3750 North Bowesville Road

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report

Prepared for:

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PN: 2020-103

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1 Screening

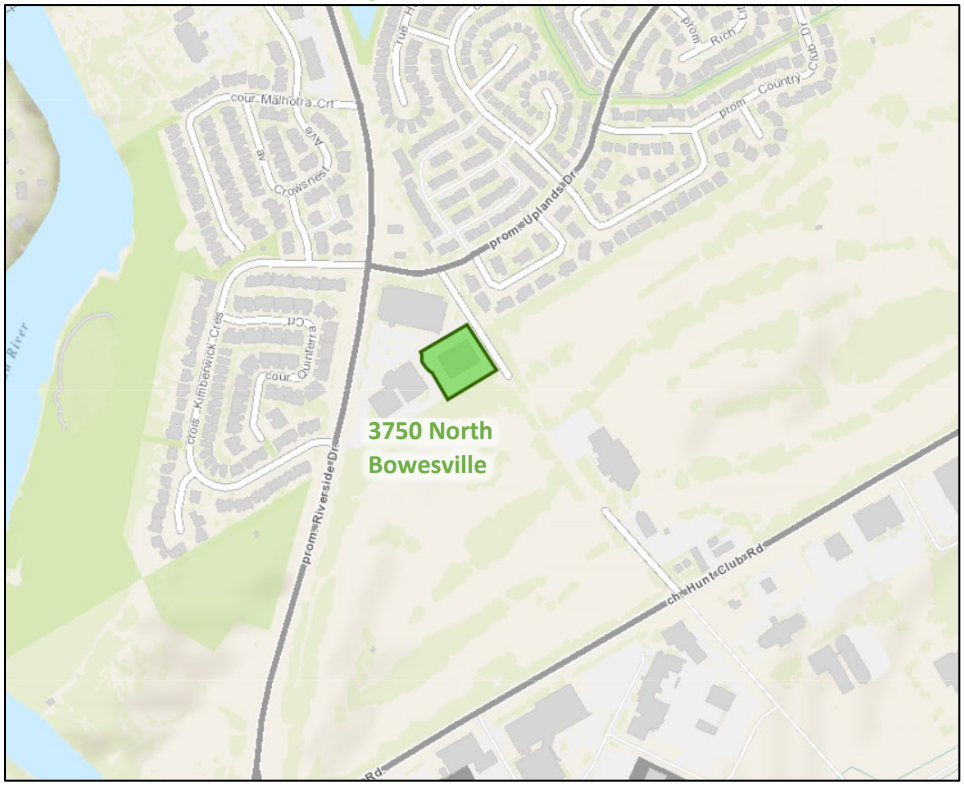
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for the TIA Study PM. As shown in the Screening Form, a TIA is required including the Design Review component and the Network Impact Component. This study has been prepared to support a zoning by-law amendment.

2 Existing and Planned Conditions

2.1 Proposed Development

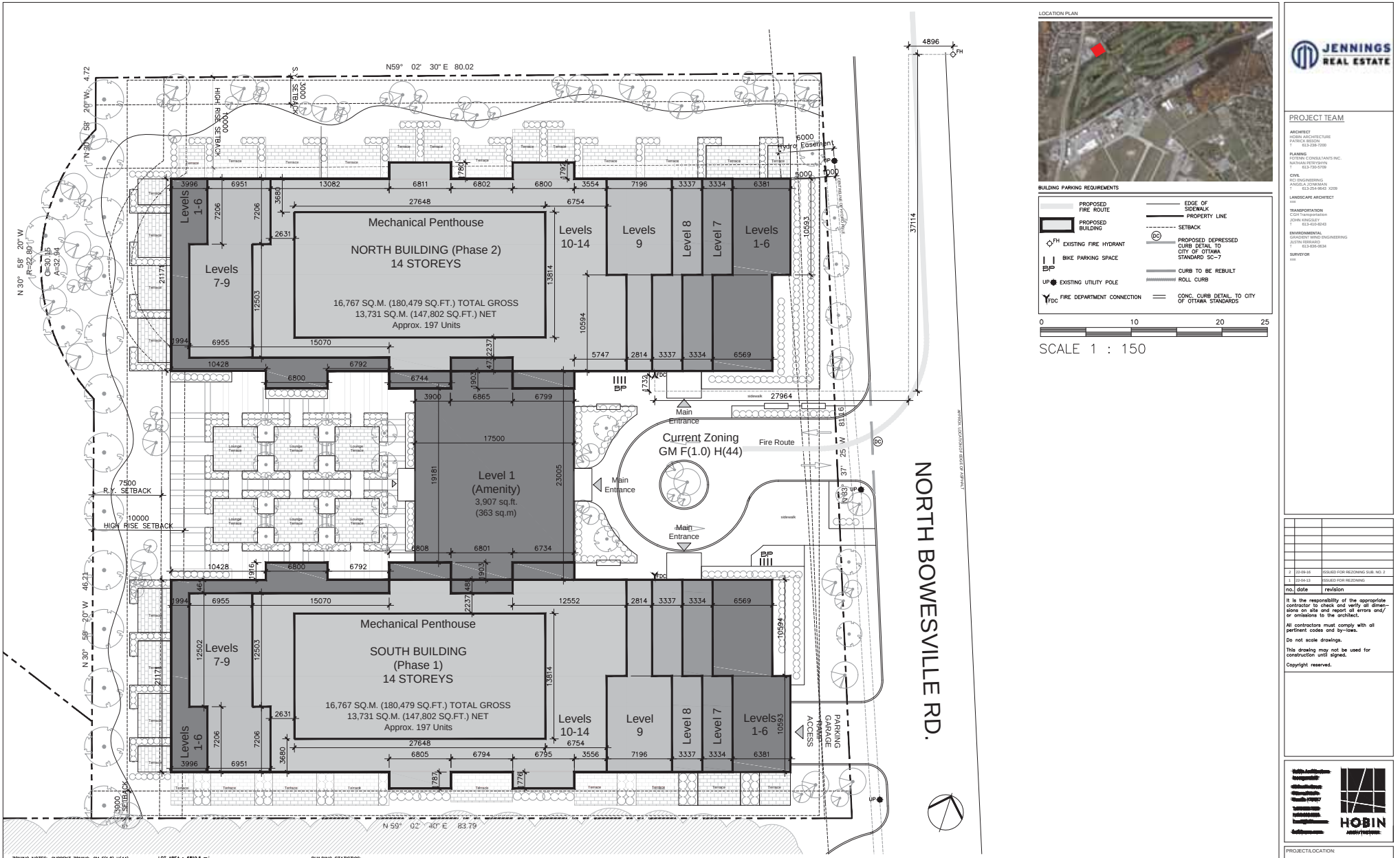
The existing site, located at 3750 North Bowesville Road, is zoned as General Mixed Use Zone (GM F(1.0) H(44)) and currently is occupied by the Tudor Hall banquet and events venue. The proposed redevelopment consists of two 14-storey residential buildings with 394 units. There are a total of 287 residential vehicle parking spaces, 40 visitor parking spaces, and 197 bicycle parking spaces. The anticipated full build-out and occupancy horizon is 2026 with construction occurring in two phases. The concept plan remains an existing full-movements access for parking garage access and proposes the relocation of an existing full-movements access for fire route and visitor access on North Bowesville Road. The site is located within the Hunt Club Secondary Plan area. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: December 8, 2021

Figure 2: Concept Plan



LOCATION PLAN

BUILDING PARKING REQUIREMENTS

PROPOSED FIRE ROUTE
PROPOSED BUILDING
EXISTING FIRE HYDRANT
BIKE PARKING SPACE
EXISTING UTILITY POLE
FIRE DEPARTMENT CONNECTION
EDGE OF SIDEWALK
PROPERTY LINE
SETBACK
PROPOSED DEPRESSED CURB DETAIL TO CITY OF OTTAWA STANDARD SC-7
CURB TO BE REBUILT
ROLL CURB
CONC. CURB DETAIL TO CITY OF OTTAWA STANDARDS

0 10 20 25

SCALE 1 : 150

ZONING NOTES: CURRENT ZONING: GM F(1.0) H(44) LOT AREA : 6819.5 m²

DEVELOPMENT STATS PHASE 1 + PHASE 2	REQUIRED	PROPOSED
LOT WIDTH		81.16m IRREGULAR
LOT DEPTH		83.7m IRREGULAR
FRONT YARD SETBACK BOWESVILLE	3m	VARIES
REAR YARD SETBACK	7.5m	VARIES
SIDE YARD SETBACK	3m	VARIES
INTERIOR SIDE YARD SETBACK	3m	VARIES

TOTAL DEVELOPMENT FSI = 33,534 SQ.M.(TOTAL DEVELOPMENT GFA)/6819.5 SQ.M.(TOTAL SITE AREA) = 4.92

PHASE 1 (SOUTH BUILDING) FSI = 16,767 SQ.M.(PHASE 1 GFA)/6819.5 SQ.M.(TOTAL SITE AREA) = 2.46

PHASE 2 (NORTH BUILDING) FSI = 16,767 SQ.M.(PHASE 2 GFA)/6819.5 SQ.M.(TOTAL SITE AREA) = 2.46

BUILDING STATISTICS:

SOUTH BUILDING PHASE 1	PROPOSED		
TOTAL UNIT COUNT			197
STUDIOS	20	10%	
1 BEDROOM	99	50%	
1 BEDROOM + DEN		%	
2 BEDROOM (1 INBOARD BED)		%	
2 BEDROOM	78	40%	
2 BEDROOM + DEN		%	
NUMBER OF STOREYS	14 STOREYS		
MAXIMUM HEIGHT	44m		
AREA – TOTAL GFA	+/– 13,512 SQ.M.		
REQUIRED AMENITY SPACE REQUIREMENT: 197 UNITS X 6 SQ.M. = 1,182 SQ.M. TOTAL AMENITY REQUIRED. REQUIRED AMENITY SPACE TO BE COMMON – 591 SQ.M. PROVIDED COMMON AMENITY SPACE – 591 SQ.M.			

NORTH BUILDING PHASE 2	PROPOSED		
TOTAL UNIT COUNT			197
STUDIOS	20	10%	
1 BEDROOM	99	50%	
1 BEDROOM + DEN		%	
2 BEDROOM (1 INBOARD BED)		%	
2 BEDROOM	78	40%	
2 BEDROOM + DEN		%	
NUMBER OF STOREYS	14 STOREYS		
MAXIMUM HEIGHT	44m		
AREA – TOTAL GFA	+/– 13,237 SQ.M.		
REQUIRED AMENITY SPACE REQUIREMENT: 197 UNITS X 6 SQ.M. = 1,182 SQ.M. TOTAL AMENITY REQUIRED. REQUIRED AMENITY SPACE TO BE COMMON – 591 SQ.M. PROVIDED COMMON AMENITY SPACE – 591 SQ.M.			

TOTAL DEVELOPMENT – REQUIRED AMENITY SPACE: 394 UNITS X 6 SQ.M. = 2,364 SQ.M.
REQUIRED AMENITY SPACE TO BE COMMON – 1,182 SQ.M
REQUIRED PRIVATE AMENITY SPACE – 1,182 SQ.M.

TOTAL DEVELOPMENT – PROVIDED AMENITY SPACE: 2,364 SQ.M.
PROVIDED AMENITY SPACE TO BE COMMON – 1,182 SQ.M
PROVIDED PRIVATE AMENITY SPACE – 1,182 SQ.M.

1. BUILDING PARKING REQUIRED: PARKING RATIO OF 1.2/UNIT (473 RESIDENTIAL PARKING REQUIRED FOR 394 UNITS)	
LAND USE	PROVIDED VEHICLE PARKING
RENTAL	287 RESIDENTIAL PARKING SPACES PROVIDED FOR 394 UNITS (0.7/UNIT) * LOCATED IN UNDERGROUND PARKING GARAGE
2. REQUIRED VISITOR PARKING: VISITOR PARKING RATIO OF 0.2/UNIT (79 VISITOR PARKING FOR 394 UNITS)	
LAND USE	PROVIDED VISITOR PARKING
CONDO	40 VISITOR PARKING SPACES PROVIDED FOR 394 UNITS (0.1/UNIT) * LOCATED IN PARKING GARAGE AND AT GRADE
TOTAL PARKING PROVIDED	327 TOTAL PARKING PARKING SPACES (INTERIOR)

3. BUILDING BICYCLE PARKING REQUIRED: 0.5 BICYCLE STALLS PER UNIT (197 STALLS REQUIRED FOR 394 UNITS).
PROVIDED BICYCLE PARKING
197 BICYCLE PARKING SPACES PROVIDED FOR 394 UNITS (0.5/UNIT)
* LOCATED IN UNDERGROUND PARKING GARAGE AND AT GRADE

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no.	date	revision
2	22-09-16	ISSUED FOR REZONING SUB. NO. 2
1	22-04-13	ISSUED FOR REZONING

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

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HOBIN ARCHITECTURE

PROJECT/LOCATION:
3750 NORTH BOWESVILLE
OTTAWA ON.

DRAWING TITLE:
SITE PLAN

DRAWN BY: PB | DATE: 22-09-16 | SCALE: 1:150

PROJECT: 2131

DRAWING NO.: A1.00

REVISION NO.:

2.2 Existing Conditions

2.2.1 Area Road Network

Riverside Drive: Riverside Drive is a City of Ottawa arterial road with a divided four-lane urban cross-section. Sidewalks are provided on both sides of the road, with it ending on the west side of the roadway at Uplands Riverside Park, and transitions to an asphalt pathway north of Malhotra Court. Paved boulevards are generally provided on both sides of the roadway. The posted speed limit is 60 km/h, and the City-protected right of way is 44.5 metres.

Uplands Drive: Uplands Drive is a City of Ottawa collector road with a two-lane urban cross-section. Asphalt pathways are provided on both sides of the road. On-street parking is permitted on the north side of the road. The posted speed limit is 50 km/h, and the existing right of way is 26.5 metres.

North Bowesville Road: North Bowesville Road is a City of Ottawa local road with a two-lane rural cross-section with gravel shoulders on both sides of the road. On-street parking is permitted on both sides of the road, the unposted speed limit is assumed to be 50 km/h, and the existing right of way varies between 19.0 and 20.0 metres.

Kimberwick Crescent: Kimberwick Crescent is a City of Ottawa local road with a two-lane urban cross-section. On-street parking is permitted on both sides of the road, the unposted speed limit is assumed to be 50 km/h, and the existing right of way is 20.0 metres.

2.2.2 Existing Intersections

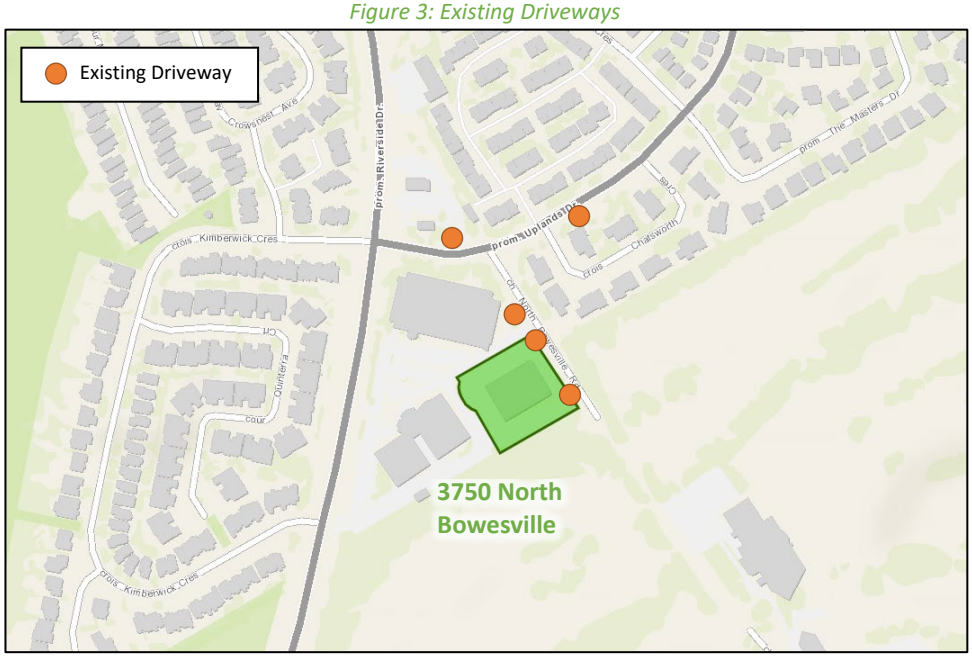
The existing signalized and key study area intersections within 400 metres of the site have been summarized below:

Riverside Drive at Uplands Drive / Kimberwick Crescent	The intersection of Riverside Drive at Uplands Drive/ Kimberwick Crescent is a signalized intersection. The northbound and southbound approaches each consist of an auxiliary left-turn lane, a through lane, and a shared through/right-turn lane. The eastbound approach consists of an auxiliary left-turn lane and a share through/right-turn lane, and westbound approach consists of a shared left-turn/through and right-turn lane. No turn restrictions were noted.
North Bowesville Road at Uplands Drive	The intersection of North Bowesville Road at Uplands Drive is a stop-controlled intersection on the minor approach of North Bowesville Road. All approaches, including the private southbound approach, consist of shared all-movement lanes. No turn restrictions were noted.

2.2.3 Existing Driveways

Within 200 metres of the proposed site access, two driveways to a banquet hall on the subject property and one driveway to an office building and its parking structure are present on the west side of North Bowesville Road, and one driveway to a townhouse and one to a gas station is present on Uplands Drive. Figure 3 illustrates the existing driveways.

Figure 3: Existing Driveways



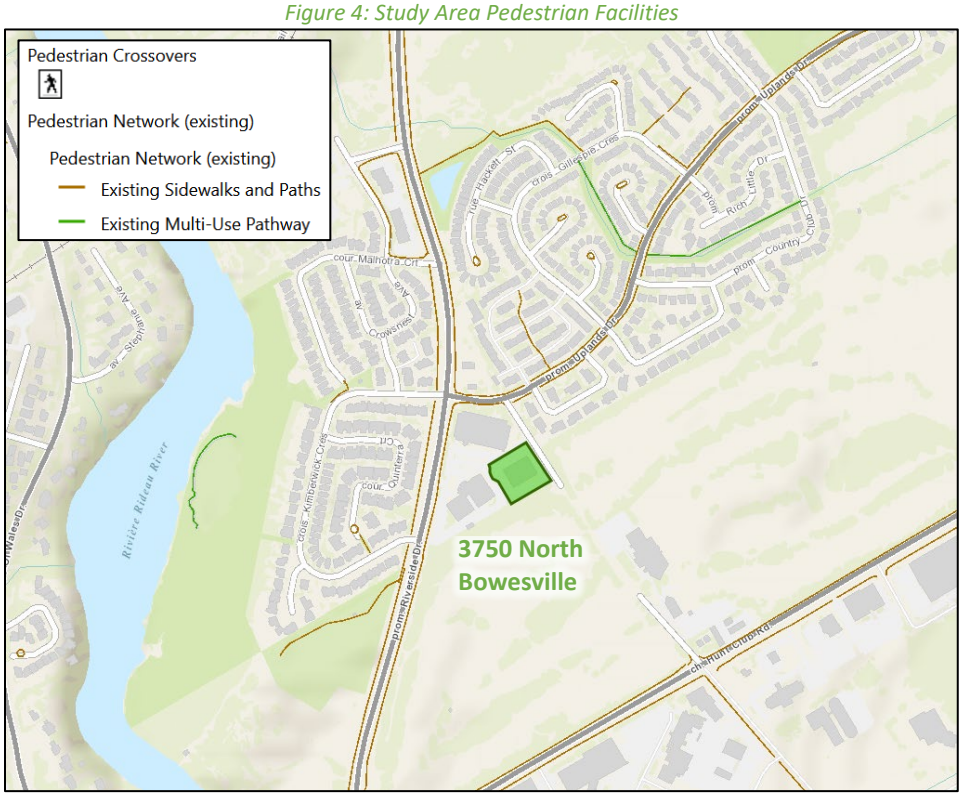
Source: http://maps.ottawa.ca/geoOttawa/ Accessed: December 8, 2021

2.2.4 Cycling and Pedestrian Facilities

Figure 4 illustrates the pedestrian facilities in the study area and Figure 5 illustrates the cycling facilities.

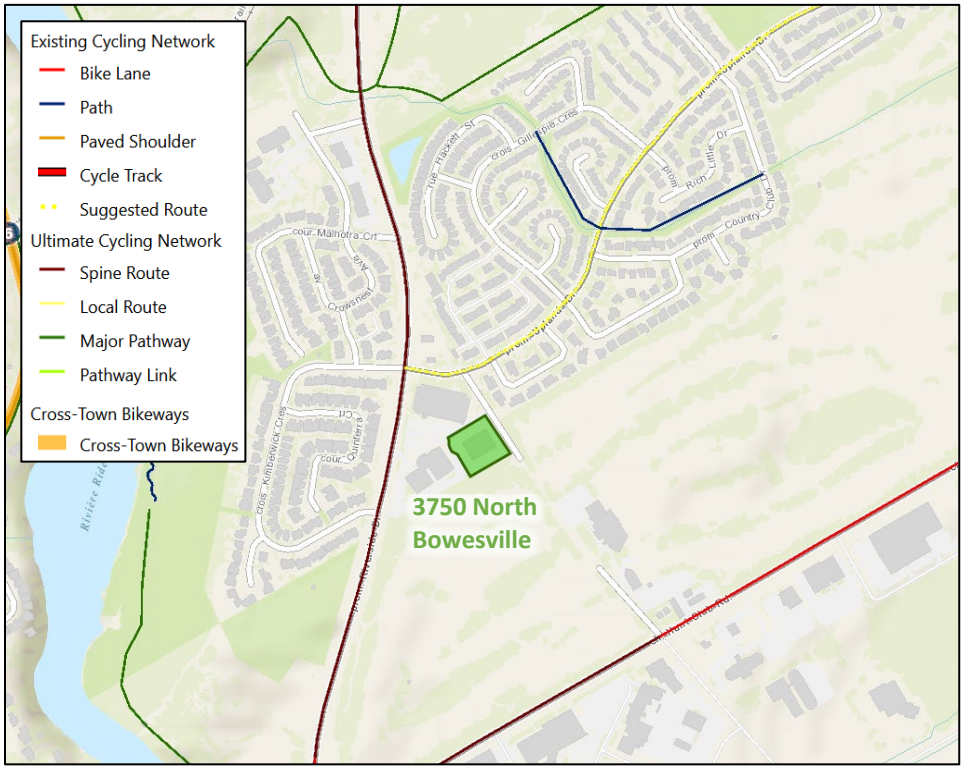
Sidewalks or asphalt pathways are provided along both sides of Uplands Drive and Riverside Drive. Riverside Drive is a spine route, and Uplands Drive is local route.

Figure 4: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: December 8, 2021

Figure 5: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: December 8, 2021

Pedestrian and cyclist volumes included in study area intersection counts, presented in Section 2.2.7, have been compiled and are illustrated in Figure 6 and Figure 7, respectively.

Figure 6: Existing Pedestrian Volumes

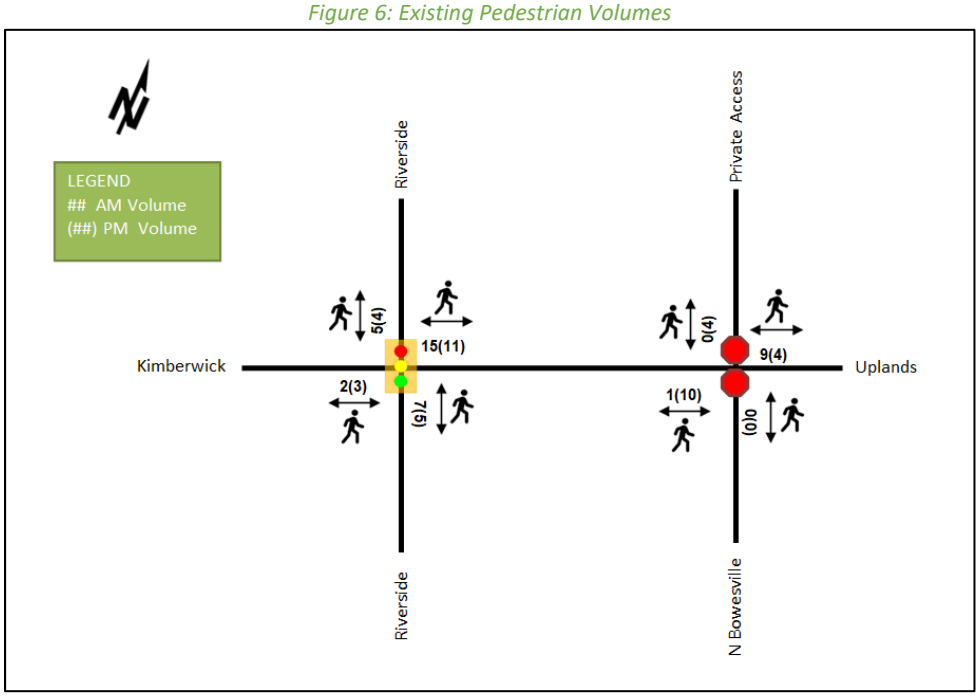
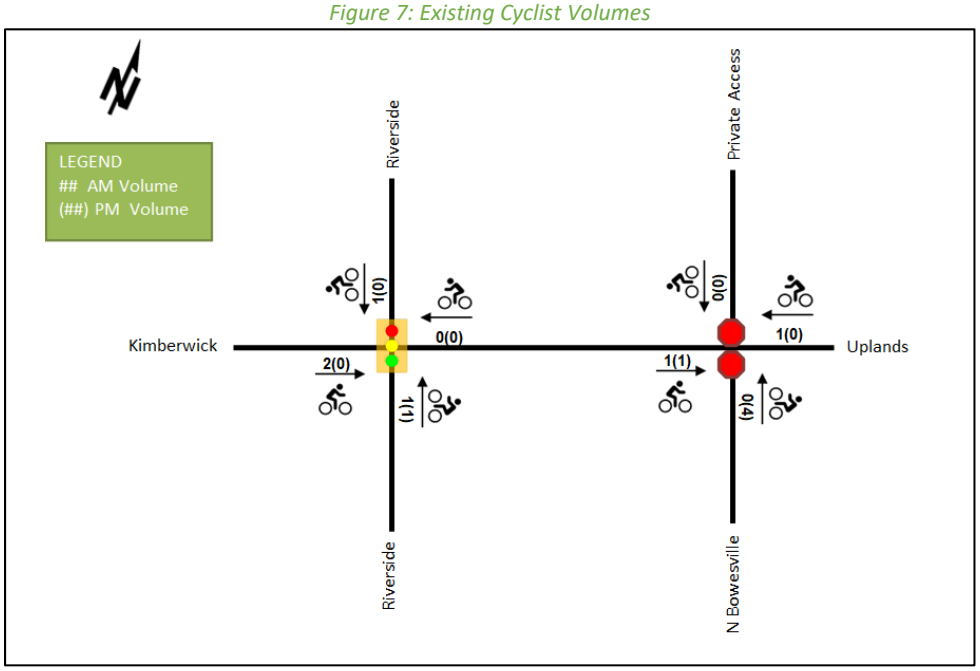


Figure 7: Existing Cyclist Volumes



2.2.5 Existing Transit

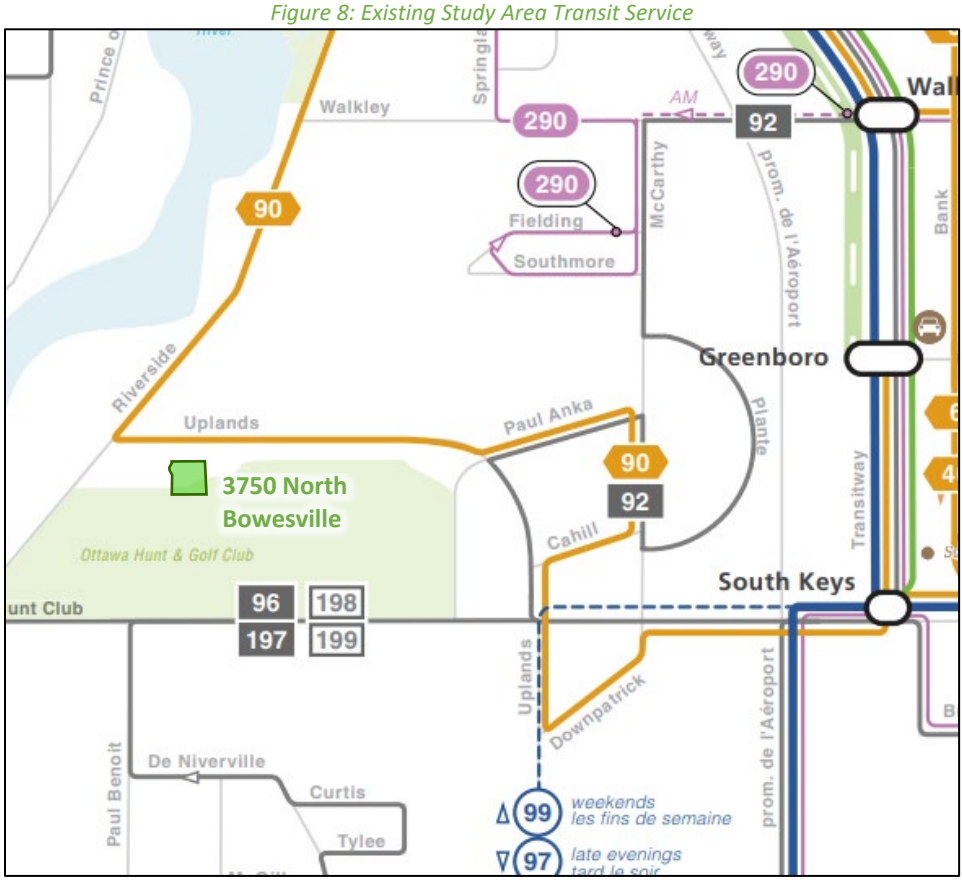
Figure 8 illustrates the transit system map in the study area and Figure 9 illustrates nearby transit stops. All transit information is from August 31, 2022 and is included for general information purposes and context to the surrounding area.

Within the study area, the route #90 travels along Riverside Drive and Uplands Drive. Primary stops are located on Uplands Road between North Bowesville Road and Riverside Drive. The frequency of this route within proximity of the proposed site based on August 31, 2022 service levels are:

- Route # 90 – 15-minute service all day, 30-minute service after 7:00 PM

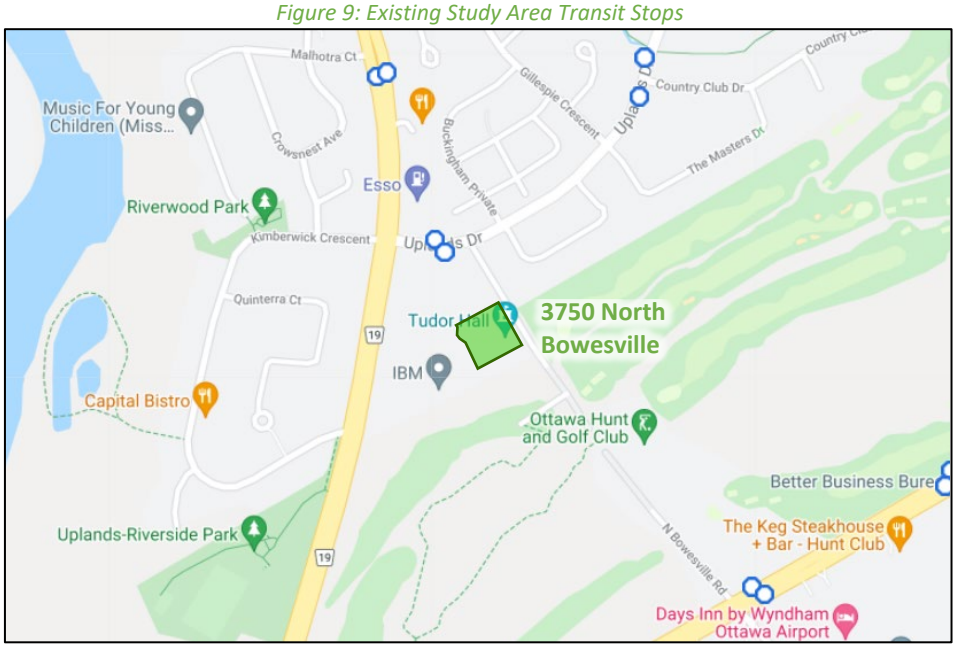
Additionally, cyclists and pedestrians are permitted to use the path through the Ottawa Hunt and Golf Club from North Bowesville Road to Hunt Club Road, where the additional transit routes #96, #197, #198, #199 are within 500 metres of the site.

Figure 8: Existing Study Area Transit Service



Source: http://www.octranspo.com/ Accessed: August 31, 2022

Figure 9: Existing Study Area Transit Stops



Source: http://www.octranspo.com/ Accessed: December 8, 2021

2.2.6 Existing Area Traffic Management Measures

Speed humps on Kimberwick Crescent are the primary traffic management measures within the study area.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing Study Area intersection. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date
Riverside Drive at Uplands Drive/ Kimberwick Crescent	Wednesday, January 22, 2020
North Bowesville Road at Uplands Drive	Tuesday, November 26, 2019

Figure 10 illustrates the existing traffic counts, balanced along Uplands Drive, and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and HCM 2010 average delay for unsignalized intersections. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.

Figure 10: Existing Traffic Counts

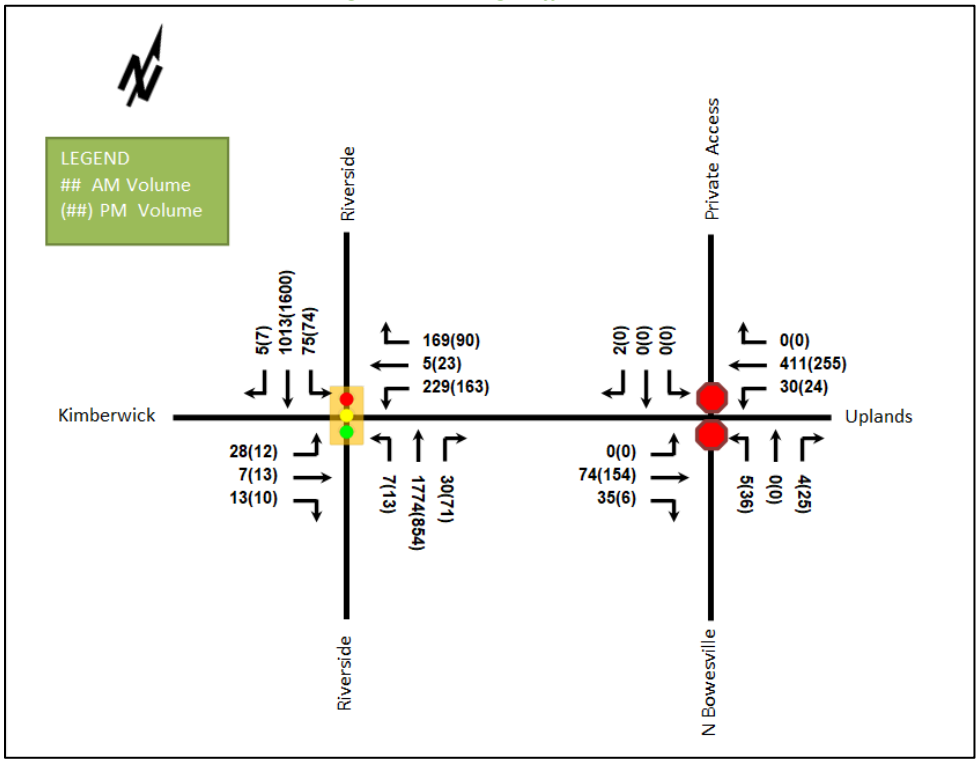


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Riverside Drive at Uplands Drive/ Kimberwick Crescent *Signalized*	EBL	A	0.20	40.7	14.8	A	0.09	42.8	8.5
	EBT/R	A	0.06	20.9	8.2	A	0.08	27.9	10.4
	WBL/T	E	0.92	**82.7**	**#106.4**	D	0.85	**80.2**	**#84.6**
	WBR	A	0.40	7.9	18.0	A	0.28	9.8	14.4
	NBL	A	0.03	14.6	3.6	A	0.14	17.3	5.8
	NBT/R	**F**	**1.06**	**66.6**	**#341.8**	A	0.52	16.3	102.1
	SBL	A	0.50	25.1	20.8	A	0.25	8.2	11.7
	SBT/R	A	0.51	11.3	82.5	C	0.76	15.0	182.1
	Overall	**F**	**1.02**	**46.5**	**-**	**D**	**0.82**	**19.5**	**-**
North Bowesville Road at Uplands Drive *Unsignalized*	EB	A	-	0.0	-	A	-	0.0	-
	WB	A	0.02	7.5	0.8	A	0.02	7.7	0.8
	NB	B	0.02	12.0	0.8	B	0.12	12.4	3.0
	SB	B	0.00	11.1	0.0	A	-	0.0	-
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**1.9**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 0.90
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

At the intersection of Riverside Drive at Uplands Drive/Kimberwick Crescent, the northbound shared though/right turn movement during AM peak hour is over theoretical capacity and may subject to extended queues and the overall intersection is over theoretical capacity. The westbound shared left turn/through movement may subject to high delays and extended queues during both peak hours. Operations and volumes at this intersection may be influenced by conditions at the intersection of Riverside Drive at Hunt Club Road, particularly for the southbound movements beyond which queues may extend from the downstream intersection during the PM peak hour.

As per City request, a SimTraffic review was completed to examine queuing on the westbound shared left turn/through movement at Riverside Drive at Uplands Drive/Kimberwick Crescent during the AM peak hour for concerns of blocking at the upstream intersection of North Bowesville Road at Uplands Drive.

Based on the SimTraffic analysis, the 95th percentile queue length is forecasted to be 33.9 metres during the AM peak hour at the existing condition, which is shorter than the approximately 90-metre distance from this approach to the upstream intersection. Therefore, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at the existing condition. SimTraffic reports are also provided in Appendix C.

2.2.8 Collision Analysis

Collision data have been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study are road network. Table 3 summarizes the collision types and conditions in the study area, Figure 11 illustrates the intersections and segments analyzed, and Table 4 summarizes the total collisions for each of these locations. Collision data are included in Appendix D.

Table 3: Study Area Collision Summary, 2015-2019

		Number	%
Total Collisions		**35**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	4	11%
	Property Damage Only	31	89%
Initial Impact Type	**Angle**	3	9%
	Rear end	16	46%
	Sideswipe	2	6%
	Turning Movement	10	29%
	SMV Other	3	9%
	Other	1	3%
Road Surface Condition	**Dry**	22	63%
	Wet	7	20%
	Loose Snow	2	6%
	Slush	2	6%
	Packed Snow	2	6%
Pedestrian Involved		1	3%
Cyclists Involved		0	0%

Figure 11: Study Area Collision Records – Representation of 2015-2019

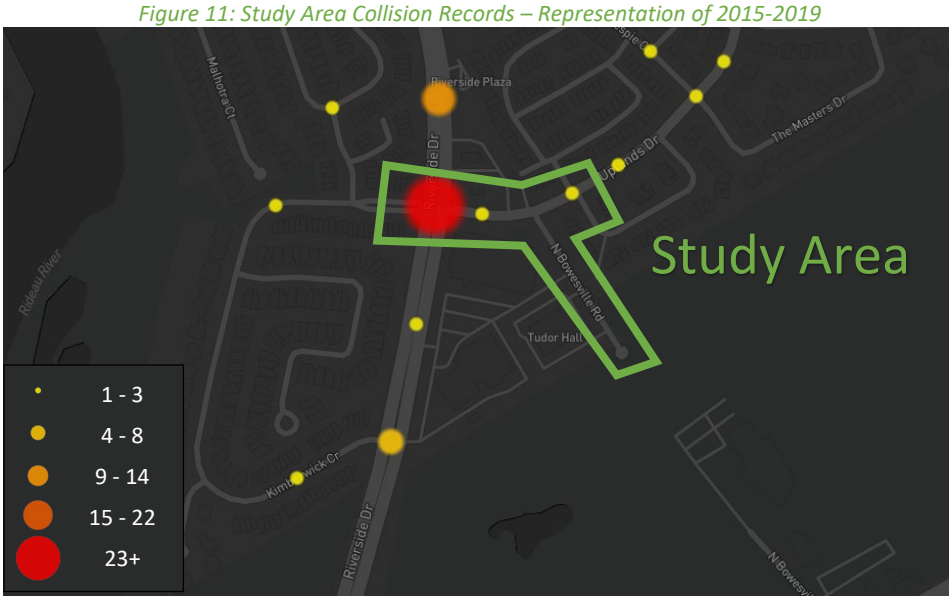


Table 4: Summary of Collision Locations, 2015-2019

	Number	%
Intersections / Segments	**35**	**100%**
Riverside Dr @ Uplands Dr/Kimberwick Cres	33	94%
Buckingham Priv @ Uplands Dr	1	3%
Uplands Dr Btwn Riverside Dr & North Bowesville Rd	1	3%

Within the study area, the intersection of Riverside Drive at Uplands Drive/Kimberwick Crescent is noted to have experienced higher collisions than other locations. Table 5 summarizes the collision types and conditions for ethe location.

Table 5: Riverside Drive at Uplands Drive/Kimberwick Crescent Collision Summary

		Number	%
Total Collisions		**33**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	4	12%
	Property Damage Only	29	88%
Initial Impact Type	**Angle**	3	9%
	Rear end	16	48%
	Sideswipe	2	6%
	Turning Movement	8	24%
	SMV Other	3	9%
	Other	1	3%
Road Surface Condition	**Dry**	21	64%
	Wet	7	21%
	Loose Snow	2	6%
	Slush	1	3%
	Packed Snow	2	6%
Pedestrian Involved		1	3%
Cyclists Involved		0	0%

The Riverside Drive at Uplands Drive/Kimberwick Crescent N intersection had a total of 33 collisions during the 2015-2019 time period, with 29 involving property damage only and the remaining four having non-fatal injuries. The collision types are most represented by the rear end with 16 collisions, followed by turning movement with eight collisions, and with the remaining collision types represented by angle, SMV other, and other. Rear end collisions are typical of congested areas. Turning movement collisions may be associated with third southbound receiving/acceleration lane along the gas station frontage. Weather conditions are not considered to affect collisions at this location.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

The Transportation Master Plan identifies isolated transit priority measures along Riverside Drive within the Network Concept; however, it is not included in the Affordable Network.

2.3.2 Other Study Area Developments

3690 & 3630 Riverside Drive

The proposed development application includes a site plan to allow the construction of senior apartments and retirement home, a 48,450 ft^2 hotel, 10,000 ft^2 of retail, 29,000 ft^2 car dealership, and 20,000 ft^2 private school. Phase one of the development was initially anticipated to be built out by 2020 and to generate 208 new AM two-way peak-hour auto trips, 181 new PM two-way peak-hour auto trips. Phase two was initially anticipated to be built out by 2021 to generate 71 new AM two-way peak-hour auto trips, 86 new PM two-way peak-hour auto trips. (Parsons, 2018)

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of:

- Riverside Drive at:
  - Uplands Drive/ Kimberwick Crescent

- North Bowesville Road at:
    - Uplands Drive

The boundary road will be North Bowesville Road and screenline SL20 is located along the Rideau River to the west of the subject site but will not be analyzed as part of this study.

3.2 Time Periods

As the proposed development is composed entirely of residential units the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year is 2026. As a result, the full build-out plus five years horizon year is 2031.

4 Exemption Review

Table 6 summarizes the exemptions for this TIA.

Table 6: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Required at Site Plan Application
	4.1.3 New Street Networks	Only required for plans of subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Required at Site Plan Application
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt. May be required at Site Plan Application
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Required
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Required
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning	Exempt

5 Development-Generated Travel Demand

5.1 Mode Shares

Examining the mode shares recommended in the TRANS Trip Generation Manual (2020) for the subject district, derived from the most recent National Capital Region Origin-Destination survey (OD Survey), the existing average district mode shares by land use for Hunt Club have been summarized in Table 7.

Table 7: TRANS Trip Generation Manual Recommended Mode Shares – Hunt Club

Travel Mode	Multi-Unit (High-Rise)	
	AM	PM
Auto Driver	39%	44%
Auto Passenger	6%	11%
Transit	44%	35%
Cycling	1%	2%
Walking	9%	9%
Total	**100%**	**100%**

5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the residential dwellings using the TRANS Trip Generation Manual (2020). Table 8 summarizes the person trip rates for the proposed residential land use for each peak period.

Table 8: Trip Generation Person Trip Rates by Peak Period

Land Use	Land Use Code	Peak Period	Person Trip Rates
Multi-Unit (High-Rise)	221 & 222 (TRANS)	AM	0.80
		PM	0.90

Using the above person trip rates, the total person trip generation has been estimated. Table 9 summarizes the total person trip generation for the residential land use.

Table 9: Total Residential Person Trip Generation by Peak Period

Land Use	Units	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Multi-Unit (High-Rise)	394	98	217	315	206	149	355

Using the above mode share targets for the person trip rates, the person trips by mode have been projected. Trip generation by peak hour has been forecasted using the prescribed peak period conversion factors presented in the TRANS Trip Generation Manual (2020) for the residential component. Table 10 summarizes the residential trip generation by mode and peak hour.

Table 10: Residential Trip Generation by Mode

Travel Mode		AM Peak Hour				PM Peak Hour			
		Mode Share	In	Out	Total	Mode Share	In	Out	Total
Multi-Unit (High-Rise)	Auto Driver	**39%**	18	41	59	**44%**	40	29	69
	Auto Passenger	**6%**	3	6	9	**11%**	10	7	17
	Transit	**44%**	24	52	76	**35%**	34	24	58
	Cycling	**1%**	1	1	2	**2%**	2	1	3
	Walking	**9%**	5	12	17	**9%**	10	7	17
	Total	**100%**	**51**	**112**	**163**	**100%**	**96**	**68**	**164**

As shown above, a total of 59 AM and 69 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.3 Trip Distribution

To understand the travel patterns of the subject development, the OD Survey has been reviewed to determine the travel for the residential component, and these patterns were applied based on the build-out of Hunt Club. Table 11 below summarizes the distributions.

Table 11: OD Survey Distribution – Hunt Club

To/From	Residential % of Trips
North	40%
South	15%
East	30%
West	15%
Total	**100%**

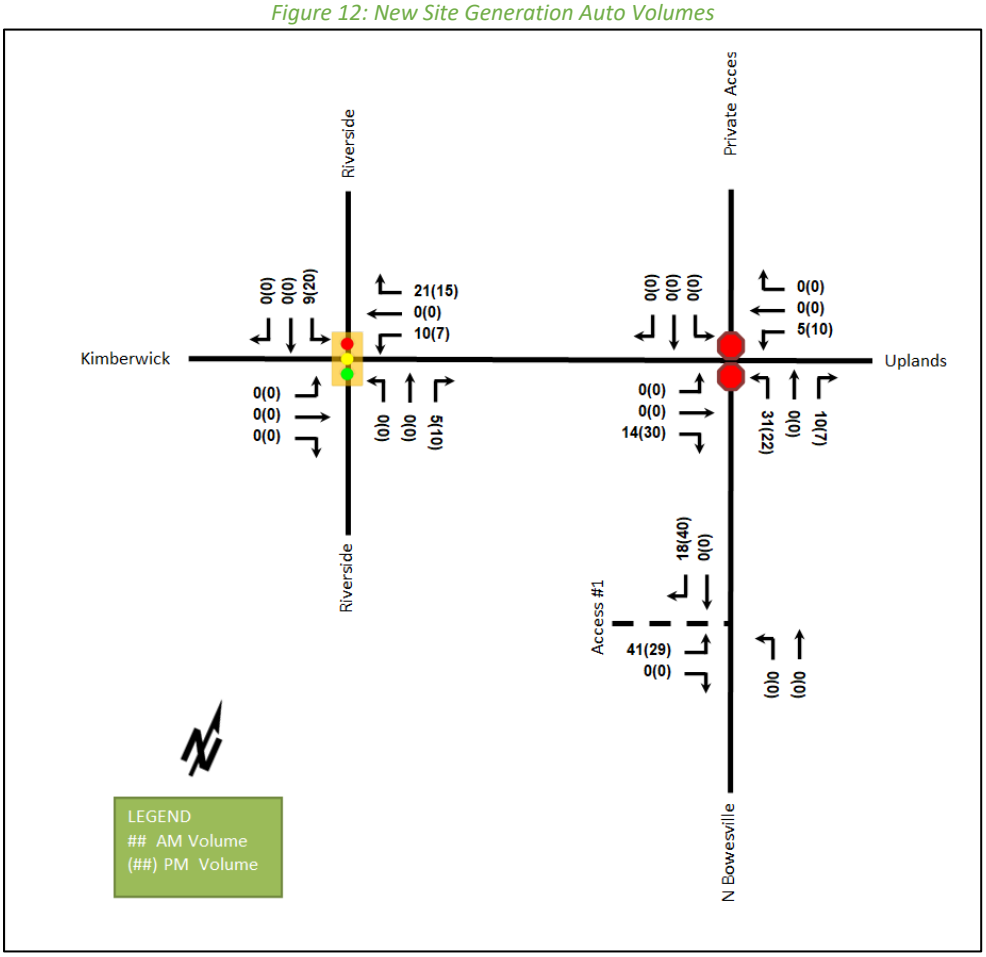
5.4 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the study area road network. Table 12 summarizes the proportional assignment to the study area roadways, and Figure 12 illustrates the new site generated volumes.

Table 12: Trip Assignment

To/From	Via
North	40% Riverside Drive (N)
South	10% Riverside Drive (S) 5% Uplands Drive (E)
East	10% Riverside Drive (N) 20% Uplands Drive (E)
West	15% Riverside Drive (S)
Total	**100%**

Figure 12: New Site Generation Auto Volumes



6 Background Network Travel Demands

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3 and is not considered to have any notable impact on the study area traffic volumes and travel patterns.

6.2 Background Growth

A review of the background projections from the City's TRANS Regional Model for the 2011 and 2031 horizons was completed to determine the background growth for each of the study area roadways. The TRANS model plots are provided in Appendix E.

The growth rates derived from the 2011 and 2031 TRANS model horizons are projected to be positive along Riverside Drive in both directions and along Uplands Drive in the eastbound direction. And it is projected to be negative along Uplands Drive in the westbound direction. When reviewing the existing volumes and comparing to the projected 2031 TRANS volumes, it is noted that the study area volumes in the off-peak direction along Riverside Drive and peak direction along Uplands Drive have been exceeded. As a result, the modified growth rates have been applied to the study area network. The rates of TRANS Regional Model Projections are provided in Table 13, and Table 14 summarizes the growth rates applied within the study area.

Table 13: TRANS Regional Model Projections – Study Area Growth Rates

Street	TRANS Rate		Existing to 2031	
	Eastbound	Westbound	Eastbound	Westbound
Uplands Drive	0.49%	-1.01%	11.56%	-3.74%
	Northbound	**Southbound**	**Northbound**	**Southbound**
Riverside Drive	0.61%	0.09%	1.06%	-3.08%

Table 14: Study Area Growth Rates Applied

Street	AM Peak Hour		PM Peak Hour	
	Eastbound	Westbound	Eastbound	Westbound
Uplands Drive	0.50 %	-	-	0.50 %
	Northbound	**Southbound**	**Northbound**	**Southbound**
Riverside Drive	0.50 %	-	-	0.50 %

6.3 Other Developments

The background developments explicitly considered in the background conditions include 3690 & 3630 Riverside Drive and these background development volumes have been provided in Appendix F.

7 Demand Rationalization

7.1 2026 Future Background Operations

Figure 13 illustrates the 2026 background volumes and Table 15 summarizes the 2026 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and HCM 2010 average delay for unsignalized intersections. The synchro worksheets for the 2026 future background horizon are provided in Appendix G.

Figure 13: 2026 Future Background Volumes

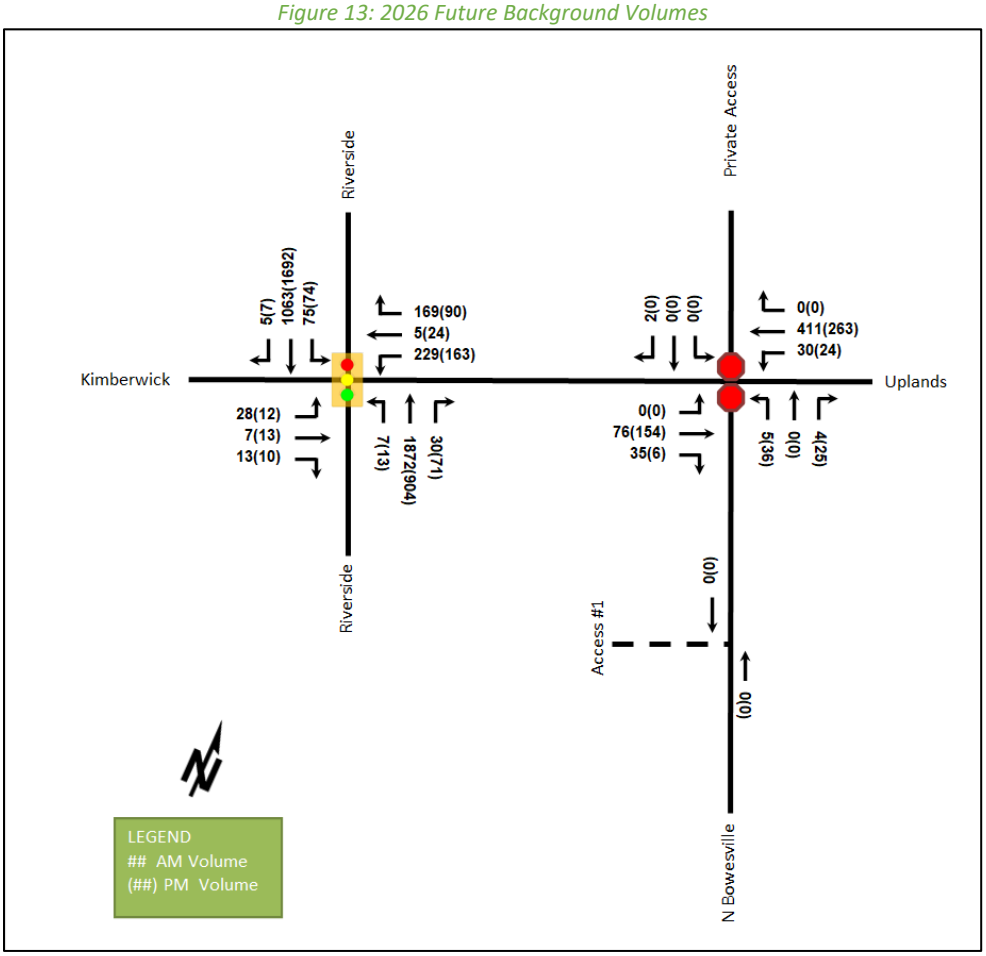


Table 15: 2026 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Riverside Drive at Uplands Drive/ Kimberwick Crescent ***Signalized***	EBL	A	0.17	39.9	13.5	A	0.08	42.7	8.0
	EBT/R	A	0.06	21.1	7.6	A	0.08	28.4	10.2
	WBL/T	D	0.88	77.0	**#91.9**	D	0.83	78.7	71.0
	WBR	A	0.39	8.2	16.9	A	0.28	10.4	13.8
	NBL	A	0.03	14.3	3.3	A	0.10	15.2	5.4
	NBT/R	E	0.99	43.9	**#315.0**	A	0.47	14.5	94.8
	SBL	A	0.49	25.3	19.2	A	0.22	7.7	10.8
	SBT/R	A	0.48	10.4	76.4	C	0.71	13.2	163.4
	Overall	**E**	**0.95**	**33.5**	-	**C**	**0.77**	**17.6**	-
North Bowesville Road at Uplands Drive ***Unsignalized***	EB	-	-	-	-	-	-	-	-
	WB	A	0.02	7.6	0.8	A	0.02	7.6	0.8
	NB	B	0.02	11.8	0.8	B	0.10	11.8	2.3
	SB	B	0.00	11.7	0.0	-	-	-	-
	Overall	**A**	-	**0.6**	-	**A**	-	**1.8**	-

Notes:
Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

At the intersection of Riverside Drive at Uplands Drive/Kimberwick Crescent, the westbound shared left-turn/through and northbound shared through/right-turn movements may subject to extended queues during the AM peak hour. The incremental improvement to the intersection operations is predominantly a result of the shift in peak hour factor to 1.00 for forecasted conditions.

As per City request, a SimTraffic review was completed to examine queuing on the westbound shared left turn/through movement at Riverside Drive at Uplands Drive/Kimberwick Crescent during the AM peak hour for concerns of blocking at the upstream intersection of North Bowesville Road at Uplands Drive.

The 95th percentile queue length is forecasted to be 62.3 metres during the AM peak hour at the 2026 future background condition, which is shorter than the approximately 90-metre distance from this approach to the upstream intersection, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at this horizon. The queue length at the 2026 future background condition is expected to increase 28.4 metres compared to the existing condition. SimTraffic reports are also provided in Appendix G.

7.2 2031 Future Background Operations

Figure 14 illustrates the 2031 background volumes and Table 16 summarizes the 2031 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and HCM 2010 average delay for unsignalized intersections. The synchro worksheets for the 2031 future background horizon are provided in Appendix H.

Figure 14: 2031 Future Background Volumes

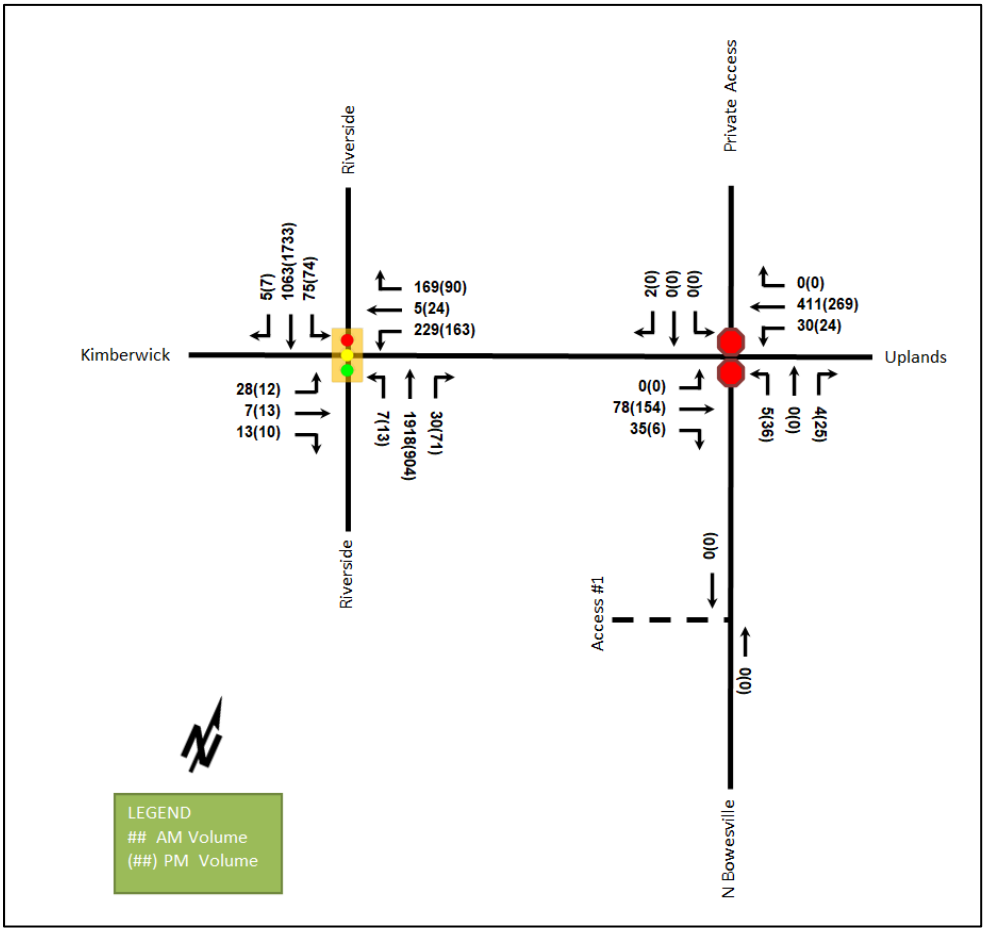


Table 16: 2031 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Riverside Drive at Uplands Drive/ Kimberwick Crescent *Signalized*	EBL	A	0.17	39.9	13.5	A	0.08	42.7	8.0
	EBT/R	A	0.06	21.1	7.6	A	0.08	28.4	10.2
	WBL/T	D	0.88	77.0	**#91.9**	D	0.83	78.7	71.0
	WBR	A	0.39	8.2	16.9	A	0.28	10.4	13.8
	NBL	A	0.03	14.3	3.3	A	0.11	15.7	5.5
	NBT/R	**F**	**1.01**	**49.7**	**#326.8**	A	0.47	14.5	94.8
	SBL	A	0.49	25.3	19.2	A	0.22	7.7	10.8
	SBT/R	A	0.48	10.4	76.4	C	0.73	13.6	171.9
	Overall	**E**	**0.97**	**36.8**	**-**	**C**	**0.79**	**17.8**	**-**
North Bowesville Road at Uplands Drive *Unsignalized*	EB	-	-	-	-	-	-	-	-
	WB	A	0.02	7.5	0.8	A	0.02	7.6	0.8
	NB	B	0.02	11.8	0.8	B	0.10	11.9	2.3
	SB	B	0.00	11.7	0.0	-	-	-	-
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**1.8**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The intersections at the 2031 future background condition are anticipated to operate similarly to the 2026 future background condition. At Riverside Drive at Uplands Drive/Kimberwick Crescent intersection during AM peak hour, the northbound share through/right-turn movement will be over theoretical and may start to be subject to extended queues and high delays due to the background growth along the corridor.

As per City request, a SimTraffic review was completed to examine queuing on the westbound shared left turn/through movement at Riverside Drive at Uplands Drive/Kimberwick Crescent during the AM peak hour for concerns of blocking at the upstream intersection of North Bowesville Road at Uplands Drive.

The 95th percentile queue length is forecasted to be 69.3 metres during the AM peak hour at the 2031 future background condition, which is shorter than the approximately 90-metre distance from this approach to the upstream intersection, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at this horizon. The queue length at the 2031 future background condition is expected to increase 7.0 metres compared to the 2026 future background condition. SimTraffic reports are also provided in Appendix H.

7.3 Modal Share Sensitivity and Demand Rationalization Conclusions

Capacity constraints have been noted on the northbound shared through/right-turn movement at the Riverside Drive at Uplands Drive/Kimberwick Crescent intersection in the existing conditions, due primarily to the high through volumes. The site generated volumes on this movement are forecasted to be low, totalling four trips during the AM peak hour and nine trips during the PM peak hour, and are not anticipated to be a contributing factor to the identified existing network constraint.

SimTraffic review was completed to examine queuing on the westbound shared left turn/through movement at Riverside Drive at Uplands Drive/Kimberwick Crescent during the AM peak hour for concerns of blocking at the upstream intersection of North Bowesville Road at Uplands Drive at all horizons, and no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at all horizons. No demand rationalization is required for this development.

8 Transportation Demand Management

8.1 Context for TDM

The mode shares used within the TIA represent the unmodified district mode shares. Overall, the modal shares are likely to be achieved and supporting TDM measures should be provided.

The subject site is not within a design priority area. The total bedroom count within the development is 512 bedrooms across both buildings with 220 bachelor/one-bedroom units and 146 two-bedroom units.

8.2 Need and Opportunity

The subject site has been assumed to rely on similar levels of auto travel to transit, and those assumptions have been carried through the analysis. As the unmodified district mode shares have been applied, risks to other network users from failing to meet mode share targets are low.

8.3 TDM Program

The "suite of post occupancy TDM measures" has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix I. The key TDM measures recommended to be considered in future site plan applications include:

- Display local area maps with walking and cycling routes, and transit route information and schedules at major entrances
- Provide a multimodal travel option information package to new residents
- Inclusion of a 1-year Presto card for first time apartment rental, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
- Unbundle parking cost from rental costs

9 Neighbourhood Traffic Management

Site traffic is proposed to access the arterial network via North Bowesville Road (a local road) and Uplands Drive Road (a collector road). The TIA guidelines have outlined thresholds for two-way traffic on local and collector roads and have been found to be too low for the purposes of this analysis. City Staff have noted that these thresholds are under review and will be updated in the future.

In general, the site is forecasted to generate approximately 3 cars per two minutes along North Bowesville Road, four car per minute along Uplands Dive east of North Bowesville Road, and one car per minute along Uplands Dive west of North Bowesville Road. This volume increase is not considered a significant impact on North Bowesville Road and Uplands Drive Road or requiring of traffic management.

10 Transit

10.1 Route Capacity

In Section 5.1 the trip generation by mode was estimated, including an estimate of the number of transit trips that will be generated by the proposed development. Table 17 summarizes the transit trip generation.

Table 17: Trip Generation by Transit Mode

Travel Mode	Mode Share	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Transit	44% (35%)	24	52	76	34	24	58

The proposed development is anticipated to generate an additional 76 AM and 58 PM peak hour two-way transit trips. From the trip distribution found in section 5.3, these values can be further broken down. Table 18 summarizes forecasted site-generated transit ridership trips by direction and the equivalent bus loads.

Table 18: Forecasted Site-Generated Transit Ridership

Direction	AM Peak Hour		PM Peak Hour		Service Type	Equivalent Peak Hour Service Level
	In	Out	In	Out		
North	9	21	14	9	Bus	Half of a Standard Bus
South	4	8	5	4		Negligible
East	7	15	10	7		One Quarter of a Standard Bus
West	4	8	5	4		Negligible

10.2 Transit Priority

Examining the study area intersection delays, negligible impacts are forecast on the transit movements at the study area intersections as a result of the development site traffic.

11 Network Intersection Design

11.1 Network Intersection Control

No change to the existing signalized control is recommended for the network intersections.

11.2 Network Intersection Design

11.2.1 2026 Future Total Network Intersection Operations

Figure 15 illustrates the 2026 future total intersection volumes and the network intersection operations are summarized below in Table 19. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and HCM 2010 average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix J.

Figure 15: 2026 Future Total Volumes

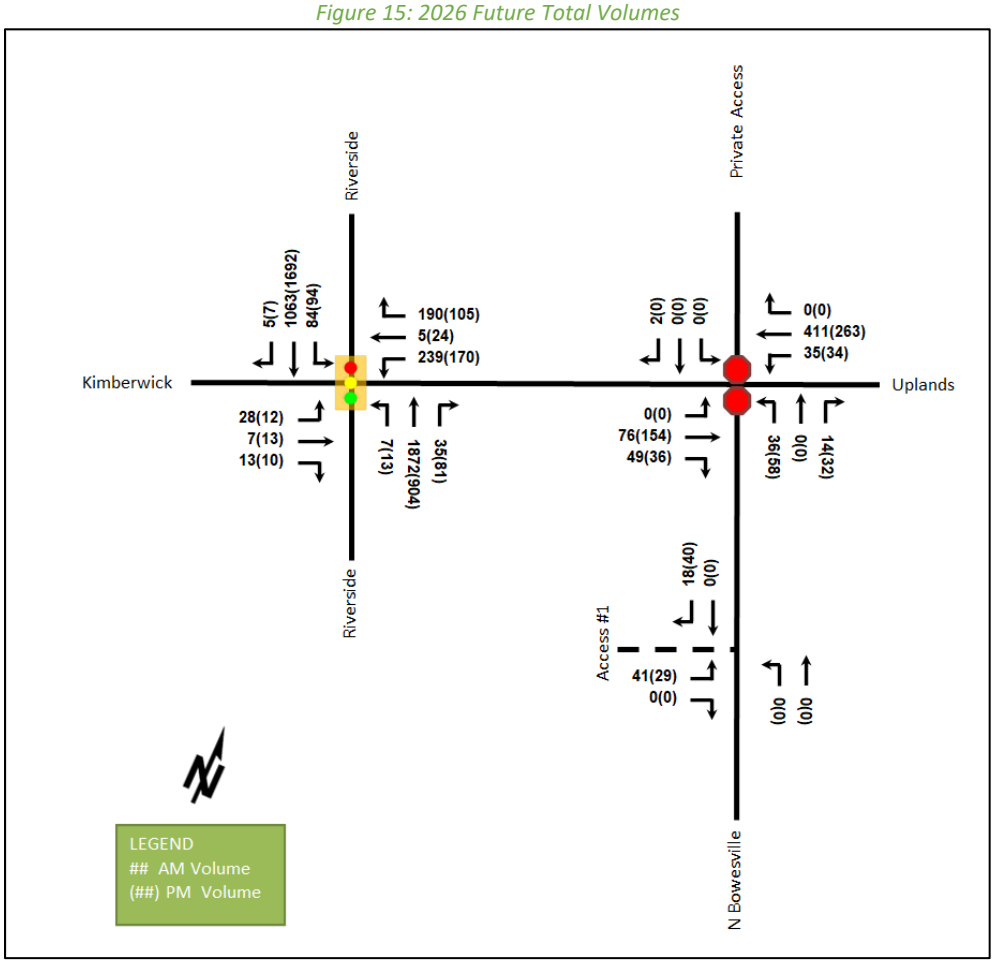


Table 19: 2026 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Riverside Drive at Uplands Drive/ Kimberwick Crescent ***Signalized***	EBL	A	0.18	39.9	13.6	A	0.08	42.5	8.0
	EBT/R	A	0.06	21.1	7.6	A	0.08	28.3	10.2
	WBL/T	D	0.90	79.3	**#97.8**	D	0.84	79.3	**#77.9**
	WBR	A	0.42	8.2	18.0	A	0.31	10.0	14.9
	NBL	A	0.03	14.7	3.4	A	0.11	15.8	5.5
	NBT/R	E	1.00	49.0	**#320.0**	A	0.49	15.9	97.6
	SBL	A	0.52	27.7	22.0	A	0.28	8.4	13.2
	SBT/R	A	0.48	10.6	76.4	C	0.71	13.5	163.4
	Overall	**E**	**0.97**	**36.5**	-	**C**	**0.78**	**18.3**	-
North Bowesville Road at Uplands Drive ***Unsignalized***	EB	A	-	0.0	0.0	A	-	0.0	0.0
	WB	A	0.02	7.5	0.8	A	0.03	7.7	0.8
	NB	B	0.11	13.7	3.0	B	0.17	12.9	4.5
	SB	B	0.00	11.7	0.0	-	-	-	-
	Overall	**A**	**-**	**1.6**	-	**A**	**-**	**2.5**	-

Notes:
Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The intersections at the 2026 future total horizon are anticipated to operate similarly to the 2026 future background horizon. As in the existing conditions, the westbound shared left-turn/through movement at Riverside Drive and Uplands Drive/Kimberwick Crescent intersection during the PM peak hour may subject to extended queues. No mitigation of conditions is required for the subject site traffic.

As per City request, a SimTraffic review was completed to examine queuing on the westbound shared left turn/through movement at Riverside Drive at Uplands Drive/Kimberwick Crescent during the AM peak hour for concerns of blocking at the upstream intersection of North Bowesville Road at Uplands Drive.

The 95th percentile queue length is forecasted to be 74.1 metres during the AM peak hour at the 2026 future total horizon, which is shorter than the approximately 90-metre distance from this approach to the upstream intersection, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at this horizon. The queue length at the 2026 future total horizon is expected to increase 11.8 metres compared to the 2026 future background condition. SimTraffic reports are also provided in Appendix J.

11.2.2 2031 Future Total Network Intersection Operations

Figure 16 illustrates the 2031 future total intersection volumes and network intersection operations are summarized below in Table 20. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and HCM 2010 average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix K.

Figure 16: 2031 Future Total Volumes

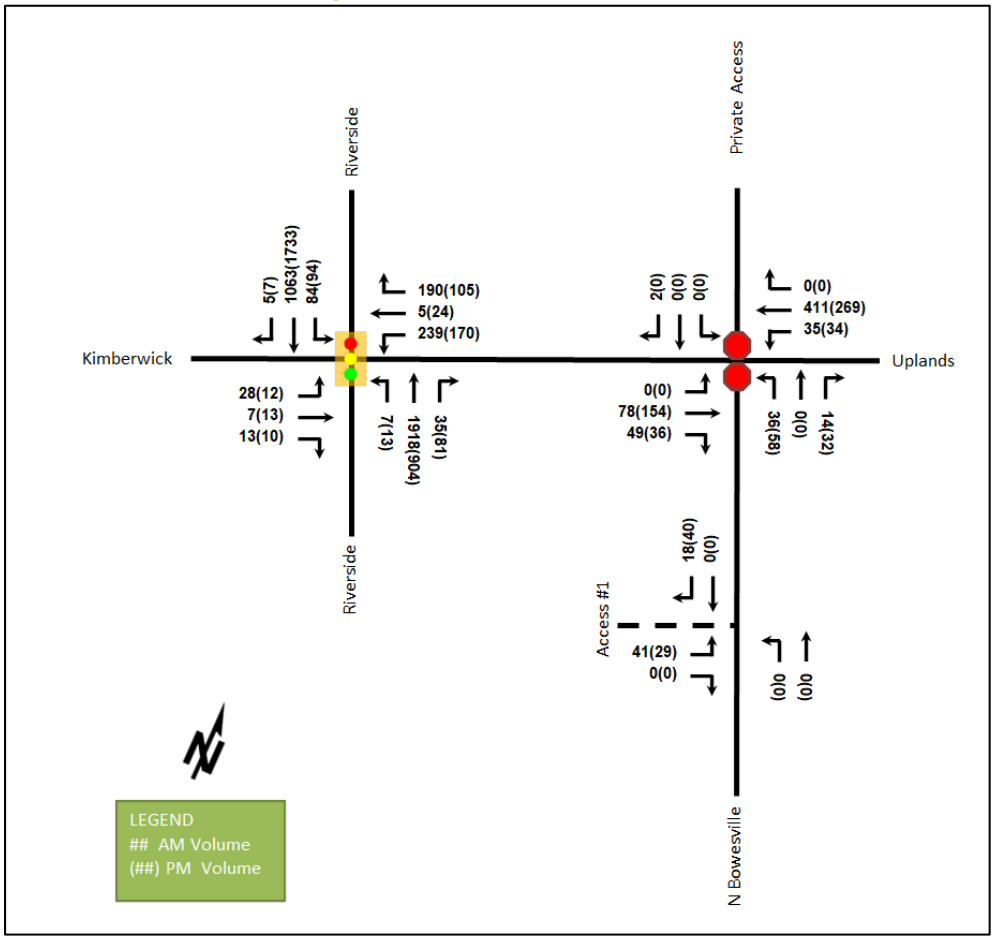


Table 20: 2031 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Riverside Drive at Uplands Drive/ Kimberwick Crescent *Signalized*	EBL	A	0.18	39.9	13.6	A	0.08	42.5	8.0
	EBT/R	A	0.06	21.1	7.6	A	0.08	28.3	10.2
	WBL/T	D	0.90	79.3	**#97.8**	D	0.84	79.3	**#77.9**
	WBR	A	0.42	8.2	18.0	A	0.31	10.0	14.9
	NBL	A	0.03	14.7	3.4	A	0.12	16.3	5.6
	NBT/R	**F**	**1.03**	**55.5**	**#332.1**	A	0.49	15.9	97.6
	SBL	A	0.52	27.7	22.0	A	0.28	8.4	13.2
	SBT/R	A	0.48	10.6	76.4	C	0.73	14.0	171.9
	Overall	**E**	**0.98**	**40.2**	**-**	**C**	**0.79**	**18.5**	**-**
North Bowesville Road at Uplands Drive *Unsignalized*	EB	A	-	0.0	0.0	A	-	0.0	0.0
	WB	A	0.02	7.5	0.8	A	0.03	7.7	0.8
	NB	B	0.11	13.7	3.0	B	0.17	13.0	4.5
	SB	B	0.00	11.7	0.0	-	-	-	-
	Overall	**A**	**-**	**1.6**	**-**	**A**	**-**	**2.5**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average driver delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity
v/c = volume to capacity ratio

The intersections at the 2031 future total horizon are anticipated to operate similarly to the 2031 future background horizon.

Similar to 2026 future total horizon, and as in the existing conditions, the westbound shared left-turn/through movement at Riverside Drive and Uplands Drive/Kimberwick Crescent intersection at 2031 future total horizon may exhibit extended queues during PM peak hour, and no mitigation for this condition is required based on site traffic.

As per City request, a SimTraffic review was completed to examine queuing on the westbound shared left turn/through movement at Riverside Drive at Uplands Drive/Kimberwick Crescent during the AM peak hour for concerns of blocking at the upstream intersection of North Bowesville Road at Uplands Drive.

The 95th percentile queue length is forecasted to be 74.2 metres during the AM peak hour at the 2031 future total horizon, which is shorter than the approximately 90-metre distance from this approach to the upstream intersection, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at this horizon. The queue length at the 2031 future total horizon is expected to increase 4.9 metres compared to the 2031 future background condition. SimTraffic reports are provided in Appendix K.

11.2.3 Network Intersection MMLOS

Table 21 summarizes the MMLOS analysis for the network intersections of Riverside Drive at Uplands Drive/Kimberwick Crescent. The existing and future conditions for both intersections will be the same and are considered in one row. The intersection analysis is based on the land use designation of “General Urban Area”. The MMLOS worksheets has been provided in Appendix L.

Table 21: Study Area Intersection MMLOS Analysis

Intersection	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Riverside Drive at Uplands Drive/Kimberwick Crescent	**F**	C	**F**	C	D	D	-	-	**E**	D

The pedestrian, bicycle, transit, and auto LOS will not be met at the study area intersection.

To meet pedestrian LOS targets, the maximum crossing distance on all pedestrian crossings would need to be reduced to three-lane widths.

To meet bicycle LOS at the intersection, the left-turn configurations would need to be two-stage or include turn boxes, and dedicated facilities would be required.

The improvements for the intersection are not the responsibility of the development and are provided for the City's planning.

11.2.4 Recommended Design Elements

No study area intersection design elements are proposed as part of this study.

12 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

Proposed Site and Screening

- The proposed site includes 394 apartment units
- The concept plan remains an existing full-movements access for parking garage access and proposes the relocation of an existing full-movements access for fire route and visitor access on North Bowesville Road
- The development is proposed to be completed in two phases by 2026
- The trip generation trigger was met for the TIA Screening
- This report is in support of a zoning by-law amendment

Existing Conditions

- Riverside Drive is arterial roads, and Uplands Drive is a collector road in the study area
- Sidewalks or asphalt pathways are provided along both sides of Uplands Drive and Riverside Drive
- The high volumes roadways have produced a high number of collisions at the study area intersections, primarily at the Riverside Drive at Uplands Drive/Kimberwick Crescent intersection (94% or 33 collisions), predominantly represented by rear end, which is typical of congested areas
- Operations and volumes at Riverside Drive at Uplands Drive/Kimberwick Crescent intersection may be influenced by conditions at the intersection of Riverside Drive at Hunt Club Road, particularly for the southbound movements beyond which queues may extend from the downstream intersection during the PM peak hour
- Based on SimTraffic review, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at the existing condition

Development Generated Travel Demand

- The proposed development is forecasted produce 163 two-way people trips during the AM peak hour and 164 two-way people trips during the PM peak hour
- Of the forecasted people trips, 59 two-way trips will be vehicle trips during the AM peak hour and 69 two-way trips will be vehicle trips during the PM peak hour
- Of the forecasted trips, 40 % are anticipated to travel north, 30 % to the east, and 15 % to both the west and south

Background Conditions

- The background developments were explicitly included in the background conditions, along with a total background growth of 0.50% per annum on peak directions along Uplands Drive and Riverside Drive
- The incremental improvement to the intersection operations is predominantly a result of the shift in peak hour factor to 1.00 for forecasted conditions
- Based on SimTraffic review, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at the future background horizons

TDM

- Supportive TDM measures to be included within the proposed development should include:
  - Display local area maps with walking and cycling routes, and transit route information and schedules at major entrances
  - Provide a multimodal travel option information package to new residents
  - Inclusion of a 1-year Presto card for first time apartment rental, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
  - Unbundle parking cost from rental costs

Neighbourhood Traffic Management

- The TIA guidelines have outlined thresholds for two-way traffic on local and collector roads and have been found to be too low for the purposes of this analysis. City Staff have noted that these thresholds are under review and will be updated in the future
- The site is forecasted to generate approximately 3 cars per two minutes along North Bowesville Road, four car per minute along Uplands Dive east of North Bowesville Road, and one car per minute along Uplands Dive west of North Bowesville Road
- The increased volume is not considered a significant impact on North Bowesville Road and Uplands Drive Road or require any traffic management

Transit

- The proposed development is anticipated to generate an additional 76 AM peak hour transit trips and 58 PM peak hour transit trips
- Peak hour increases in transit ridership resulting from the site equate to half of a standard bus load north of the site, one quarter of a standard nus load east of the site, and negligible impact south and west of the site
- Examining the study area intersection delays, negligible impacts are noted on the transit movements at the study area intersections as a result of the development site traffic

Network Intersection Design

- Generally, the network intersections will operate similarly to future background horizons
- As in the existing conditions, the westbound shared left-turn/through movement at Riverside Drive and Uplands Drive/Kimberwick intersection at future total horizons may exhibit extended queues during PM peak hour, and no mitigation of conditions is required
- Based on SimTraffic review, no blocking of the northbound left-turn at the intersection of North Bowesville Road at Uplands Drive is anticipated at the future total horizons
- The pedestrian LOS will not be met at Riverside Drive at Uplands Drive/Kimberwick Crescent intersection and requires the maximum crossing distance on all pedestrian crossings to be reduced to three-lane widths

- The bicycle LOS will not be met at Riverside Drive at Uplands Drive/Kimberwick Crescent intersection and requires dedicated facilities and the left-turn configurations be two-stage or include turn boxes

13 Conclusion

It is recommended that, from a transportation perspective, the proposed development applications proceed.

Prepared By:

Yu-Chu Chen, EIT
Transportation Engineering-Intern

Reviewed By:

Andrew Harte, P.Eng.
Senior Transportation Engineer

Appendix A

TIA Screening Form and PM Certification Form

6 Plaza Court,
Ottawa ON K2H 7W1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 15-Feb-22
Project Number: 2020-103
Project Reference: 3750 North Bowesville

1.1 Description of Proposed Development	
Municipal Address	3750 North Bowesville Road
Description of Location	0.68 ha parcel at the south end of North Bowesville Road on the west side of the road
Land Use Classification	General Mixed Use (GM F(1.0) H(44))
Development Size	~300 High-Rise Units
Accesses	One full-moves on North Bowesville Rd
Phase of Development	One
Buildout Year	2026
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Townhomes or apartments	
Development Size	300	Units
Trip Generation Trigger	Yes	

1.3 Location Triggers	
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	No
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	No
Location Trigger	No

1.4. Safety Triggers	
Are posted speed limits on a boundary street 80 km/hr or greater?	No
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	No
Is the proposed driveway 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)?	No
Is the proposed driveway within auxiliary lanes of an intersection?	No
Does the proposed driveway make use of an existing median break that serves an existing site?	No
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	No
Does the development include a drive-thru facility?	No
Safety Trigger	No

TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering √ or transportation planning □.

[1,2] License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

City Of Ottawa
Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d 'infrastructure et Viabilité des collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at Ottawa (City) this 20 day of September, 2018.

Name: Andrew Harte
(Please Print)

Professional Title: Professional Engineer

Signature of Individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)
Address: 6 Plaza Court
City / Postal Code: Ottawa / K2H 7W1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com

Appendix B

Turning Movement Counts

Transportation Services - Traffic Services

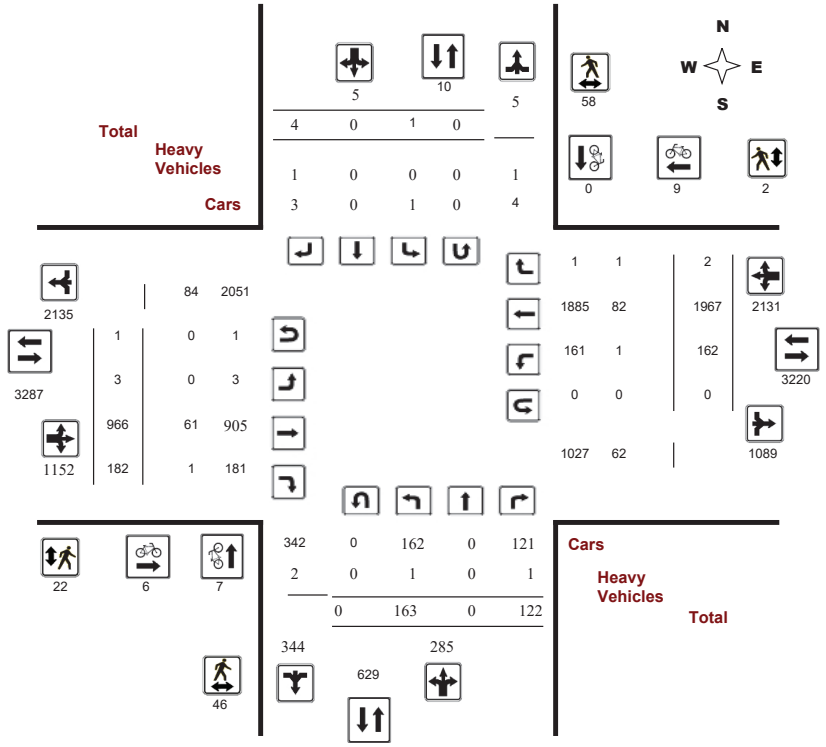
Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study Diagram



Transportation Services - Traffic Services

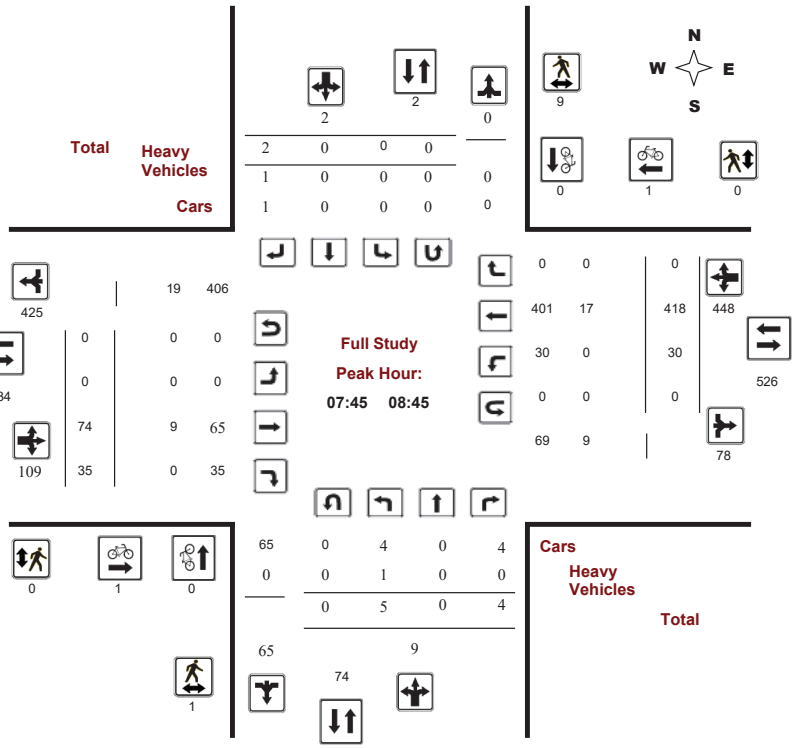
Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study Peak Hour Diagram



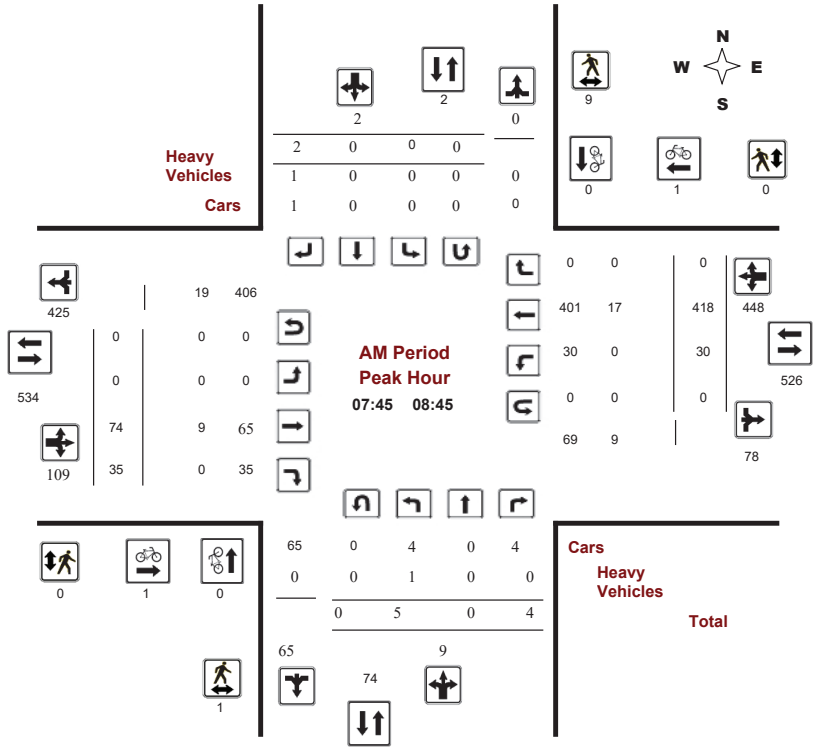
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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



Comments

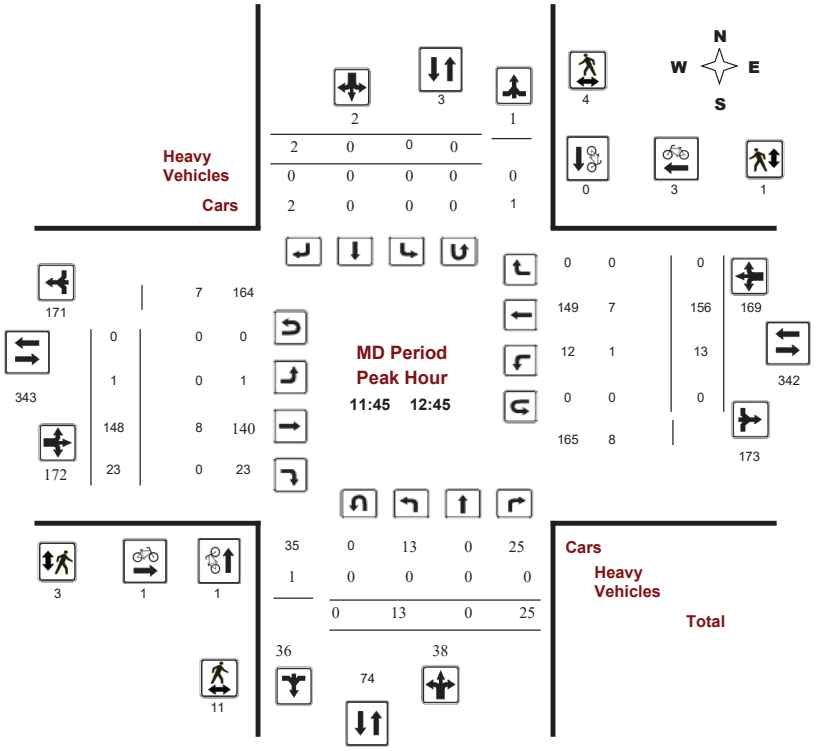
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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



Comments

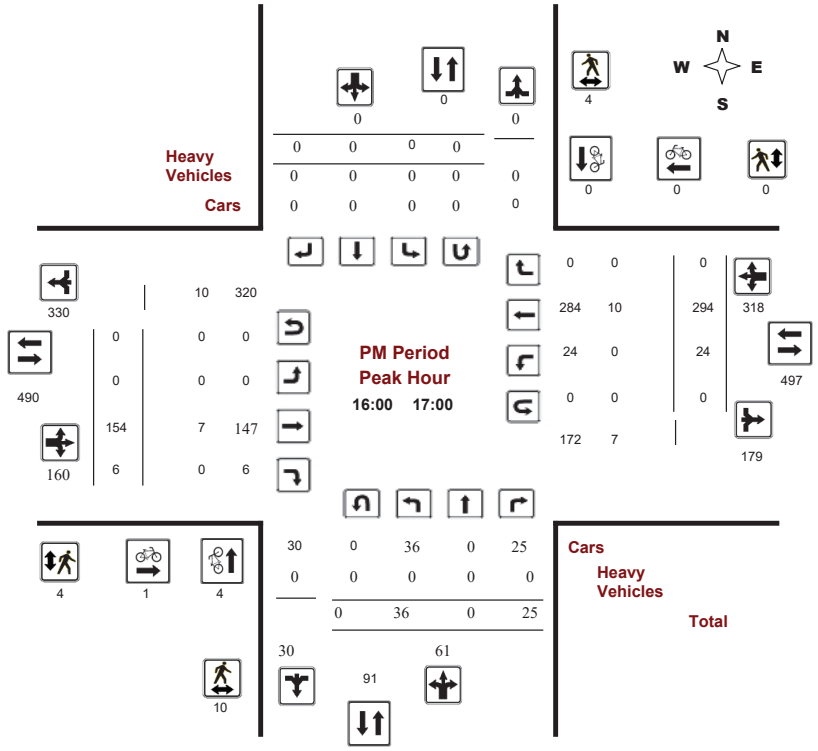
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study Summary (8 HR Standard)

Survey Date: Tuesday, November 26, 2019

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 1 Westbound: 0

AADT Factor 1.00

	Northbound				Southbound				Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	0	0	3	**3**	0	0	1	**1**	**4**	1	46	17	**64**	7	326	1	**334**	**398**	**402**
08:00 09:00	8	0	3	**11**	0	0	1	**1**	**12**	0	77	53	**130**	42	377	0	**419**	**549**	**561**
09:00 10:00	7	0	8	**15**	1	0	0	**1**	**16**	0	103	66	**169**	32	206	1	**239**	**408**	**424**
11:30 12:30	19	0	24	**43**	0	0	2	**2**	**45**	2	154	16	**172**	7	151	0	**158**	**330**	**375**
12:30 13:30	16	0	10	**26**	0	0	0	**0**	**26**	0	132	15	**147**	21	171	0	**192**	**339**	**365**
15:00 16:00	29	0	15	**44**	0	0	0	**0**	**44**	0	151	3	**154**	2	240	0	**242**	**396**	**440**
16:00 17:00	36	0	25	**61**	0	0	0	**0**	**61**	0	154	6	**160**	24	294	0	**318**	**478**	**539**
17:00 18:00	48	0	34	**82**	0	0	0	**0**	**82**	0	149	6	**155**	27	202	0	**229**	**384**	**466**
Sub Total	163	0	122	**285**	1	0	4	**5**	**290**	3	966	182	**1151**	162	1967	2	**2131**	**3282**	**3572**
U Turns	0			**0**	0			**0**	**0**	**1**			**1**	0			**0**	**1**	**1**
Total	163	0	122	**285**	1	0	4	**5**	**290**	4	966	182	**1152**	162	1967	2	**2131**	**3283**	**3573**
EQ 12Hr	227	0	170	**397**	1	0	6	**7**	**404**	6	1343	253	**1602**	225	2734	3	**2962**	**4564**	**4968**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	227	0	170	**397**	1	0	6	**7**	**404**	6	1343	253	**1602**	225	2734	3	**2962**	**4564**	**4968**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**1.00**					
AVG 24Hr	297	0	223	**520**	1	0	8	**9**	**529**	8	1759	331	**2098**	295	3582	4	**3881**	**5979**	**6508**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

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

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study 15 Minute Increments

Time Period		Northbound				Southbound					Eastbound				Westbound					Grand Total
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	
07:00	07:15	0	0	0	0	0	0	0	0	**0**	0	10	3	13	2	46	1	49	**62**	**62**
07:15	07:30	0	0	1	1	0	0	0	0	**1**	0	9	3	12	1	57	0	58	**70**	**71**
07:30	07:45	0	0	1	1	0	0	0	0	**1**	1	10	6	17	1	101	0	102	**119**	**120**
07:45	08:00	0	0	1	1	0	0	1	1	**2**	0	17	5	22	3	122	0	125	**147**	**149**
08:00	08:15	0	0	0	0	0	0	0	0	**0**	0	14	8	22	11	104	0	115	**137**	**137**
08:15	08:30	2	0	1	3	0	0	1	1	**4**	0	24	13	37	8	108	0	116	**153**	**157**
08:30	08:45	3	0	2	5	0	0	0	0	**5**	0	19	9	28	8	84	0	92	**120**	**125**
08:45	09:00	3	0	0	3	0	0	0	0	**3**	1	20	23	44	15	81	0	96	**140**	**143**
09:00	09:15	1	0	2	3	0	0	0	0	**3**	0	28	24	52	19	56	1	76	**128**	**131**
09:15	09:30	2	0	3	5	0	0	0	0	**5**	0	20	17	37	6	52	0	58	**95**	**100**
09:30	09:45	2	0	2	4	1	0	0	1	**5**	0	32	12	44	3	50	0	53	**97**	**102**
09:45	10:00	2	0	1	3	0	0	0	0	**3**	0	23	13	36	4	48	0	52	**88**	**91**
11:30	11:45	9	0	1	10	0	0	0	0	**10**	1	37	1	39	1	36	0	37	**76**	**86**
11:45	12:00	5	0	14	19	0	0	0	0	**19**	0	34	3	37	2	38	0	40	**77**	**96**
12:00	12:15	4	0	4	8	0	0	1	1	**9**	1	44	4	49	3	32	0	35	**84**	**93**
12:15	12:30	1	0	5	6	0	0	1	1	**7**	0	39	8	47	1	45	0	46	**93**	**100**
12:30	12:45	3	0	2	5	0	0	0	0	**5**	0	31	8	39	7	41	0	48	**87**	**92**
12:45	13:00	6	0	6	12	0	0	0	0	**12**	0	33	2	35	3	44	0	47	**82**	**94**
13:00	13:15	6	0	0	6	0	0	0	0	**6**	0	31	2	33	2	46	0	48	**81**	**87**
13:15	13:30	1	0	2	3	0	0	0	0	**3**	0	37	3	40	9	40	0	49	**89**	**92**
15:00	15:15	3	0	4	7	0	0	0	0	**7**	0	48	1	49	0	44	0	44	**93**	**100**
15:15	15:30	7	0	3	10	0	0	0	0	**10**	0	36	1	37	0	55	0	55	**92**	**102**
15:30	15:45	10	0	5	15	0	0	0	0	**15**	0	31	0	31	1	67	0	68	**99**	**114**
15:45	16:00	9	0	3	12	0	0	0	0	**12**	0	36	1	37	1	74	0	75	**112**	**124**
16:00	16:15	8	0	6	14	0	0	0	0	**14**	0	40	0	40	2	79	0	81	**121**	**135**
16:15	16:30	13	0	7	20	0	0	0	0	**20**	0	47	2	49	9	77	0	86	**135**	**155**
16:30	16:45	6	0	6	12	0	0	0	0	**12**	0	37	2	39	5	69	0	74	**113**	**125**
16:45	17:00	9	0	6	15	0	0	0	0	**15**	0	30	2	32	8	69	0	77	**109**	**124**
17:00	17:15	13	0	16	29	0	0	0	0	**29**	0	36	2	38	7	59	0	66	**104**	**133**
17:15	17:30	16	0	7	23	0	0	0	0	**23**	0	38	0	38	6	49	0	55	**93**	**116**
17:30	17:45	10	0	4	14	0	0	0	0	**14**	0	32	2	34	9	49	0	58	**92**	**106**
17:45	18:00	9	0	7	16	0	0	0	0	**16**	0	43	2	45	5	45	0	50	**95**	**111**
Total:		163	0	122	285	1	0	4	5	**290**	4	966	182	1152	162	1967	2	2131	**290**	**3,573**

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study Cyclist Volume

Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	1	0	**1**	0	0	**0**	**1**
07:15	07:30	0	0	**0**	0	1	**1**	**1**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	0	1	**1**	**1**
08:00	08:15	0	0	**0**	0	0	**0**	**0**
08:15	08:30	0	0	**0**	0	0	**0**	**0**
08:30	08:45	0	0	**0**	1	0	**1**	**1**
08:45	09:00	0	0	**0**	1	0	**1**	**1**
09:00	09:15	0	0	**0**	0	1	**1**	**1**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	0	**0**	1	0	**1**	**1**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
11:30	11:45	0	0	**0**	0	2	**2**	**2**
11:45	12:00	0	0	**0**	1	0	**1**	**1**
12:00	12:15	1	0	**1**	0	0	**0**	**1**
12:15	12:30	0	0	**0**	0	2	**2**	**2**
12:30	12:45	0	0	**0**	0	1	**1**	**1**
12:45	13:00	0	0	**0**	0	1	**1**	**1**
13:00	13:15	1	0	**1**	0	0	**0**	**1**
13:15	13:30	0	0	**0**	0	0	**0**	**0**
15:00	15:15	0	0	**0**	0	0	**0**	**0**
15:15	15:30	0	0	**0**	0	0	**0**	**0**
15:30	15:45	0	0	**0**	1	0	**1**	**1**
15:45	16:00	0	0	**0**	0	0	**0**	**0**
16:00	16:15	0	0	**0**	0	0	**0**	**0**
16:15	16:30	4	0	**4**	0	0	**0**	**4**
16:30	16:45	0	0	**0**	0	0	**0**	**0**
16:45	17:00	0	0	**0**	1	0	**1**	**1**
17:00	17:15	0	0	**0**	0	0	**0**	**0**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	0	0	**0**	0	0	**0**	**0**
17:45	18:00	0	0	**0**	0	0	**0**	**0**
Total		7	0	**7**	6	9	**15**	**22**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study Pedestrian Volume

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	1	2	**3**	0	0	**0**	**3**
07:15 07:30	1	0	**1**	1	0	**1**	**2**
07:30 07:45	3	4	**7**	0	0	**0**	**7**
07:45 08:00	1	2	**3**	0	0	**0**	**3**
08:00 08:15	0	5	**5**	0	0	**0**	**5**
08:15 08:30	0	1	**1**	0	0	**0**	**1**
08:30 08:45	0	1	**1**	0	0	**0**	**1**
08:45 09:00	1	5	**6**	0	0	**0**	**6**
09:00 09:15	0	1	**1**	1	0	**1**	**2**
09:15 09:30	2	2	**4**	0	0	**0**	**4**
09:30 09:45	1	0	**1**	0	0	**0**	**1**
09:45 10:00	1	1	**2**	0	0	**0**	**2**
11:30 11:45	2	1	**3**	1	0	**1**	**4**
11:45 12:00	2	0	**2**	1	0	**1**	**3**
12:00 12:15	7	2	**9**	0	0	**0**	**9**
12:15 12:30	1	1	**2**	0	1	**1**	**3**
12:30 12:45	1	1	**2**	2	0	**2**	**4**
12:45 13:00	3	1	**4**	1	0	**1**	**5**
13:00 13:15	1	4	**5**	0	0	**0**	**5**
13:15 13:30	0	2	**2**	1	0	**1**	**3**
15:00 15:15	0	1	**1**	1	0	**1**	**2**
15:15 15:30	1	1	**2**	0	0	**0**	**2**
15:30 15:45	1	2	**3**	3	0	**3**	**6**
15:45 16:00	0	2	**2**	1	0	**1**	**3**
16:00 16:15	2	1	**3**	1	0	**1**	**4**
16:15 16:30	4	3	**7**	1	0	**1**	**8**
16:30 16:45	0	0	**0**	0	0	**0**	**0**
16:45 17:00	4	0	**4**	2	0	**2**	**6**
17:00 17:15	0	4	**4**	0	1	**1**	**5**
17:15 17:30	2	2	**4**	1	0	**1**	**5**
17:30 17:45	2	0	**2**	0	0	**0**	**2**
17:45 18:00	2	6	**8**	4	0	**4**	**12**
Total	46	58	**104**	22	2	**24**	**128**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study Heavy Vehicles

		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	1	1	**2**	**3**	**3**
07:15	07:30	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	1	0	**1**	**3**	**3**
07:30	07:45	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	5	0	**5**	**8**	**8**
07:45	08:00	0	0	0	**0**	0	0	1	**1**	**1**	0	3	0	**3**	0	3	0	**3**	**6**	**7**
08:00	08:15	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	6	0	**6**	**8**	**8**
08:15	08:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	4	0	**4**	**7**	**7**
08:30	08:45	1	0	0	**1**	0	0	0	**0**	**1**	0	1	0	**1**	0	4	0	**4**	**5**	**6**
08:45	09:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	5	0	**5**	**7**	**7**
09:00	09:15	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	2	0	**2**	**4**	**4**
09:15	09:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	5	0	**5**	**8**	**8**
09:30	09:45	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	2	0	**2**	**3**	**3**
09:45	10:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	2	0	**2**	**4**	**4**
11:30	11:45	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	2	0	**2**	**3**	**3**
11:45	12:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	1	0	**1**	**3**	**3**
12:00	12:15	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	1	2	0	**3**	**5**	**5**
12:15	12:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	3	0	**3**	**6**	**6**
12:30	12:45	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	1	0	**1**	**2**	**2**
12:45	13:00	0	0	0	**0**	0	0	0	**0**	**0**	0	4	0	**4**	0	1	0	**1**	**5**	**5**
13:00	13:15	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	1	0	**1**	**3**	**3**
13:15	13:30	0	0	0	**0**	0	0	0	**0**	**0**	0	2	1	**3**	0	2	0	**2**	**5**	**5**
15:00	15:15	0	0	0	**0**	0	0	0	**0**	**0**	0	4	0	**4**	0	3	0	**3**	**7**	**7**
15:15	15:30	0	0	1	**1**	0	0	0	**0**	**1**	0	1	0	**1**	0	6	0	**6**	**7**	**8**
15:30	15:45	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	5	0	**5**	**7**	**7**
15:45	16:00	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	3	0	**3**	**3**	**3**
16:00	16:15	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	3	0	**3**	**5**	**5**
16:15	16:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	2	0	**2**	**5**	**5**
16:30	16:45	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	2	0	**2**	**2**	**2**
16:45	17:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	3	0	**3**	**5**	**5**
17:00	17:15	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	1	0	**1**	**2**	**2**
17:15	17:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	0	0	**0**	**0**	**0**
17:30	17:45	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	1	0	**1**	**2**	**2**
17:45	18:00	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	0	0	**0**	**3**	**3**
Total:	None	1	0	1	**2**	0	0	1	**1**	**3**	0	61	1	**62**	1	82	1	**84**	**146**	**149**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NORTH BOWESVILLE RD @ UPLANDS DR

Survey Date: Tuesday, November 26, 2019 **WO No:** 39101

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

Full Study 15 Minute U-Turn Total

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	**0**
07:15	07:30	0	0	0	0	**0**
07:30	07:45	0	0	0	0	**0**
07:45	08:00	0	0	0	0	**0**
08:00	08:15	0	0	0	0	**0**
08:15	08:30	0	0	0	0	**0**
08:30	08:45	0	0	0	0	**0**
08:45	09:00	0	0	1	0	**1**
09:00	09:15	0	0	0	0	**0**
09:15	09:30	0	0	0	0	**0**
09:30	09:45	0	0	0	0	**0**
09:45	10:00	0	0	0	0	**0**
11:30	11:45	0	0	0	0	**0**
11:45	12:00	0	0	0	0	**0**
12:00	12:15	0	0	0	0	**0**
12:15	12:30	0	0	0	0	**0**
12:30	12:45	0	0	0	0	**0**
12:45	13:00	0	0	0	0	**0**
13:00	13:15	0	0	0	0	**0**
13:15	13:30	0	0	0	0	**0**
15:00	15:15	0	0	0	0	**0**
15:15	15:30	0	0	0	0	**0**
15:30	15:45	0	0	0	0	**0**
15:45	16:00	0	0	0	0	**0**
16:00	16:15	0	0	0	0	**0**
16:15	16:30	0	0	0	0	**0**
16:30	16:45	0	0	0	0	**0**
16:45	17:00	0	0	0	0	**0**
17:00	17:15	0	0	0	0	**0**
17:15	17:30	0	0	0	0	**0**
17:30	17:45	0	0	0	0	**0**
17:45	18:00	0	0	0	0	**0**
Total		0	0	1	0	**1**

Transportation Services - Traffic Services

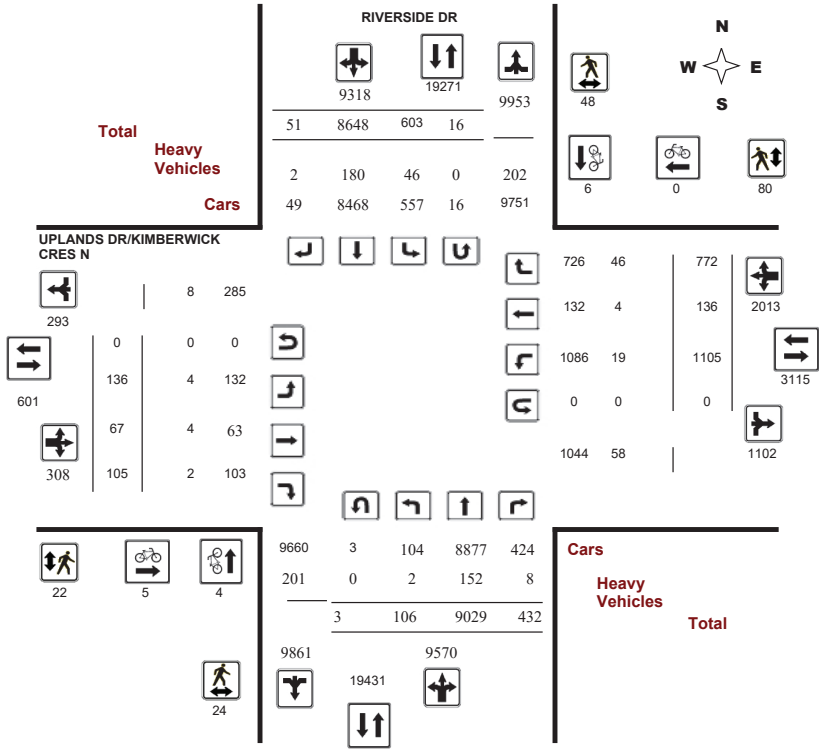
Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study Diagram



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

Transportation Services - Traffic Services

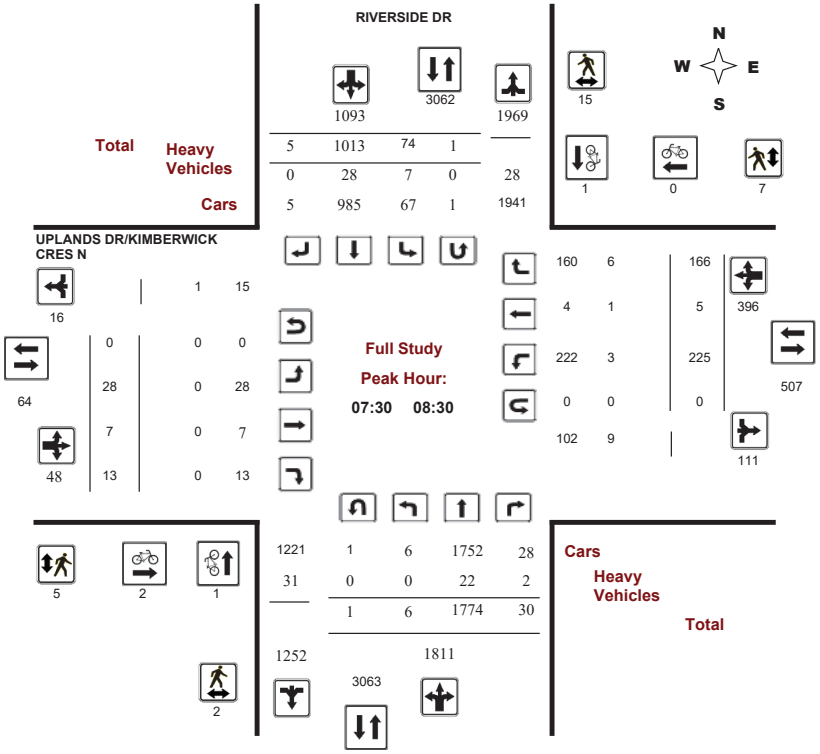
Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study Peak Hour Diagram



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

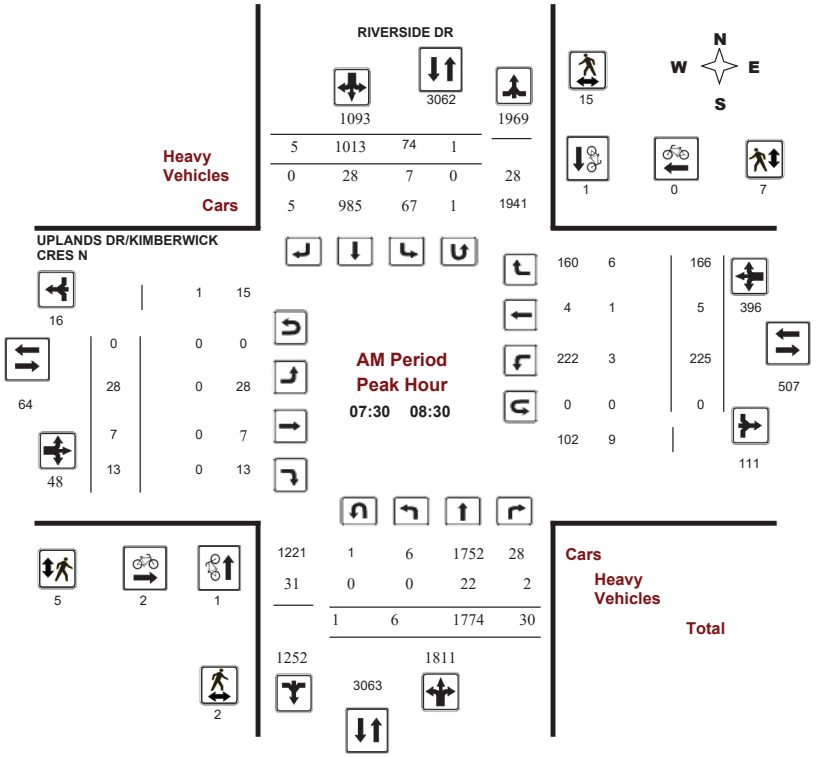
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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



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

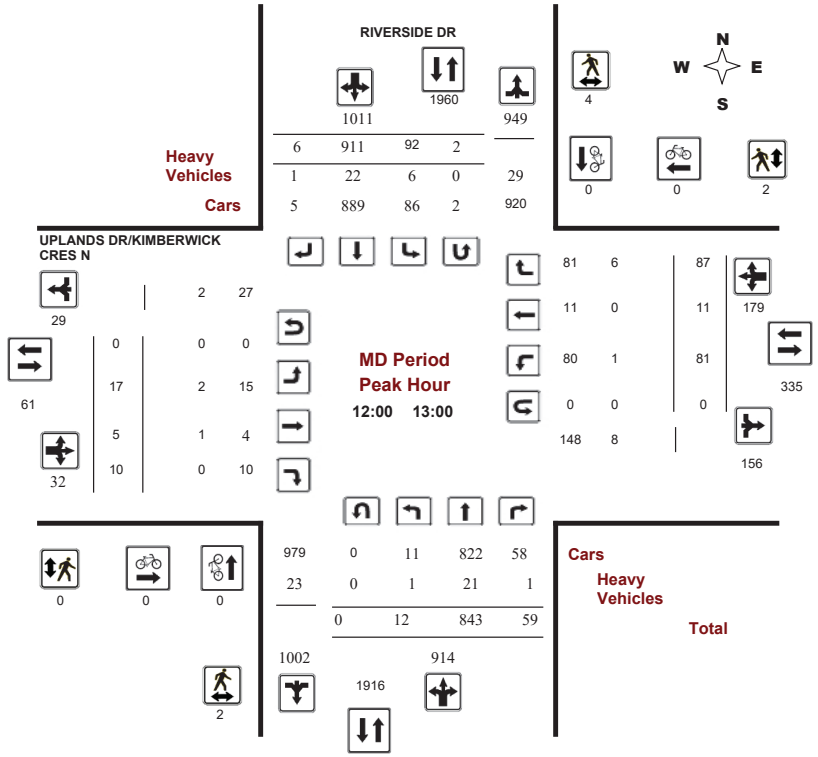
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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



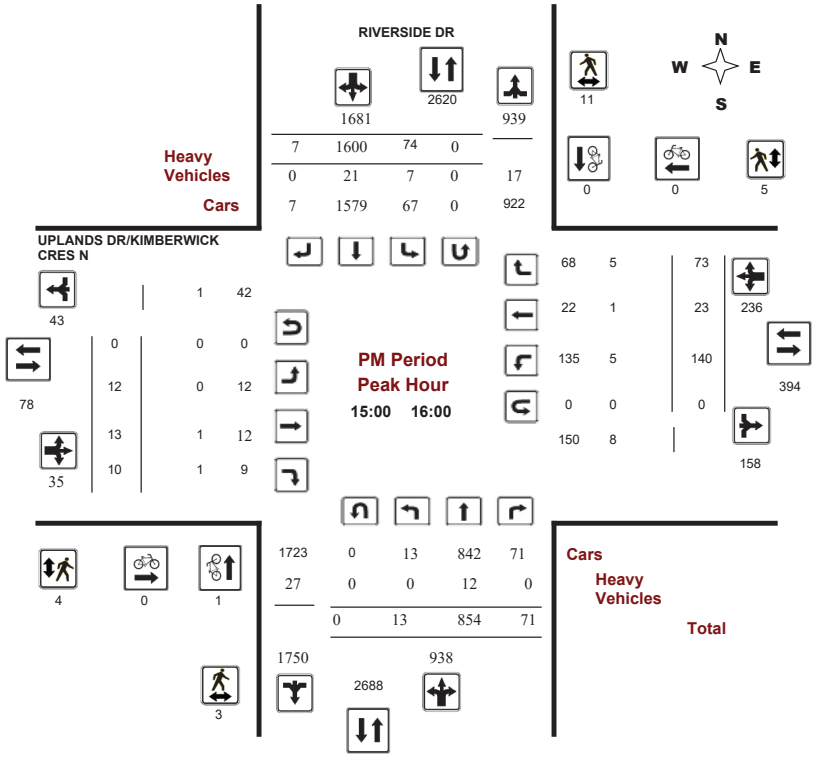
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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



Transportation Services - Traffic Services

Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, January 22, 202

Total Observed U-Turns

Northbound: 3 Southbound: 16

Eastbound: 0 Westbound: 0

AADT Factor

1.00

	RIVERSIDE DR									UPLANDS DR/KIMBERWICK CRES N									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	2	1871	19	**1892**	40	859	5	**904**	**2796**	18	8	9	**35**	159	1	133	**293**	**328**	**3124**
08:00 09:00	8	1690	24	**1722**	100	945	6	**1051**	**2773**	27	3	14	**44**	202	9	149	**360**	**404**	**3177**
09:00 10:00	7	1234	49	**1290**	117	758	13	**888**	**2178**	27	7	4	**38**	100	7	102	**209**	**247**	**2425**
11:30 12:30	15	837	44	**896**	72	913	8	**993**	**1889**	15	6	10	**31**	80	7	85	**172**	**203**	**2092**
12:30 13:30	15	761	69	**845**	86	954	6	**1046**	**1891**	15	5	12	**32**	84	13	73	**170**	**202**	**2093**
15:00 16:00	13	854	71	**938**	74	1600	7	**1681**	**2619**	12	13	10	**35**	140	23	73	**236**	**271**	**2890**
16:00 17:00	21	855	86	**962**	42	1280	4	**1326**	**2288**	10	11	24	**45**	188	45	73	**306**	**351**	**2639**
17:00 18:00	25	927	70	**1022**	72	1339	2	**1413**	**2435**	12	14	22	**48**	152	31	84	**267**	**315**	**2750**
Sub Total	106	9029	432	**9567**	603	8648	51	**9302**	**18869**	136	67	105	**308**	1105	136	772	**2013**	**2321**	**21190**
U Turns	3			**3**	16			**16**	**19**	**0**			**0**	0			**0**	**0**	**19**
Total	109	9029	432	**9570**	619	8648	51	**9318**	**18888**	136	67	105	**308**	1105	136	772	**2013**	**2321**	**21209**
EQ 12Hr	152	12550	600	**13302**	860	12021	71	**12952**	**26254**	189	93	146	**428**	1536	189	1073	**2798**	**3226**	**29480**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	152	12550	600	**13302**	860	12021	71	**12952**	**26254**	189	93	146	**428**	1536	189	1073	**2798**	**3226**	**29480**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**1.00**					
AVG 24Hr	199	16440	786	**17425**	1127	15748	93	**16968**	**34393**	248	122	191	**561**	2012	248	1406	**3666**	**4227**	**38620**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

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

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study 15 Minute Increments

		RIVERSIDE DR									UPLANDS DR/KIMBERWICK CRES N									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	509	4	513	7	151	1	159	**672**	2	1	0	3	22	0	25	47	**50**	**722**
07:15	07:30	1	473	6	480	7	206	1	214	**694**	2	1	2	5	25	0	22	47	**52**	**746**
07:30	07:45	2	427	6	435	12	230	2	244	**679**	9	4	3	16	49	1	55	105	**121**	**800**
07:45	08:00	0	462	3	465	14	272	1	287	**752**	5	2	4	11	63	0	31	94	**105**	**857**
08:00	08:15	3	427	8	438	19	261	0	280	**718**	7	1	3	11	51	2	42	95	**106**	**824**
08:15	08:30	2	458	13	473	30	250	2	282	**755**	7	0	3	10	62	2	38	102	**112**	**867**
08:30	08:45	1	437	2	440	17	202	1	220	**660**	6	1	4	11	52	5	39	96	**107**	**767**
08:45	09:00	2	368	1	371	36	232	3	271	**642**	7	1	4	12	37	0	30	67	**79**	**721**
09:00	09:15	1	328	10	339	31	184	4	219	**558**	8	1	3	12	31	1	30	62	**74**	**632**
09:15	09:30	1	315	10	326	39	213	3	255	**581**	5	1	0	6	26	3	28	57	**63**	**644**
09:30	09:45	3	307	11	321	24	191	3	218	**539**	7	2	0	9	22	1	22	45	**54**	**593**
09:45	10:00	2	284	18	304	26	170	3	199	**503**	7	3	1	11	21	2	22	45	**56**	**559**
11:30	11:45	0	210	8	218	17	222	3	242	**460**	5	1	2	8	23	0	25	48	**56**	**516**
11:45	12:00	9	202	11	222	10	235	3	248	**470**	4	3	4	11	17	3	18	38	**49**	**519**
12:00	12:15	3	206	16	225	24	233	0	257	**482**	3	0	2	5	17	3	26	46	**51**	**533**
12:15	12:30	4	219	9	232	24	223	2	249	**481**	3	2	2	7	23	1	16	40	**47**	**528**
12:30	12:45	3	232	11	246	21	222	3	246	**492**	4	2	3	9	21	2	19	42	**51**	**543**
12:45	13:00	2	186	23	211	25	233	1	259	**470**	7	1	3	11	20	5	26	51	**62**	**532**
13:00	13:15	7	164	13	184	19	216	2	237	**421**	4	0	4	8	27	5	17	49	**57**	**478**
13:15	13:30	3	179	22	204	22	283	0	305	**509**	0	2	2	4	16	1	11	28	**32**	**541**
15:00	15:15	4	219	20	243	22	433	3	458	**701**	5	3	6	14	28	4	30	62	**76**	**777**
15:15	15:30	2	222	19	243	18	408	3	429	**672**	2	6	0	8	36	5	11	52	**60**	**732**
15:30	15:45	5	211	17	233	13	413	1	427	**660**	2	1	3	6	27	7	15	49	**55**	**715**
15:45	16:00	2	202	15	219	21	346	0	367	**586**	3	3	1	7	49	7	17	73	**80**	**666**
16:00	16:15	7	227	16	250	7	334	1	342	**592**	1	4	2	7	52	8	16	76	**83**	**675**
16:15	16:30	2	222	20	244	10	325	1	336	**580**	3	0	7	10	46	9	18	73	**83**	**663**
16:30	16:45	8	189	24	221	15	298	1	314	**535**	4	4	10	18	40	15	22	77	**95**	**630**
16:45	17:00	5	217	26	248	13	323	1	337	**585**	2	3	5	10	50	13	17	80	**90**	**675**
17:00	17:15	6	214	21	241	8	294	0	302	**543**	1	3	7	11	45	9	18	72	**83**	**626**
17:15	17:30	3	224	16	243	23	351	0	374	**617**	3	6	3	12	41	6	21	68	**80**	**697**
17:30	17:45	8	239	19	266	25	333	1	359	**625**	5	1	6	12	37	11	30	78	**90**	**715**
17:45	18:00	8	250	14	272	20	361	1	382	**654**	3	4	6	13	29	5	15	49	**62**	**716**
Total:		109	9029	432	9570	619	8648	51	9318	**18888**	136	67	105	308	1105	136	772	2013	**18888**	**21,209**

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study Cyclist Volume

Time Period		RIVERSIDE DR			UPLANDS DR/KIMBERWICK CRES N			
		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	**0**	0	0	**0**	**0**
07:15	07:30	0	0	**0**	0	0	**0**	**0**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	0	0	**0**	**0**
08:00	08:15	1	0	**1**	0	0	**0**	**1**
08:15	08:30	0	1	**1**	2	0	**2**	**3**
08:30	08:45	0	1	**1**	1	0	**1**	**2**
08:45	09:00	0	1	**1**	0	0	**0**	**1**
09:00	09:15	0	0	**0**	1	0	**1**	**1**
09:15	09:30	0	1	**1**	1	0	**1**	**2**
09:30	09:45	0	0	**0**	0	0	**0**	**0**
09:45	10:00	0	1	**1**	0	0	**0**	**1**
11:30	11:45	0	0	**0**	0	0	**0**	**0**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	0	**0**	0	0	**0**	**0**
12:15	12:30	0	0	**0**	0	0	**0**	**0**
12:30	12:45	0	0	**0**	0	0	**0**	**0**
12:45	13:00	0	0	**0**	0	0	**0**	**0**
13:00	13:15	0	0	**0**	0	0	**0**	**0**
13:15	13:30	0	0	**0**	0	0	**0**	**0**
15:00	15:15	0	0	**0**	0	0	**0**	**0**
15:15	15:30	1	0	**1**	0	0	**0**	**1**
15:30	15:45	0	0	**0**	0	0	**0**	**0**
15:45	16:00	0	0	**0**	0	0	**0**	**0**
16:00	16:15	0	0	**0**	0	0	**0**	**0**
16:15	16:30	0	0	**0**	0	0	**0**	**0**
16:30	16:45	0	0	**0**	0	0	**0**	**0**
16:45	17:00	1	0	**1**	0	0	**0**	**1**
17:00	17:15	0	0	**0**	0	0	**0**	**0**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	1	1	**2**	0	0	**0**	**2**
17:45	18:00	0	0	**0**	0	0	**0**	**0**
Total		4	6	**10**	5	0	**5**	**15**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study Pedestrian Volume

Time Period		RIVERSIDE DR			UPLANDS DR/KIMBERWICK CRES N			
		NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00	07:15	0	2	**2**	4	0	**4**	**6**
07:15	07:30	2	1	**3**	0	2	**2**	**5**
07:30	07:45	2	3	**5**	2	0	**2**	**7**
07:45	08:00	0	3	**3**	0	0	**0**	**3**
08:00	08:15	0	2	**2**	1	2	**3**	**5**
08:15	08:30	0	7	**7**	2	5	**7**	**14**
08:30	08:45	2	2	**4**	1	4	**5**	**9**
08:45	09:00	2	1	**3**	0	3	**3**	**6**
09:00	09:15	1	0	**1**	0	3	**3**	**4**
09:15	09:30	1	1	**2**	1	1	**2**	**4**
09:30	09:45	0	1	**1**	0	0	**0**	**1**
09:45	10:00	1	3	**4**	2	0	**2**	**6**
11:30	11:45	2	2	**4**	3	2	**5**	**9**
11:45	12:00	0	1	**1**	0	9	**9**	**10**
12:00	12:15	0	2	**2**	0	0	**0**	**2**
12:15	12:30	1	2	**3**	0	1	**1**	**4**
12:30	12:45	1	0	**1**	0	0	**0**	**1**
12:45	13:00	0	0	**0**	0	1	**1**	**1**
13:00	13:15	1	0	**1**	0	1	**1**	**2**
13:15	13:30	0	0	**0**	0	1	**1**	**1**
15:00	15:15	2	3	**5**	2	0	**2**	**7**
15:15	15:30	0	6	**6**	0	1	**1**	**7**
15:30	15:45	0	1	**1**	0	1	**1**	**2**
15:45	16:00	1	1	**2**	2	3	**5**	**7**
16:00	16:15	0	2	**2**	0	3	**3**	**5**
16:15	16:30	0	0	**0**	1	5	**6**	**6**
16:30	16:45	0	0	**0**	0	3	**3**	**3**
16:45	17:00	0	0	**0**	1	2	**3**	**3**
17:00	17:15	2	1	**3**	0	10	**10**	**13**
17:15	17:30	1	0	**1**	0	7	**7**	**8**
17:30	17:45	1	1	**2**	0	4	**4**	**6**
17:45	18:00	1	0	**1**	0	6	**6**	**7**
Total	.....	24	48	**72**	22	80	**102**	**174**

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

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study Heavy Vehicles

		RIVERSIDE DR									UPLANDS DR/KIMBERWICK CRES N									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	8	0	**8**	1	4	0	**5**	**13**	0	0	0	**0**	0	0	1	**1**	**1**	**14**
07:15	07:30	0	4	0	**4**	1	3	0	**4**	**8**	0	0	0	**0**	0	0	2	**2**	**2**	**10**
07:30	07:45	0	4	1	**5**	2	4	0	**6**	**11**	0	0	0	**0**	2	0	2	**4**	**4**	**15**
07:45	08:00	0	6	0	**6**	2	7	0	**9**	**15**	0	0	0	**0**	0	0	0	**0**	**0**	**15**
08:00	08:15	0	7	1	**8**	3	11	0	**14**	**22**	0	0	0	**0**	0	1	1	**2**	**2**	**24**
08:15	08:30	0	5	0	**5**	0	6	0	**6**	**11**	0	0	0	**0**	1	0	3	**4**	**4**	**15**
08:30	08:45	0	8	1	**9**	1	5	0	**6**	**15**	0	0	0	**0**	2	1	6	**9**	**9**	**24**
08:45	09:00	0	6	0	**6**	2	6	0	**8**	**14**	0	0	0	**0**	0	0	2	**2**	**2**	**16**
09:00	09:15	0	7	0	**7**	2	9	0	**11**	**18**	0	0	0	**0**	0	0	1	**1**	**1**	**19**
09:15	09:30	0	4	0	**4**	2	4	0	**6**	**10**	0	0	0	**0**	0	0	1	**1**	**1**	**11**
09:30	09:45	0	6	1	**7**	1	11	0	**12**	**19**	1	0	0	**1**	0	0	1	**1**	**2**	**21**
09:45	10:00	0	6	0	**6**	1	6	1	**8**	**14**	0	1	0	**1**	0	0	1	**1**	**2**	**16**
11:30	11:45	0	4	0	**4**	2	5	0	**7**	**11**	0	0	0	**0**	0	0	1	**1**	**1**	**12**
11:45	12:00	1	5	0	**6**	2	13	0	**15**	**21**	0	0	1	**1**	0	0	1	**1**	**2**	**23**
12:00	12:15	0	4	0	**4**	1	5	0	**6**	**10**	0	0	0	**0**	1	0	2	**3**	**3**	**13**
12:15	12:30	0	7	0	**7**	2	3	0	**5**	**12**	0	0	0	**0**	0	0	1	**1**	**1**	**13**
12:30	12:45	1	6	0	**7**	2	7	1	**10**	**17**	2	0	0	**2**	0	0	2	**2**	**4**	**21**
12:45	13:00	0	4	1	**5**	1	7	0	**8**	**13**	0	1	0	**1**	0	0	1	**1**	**2**	**15**
13:00	13:15	0	5	0	**5**	1	5	0	**6**	**11**	0	0	0	**0**	0	0	1	**1**	**1**	**12**
13:15	13:30	0	5	1	**6**	2	10	0	**12**	**18**	0	0	0	**0**	1	0	1	**2**	**2**	**20**
15:00	15:15	0	3	0	**3**	2	11	0	**13**	**16**	0	1	1	**2**	2	0	2	**4**	**6**	**22**
15:15	15:30	0	1	0	**1**	2	5	0	**7**	**8**	0	0	0	**0**	1	1	1	**3**	**3**	**11**
15:30	15:45	0	2	0	**2**	1	3	0	**4**	**6**	0	0	0	**0**	1	0	1	**2**	**2**	**8**
15:45	16:00	0	6	0	**6**	2	2	0	**4**	**10**	0	0	0	**0**	1	0	1	**2**	**2**	**12**
16:00	16:15	0	5	1	**6**	0	7	0	**7**	**13**	0	0	0	**0**	4	0	2	**6**	**6**	**19**
16:15	16:30	0	4	1	**5**	1	5	0	**6**	**11**	0	0	0	**0**	2	0	0	**2**	**2**	**13**
16:30	16:45	0	6	0	**6**	2	2	0	**4**	**10**	0	0	0	**0**	1	1	2	**4**	**4**	**14**
16:45	17:00	0	4	0	**4**	0	4	0	**4**	**8**	1	0	0	**1**	0	0	1	**1**	**2**	**10**
17:00	17:15	0	2	0	**2**	2	6	0	**8**	**10**	0	0	0	**0**	0	0	2	**2**	**2**	**12**
17:15	17:30	0	1	0	**1**	1	3	0	**4**	**5**	0	1	0	**1**	0	0	1	**1**	**2**	**7**
17:30	17:45	0	1	0	**1**	1	1	0	**2**	**3**	0	0	0	**0**	0	0	1	**1**	**1**	**4**
17:45	18:00	0	6	0	**6**	1	0	0	**1**	**7**	0	0	0	**0**	0	0	1	**1**	**1**	**8**
Total:	None	2	152	8	**162**	46	180	2	**228**	**390**	4	4	2	**10**	19	4	46	**69**	**79**	**469**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N

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

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

Full Study 15 Minute U-Turn Total

		RIVERSIDE DR	UPLANDS DR/KIMBERWICK CRES N			
Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	**0**
07:15	07:30	0	0	0	0	**0**
07:30	07:45	1	0	0	0	**1**
07:45	08:00	0	0	0	0	**0**
08:00	08:15	0	0	0	0	**0**
08:15	08:30	0	1	0	0	**1**
08:30	08:45	0	0	0	0	**0**
08:45	09:00	0	1	0	0	**1**
09:00	09:15	0	0	0	0	**0**
09:15	09:30	0	2	0	0	**2**
09:30	09:45	0	1	0	0	**1**
09:45	10:00	0	0	0	0	**0**
11:30	11:45	0	0	0	0	**0**
11:45	12:00	1	1	0	0	**2**
12:00	12:15	0	0	0	0	**0**
12:15	12:30	0	2	0	0	**2**
12:30	12:45	0	0	0	0	**0**
12:45	13:00	0	0	0	0	**0**
13:00	13:15	0	0	0	0	**0**
13:15	13:30	0	1	0	0	**1**
15:00	15:15	0	0	0	0	**0**
15:15	15:30	0	0	0	0	**0**
15:30	15:45	0	0	0	0	**0**
15:45	16:00	0	0	0	0	**0**
16:00	16:15	0	0	0	0	**0**
16:15	16:30	0	0	0	0	**0**
16:30	16:45	1	1	0	0	**2**
16:45	17:00	0	2	0	0	**2**
17:00	17:15	0	0	0	0	**0**
17:15	17:30	0	3	0	0	**3**
17:30	17:45	0	1	0	0	**1**
17:45	18:00	0	0	0	0	**0**
Total		3	16	0	0	**19**

Appendix C

Synchro and SimTraffic Intersection Worksheets – Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	229	5	169	7	1774	30	75	1013	5
Future Volume (vph)	28	7	13	229	5	169	7	1774	30	75	1013	5
Satd. Flow (prot)	1658	1563	0	0	1656	1455	1658	3304	0	1551	3280	0
Flt Permitted	0.398				0.715		0.250			0.055		
Satd. Flow (perm)	687	1563	0	0	1240	1410	435	3304	0	90	3280	0
Satd. Flow (RTOR)		14				188		2			1	
Lane Group Flow (vph)	31	22	0	0	260	188	8	2004	0	83	1132	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	34.5	34.5		34.5	34.5	34.5	31.1	31.1		11.1	31.1	
Total Split (s)	35.0	35.0		35.0	35.0	35.0	65.0	65.0		20.0	85.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%	29.2%	54.2%	54.2%		16.7%	70.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.7	3.7		3.7	3.7	
All-Red Time (s)	3.2	3.2		3.2	3.2	3.2	2.4	2.4		2.4	2.4	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5			6.5	6.5	6.1	6.1		6.1	6.1	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	27.3	27.3			27.3	27.3	68.1	68.1		80.1	80.1	
Actuated g/C Ratio	0.23	0.23			0.23	0.23	0.57	0.57		0.67	0.67	
v/c Ratio	0.20	0.06			0.93	0.40	0.03	1.07		0.52	0.52	
Control Delay	40.5	20.9			82.9	8.0	14.9	69.3		27.0	11.4	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	40.5	20.9			82.9	8.0	14.9	69.3		27.0	11.4	
LOS	D	C			F	A	B	E		C	B	
Approach Delay		32.4			51.5			69.1			12.4	
Approach LOS		C			D			E			B	
Queue Length 50th (m)	5.9	1.5			59.4	0.0	0.9	~286.7		6.5	67.4	
Queue Length 95th (m)	14.8	8.2			#106.7	18.0	3.6	#344.6		21.4	83.1	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	163	381			294	478	246	1875		229	2189	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.19	0.06			0.88	0.39	0.03	1.07		0.36	0.52	

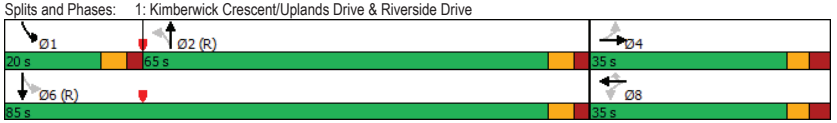
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 48.0	Intersection LOS: D
Intersection Capacity Utilization 94.8%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	74	35	30	411	0	5	0	4	0	0	2
Future Vol, veh/h	0	74	35	30	411	0	5	0	4	0	0	2
Conflicting Peds, #/hr	9	0	1	1	0	9	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	12	2	2	4	2	20	2	2	2	2	50
Mvmt Flow	0	82	39	33	457	0	6	0	4	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	466	0	0	122	0	0	627	635	103	636	654	466
Stage 1	-	-	-	-	-	-	103	103	-	532	532	-
Stage 2	-	-	-	-	-	-	524	532	-	104	122	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.3	6.52	6.22	7.12	6.52	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.68	4.018	3.318	3.518	4.018	3.75
Pot Cap-1 Maneuver	1095	-	-	1465	-	-	372	396	952	391	386	509
Stage 1	-	-	-	-	-	-	861	810	-	531	526	-
Stage 2	-	-	-	-	-	-	505	526	-	902	795	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1087	-	-	1464	-	-	362	381	951	378	371	505
Mov Cap-2 Maneuver	-	-	-	-	-	-	362	381	-	378	371	-
Stage 1	-	-	-	-	-	-	860	809	-	527	507	-
Stage 2	-	-	-	-	-	-	488	507	-	898	794	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.5	12.4	12.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	499	1087	-	-	1464	-	-	505
HCM Lane V/C Ratio	0.02	-	-	-	0.023	-	-	0.004
HCM Control Delay (s)	12.4	0	-	-	7.5	0	-	12.2
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	12	13	10	163	23	90	13	854	71	74	1600	7
Future Volume (vph)	12	13	10	163	23	90	13	854	71	74	1600	7
Satd. Flow (prot)	1658	1516	0	0	1640	1414	1658	3268	0	1551	3312	0
Flt Permitted	0.449				0.735		0.095			0.206		
Satd. Flow (perm)	776	1516	0	0	1254	1376	166	3268	0	336	3312	0
Satd. Flow (RTOR)		11				100		9			1	
Lane Group Flow (vph)	13	25	0	0	207	100	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	25.0	25.0			25.0	25.0	78.6	78.6		92.4	92.4	
Actuated g/C Ratio	0.19	0.19			0.19	0.19	0.60	0.60		0.71	0.71	
v/c Ratio	0.09	0.08			0.86	0.29	0.14	0.52		0.26	0.76	
Control Delay	42.5	27.9			81.3	10.0	17.4	16.6		8.6	15.2	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.5	27.9			81.3	10.0	17.4	16.6		8.6	15.2	
LOS	D	C			F	A	B	B		A	B	
Approach Delay		32.9			58.1			16.6			14.9	
Approach LOS		C			E			B			B	
Queue Length 50th (m)	2.7	2.9			50.6	0.0	1.5	78.7		6.2	146.1	
Queue Length 95th (m)	8.5	10.4			#86.0	14.4	5.8	102.7		11.8	182.1	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	170	340			274	379	100	1978		415	2353	
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	0.08	0.07			0.76	0.26	0.14	0.52		0.20	0.76	

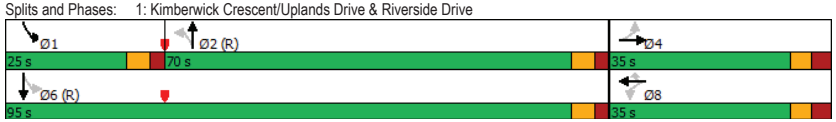
Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 90.1%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	154	6	24	255	0	36	0	25	0	0	0
Future Vol, veh/h	0	154	6	24	255	0	36	0	25	0	0	0
Conflicting Peds, #/hr	4	0	10	10	0	4	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	5	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	0	171	7	27	283	0	40	0	28	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	287	0	0	188	0	0	526	526	185	530	529	291
Stage 1	-	-	-	-	-	-	185	185	-	341	341	-
Stage 2	-	-	-	-	-	-	341	341	-	189	188	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1275	-	-	1386	-	-	462	457	857	460	455	748
Stage 1	-	-	-	-	-	-	817	747	-	674	639	-
Stage 2	-	-	-	-	-	-	674	639	-	813	745	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1271	-	-	1375	-	-	449	441	850	436	440	743
Mov Cap-2 Maneuver	-	-	-	-	-	-	449	441	-	436	440	-
Stage 1	-	-	-	-	-	-	810	741	-	672	622	-
Stage 2	-	-	-	-	-	-	656	622	-	786	739	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.7	12.4	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	557	1271	-	-	1375	-	-	-
HCM Lane V/C Ratio	0.122	-	-	-	0.019	-	-	-
HCM Control Delay (s)	12.4	0	-	-	7.7	0	-	0
HCM Lane LOS	B	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	-

SimTraffic Simulation Summary
Existing 10/20/2022

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:15	8:15	8:15	8:15
Total Time (min)	60	60	60	60
Time Recorded (min)	30	30	30	30
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1664	1739	1779	1727
Vehs Exited	1653	1718	1808	1726
Starting Vehs	60	57	110	73
Ending Vehs	71	78	81	75
Denied Entry Before	0	1	8	3
Denied Entry After	0	0	4	1
Travel Distance (km)	795	834	874	834
Travel Time (hr)	24.0	27.5	37.7	29.7
Total Delay (hr)	9.9	12.8	22.3	15.0
Total Stops	791	922	1255	988
Fuel Used (l)	75.8	81.7	97.3	84.9

Interval #0 Information Seeding

Start Time	7:15
End Time	7:45
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:15
Total Time (min)	30

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	1664	1739	1779	1727
Vehs Exited	1653	1718	1808	1726
Starting Vehs	60	57	110	73
Ending Vehs	71	78	81	75
Denied Entry Before	0	1	8	3
Denied Entry After	0	0	4	1
Travel Distance (km)	795	834	874	834
Travel Time (hr)	24.0	27.5	37.7	29.7
Total Delay (hr)	9.9	12.8	22.3	15.0
Total Stops	791	922	1255	988
Fuel Used (l)	75.8	81.7	97.3	84.9

SimTraffic Performance Report
Existing 10/20/2022

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Entered	14	2	5	108	10	88	3	926	17	42	495	3
Vehicles Exited	14	2	5	108	10	88	2	925	16	42	494	3
Hourly Exit Rate	28	4	10	216	20	176	4	1850	32	84	988	6
Input Volume	28	7	13	229	20	169	7	1774	30	75	1013	5
% of Volume	100	57	77	94	100	104	57	104	107	112	98	120
Denied Entry Before	0	0	0	0	0	0	0	3	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	1	0	0	0	0

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	All
Vehicles Entered	1713
Vehicles Exited	1709
Hourly Exit Rate	3418
Input Volume	3370
% of Volume	101
Denied Entry Before	3
Denied Entry After	1

2: N Bowesville & Uplands Drive Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBR	All
Vehicles Entered	41	20	11	203	3	3	1	282
Vehicles Exited	41	20	11	202	3	3	1	281
Hourly Exit Rate	82	40	22	404	6	6	2	562
Input Volume	78	35	30	411	5	4	2	565
% of Volume	105	114	73	98	120	150	100	99
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

Total Network Performance

Vehicles Entered	1727
Vehicles Exited	1726
Hourly Exit Rate	3452
Input Volume	7469
% of Volume	46
Denied Entry Before	3
Denied Entry After	1

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

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)	21.1	11.2	59.5	44.5	8.0	217.5	217.8	30.0	58.4	52.9
Average Queue (m)	6.4	3.2	38.8	18.0	1.3	146.7	136.6	15.1	35.8	24.2
95th Queue (m)	17.7	10.5	58.6	33.9	6.0	253.8	247.9	29.3	58.4	47.6
Link Distance (m)		157.9		77.5		271.3	271.3		210.2	210.2
Upstream Blk Time (%)						4	4			
Queuing Penalty (veh)						0	0			
Storage Bay Dist (m)	28.0		60.0		47.5			185.0		
Storage Blk Time (%)			1	0		29				
Queuing Penalty (veh)			1	0		2				

Intersection: 2: N Bowesville & Uplands Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	3.4	12.5	15.1
Average Queue (m)	0.2	2.3	1.2
95th Queue (m)	1.9	9.1	7.7
Link Distance (m)	44.6	89.6	23.9
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 3

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

Phase	1	2	4	6	8
Movement(s) Served	SBL	NBTL	EBTL	SBTL	WBTL
Maximum Green (s)	13.9	58.9	28.5	78.9	28.5
Minimum Green (s)	5.0	10.0	10.0	10.0	10.0
Recall	None	C-Max	None	C-Max	None
Avg. Green (s)	8.3	75.3	22.7	85.1	22.7
g/C Ratio	-0.01	NA	NA	NA	NA
Cycles Skipped (%)	33	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0
Cycles Maxed Out (%)	0	100	20	100	20
Cycles with Peds (%)	0	21	0	14	33

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Appendix D

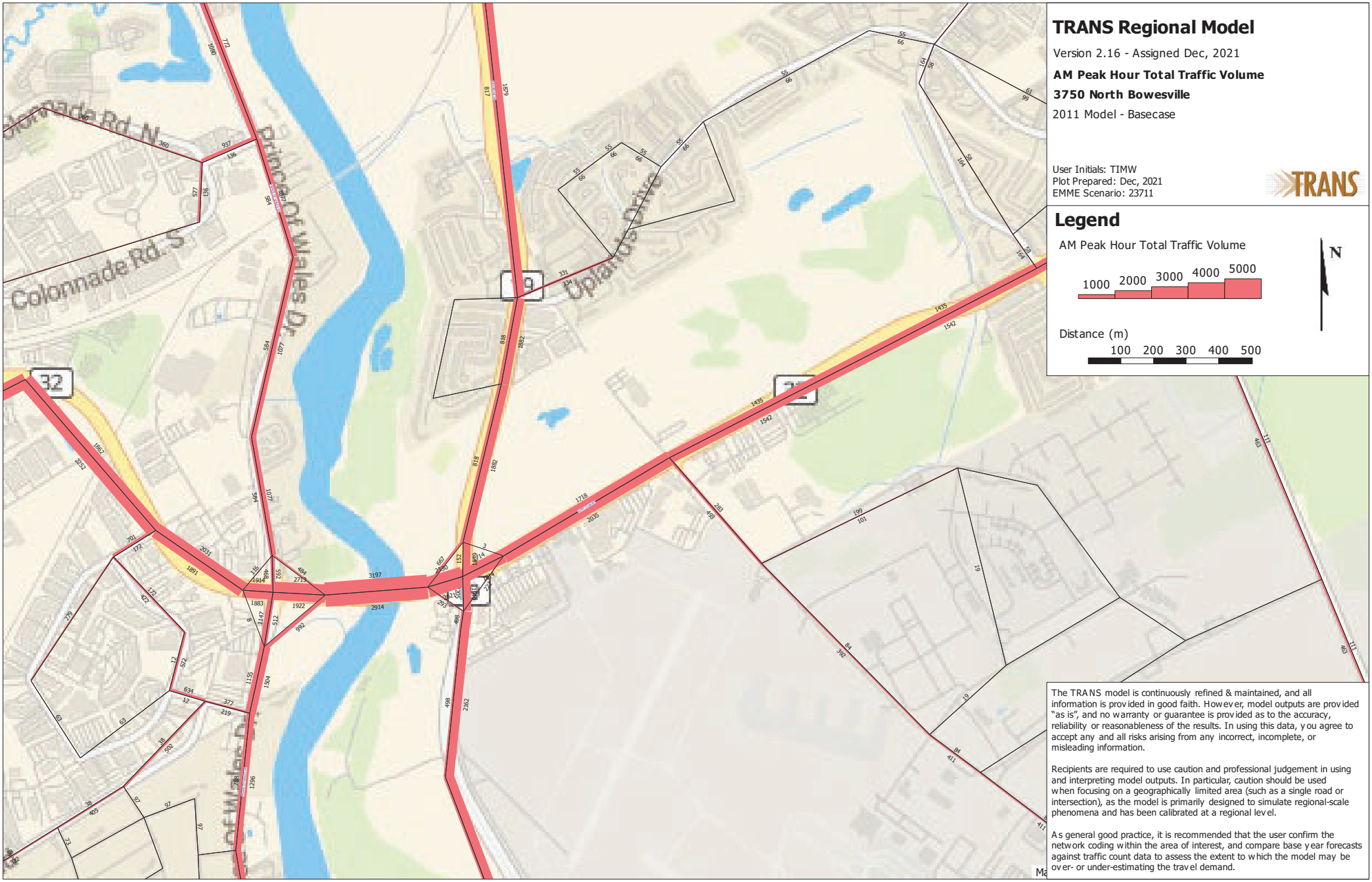
Collision Data

CGH TRANSPORTATION

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition
2017-01-04	2017	7:31	BUCKINGHAM PRIV @ UPLANDS DR	03 - Snow	03 - Dawn	02 - Stop sign		03 - P.D. only	05 - Turning movement	04 - Slush
2017-04-20	2017	17:00	UPLANDS DR btwn RIVERSIDE DR & NORTH BOWESVILLE RD	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	05 - Turning movement	01 - Dry
2015-02-22	2015	9:54	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	03 - Rear end	05 - Packed snow
2015-10-13	2015	10:35	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	02 - Rain	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	02 - Wet
2015-05-07	2015	4:22	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	07 - SMV other	01 - Dry
2015-08-09	2015	15:42	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2015-06-18	2015	11:09	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-09-04	2015	8:05	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-12-23	2015	17:39	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	02 - Rain	07 - Dark	01 - Traffic signal		03 - P.D. only	05 - Turning movement	02 - Wet
2015-11-22	2015	18:11	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-08-09	2015	15:05	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2015-09-05	2015	1:28	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2016-10-28	2016	20:54	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	07 - Dark	01 - Traffic signal		02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-04-06	2016	18:32	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	03 - Snow	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	03 - Loose snow
2016-05-11	2016	9:28	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-08-13	2016	14:17	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2016-06-15	2016	17:30	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2016-07-02	2016	15:24	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-06-13	2017	12:13	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	01 - Dry
2017-08-21	2017	14:00	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-01-25	2017	10:53	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2017-04-06	2017	7:36	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	02 - Wet
2017-12-25	2017	21:03	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N	03 - Snow	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	04 - Slush
2018-03-02	2018	17:37	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-03-08	2018	19:23	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	03 - Snow	07 - Dark	01 - Traffic signal		03 - P.D. only	07 - SMV other	05 - Packed snow
2018-03-08	2018	18:30	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	04 - Freezing Rain	05 - Dusk	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2018-04-20	2018	17:00	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2018-05-08	2018	20:42	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-05-30	2018	14:08	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2018-06-27	2018	17:50	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-11-01	2018	10:39	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2018-11-26	2018	15:55	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	99 - Other	02 - Wet
2019-09-05	2019	17:20	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2019-11-18	2019	14:24	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2019-12-04	2019	7:51	RIVERSIDE DR @ UPLANDS DR/KIMBERWICK CRES N (0006890)	03 - Snow	03 - Dawn	01 - Traffic signal		03 - P.D. only	03 - Rear end	03 - Loose snow

Appendix E

TRANS Model Plots



TRANS Regional Model

Version 2.16 - Assigned Dec, 2021

AM Peak Hour Total Traffic Volume

3750 North Bowesville

2011 Model - Basecase

User Initials: TIMW
Plot Prepared: Dec, 2021
EMME Scenario: 23711

TRANS

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

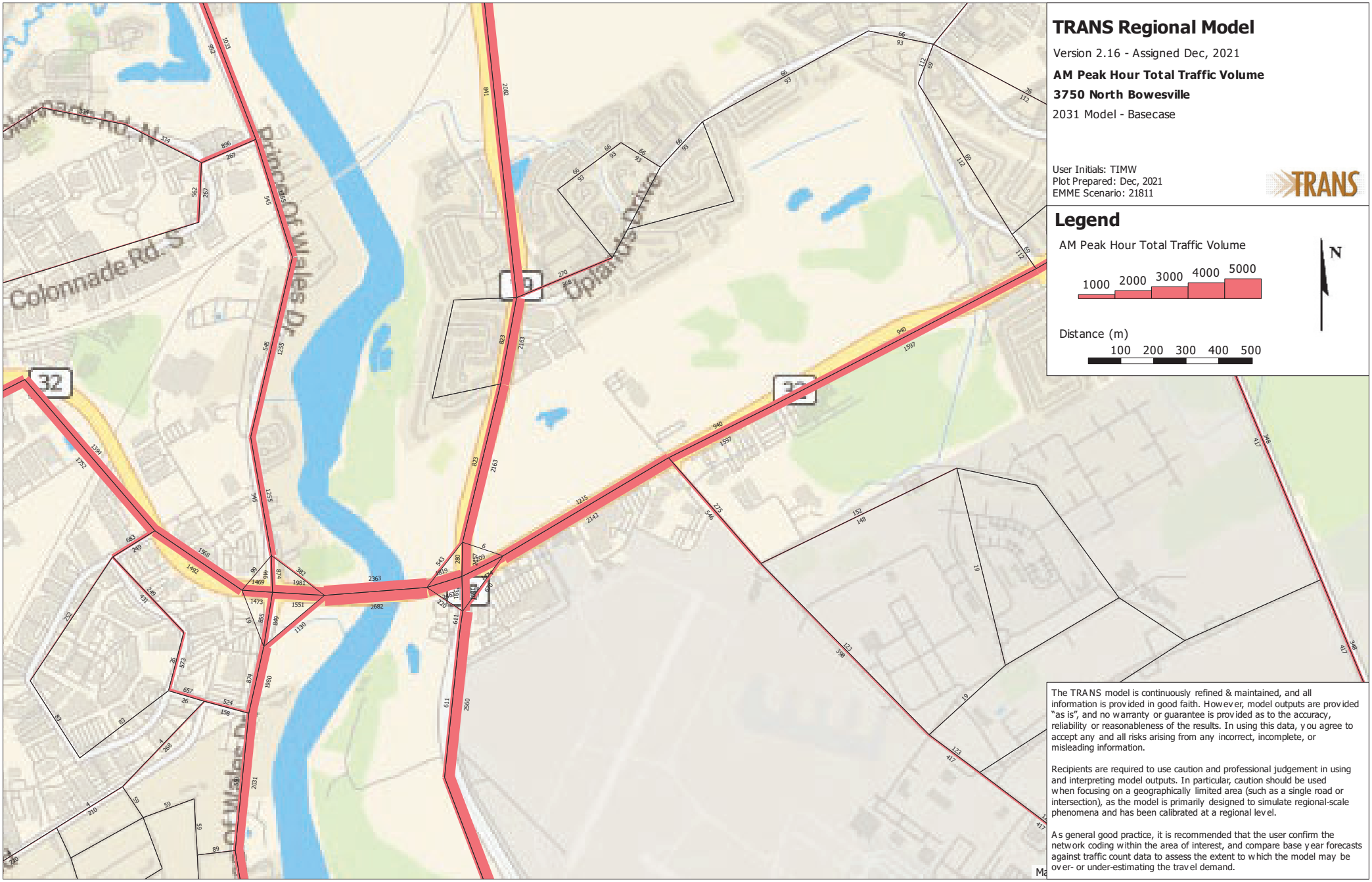
Distance (m)

100 200 300 400 500

The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.



TRANS Regional Model

Version 2.16 - Assigned Dec, 2021

AM Peak Hour Total Traffic Volume

3750 North Bowesville

2031 Model - Basecase

User Initials: TIMW
Plot Prepared: Dec, 2021
EMME Scenario: 21811

TRANS

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

Distance (m)

100 200 300 400 500

The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

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As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.

Appendix F

Background Development Volumes

CGH TRANSPORTATION

3.1.3. TRIP ASSIGNMENT

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

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

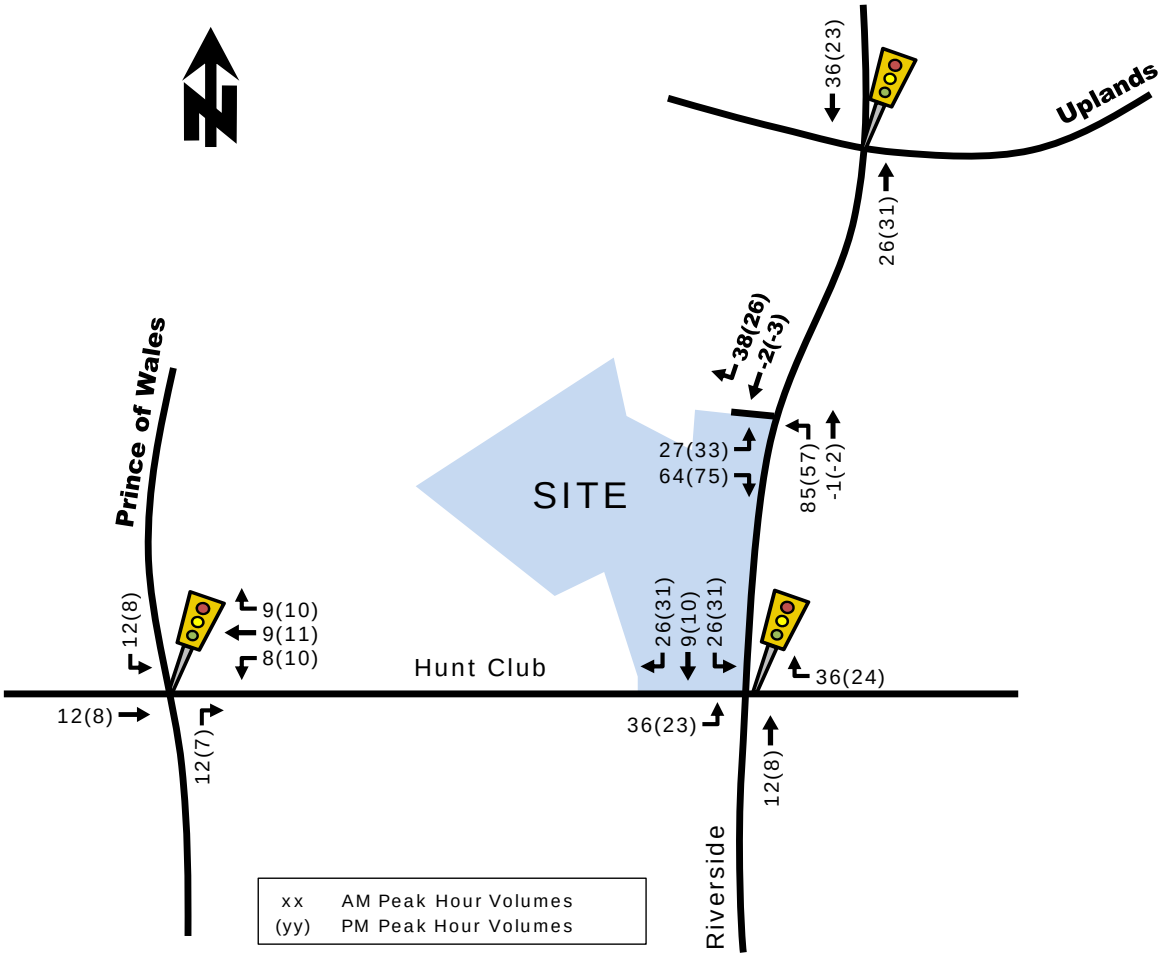
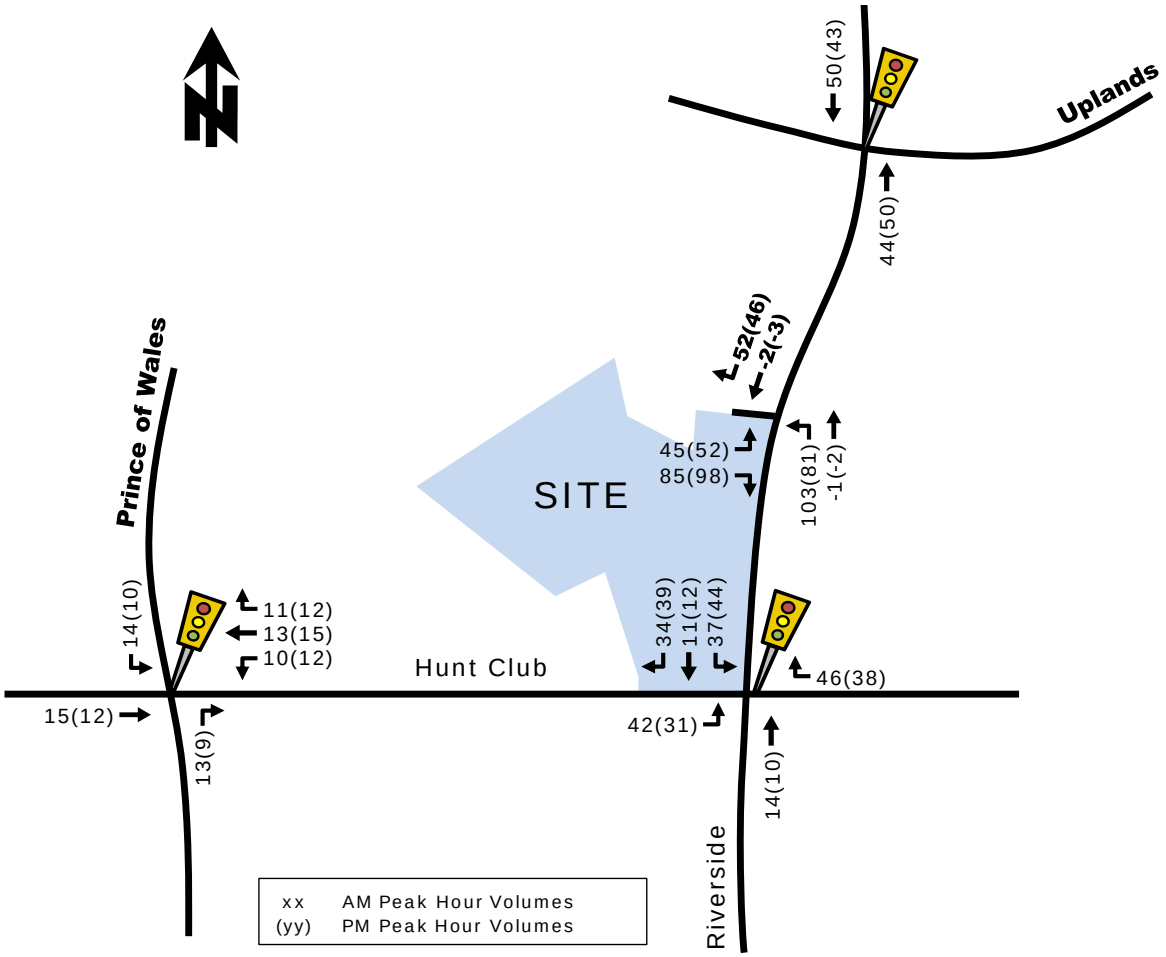


Figure 7: Phases 1 and 2 'New' and 'Pass-by' Site-Generated Traffic



Appendix G

Synchro and SimTraffic Intersection Worksheets – 2026 Future Background Conditions

CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	229	5	169	7	1872	30	75	1063	5
Future Volume (vph)	28	7	13	229	5	169	7	1872	30	75	1063	5
Satd. Flow (prot)	1658	1557	0	0	1657	1455	1658	3305	0	1551	3280	0
Flt Permitted	0.433				0.716		0.268			0.053		
Satd. Flow (perm)	746	1557	0	0	1242	1410	466	3305	0	87	3280	0
Satd. Flow (RTOR)		13				169		2			1	
Lane Group Flow (vph)	28	20	0	0	234	169	7	1902	0	75	1068	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	25.8	25.8			25.8	25.8	70.0	70.0		81.6	81.6	
Actuated g/C Ratio	0.22	0.22			0.22	0.22	0.58	0.58		0.68	0.68	
v/c Ratio	0.17	0.06			0.88	0.39	0.03	0.99		0.49	0.48	
Control Delay	39.9	21.1			77.0	8.2	14.3	43.9		25.3	10.4	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	39.9	21.1			77.0	8.2	14.3	43.9		25.3	10.4	
LOS	D	C			E	A	B	D		C	B	
Approach Delay		32.1			48.2			43.8			11.3	
Approach LOS		C			D			D			B	
Queue Length 50th (m)	5.3	1.3			52.1	0.0	0.7	~258.7		5.9	61.7	
Queue Length 95th (m)	13.5	7.6			#91.9	16.9	3.3	#315.0		19.2	76.4	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	177	379			294	463	271	1929		228	2231	
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			0.80	0.37	0.03	0.99		0.33	0.48	

Intersection Summary

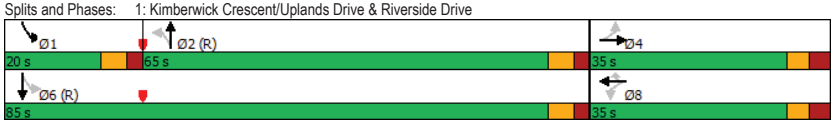
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 33.5	Intersection LOS: C
Intersection Capacity Utilization 97.6%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	76	35	30	411	0	5	0	4	0	0	2
Future Vol, veh/h	0	76	35	30	411	0	5	0	4	0	0	2
Conflicting Peds, #/hr	9	0	1	1	0	9	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	12	2	2	4	2	20	2	2	2	2	50
Mvmt Flow	0	76	35	30	411	0	5	0	4	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	420	0	0	112	0	0	567	575	95	576	592	420
Stage 1	-	-	-	-	-	-	95	95	-	480	480	-
Stage 2	-	-	-	-	-	-	472	480	-	96	112	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.3	6.52	6.22	7.12	6.52	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.68	4.018	3.318	3.518	4.018	3.75
Pot Cap-1 Maneuver	1139	-	-	1478	-	-	408	429	962	428	419	542
Stage 1	-	-	-	-	-	-	869	816	-	567	554	-
Stage 2	-	-	-	-	-	-	540	554	-	911	803	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1131	-	-	1477	-	-	398	414	961	415	405	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	398	414	-	415	405	-
Stage 1	-	-	-	-	-	-	868	815	-	563	536	-
Stage 2	-	-	-	-	-	-	524	536	-	907	802	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.5	11.8	11.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	538	1131	-	-	1477	-	-	538
HCM Lane V/C Ratio	0.017	-	-	-	0.02	-	-	0.004
HCM Control Delay (s)	11.8	0	-	-	7.5	0	-	11.7
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

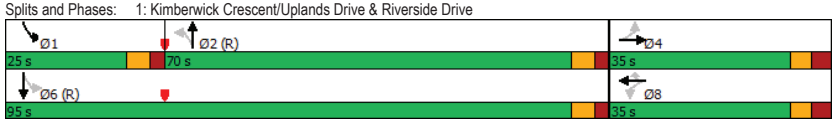
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	163	24	90	13	904	71	74	1692	7
Future Volume (vph)	12	13	10	163	24	90	13	904	71	74	1692	7
Satd. Flow (prot)	1658	1518	0	0	1640	1414	1658	3272	0	1551	3312	0
Flt Permitted	0.481				0.737		0.112			0.229		
Satd. Flow (perm)	830	1518	0	0	1257	1376	195	3272	0	374	3312	0
Satd. Flow (RTOR)		10				90		9			1	
Lane Group Flow (vph)	12	23	0	0	187	90	13	975	0	74	1699	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	23.5	23.5			23.5	23.5	82.8	82.8		93.9	93.9	
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.64	0.64		0.72	0.72	
v/c Ratio	0.08	0.08			0.83	0.28	0.10	0.47		0.22	0.71	
Control Delay	42.7	28.4			78.7	10.4	15.2	14.5		7.7	13.2	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.7	28.4			78.7	10.4	15.2	14.5		7.7	13.2	
LOS	D	C			E	B	B	B		A	B	
Approach Delay		33.3			56.5			14.5			12.9	
Approach LOS		C			E			B			B	
Queue Length 50th (m)	2.6	2.8			46.1	0.0	1.3	68.1		5.1	120.8	
Queue Length 95th (m)	8.0	10.2			71.0	13.8	5.4	94.8		10.8	163.4	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	181	340			275	371	124	2086		441	2393	
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			0.68	0.24	0.10	0.47		0.17	0.71	

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: 0.83

Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 92.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	154	6	24	263	0	36	0	25	0	0	0
Future Vol, veh/h	0	154	6	24	263	0	36	0	25	0	0	0
Conflicting Peds, #/hr	4	0	10	10	0	4	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	5	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	0	154	6	24	263	0	36	0	25	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	267	0	0	170	0	0	482	482	167	485	485	271
Stage 1	-	-	-	-	-	-	167	167	-	315	315	-
Stage 2	-	-	-	-	-	-	315	315	-	170	170	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1297	-	-	1407	-	-	495	484	877	492	482	768
Stage 1	-	-	-	-	-	-	835	760	-	696	656	-
Stage 2	-	-	-	-	-	-	696	656	-	832	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1293	-	-	1396	-	-	482	469	870	469	467	763
Mov Cap-2 Maneuver	-	-	-	-	-	-	482	469	-	469	467	-
Stage 1	-	-	-	-	-	-	828	754	-	694	641	-
Stage 2	-	-	-	-	-	-	680	641	-	808	752	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.6	11.8	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	590	1293	-	-	1396	-	-	-
HCM Lane V/C Ratio	0.103	-	-	-	0.017	-	-	-
HCM Control Delay (s)	11.8	0	-	-	7.6	0	-	0
HCM Lane LOS	B	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	-

SimTraffic Simulation Summary
2026 Future Background 10/20/2022

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:15	8:15	8:15	8:15
Total Time (min)	60	60	60	60
Time Recorded (min)	30	30	30	30
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1751	1754	1771	1759
Vehs Exited	1737	1774	1773	1761
Starting Vehs	56	77	76	69
Ending Vehs	70	57	74	64
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0
Travel Distance (km)	843	856	852	851
Travel Time (hr)	26.1	28.5	26.2	26.9
Total Delay (hr)	11.2	13.5	11.1	12.0
Total Stops	872	985	844	900
Fuel Used (l)	81.2	85.6	82.5	83.1

Interval #0 Information Seeding

Start Time	7:15
End Time	7:45
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:15
Total Time (min)	30

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	1751	1754	1771	1759
Vehs Exited	1737	1774	1773	1761
Starting Vehs	56	77	76	69
Ending Vehs	70	57	74	64
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0
Travel Distance (km)	843	856	852	851
Travel Time (hr)	26.1	28.5	26.2	26.9
Total Delay (hr)	11.2	13.5	11.1	12.0
Total Stops	872	985	844	900
Fuel Used (l)	81.2	85.6	82.5	83.1

SimTraffic Performance Report
2026 Future Background 10/20/2022

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Entered	13	6	4	105	12	88	3	896	19	44	550	1
Vehicles Exited	13	6	4	104	12	88	4	904	18	43	548	1
Hourly Exit Rate	26	12	8	208	24	176	8	1808	36	86	1096	2
Input Volume	28	7	13	229	20	169	7	1872	30	75	1063	5
% of Volume	93	171	62	91	120	104	114	97	120	115	103	40
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	All
Vehicles Entered	1741
Vehicles Exited	1745
Hourly Exit Rate	3490
Input Volume	3518
% of Volume	99
Denied Entry Before	0
Denied Entry After	0

2: N Bowesville & Uplands Drive Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBR	All
Vehicles Entered	42	26	14	201	4	2	1	290
Vehicles Exited	42	25	14	201	4	2	1	289
Hourly Exit Rate	84	50	28	402	8	4	2	578
Input Volume	78	35	30	411	5	4	2	565
% of Volume	108	143	93	98	160	100	100	102
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

Total Network Performance

Vehicles Entered	1759
Vehicles Exited	1761
Hourly Exit Rate	3522
Input Volume	7767
% of Volume	45
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

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)	14.8	13.4	68.8	32.9	5.4	179.2	168.9	39.7	72.1	55.2
Average Queue (m)	5.8	4.2	39.0	15.8	0.9	121.9	112.4	16.6	40.3	29.9
95th Queue (m)	15.5	12.4	62.3	28.2	4.9	177.5	166.4	32.7	65.1	57.6
Link Distance (m)		157.9	77.0	77.0		271.3	271.3		210.2	210.2
Upstream Blk Time (%)			0							
Queuing Penalty (veh)			0							
Storage Bay Dist (m)	28.0				47.5			185.0		
Storage Blk Time (%)						28				
Queuing Penalty (veh)						2				

Intersection: 2: N Bowesville & Uplands Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	11.5	14.8	9.3
Average Queue (m)	2.4	2.9	0.6
95th Queue (m)	10.9	10.4	5.4
Link Distance (m)	45.1	91.5	22.0
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 2

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

Phase	1	2	4	6	8
Movement(s) Served	SBL	NBTL	EBTL	SBTL	WBTL
Maximum Green (s)	13.9	58.9	28.5	78.9	28.5
Minimum Green (s)	5.0	10.0	10.0	10.0	10.0
Recall	None	C-Max	None	C-Max	None
Avg. Green (s)	8.4	73.5	23.8	83.6	23.8
g/C Ratio	-0.01	NA	NA	NA	NA
Cycles Skipped (%)	38	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0
Cycles Maxed Out (%)	0	100	27	100	27
Cycles with Peds (%)	0	14	7	21	33

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Appendix H

Synchro and SimTraffic Intersection Worksheets – 2031 Future Background Conditions

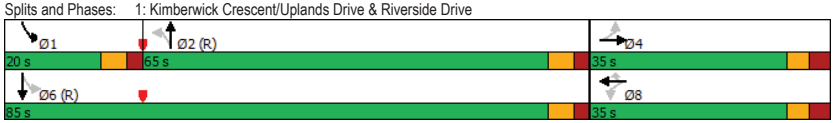
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	229	5	169	7	1918	30	75	1063	5
Future Volume (vph)	28	7	13	229	5	169	7	1918	30	75	1063	5
Satd. Flow (prot)	1658	1557	0	0	1657	1455	1658	3305	0	1551	3280	0
Flt Permitted	0.433				0.716		0.268			0.053		
Satd. Flow (perm)	746	1557	0	0	1242	1410	466	3305	0	87	3280	0
Satd. Flow (RTOR)		13				169		2			1	
Lane Group Flow (vph)	28	20	0	0	234	169	7	1948	0	75	1068	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	25.8	25.8			25.8	25.8	70.0	70.0		81.6	81.6	
Actuated g/C Ratio	0.22	0.22			0.22	0.22	0.58	0.58		0.68	0.68	
v/c Ratio	0.17	0.06			0.88	0.39	0.03	1.01		0.49	0.48	
Control Delay	39.9	21.1			77.0	8.2	14.3	49.7		25.3	10.4	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	39.9	21.1			77.0	8.2	14.3	49.7		25.3	10.4	
LOS	D	C			E	A	B	D		C	B	
Approach Delay		32.1			48.2			49.5			11.3	
Approach LOS		C			D			D			B	
Queue Length 50th (m)	5.3	1.3			52.1	0.0	0.7	~270.8		5.9	61.7	
Queue Length 95th (m)	13.5	7.6			#91.9	16.9	3.3	#326.8		19.2	76.4	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	177	379			294	463	271	1929		228	2231	
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			0.80	0.37	0.03	1.01		0.33	0.48	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01
Intersection Signal Delay: 36.8 Intersection LOS: D
Intersection Capacity Utilization 99.0% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	78	35	30	411	0	5	0	4	0	0	2
Future Vol, veh/h	0	78	35	30	411	0	5	0	4	0	0	2
Conflicting Peds, #/hr	9	0	1	1	0	9	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	12	2	2	4	2	20	2	2	2	2	50
Mvmt Flow	0	78	35	30	411	0	5	0	4	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	420	0	0	114	0	0	569	577	97	578	594	420
Stage 1	-	-	-	-	-	-	97	97	-	480	480	-
Stage 2	-	-	-	-	-	-	472	480	-	98	114	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.3	6.52	6.22	7.12	6.52	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.68	4.018	3.318	3.518	4.018	3.75
Pot Cap-1 Maneuver	1139	-	-	1475	-	-	407	427	959	427	418	542
Stage 1	-	-	-	-	-	-	867	815	-	567	554	-
Stage 2	-	-	-	-	-	-	540	554	-	908	801	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1131	-	-	1474	-	-	397	412	958	414	404	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	397	412	-	414	404	-
Stage 1	-	-	-	-	-	-	866	814	-	563	536	-
Stage 2	-	-	-	-	-	-	524	536	-	904	800	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.5	11.8	11.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	537	1131	-	-	1474	-	-	538
HCM Lane V/C Ratio	0.017	-	-	-	0.02	-	-	0.004
HCM Control Delay (s)	11.8	0	-	-	7.5	0	-	11.7
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

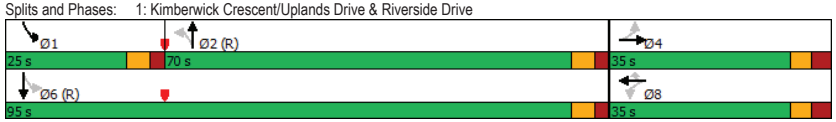
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	163	24	90	13	904	71	74	1733	7
Future Volume (vph)	12	13	10	163	24	90	13	904	71	74	1733	7
Satd. Flow (prot)	1658	1518	0	0	1640	1414	1658	3272	0	1551	3312	0
Flt Permitted	0.481				0.737		0.104			0.229		
Satd. Flow (perm)	830	1518	0	0	1257	1376	181	3272	0	374	3312	0
Satd. Flow (RTOR)		10				90		9			1	
Lane Group Flow (vph)	12	23	0	0	187	90	13	975	0	74	1740	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	23.5	23.5			23.5	23.5	82.8	82.8		93.9	93.9	
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.64	0.64		0.72	0.72	
v/c Ratio	0.08	0.08			0.83	0.28	0.11	0.47		0.22	0.73	
Control Delay	42.7	28.4			78.7	10.4	15.7	14.5		7.7	13.6	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.7	28.4			78.7	10.4	15.7	14.5		7.7	13.6	
LOS	D	C			E	B	B	B		A	B	
Approach Delay		33.3			56.5			14.5			13.4	
Approach LOS		C			E			B			B	
Queue Length 50th (m)	2.6	2.8			46.1	0.0	1.3	68.1		5.1	127.1	
Queue Length 95th (m)	8.0	10.2			71.0	13.8	5.5	94.8		10.8	171.9	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	181	340			275	371	115	2086		441	2393	
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			0.68	0.24	0.11	0.47		0.17	0.73	

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

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 17.8	Intersection LOS: B
Intersection Capacity Utilization 94.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	154	6	24	269	0	36	0	25	0	0	0
Future Vol, veh/h	0	154	6	24	269	0	36	0	25	0	0	0
Conflicting Peds, #/hr	4	0	10	10	0	4	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	5	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	0	154	6	24	269	0	36	0	25	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	273	0	0	170	0	0	488	488	167	491	491	277
Stage 1	-	-	-	-	-	-	167	167	-	321	321	-
Stage 2	-	-	-	-	-	-	321	321	-	170	170	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1290	-	-	1407	-	-	490	480	877	488	478	762
Stage 1	-	-	-	-	-	-	835	760	-	691	652	-
Stage 2	-	-	-	-	-	-	691	652	-	832	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1286	-	-	1396	-	-	477	465	870	465	463	757
Mov Cap-2 Maneuver	-	-	-	-	-	-	477	465	-	465	463	-
Stage 1	-	-	-	-	-	-	828	754	-	689	637	-
Stage 2	-	-	-	-	-	-	675	637	-	808	752	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.6	11.9	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	585	1286	-	-	1396	-	-	-
HCM Lane V/C Ratio	0.104	-	-	-	0.017	-	-	-
HCM Control Delay (s)	11.9	0	-	-	7.6	0	-	0
HCM Lane LOS	B	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	-

SimTraffic Simulation Summary
2031 Future Background 10/20/2022

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:15	8:15	8:15	8:15
Total Time (min)	60	60	60	60
Time Recorded (min)	30	30	30	30
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1772	1809	1837	1806
Vehs Exited	1750	1759	1816	1775
Starting Vehs	54	55	86	64
Ending Vehs	76	105	107	97
Denied Entry Before	1	0	2	1
Denied Entry After	0	2	24	8
Travel Distance (km)	848	858	886	864
Travel Time (hr)	26.5	34.7	50.2	37.2
Total Delay (hr)	11.6	19.7	34.7	22.0
Total Stops	886	1264	1635	1262
Fuel Used (l)	82.0	92.5	110.9	95.1

Interval #0 Information Seeding

Start Time	7:15
End Time	7:45
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:15
Total Time (min)	30

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	1772	1809	1837	1806
Vehs Exited	1750	1759	1816	1775
Starting Vehs	54	55	86	64
Ending Vehs	76	105	107	97
Denied Entry Before	1	0	2	1
Denied Entry After	0	2	24	8
Travel Distance (km)	848	858	886	864
Travel Time (hr)	26.5	34.7	50.2	37.2
Total Delay (hr)	11.6	19.7	34.7	22.0
Total Stops	886	1264	1635	1262
Fuel Used (l)	82.0	92.5	110.9	95.1

SimTraffic Performance Report
2031 Future Background 10/20/2022

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Entered	15	3	6	104	8	87	5	978	15	36	531	2
Vehicles Exited	15	3	6	104	8	86	5	954	14	37	528	2
Hourly Exit Rate	30	6	12	208	16	172	10	1908	28	74	1056	4
Input Volume	28	7	13	229	20	169	7	1918	30	75	1063	5
% of Volume	107	86	92	91	80	102	143	99	93	99	99	80
Denied Entry Before	0	0	0	0	0	0	0	1	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	8	0	0	0	0

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	All
Vehicles Entered	1790
Vehicles Exited	1762
Hourly Exit Rate	3524
Input Volume	3564
% of Volume	99
Denied Entry Before	1
Denied Entry After	8

2: N Bowesville & Uplands Drive Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBR	All
Vehicles Entered	36	18	14	196	3	2	0	269
Vehicles Exited	36	18	14	195	3	2	0	268
Hourly Exit Rate	72	36	28	390	6	4	0	536
Input Volume	78	35	30	411	5	4	2	565
% of Volume	92	103	93	95	120	100	0	95
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

Total Network Performance

Vehicles Entered	1806
Vehicles Exited	1775
Hourly Exit Rate	3550
Input Volume	7861
% of Volume	45
Denied Entry Before	1
Denied Entry After	8

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

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)	20.8	11.2	79.3	38.4	44.1	238.3	234.4	41.6	67.3	59.0
Average Queue (m)	8.2	3.8	42.3	16.8	4.8	191.3	181.1	15.4	43.7	33.3
95th Queue (m)	18.0	11.0	69.3	32.0	25.9	311.4	310.8	32.3	68.1	60.7
Link Distance (m)		157.9	77.0	77.0		271.3	271.3		210.2	210.2
Upstream Blk Time (%)			1			16	15			
Queuing Penalty (veh)			2			0	0			
Storage Bay Dist (m)	28.0				47.5			185.0		
Storage Blk Time (%)	0					33				
Queuing Penalty (veh)	0					2				

Intersection: 2: N Bowesville & Uplands Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	13.6	14.4	4.6
Average Queue (m)	1.7	2.4	0.3
95th Queue (m)	8.5	9.7	3.7
Link Distance (m)	45.1	91.5	22.0
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 5

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

Phase	1	2	4	6	8
Movement(s) Served	SBL	NBTL	EBTL	SBTL	WBTL
Maximum Green (s)	13.9	58.9	28.5	78.9	28.5
Minimum Green (s)	5.0	10.0	10.0	10.0	10.0
Recall	None	C-Max	None	C-Max	None
Avg. Green (s)	8.5	73.9	24.8	82.8	24.8
g/C Ratio	-0.01	NA	NA	NA	NA
Cycles Skipped (%)	40	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0
Cycles Maxed Out (%)	0	100	20	100	20
Cycles with Peds (%)	0	21	7	21	40

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Appendix I

TDM Checklist

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

Legend

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

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

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

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

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

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

Appendix J

Synchro and SimTraffic Intersection Worksheets – 2026 Future Total Conditions

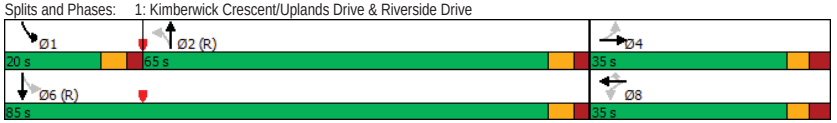
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	239	5	190	7	1872	35	84	1063	5
Future Volume (vph)	28	7	13	239	5	190	7	1872	35	84	1063	5
Satd. Flow (prot)	1658	1557	0	0	1657	1455	1658	3301	0	1551	3280	0
Flt Permitted	0.418				0.716		0.268			0.054		
Satd. Flow (perm)	721	1557	0	0	1242	1410	466	3301	0	88	3280	0
Satd. Flow (RTOR)		13				190		2			1	
Lane Group Flow (vph)	28	20	0	0	244	190	7	1907	0	84	1068	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	26.3	26.3			26.3	26.3	69.0	69.0		81.1	81.1	
Actuated g/C Ratio	0.22	0.22			0.22	0.22	0.58	0.58		0.68	0.68	
v/c Ratio	0.18	0.06			0.90	0.42	0.03	1.00		0.52	0.48	
Control Delay	39.9	21.1			79.3	8.2	14.7	49.0		27.7	10.6	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	39.9	21.1			79.3	8.2	14.7	49.0		27.7	10.6	
LOS	D	C			E	A	B	D		C	B	
Approach Delay		32.1			48.1			48.9			11.8	
Approach LOS		C			D			D			B	
Queue Length 50th (m)	5.3	1.3			54.8	0.0	0.7	~261.5		6.6	61.7	
Queue Length 95th (m)	13.6	7.6			#97.8	18.0	3.4	#320.0		22.0	76.4	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	171	379			294	479	267	1899		229	2216	
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			0.83	0.40	0.03	1.00		0.37	0.48	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00
Intersection Signal Delay: 36.5 — Intersection LOS: D
Intersection Capacity Utilization 98.6% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	76	49	35	411	0	36	0	14	0	0	2
Future Vol, veh/h	0	76	49	35	411	0	36	0	14	0	0	2
Conflicting Peds, #/hr	9	0	1	1	0	9	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	12	2	2	4	2	20	2	2	2	2	50
Mvmt Flow	0	76	49	35	411	0	36	0	14	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	420	0	0	126	0	0	584	592	102	598	616	420
Stage 1	-	-	-	-	-	-	102	102	-	490	490	-
Stage 2	-	-	-	-	-	-	482	490	-	108	126	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.3	6.52	6.22	7.12	6.52	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.68	4.018	3.318	3.518	4.018	3.75
Pot Cap-1 Maneuver	1139	-	-	1460	-	-	398	419	953	414	406	542
Stage 1	-	-	-	-	-	-	862	811	-	560	549	-
Stage 2	-	-	-	-	-	-	533	549	-	897	792	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1131	-	-	1459	-	-	387	403	952	395	390	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	387	403	-	395	390	-
Stage 1	-	-	-	-	-	-	861	810	-	556	528	-
Stage 2	-	-	-	-	-	-	515	528	-	884	791	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.6	13.7	11.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	464	1131	-	-	1459	-	-	538
HCM Lane V/C Ratio	0.108	-	-	-	0.024	-	-	0.004
HCM Control Delay (s)	13.7	0	-	-	7.5	0	-	11.7
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	170	24	105	13	904	81	94	1692	7
Future Volume (vph)	12	13	10	170	24	105	13	904	81	94	1692	7
Satd. Flow (prot)	1658	1518	0	0	1640	1414	1658	3268	0	1551	3312	0
Flt Permitted	0.469				0.736		0.113			0.221		
Satd. Flow (perm)	810	1518	0	0	1255	1376	197	3268	0	361	3312	0
Satd. Flow (RTOR)		10				105		10			1	
Lane Group Flow (vph)	12	23	0	0	194	105	13	985	0	94	1699	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	24.0	24.0			24.0	24.0	79.3	79.3		93.4	93.4	
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.61	0.61		0.72	0.72	
v/c Ratio	0.08	0.08			0.84	0.31	0.11	0.49		0.28	0.71	
Control Delay	42.5	28.3			79.3	10.0	15.8	15.9		8.4	13.5	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.5	28.3			79.3	10.0	15.8	15.9		8.4	13.5	
LOS	D	C			E	B	B	B		A	B	
Approach Delay		33.1			55.0			15.9			13.2	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	2.5	2.7			47.7	0.0	1.4	71.3		6.8	124.4	
Queue Length 95th (m)	8.0	10.2			#77.9	14.9	5.5	97.6		13.2	163.4	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	177	340			275	383	120	1996		432	2378	
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			0.71	0.27	0.11	0.49		0.22	0.71	

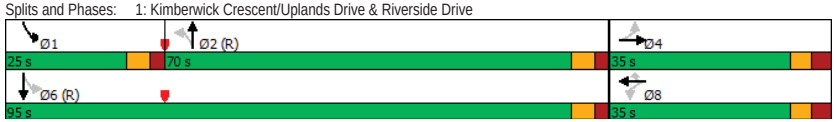
Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 93.1%	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.

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	154	36	34	263	0	58	0	32	0	0	0
Future Vol, veh/h	0	154	36	34	263	0	58	0	32	0	0	0
Conflicting Peds, #/hr	4	0	10	10	0	4	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	5	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	0	154	36	34	263	0	58	0	32	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	267	0	0	200	0	0	517	517	182	523	535	271
Stage 1	-	-	-	-	-	-	182	182	-	335	335	-
Stage 2	-	-	-	-	-	-	335	335	-	188	200	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1297	-	-	1372	-	-	469	462	861	465	452	768
Stage 1	-	-	-	-	-	-	820	749	-	679	643	-
Stage 2	-	-	-	-	-	-	679	643	-	814	736	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1293	-	-	1361	-	-	454	444	854	436	434	763
Mov Cap-2 Maneuver	-	-	-	-	-	-	454	444	-	436	434	-
Stage 1	-	-	-	-	-	-	813	743	-	677	622	-
Stage 2	-	-	-	-	-	-	657	622	-	783	730	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.9	12.9	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	545	1293	-	-	1361	-	-	-
HCM Lane V/C Ratio	0.165	-	-	-	0.025	-	-	-
HCM Control Delay (s)	12.9	0	-	-	7.7	0	-	0
HCM Lane LOS	B	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	-

SimTraffic Simulation Summary
2026 Future Total

10/20/2022

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:15	8:15	8:15	8:15
Total Time (min)	60	60	60	60
Time Recorded (min)	30	30	30	30
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1791	1767	1766	1774
Vehs Exited	1743	1824	1767	1778
Starting Vehs	63	94	70	75
Ending Vehs	111	37	69	72
Denied Entry Before	0	0	0	0
Denied Entry After	22	0	0	7
Travel Distance (km)	848	873	854	858
Travel Time (hr)	44.6	34.4	30.1	36.3
Total Delay (hr)	29.5	18.9	15.0	21.1
Total Stops	1441	1275	1106	1273
Fuel Used (l)	101.4	94.2	87.1	94.3

Interval #0 Information Seeding

Start Time	7:15
End Time	7:45
Total Time (min)	30

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:15
Total Time (min)	30

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	1791	1767	1766	1774
Vehs Exited	1743	1824	1767	1778
Starting Vehs	63	94	70	75
Ending Vehs	111	37	69	72
Denied Entry Before	0	0	0	0
Denied Entry After	22	0	0	7
Travel Distance (km)	848	873	854	858
Travel Time (hr)	44.6	34.4	30.1	36.3
Total Delay (hr)	29.5	18.9	15.0	21.1
Total Stops	1441	1275	1106	1273
Fuel Used (l)	101.4	94.2	87.1	94.3

SimTraffic Performance Report
2026 Future Total

10/20/2022

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Entered	11	4	6	113	8	97	3	927	14	43	526	2
Vehicles Exited	11	4	6	110	8	97	3	930	14	44	525	2
Hourly Exit Rate	22	8	12	220	16	194	6	1860	28	88	1050	4
Input Volume	28	7	13	239	20	190	7	1872	35	84	1063	5
% of Volume	79	114	92	92	80	102	86	99	80	105	99	80
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	7	0	0	0	0

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	All
Vehicles Entered	1754
Vehicles Exited	1754
Hourly Exit Rate	3508
Input Volume	3563
% of Volume	98
Denied Entry Before	0
Denied Entry After	7

2: N Bowesville & Uplands Drive Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBR	All
Vehicles Entered	37	25	15	198	18	6	1	300
Vehicles Exited	37	24	15	199	18	6	1	300
Hourly Exit Rate	74	48	30	398	36	12	2	600
Input Volume	77	49	35	411	36	14	2	624
% of Volume	96	98	86	97	100	86	100	96
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

3: Access #1 & N Bowesville Performance by movement

Movement	EBL	SBT	SBR	All
Vehicles Entered	22	29	11	62
Vehicles Exited	22	29	11	62
Hourly Exit Rate	44	58	22	124
Input Volume	41	66	18	125
% of Volume	107	88	122	99
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Vehicles Entered	1774
Vehicles Exited	1778
Hourly Exit Rate	3556
Input Volume	7967
% of Volume	45
Denied Entry Before	0
Denied Entry After	7

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

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)	15.0	8.9	75.1	47.1	23.5	279.7	267.4	39.6	77.0	74.6
Average Queue (m)	5.1	2.9	43.1	19.7	2.7	184.1	172.8	16.9	44.7	33.4
95th Queue (m)	13.1	9.4	74.1	37.6	18.5	301.7	294.2	32.9	73.0	65.6
Link Distance (m)		157.9	77.0	77.0		271.3	271.3		210.2	210.2
Upstream Blk Time (%)			2			8	8			
Queuing Penalty (veh)			4			0	0			
Storage Bay Dist (m)	28.0				47.5			185.0		
Storage Blk Time (%)						34				
Queuing Penalty (veh)						2				

Intersection: 2: N Bowesville & Uplands Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	19.2	19.9	12.0
Average Queue (m)	1.6	8.2	1.1
95th Queue (m)	11.6	17.6	7.1
Link Distance (m)	45.1	91.5	22.0
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Access #1 & N Bowesville

Movement	EB
Directions Served	LR
Maximum Queue (m)	11.3
Average Queue (m)	6.7
95th Queue (m)	13.6
Link Distance (m)	61.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 6

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

Phase	1	2	4	6	8
Movement(s) Served	SBL	NBTL	EBTL	SBTL	WBTL
Maximum Green (s)	13.9	58.9	28.5	78.9	28.5
Minimum Green (s)	5.0	10.0	10.0	10.0	10.0
Recall	None	C-Max	None	C-Max	None
Avg. Green (s)	9.5	71.7	25.8	81.3	25.8
g/C Ratio	-0.01	NA	NA	NA	NA
Cycles Skipped (%)	36	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0
Cycles Maxed Out (%)	0	100	33	100	33
Cycles with Peds (%)	0	29	0	21	47

Controller Summary
Average Cycle Length (s): NA

Number of Complete Cycles : 0

Appendix K

Synchro and SimTraffic Intersection Worksheets – 2031 Future Total Conditions

CGH TRANSPORTATION

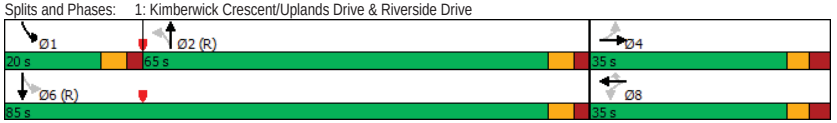
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	7	13	239	5	190	7	1918	35	84	1063	5
Future Volume (vph)	28	7	13	239	5	190	7	1918	35	84	1063	5
Satd. Flow (prot)	1658	1557	0	0	1657	1455	1658	3301	0	1551	3280	0
Flt Permitted	0.418				0.716		0.268			0.054		
Satd. Flow (perm)	721	1557	0	0	1242	1410	466	3301	0	88	3280	0
Satd. Flow (RTOR)		13				190		2			1	
Lane Group Flow (vph)	28	20	0	0	244	190	7	1953	0	84	1068	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	26.3	26.3			26.3	26.3	69.0	69.0		81.1	81.1	
Actuated g/C Ratio	0.22	0.22			0.22	0.22	0.58	0.58		0.68	0.68	
v/c Ratio	0.18	0.06			0.90	0.42	0.03	1.03		0.52	0.48	
Control Delay	39.9	21.1			79.3	8.2	14.7	55.5		27.7	10.6	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	39.9	21.1			79.3	8.2	14.7	55.5		27.7	10.6	
LOS	D	C			E	A	B	E		C	B	
Approach Delay		32.1			48.1			55.4			11.8	
Approach LOS		C			D			E			B	
Queue Length 50th (m)	5.3	1.3			54.8	0.0	0.7	~273.5		6.6	61.7	
Queue Length 95th (m)	13.6	7.6			#97.8	18.0	3.4	#332.1		22.0	76.4	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	171	379			294	479	267	1899		229	2216	
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			0.83	0.40	0.03	1.03		0.37	0.48	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03
Intersection Signal Delay: 40.2 — Intersection LOS: D
Intersection Capacity Utilization 100.0% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	78	49	35	411	0	36	0	14	0	0	2
Future Vol, veh/h	0	78	49	35	411	0	36	0	14	0	0	2
Conflicting Peds, #/hr	9	0	1	1	0	9	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	12	2	2	4	2	20	2	2	2	2	50
Mvmt Flow	0	78	49	35	411	0	36	0	14	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	420	0	0	128	0	0	586	594	104	600	618	420
Stage 1	-	-	-	-	-	-	104	104	-	490	490	-
Stage 2	-	-	-	-	-	-	482	490	-	110	128	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.3	6.52	6.22	7.12	6.52	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.3	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.68	4.018	3.318	3.518	4.018	3.75
Pot Cap-1 Maneuver	1139	-	-	1458	-	-	396	418	951	413	405	542
Stage 1	-	-	-	-	-	-	860	809	-	560	549	-
Stage 2	-	-	-	-	-	-	533	549	-	895	790	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1131	-	-	1457	-	-	385	402	950	394	389	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	385	402	-	394	389	-
Stage 1	-	-	-	-	-	-	859	808	-	556	528	-
Stage 2	-	-	-	-	-	-	515	528	-	882	789	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.6	13.7	11.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	462	1131	-	-	1457	-	-	538
HCM Lane V/C Ratio	0.108	-	-	-	0.024	-	-	0.004
HCM Control Delay (s)	13.7	0	-	-	7.5	0	-	11.7
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	13	10	170	24	105	13	904	81	94	1733	7
Future Volume (vph)	12	13	10	170	24	105	13	904	81	94	1733	7
Satd. Flow (prot)	1658	1518	0	0	1640	1414	1658	3268	0	1551	3312	0
Flt Permitted	0.469				0.736		0.105			0.221		
Satd. Flow (perm)	810	1518	0	0	1255	1376	183	3268	0	361	3312	0
Satd. Flow (RTOR)		10				105		10			1	
Lane Group Flow (vph)	12	23	0	0	194	105	13	985	0	94	1740	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							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)	24.0	24.0			24.0	24.0	79.3	79.3		93.4	93.4	
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.61	0.61		0.72	0.72	
v/c Ratio	0.08	0.08			0.84	0.31	0.12	0.49		0.28	0.73	
Control Delay	42.5	28.3			79.3	10.0	16.3	15.9		8.4	14.0	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.5	28.3			79.3	10.0	16.3	15.9		8.4	14.0	
LOS	D	C			E	B	B	B		A	B	
Approach Delay		33.1			55.0			15.9			13.7	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	2.5	2.7			47.7	0.0	1.4	71.3		6.8	130.7	
Queue Length 95th (m)	8.0	10.2			#77.9	14.9	5.6	97.6		13.2	171.9	
Internal Link Dist (m)		147.2			77.5			257.5			196.3	
Turn Bay Length (m)	28.0						47.5			185.0		
Base Capacity (vph)	177	340			275	383	111	1996		432	2378	
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			0.71	0.27	0.12	0.49		0.22	0.73	

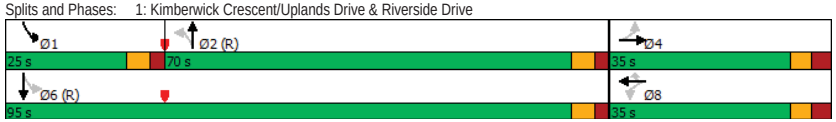
Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 43 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 18.5	Intersection LOS: B
Intersection Capacity Utilization 94.3%	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.

Splits and Phases: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive



Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	154	36	34	269	0	58	0	32	0	0	0
Future Vol, veh/h	0	154	36	34	269	0	58	0	32	0	0	0
Conflicting Peds, #/hr	4	0	10	10	0	4	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	5	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	0	154	36	34	269	0	58	0	32	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	273	0	0	200	0	0	523	523	182	529	541	277
Stage 1	-	-	-	-	-	-	182	182	-	341	341	-
Stage 2	-	-	-	-	-	-	341	341	-	188	200	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1290	-	-	1372	-	-	465	459	861	460	448	762
Stage 1	-	-	-	-	-	-	820	749	-	674	639	-
Stage 2	-	-	-	-	-	-	674	639	-	814	736	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1286	-	-	1361	-	-	450	441	854	431	430	757
Mov Cap-2 Maneuver	-	-	-	-	-	-	450	441	-	431	430	-
Stage 1	-	-	-	-	-	-	813	743	-	672	619	-
Stage 2	-	-	-	-	-	-	652	619	-	783	730	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.9	13	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	541	1286	-	-	1361	-	-	-
HCM Lane V/C Ratio	0.166	-	-	-	0.025	-	-	-
HCM Control Delay (s)	13	0	-	-	7.7	0	-	0
HCM Lane LOS	B	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	-

SimTraffic Simulation Summary
2031 Future Total

10/20/2022

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:15	8:15	8:15	8:15
Total Time (min)	60	60	60	60
Time Recorded (min)	30	30	30	30
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1831	1852	1853	1845
Vehs Exited	1804	1850	1841	1832
Starting Vehs	74	113	95	93
Ending Vehs	101	115	107	107
Denied Entry Before	2	7	1	3
Denied Entry After	1	26	52	27
Travel Distance (km)	869	893	892	885
Travel Time (hr)	39.1	62.1	62.3	54.5
Total Delay (hr)	23.7	46.3	46.5	38.8
Total Stops	1474	1673	1685	1612
Fuel Used (l)	98.0	121.8	121.7	113.8

Interval #0 Information Seeding

Start Time	7:15
End Time	7:45
Total Time (min)	30

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:15
Total Time (min)	30

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	1831	1852	1853	1845
Vehs Exited	1804	1850	1841	1832
Starting Vehs	74	113	95	93
Ending Vehs	101	115	107	107
Denied Entry Before	2	7	1	3
Denied Entry After	1	26	52	27
Travel Distance (km)	869	893	892	885
Travel Time (hr)	39.1	62.1	62.3	54.5
Total Delay (hr)	23.7	46.3	46.5	38.8
Total Stops	1474	1673	1685	1612
Fuel Used (l)	98.0	121.8	121.7	113.8

SimTraffic Performance Report
2031 Future Total

10/20/2022

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Entered	12	4	6	110	13	91	3	975	17	50	536	2
Vehicles Exited	13	4	6	109	13	89	4	952	17	51	538	2
Hourly Exit Rate	26	8	12	218	26	178	8	1904	34	102	1076	4
Input Volume	28	7	13	239	20	190	7	1918	35	84	1063	5
% of Volume	93	114	92	91	130	94	114	99	97	121	101	80
Denied Entry Before	0	0	0	0	0	0	0	3	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	26	1	0	0	0

1: Kimberwick Crescent/Uplands Drive & Riverside Drive Performance by movement

Movement	All
Vehicles Entered	1819
Vehicles Exited	1798
Hourly Exit Rate	3596
Input Volume	3609
% of Volume	100
Denied Entry Before	3
Denied Entry After	27

2: N Bowesville & Uplands Drive Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBR	All
Vehicles Entered	45	27	16	195	18	8	2	311
Vehicles Exited	45	27	16	195	18	8	2	311
Hourly Exit Rate	90	54	32	390	36	16	4	622
Input Volume	78	49	35	411	36	14	2	625
% of Volume	115	110	91	95	100	114	200	100
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

3: Access #1 & N Bowesville Performance by movement

Movement	EBL	SBT	SBR	All
Vehicles Entered	23	35	9	67
Vehicles Exited	23	35	9	67
Hourly Exit Rate	46	70	18	134
Input Volume	41	66	18	125
% of Volume	112	106	100	107
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Vehicles Entered	1845
Vehicles Exited	1832
Hourly Exit Rate	3664
Input Volume	8062
% of Volume	45
Denied Entry Before	3
Denied Entry After	27

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

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)	16.6	11.0	80.2	31.9	44.1	285.3	283.2	40.6	70.3	65.2
Average Queue (m)	5.9	4.6	42.6	15.8	5.5	256.0	251.2	18.6	41.9	29.5
95th Queue (m)	14.8	11.9	74.2	27.4	30.7	333.1	336.9	36.5	67.1	57.5
Link Distance (m)		157.9	77.0	77.0		271.3	271.3		210.2	210.2
Upstream Blk Time (%)			2			35	35			
Queuing Penalty (veh)			4			0	0			
Storage Bay Dist (m)	28.0				47.5			185.0		
Storage Blk Time (%)						39				
Queuing Penalty (veh)						3				

Intersection: 2: N Bowesville & Uplands Drive

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	33.1	16.4	9.8
Average Queue (m)	4.4	7.7	1.3
95th Queue (m)	20.2	15.3	7.7
Link Distance (m)	45.1	91.5	22.0
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Access #1 & N Bowesville

Movement	EB
Directions Served	LR
Maximum Queue (m)	11.2
Average Queue (m)	7.1
95th Queue (m)	13.6
Link Distance (m)	61.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 6

Intersection: 1: Kimberwick Crescent/Uplands Drive & Riverside Drive

Phase	1	2	4	6	8
Movement(s) Served	SBL	NBTL	EBTL	SBTL	WBTL
Maximum Green (s)	13.9	58.9	28.5	78.9	28.5
Minimum Green (s)	5.0	10.0	10.0	10.0	10.0
Recall	None	C-Max	None	C-Max	None
Avg. Green (s)	9.0	71.8	24.7	82.6	24.7
g/C Ratio	-0.01	NA	NA	NA	NA
Cycles Skipped (%)	31	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0
Cycles Maxed Out (%)	6	100	47	100	47
Cycles with Peds (%)	0	14	7	14	33

Controller Summary
Average Cycle Length (s): NA

Number of Complete Cycles : 0

Appendix L

MMLOS Analysis

CGH TRANSPORTATION

Multi-Modal Level of Service - Intersections Form

Consultant	**CGH Transportation Inc.**	**Project**	**3750 North Bowesville Road**
Scenario	**Existing/Future**	**Date**	**10/20/2022**
Comments			

	INTERSECTIONS	**Riverside Drive at Uplands Drive/ Kimberwick Crescent**			
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**
Pedestrian	Lanes	8	8	6	6
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected/ Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**-12**	**-12**	**20**	**20**
	Ped. Exposure to Traffic LoS	**F**	**F**	**F**	**F**
	Cycle Length	120	120	120	120
	Effective Walk Time	61	41	8	8
	Average Pedestrian Delay	**15**	**26**	**52**	**52**
	Pedestrian Delay LoS	**B**	**C**	**E**	**E**
	Level of Service	**F**	**F**	**F**	**F**
		F			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration			≤ 50 m	
	Right Turning Speed			≤ 25 km/h	
	Cyclist relative to RT motorists	**#N/A**	**#N/A**	**D**	**#N/A**
	Separated or Mixed Traffic	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h
	Left Turning Cyclist	**F**	**F**	**E**	**E**
	Level of Service	**#N/A**	**#N/A**	**E**	**#N/A**
		F			
Transit	Average Signal Delay	≤ 30 sec		≤ 10 sec	
	Level of Service	**D**	**-**	**B**	**-**
		D			
Truck	Effective Corner Radius				
	Number of Receiving Lanes on Departure from Intersection				
	Level of Service	**-**	**-**	**-**	**-**
		-			
Auto	Volume to Capacity Ratio	0.91 - 1.00			
	Level of Service	**E**			