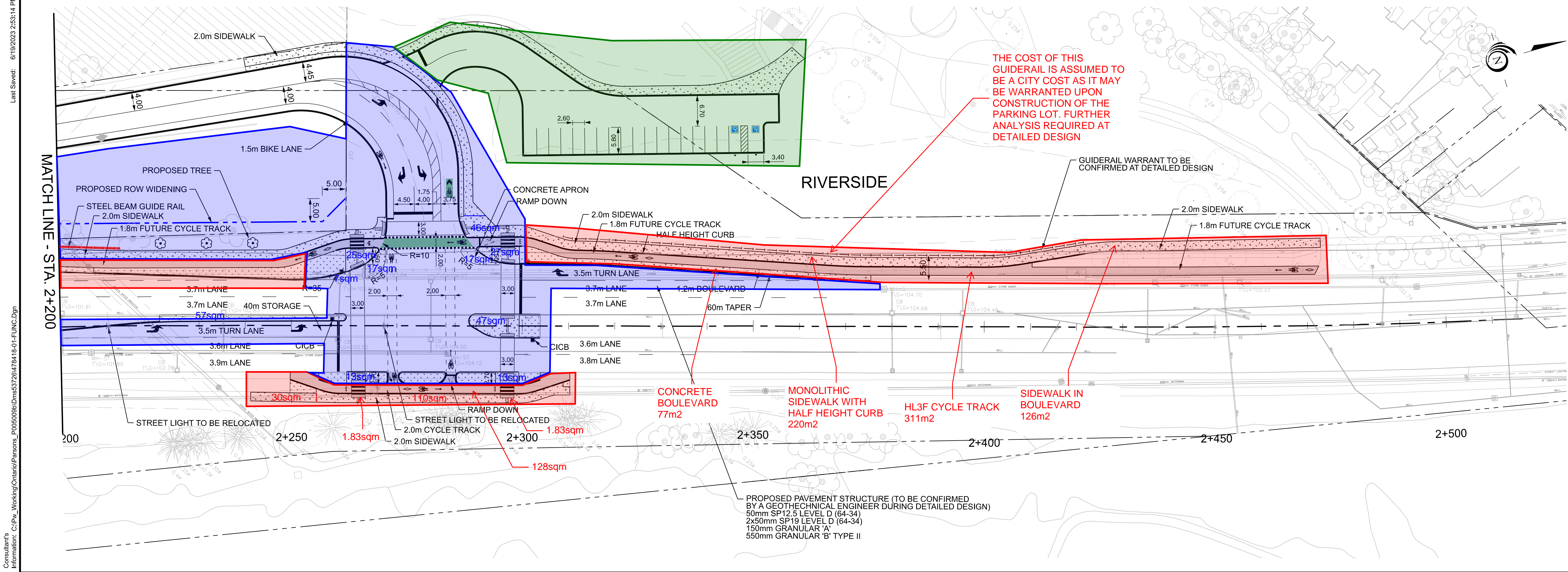
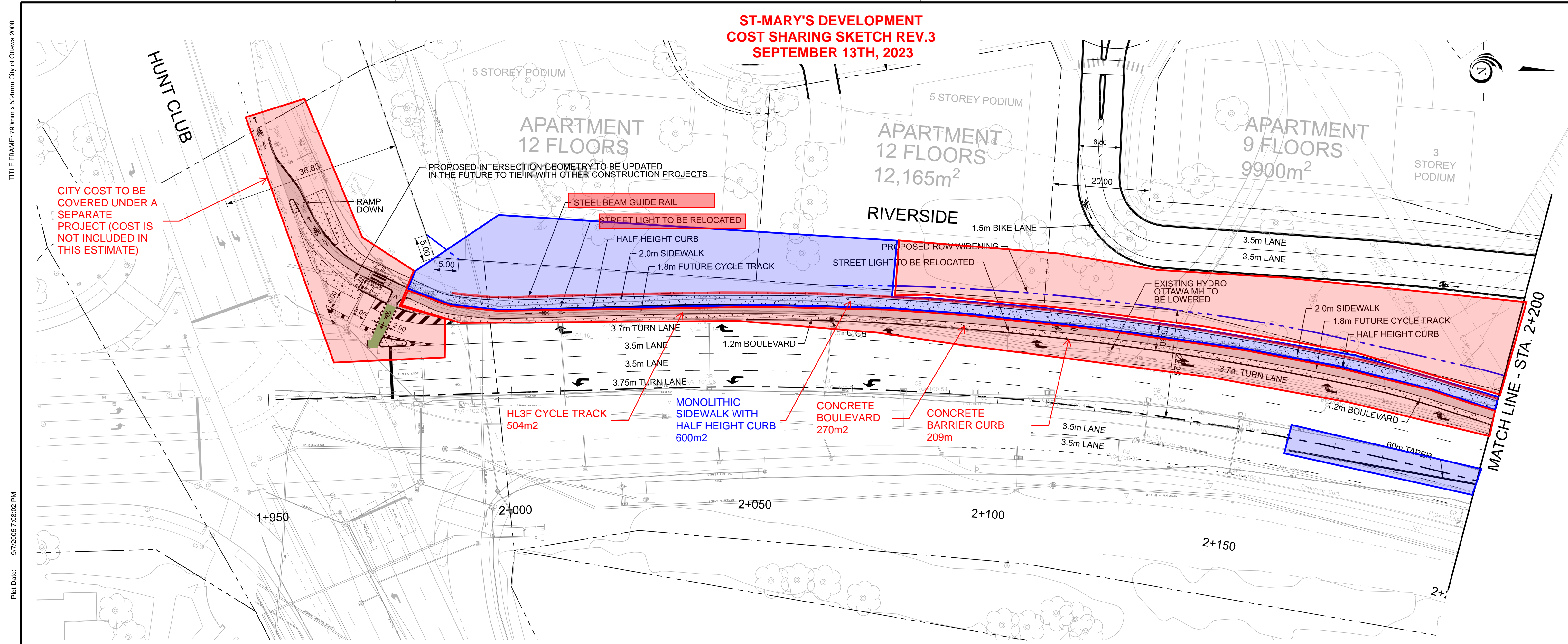
Scale: HORIZONTAL

0m 5 10 20

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.

| 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.2 | PR | 09/11/22 |
| 04 | ISSUED FOR PRELIMINARY DESIGN REV.3 | PR | 08/12/22 |
| 05 | ISSUED FOR PRELIMINARY DESIGN REV.4 | PR | 19/08/23 |

- CITY OF OTTAWA COST
- FUTURE CITY OF OTTAWA COST
- DEVELOPER COST
- SHARED COST



TITLE FRAME: 780mm x 534mm City of Ottawa 2008
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 Last Saved: 07/19/2023 2:55:14 PM
 Consultant's Information: C:\p\Working\Charlie\Parsons_P050509\Drawings\23\23-01-RIVERSIDE-CH-FUNC.Dgn

PARSONS**CONSTRUCTION CLASS 'C' COST ESTIMATE**

Project No. 478418
 Contract No. -

Subject: **Roadway Modifications St-Mary's Development - City Parking Lot**Location: **3930 and 3960 Riverside Drive**Client: **Taggart Realty Management**By: Patrick RogerDate: September 13, 2023

| Item No. | Description | Unit | Estimated Quantity | Unit Price | Amount |
|--|--|----------------|--------------------|-------------|----------------------|
| 1.0 - General | | | | | |
| 1.1 | Traffic Control Plan | LS | 1.0 | \$ 5,000.00 | \$ 5,000.00 |
| 1.2 | Construction Site Pedestrian Control Plan | LS | 1.0 | \$ 2,000.00 | \$ 2,000.00 |
| 1.3 | Steel Interlocking Pedestrian Barrier | m | 50.0 | \$ 34.00 | \$ 1,700.00 |
| 1.4 | Erosion and sediment control | LS | 1.0 | \$ 5,000.00 | \$ 5,000.00 |
| Section 1.0 Total | | | | | \$ 13,700.00 |
| 2.0 - Removals | | | | | |
| 2.1 | Earth Excavation - Grading | m ³ | 890.0 | \$ 38.00 | \$ 33,820.00 |
| Section 2.0 Total | | | | | \$ 33,820.00 |
| 3.0 - Roads | | | | | |
| 3.1 | Select Subgrade Material | m ³ | 600.0 | \$ 36.00 | \$ 21,600.00 |
| 3.2 | Granular 'A' | t | 420.0 | \$ 40.00 | \$ 16,800.00 |
| 3.3 | Granular 'B' Type II | t | 1,260.0 | \$ 30.00 | \$ 37,800.00 |
| 3.4 | Concrete Sidewalks, Boulevards and Islands | m ² | 215.0 | \$ 212.00 | \$ 45,580.00 |
| 3.5 | Concrete Barrier Curb as per SC1.1 | m | 200.0 | \$ 165.00 | \$ 33,000.00 |
| 3.6 | Performance Graded Superpave 12.5mm Level D (PG 64-34) | t | 165.0 | \$ 350.00 | \$ 57,750.00 |
| 3.7 | Performance Graded Superpave 19.0mm Level D (PG 64-34) | t | 195.0 | \$ 230.00 | \$ 44,850.00 |
| Section 3.0 Total | | | | | \$ 257,380.00 |
| 5.0 - Pavement Marking and Signage | | | | | |
| 5.1 | Pavement Markings (lines - symbols and thermoplastic) | LS | 1.0 | \$ 2,500.00 | \$ 2,500.00 |
| 5.2 | New Signs on new posts | ea | 4.0 | \$ 400.00 | \$ 1,600.00 |
| Section 5.0 Total | | | | | \$ 4,100.00 |
| 6.0 - Miscellaneous | | | | | |
| 6.1 | Topsoil - 100mm Thick | m ³ | 40.0 | \$ 75.00 | \$ 3,000.00 |
| 6.2 | Sodding Including Watering | m ² | 400.0 | \$ 24.00 | \$ 9,600.00 |
| Section 6.0 Total | | | | | \$ 12,600.00 |
| Subtotal Construction Costs (Sections 1-6) | | | | | \$321,600.00 |
| Project Contingency | | | 30% | | \$96,480.00 |
| Total Project Cost (Rounded) | | | | | \$419,000.00 |

PARSONS

CONSTRUCTION CLASS 'C' COST ESTIMATE

Project No. 478418
 Contract No. -

Subject: Roadway Modifications St-Mary's Development - City Parking Lot

Location: 3930 and 3960 Riverside Drive

Client: Taggart Realty Management

By: Patrick Roger Date: September 13, 2023

| Item No. | Description | Unit | Estimated Quantity | Unit Price | Amount |
|---|-------------|------|--------------------|------------|--------|
| Notes and Assumptions | | | | | |
| 1. Costs are in 2023 dollars and exclude HST. | | | | | |
| 2. Unit rates are based on City of Ottawa historical unit prices for April 2023 | | | | | |
| 3. It is assumed that a storm sewer system for the parking lot is already built | | | | | |
| 4. The volume of earth excavation and select subgrade material is approximate only and should be refined at the detailed design stage | | | | | |
| 5. Does not include Engineering or Contract Administration Costs | | | | | |
| 6. Does not include City Internal Cost or Misc. Soft Costs. | | | | | |
| 7. Does not include Landscaping elements beyond topsoil and sod | | | | | |
| 8. Construction contract initiation costs are assumed to be included in the general contingency | | | | | |
| 9. No property aquisition costs expected | | | | | |
| 10. Pavement structure to be confirmed by a Geotechnical Engineer during detailed design | | | | | |
| 11. Management of Excess soils as per the O'Reg 406/19 is assumed to be additional | | | | | |

Appendix J:

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: <i>Residential developments</i> | | Check if completed & add descriptions, explanations or plan/drawing references |
|---|---|--|
| 1. WALKING & CYCLING: ROUTES | | |
| 1.1 Building location & access points | | |
| BASIC | 1.1.1 Locate building close to the street, and do not locate parking areas between the street and building entrances | <input checked="" type="checkbox"/> Parking proposed underground |
| BASIC | 1.1.2 Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations | <input checked="" type="checkbox"/> 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 | <input checked="" type="checkbox"/> 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 (<i>see Official Plan policy 4.3.3</i>) | <input checked="" type="checkbox"/> 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 (<i>see Official Plan policy 4.3.12</i>) | <input checked="" type="checkbox"/> Internal sidewalks for Phase 2 will be confirmed during SPA. |

| TDM-supportive design & infrastructure measures: <i>Residential developments</i> | | Check if completed & add descriptions, explanations or plan/drawing references |
|---|--|--|
| REQUIRED | 1.2.3 Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks (<i>see Official Plan policy 4.3.10</i>) | <input checked="" type="checkbox"/> 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 (<i>see Official Plan policy 4.3.10</i>) | <input checked="" type="checkbox"/> 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 (<i>see Official Plan policy 4.3.11</i>) | <input checked="" type="checkbox"/> 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 | <input checked="" type="checkbox"/> 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 | <input checked="" type="checkbox"/> 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 | <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> 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) | <input type="checkbox"/> |

| TDM-supportive design & infrastructure measures: <i>Residential developments</i> | | Check if completed & add descriptions, explanations or plan/drawing references |
|---|--|---|
| 2. WALKING & CYCLING: END-OF-TRIP FACILITIES | | |
| 2.1 Bicycle parking | | |
| REQUIRED | 2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see <i>Official Plan policy 4.3.6</i>) | <input checked="" type="checkbox"/> 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 <i>Zoning By-law Section 111</i>) | <input checked="" type="checkbox"/> 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 <i>Zoning By-law Section 111</i>) | <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> |
| 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 <i>Zoning By-law Section 111</i>) | <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> |
| 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) | <input type="checkbox"/> |
| 3. TRANSIT | | |
| 3.1 Customer amenities | | |
| BASIC | 3.1.1 Provide shelters, lighting and benches at any on-site transit stops | <input type="checkbox"/> |
| 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 | <input type="checkbox"/> |
| BETTER | 3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building | <input type="checkbox"/> |

| TDM-supportive design & infrastructure measures: <i>Residential developments</i> | | 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 | <input type="checkbox"/> |
| 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 (<i>see Zoning By-law Section 94</i>) | <input type="checkbox"/> |
| 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 | <input type="checkbox"/> |
| 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 | <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> |
| BASIC | 6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (<i>see Zoning By-law Section 104</i>) | <input type="checkbox"/> |
| BETTER | 6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (<i>see Zoning By-law Section 111</i>) | <input type="checkbox"/> |
| 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) | <input type="checkbox"/> |

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: <i>Residential developments</i> | | 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 | <input type="checkbox"/> |
| 1.2 Travel surveys | | |
| BETTER | 1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress | <input type="checkbox"/> |
| 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 (<i>multi-family, condominium</i>) | <input checked="" type="checkbox"/> Potential TDM measure |
| 2.2 Bicycle skills training | | |
| BETTER | 2.2.1 Offer on-site cycling courses for residents, or subsidize off-site courses | <input type="checkbox"/> |

| TDM measures: <i>Residential developments</i> | | Check if proposed & add descriptions |
|---|--|---|
| 3. TRANSIT | | |
| 3.1 Transit information | | |
| BASIC | 3.1.1 Display relevant transit schedules and route maps at entrances (<i>multi-family, condominium</i>) | <input checked="" type="checkbox"/> Potential TDM measure |
| BETTER | 3.1.2 Provide real-time arrival information display at entrances (<i>multi-family, condominium</i>) | <input type="checkbox"/> |
| 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 | <input type="checkbox"/> |
| BETTER | 3.2.2 Offer at least one year of free monthly transit passes on residence purchase/move-in | <input type="checkbox"/> |
| 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 (<i>subdivision</i>) | <input type="checkbox"/> |
| 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) | <input type="checkbox"/> |
| 4. CARSHARING & BIKESHARING | | |
| 4.1 Bikeshare stations & memberships | | |
| BETTER | 4.1.1 Contract with provider to install on-site bikeshare station (<i>multi-family</i>) | <input type="checkbox"/> |
| BETTER | 4.1.2 Provide residents with bikeshare memberships, either free or subsidized (<i>multi-family</i>) | <input type="checkbox"/> |
| 4.2 Carshare vehicles & memberships | | |
| BETTER | 4.2.1 Contract with provider to install on-site carshare vehicles and promote their use by residents | <input type="checkbox"/> |
| BETTER | 4.2.2 Provide residents with carshare memberships, either free or subsidized | <input type="checkbox"/> |
| 5. PARKING | | |
| 5.1 Priced parking | | |
| BASIC ★ | 5.1.1 Unbundle parking cost from purchase price (<i>condominium</i>) | <input type="checkbox"/> |
| BASIC ★ | 5.1.2 Unbundle parking cost from monthly rent (<i>multi-family</i>) | <input checked="" type="checkbox"/> proposed |

| TDM measures: <i>Residential developments</i> | | 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 | <input checked="" type="checkbox"/> Potential TDM measure |
| 6.2 Personalized trip planning | | |
| BETTER ★ | 6.2.1 Offer personalized trip planning to new residents | <input type="checkbox"/> |

Appendix J:

MMLOS Analysis: Intersections

Multi-Modal Level of Service - Segments Form

| | |
|------------|------------------------|
| Consultant | Parsons |
| Scenario | 3960 Riverside Drive |
| Comments | St. Mary's Development |
| | |

| | |
|---------|-----------|
| Project | 478378 |
| Date | 30-Nov-22 |
| | |
| | |

| SEGMENTS | Street A | Hunt Club | Hunt Club | Riverside | Riverside | Riverside | Section | Section | Section | Section |
|---|---|-----------------|-----------------|-----------------|-----------------|----------------------|----------|-----------------|----------|----------|
| | | N Side | Both Sides | W Side | E Side | Future | 6 | 7 | 8 | 9 |
| Pedestrian | Sidewalk Width | 1.8 m | 1.8 m | 1.5 m | 1.8 m | ≥ 2 m | | ≥ 2 m | | |
| | Boulevard Width | < 0.5 m | < 0.5 m | < 0.5 m | > 2 m | > 2 m | | > 2 m | | |
| | Avg Daily Curb Lane Traffic Volume | > 3000 | > 3000 | > 3000 | > 3000 | > 3000 | | > 3000 | | |
| | Operating Speed | > 60 km/h | > 60 km/h | > 60 km/h | > 60 km/h | > 60 km/h | | > 50 to 60 km/h | | |
| | On-Street Parking | no | no | no | no | no | | 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 | - | - | - | - | - | - | - | - | |
| | 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 | 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 | > 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.

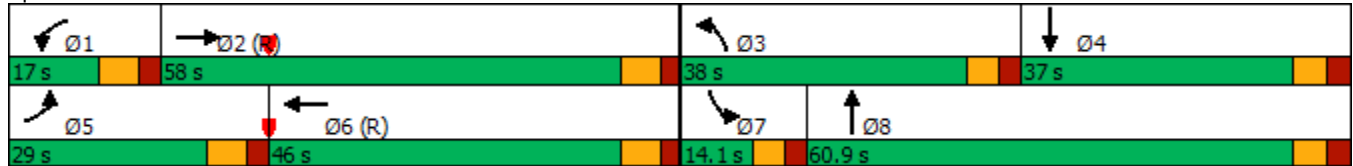
Queue shown is maximum after two cycles.

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 | 0.0 | |
| Total Lost Time (s) | 6.5 | 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 | 28.8 | 67.4 | 67.4 | | 79.7 | 78.6 | |
| Actuated g/C Ratio | 0.24 | 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 | 1.05 | | 0.50 | 0.51 | |
| Control Delay | 37.0 | 19.3 | | 66.7 | 7.0 | 21.5 | 63.6 | 63.6 | | 42.3 | 12.2 | |
| Queue Delay | 0.0 | 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 | 63.6 | | 42.3 | 12.2 | |
| LOS | D | B | | E | A | C | E | E | | D | B | |
| Approach Delay | | 29.7 | | 41.7 | | | 63.4 | 63.4 | | | 14.3 | |
| Approach LOS | | C | | D | | | E | E | | | B | |
| Queue Length 50th (m) | 5.7 | 1.4 | | 56.2 | 0.0 | 0.8 | ~285.2 | ~285.2 | | 6.8 | 70.8 | |
| Queue Length 95th (m) | 14.1 | 7.9 | | #95.1 | 16.9 | m2.0 | #341.6 | #341.6 | | 20.6 | 87.8 | |
| Internal Link Dist (m) | | 134.6 | | 144.2 | | | 580.6 | 580.6 | | | 317.7 | |
| Turn Bay Length (m) | 30.0 | | | | | | 55.0 | 55.0 | | 175.0 | | |
| Base Capacity (vph) | 191 | 418 | | 324 | 524 | 197 | 1901 | 1901 | | 255 | 2279 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.16 | 0.05 | | 0.79 | 0.35 | 0.04 | 1.05 | 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:NBT 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

| | |
|--|--|
|  Ø2 (R) 85 s |  Ø4 35 s |
|  Ø5 (R) 85 s | |



| 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

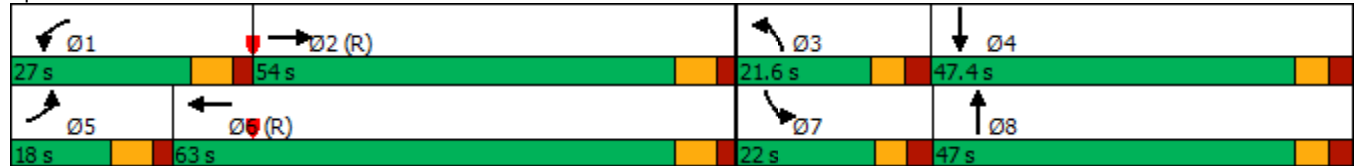
Analysis Period (min) 15

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



St. Mary's Synchro PM.syn
1: Riverside & Hunt Club

Existing PM
11/30/2022



| 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

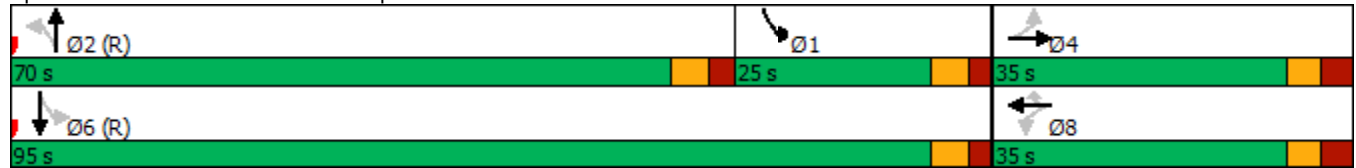
Intersection Capacity Utilization 90.6%

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:NBT 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

| | |
|--|--|
|  Ø2 (R) 95 s |  Ø4 35 s |
|  Ø5 (R) 95 s | |



| 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.

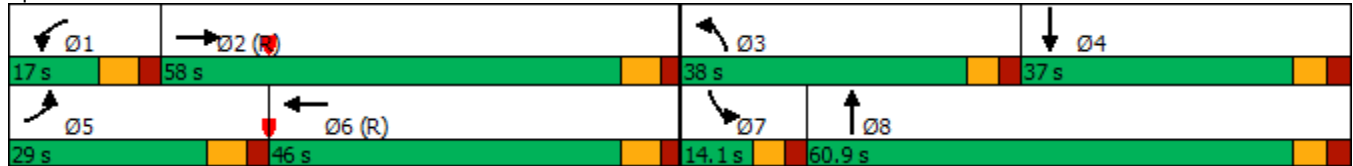
Queue shown is maximum after two cycles.

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

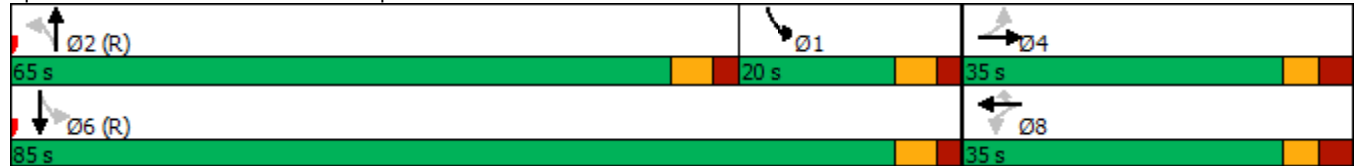
Analysis Period (min) 15

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:NBT 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

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



| 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

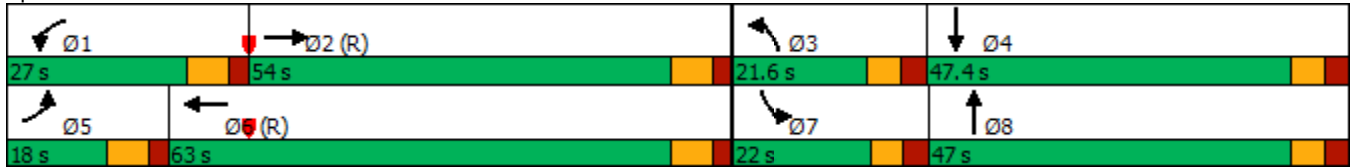
Analysis Period (min) 15

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



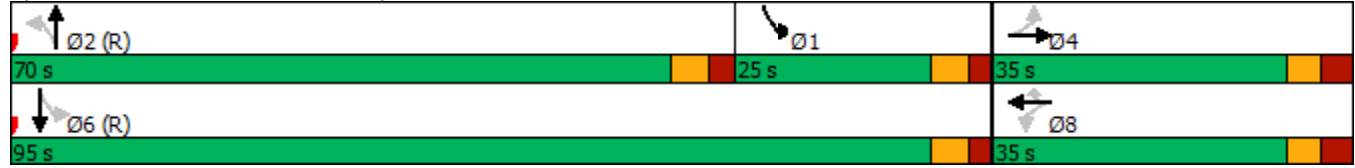


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-----|-------|-------|-------|-------|-------|-----|-------|-------|-----|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 12 | 13 | 10 | 147 | 23 | 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:NBT 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

| | |
|---|---|
|  Ø2 (R) |  Ø4 |
| 95 s | 35 s |
|  Ø5 (R) | |
| 95 s | |



| 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.

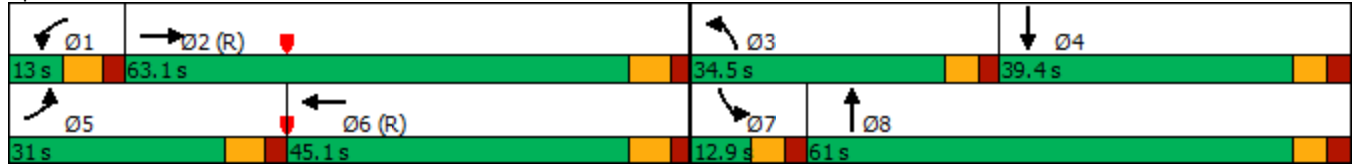
Queue shown is maximum after two cycles.

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

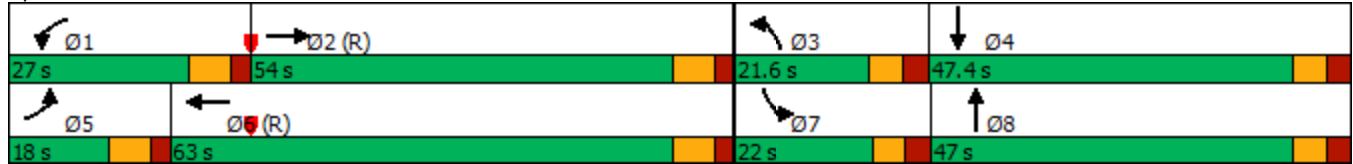
Analysis Period (min) 15

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.

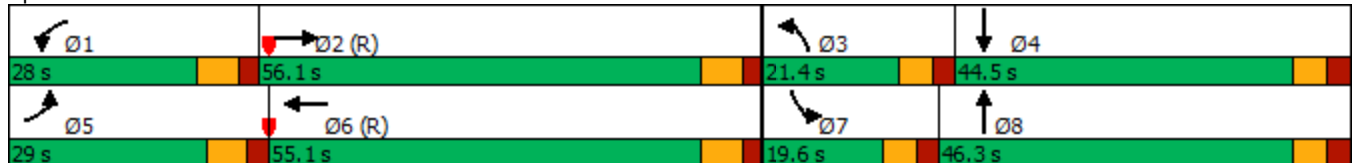
Queue shown is maximum after two cycles.

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.

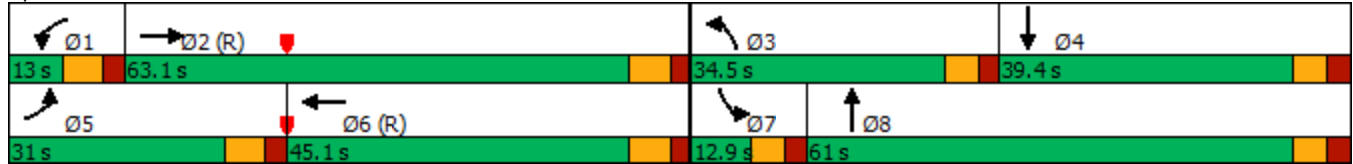
Queue shown is maximum after two cycles.

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



3: Riverside & Site



| 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

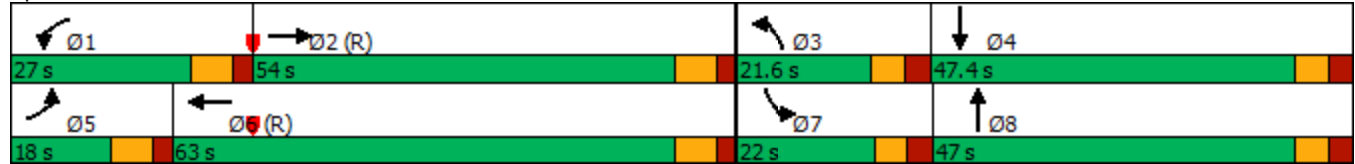
Analysis Period (min) 15

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

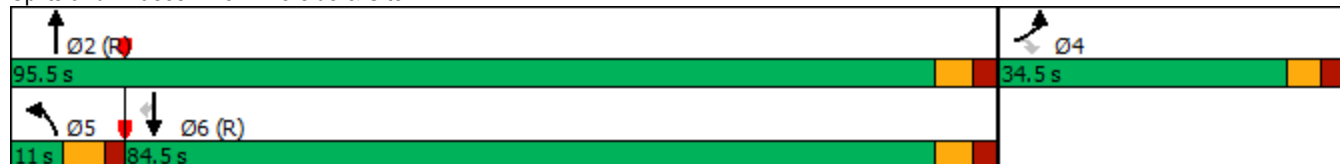
Analysis Period (min) 15

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