

70 Richmond Road

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report (Revision #8 – SPA)

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1 Screening

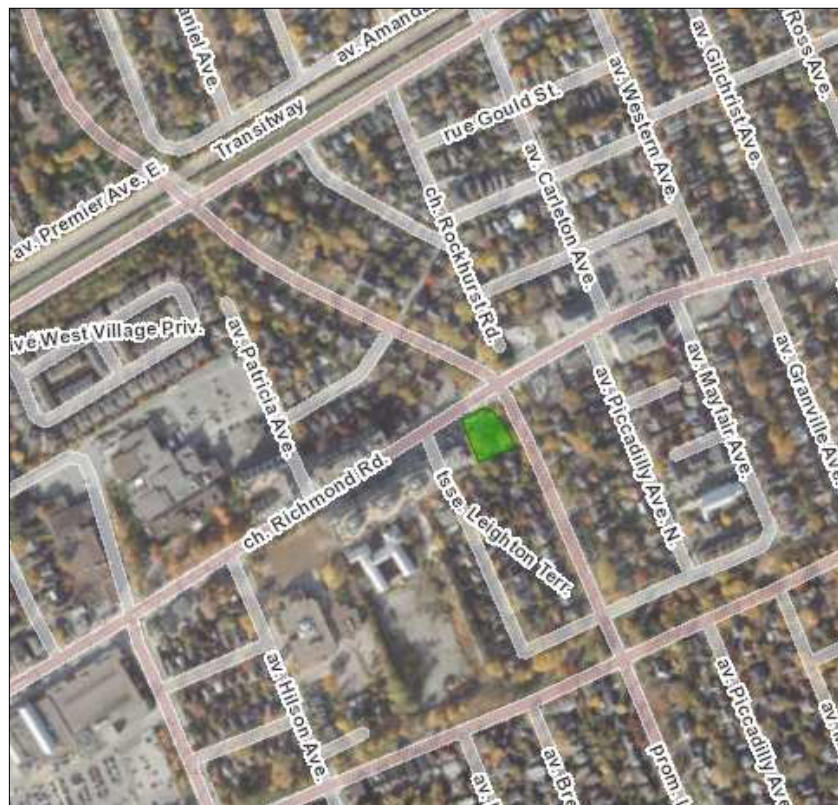
This study has been prepared according to the City of Ottawa’s 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for the TIA Study PM. As shown in the Screening Form, a TIA is required based on the Location and Safety triggers and will only include the Design Review component. This report is in support of a site plan application.

2 Existing and Planned Conditions

2.1 Proposed Development

The proposed development, designated and zoned as Traditional Mainstreet, is planned as a nine-storey, 96-unit mixed-use (residential and commercial) building with 1,455 sq. ft. of ground floor retail. The site is also located within the Richmond Road/Westboro Secondary Plan area (“Secondary Plan”) which is the statutory implementation of the Richmond Road/Westboro Community Design Plan (“CDP”). The site is to be built out in a single phase by 2023. The development includes 63 resident and eight visitor vehicular parking stalls across two underground parking levels and 96 bicycle parking stalls. Access is to be provided via an existing municipal laneway onto Richmond Road as a full-movement access. The study area will include the intersections of Island Park Drive at Scott Street, Island Park Drive at Richmond Road/Wellington Street West, Island Park Drive at Byron Avenue, Richmond Road at Kirkwood Avenue, Richmond Road at Patricia Avenue, Richmond Road at Future Site Access, and Wellington Street West at Western Avenue. 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: August 6, 2021

2.2 Existing Conditions

2.2.1 Area Road Network

Richmond Road: Richmond Road is a City of Ottawa arterial road with a two-lane urban cross-section with sidewalks on both sides of the road and on-street parking permitted on the north side of the road (no stopping 3:30 PM – 5:30 PM) and on the south side of the road (no restrictions) west of a point 20 metres west of Leighton Terrace. The posted speed limit is 50 km/h and the existing right of way within the study area varies from 20.0 metres to 21.0 metres. Richmond Road is a truck route.

Wellington Street West: Wellington Street West is a City of Ottawa arterial road with a four-lane urban cross-section west of Western Avenue where on-street parking is permitted on the north side of the road (no stopping 3:30 PM – 5:30 PM) and on the south side of the road east of the Esso property (no restrictions), and a four-lane urban cross-section east of Western Avenue where on-street parking is permitted in parking lanes on both sides of the road. The posted speed limit is 50 km/h and the City-protected right of way is 20.0 metres. Wellington Street West is a truck route.

Island Park Drive: Island Park Drive is a federally owned arterial road with a two-lane urban cross-section with curbside bike lanes and sidewalks on both sides of the road. The posted speed limit is 40 km/h and the existing right of way within the study area is 30.5 metres.

Scott Street: Scott Street is a City of Ottawa arterial road with a two-lane urban cross-section with curbside bike lanes on both sides of the road, a mixed-use path on the north side of the road, and a sidewalk on the south side of the road. The posted speed limit is 50 km/h and the City-protected right of way is 26.0 metres. Scott Street is a truck route.

Kirkwood Avenue: Kirkwood Avenue is a City of Ottawa arterial road with a four-lane urban cross-section with sidewalks on both sides of the road south of Richmond Road within the study area, and a local road with a two-lane urban cross-section and angle parking on the east side of the road and bay parking on the west side of the road north of Richmond Road. The posted speed limit is 50 km/h and the City-protected right of way is 26.0 metres south of Richmond Road, and the existing right of way is 19.5 metres north of Richmond Road. Kirkwood Avenue is a truck route.

Byron Avenue: Byron Avenue is a City of Ottawa collector road with a two-lane urban cross-section with a sidewalk on the south side of the road. West of Island Park Drive, curbside bike lanes are on both sides of the road. The unposted speed limit is 50 km/h and the existing right of way within the study area is 20.0 metres west of Island Park Drive and 15.0 metres east of Island Park Drive.

Patricia Avenue: Patricia Avenue is a City of Ottawa local road with a two-lane urban cross-section with a sidewalk on the east side of the road. North of Mailes Avenue, Patricia Avenue is no exit. The unposted speed limit is 50 km/h and the existing right of way is 15.5 metres.

Western Avenue: Western Avenue is a City of Ottawa local road with a two-lane urban cross-section with on-street parking permitted and sidewalks on both sides of the road. The unposted speed limit is 50 km/h and the existing right of way is 20.0 metres within the study area.

2.2.2 Existing Intersections

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

<i>Richmond Road/Wellington Street West at Island Park Drive</i>	The intersection of Richmond Road/Wellington Street West at Island Park Drive is a signalized intersection. The northbound and southbound approaches each consists of an auxiliary left-turn lane, a shared through/right-turn lane, and a bike lane. The eastbound and westbound approaches each consist of a shared left-turn/through lane and a shared through/right-turn lane. Commercial vehicles are restricted from turning onto Island Park Drive.
<i>Richmond Road at Kirkwood Avenue</i>	The intersection of Richmond Road at Kirkwood Avenue is a signalized intersection. The northbound approach consists of a left-turn lane and a shared through/right-turn lane, and the southbound approach consists of shared all-movements lane. The eastbound and westbound approaches each consist of a shared left-turn/through lane and a shared through/right-turn lane, although on-street parking is permitted in the curbside lanes. No turn restrictions were noted.
<i>Richmond Road at Patricia Avenue</i>	The intersection of Richmond Road at Patricia Avenue is a signalized intersection. The private northbound approach and the southbound approach each consist of a shared all-movements lane. The eastbound and westbound approaches each consist of a shared left-turn/through lane and a shared through/right turn lane, although on-street parking is permitted in the curbside lanes. No turn restrictions were noted.
<i>Wellington Street West at Western Avenue</i>	The intersection of Wellington Street West at Western Avenue is a signalized intersection. The southbound approach consist of a shared all-movements lane and the northbound approach consists of two private driveways. The eastbound approach consists of a shared left-turn/through lane and a shared through/right-turn lane, which stops at the intersection and acts as a bypass for any left-turning vehicles. The westbound approach consists of a shared all-movements lane. A parking lane is provided on the north side of Wellington Street on the east side of the intersection and on-street parking is permitted on the west side of the intersection. A taxi parking lane is provided on the south side of Wellington Street to the east of the intersection. Northbound right turns on red are restricted from the private driveways.
<i>Scott Street at Island Park Drive</i>	The intersection of Scott Street at Island Park Drive is a signalized intersection. The northbound approach consists of a shared all-movements lane, and the southbound approach consists of an auxiliary left-turn lane and a shared through/right-turn lane. The eastbound approach consists of an auxiliary left-turn lane, a through lane, and an auxiliary right-turn lane and the westbound approach consists of an auxiliary left-turn lane and a shared through/right-turn lane. Bike lanes are provided on all approaches. No turn restrictions were noted.

Byron Avenue at Island Park Drive

The intersection of Byron Avenue at Island Park Drive is a signalized intersection. The northbound, southbound, eastbound, and westbound approaches each consist of a shared all-movements lane and the northbound and southbound approaches each have a bike lane. Left-turn bike boxes are provided on the northbound and southbound approaches. Northbound and southbound right turns on red are restricted.

2.2.3 Existing Driveways

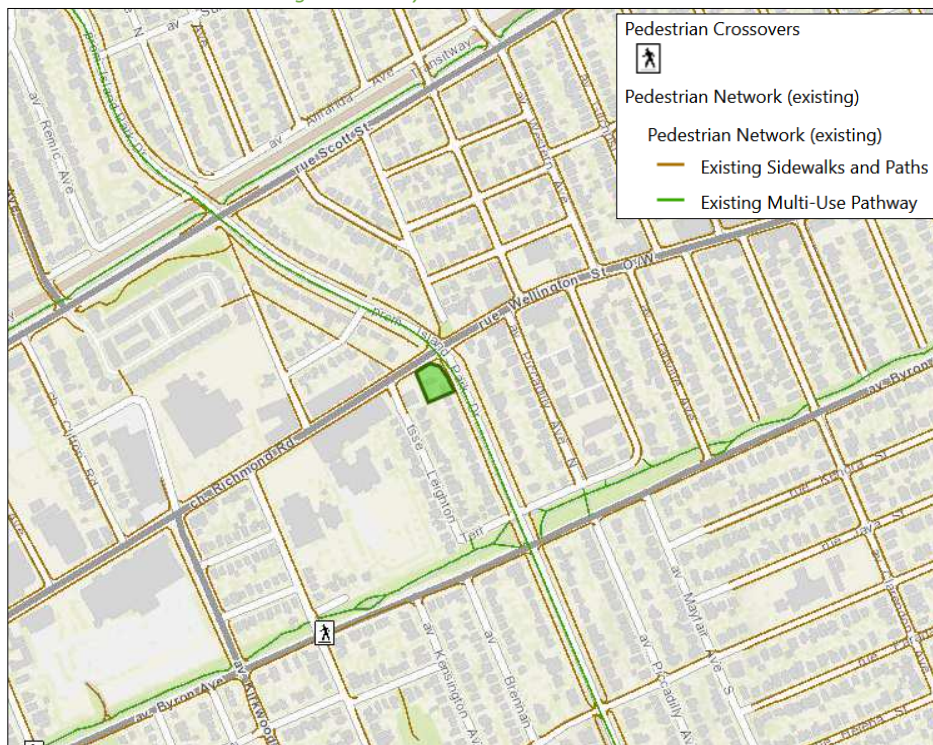
Driveways to low and medium-density residential and commercial land uses exist on both sides of Richmond Road and to low density residential land uses on both sides of Island Park Drive, and a gas station on the east side, within 200 metres of the proposed site access.

2.2.4 Cycling and Pedestrian Facilities

Figure 3 illustrates the pedestrian facilities in the study area and Figure 4 illustrates the cycling facilities.

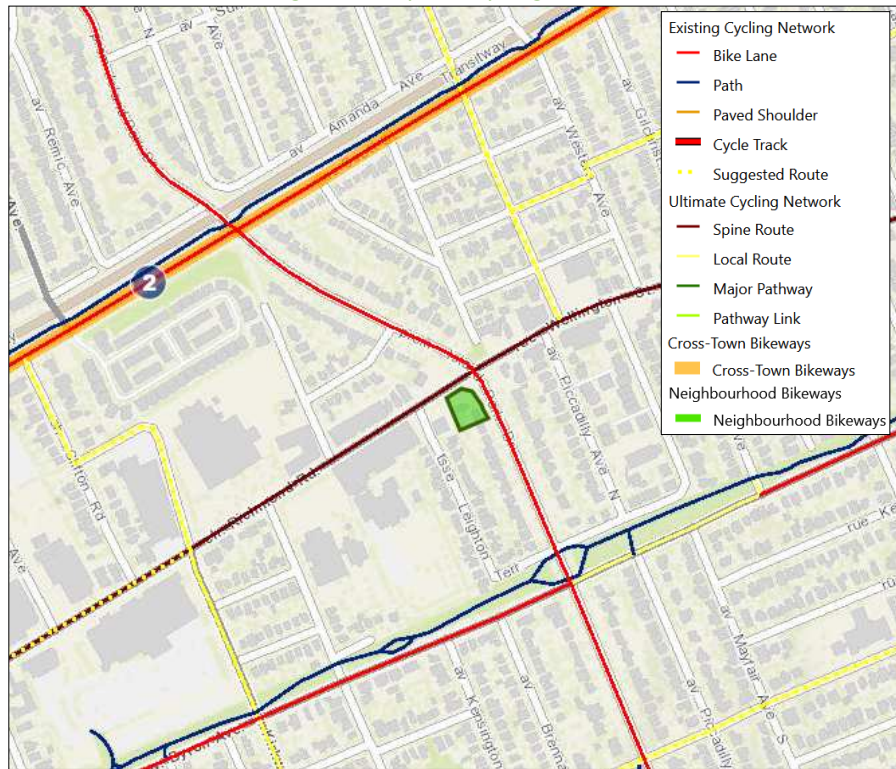
Sidewalks are provided along both sides of arterial roads within the study area, with the exception of Scott Street. Scott Street and Byron Avenue each have a mixed-use path on their north side and a sidewalk on their south side, and Patricia Avenue has a sidewalk on its east side. Cycling facilities include curbside bike lanes on Island Park Drive, Scott Street, and Byron Avenue excepting the segment between Island Park Drive and Granville Avenue. Mixed-use paths are on the north side of Scott Street and on the north side of Byron Avenue. Island Park Drive, Scott Street, and Richmond Road are cycling spine routes and Kirkwood Avenue, Carleton Avenue, and Byron Avenue are local routes.

Figure 3: Study Area Pedestrian Facilities



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: May 4, 2022

Figure 4: Study Area Cycling Facilities



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: May 4, 2022

Pedestrian and cyclist volumes included in study area intersection counts, presented in Section 2.2.7, have been compiled and are illustrated in Figure 5 and Figure 6 respectively.

Figure 5: Existing Pedestrian Volumes

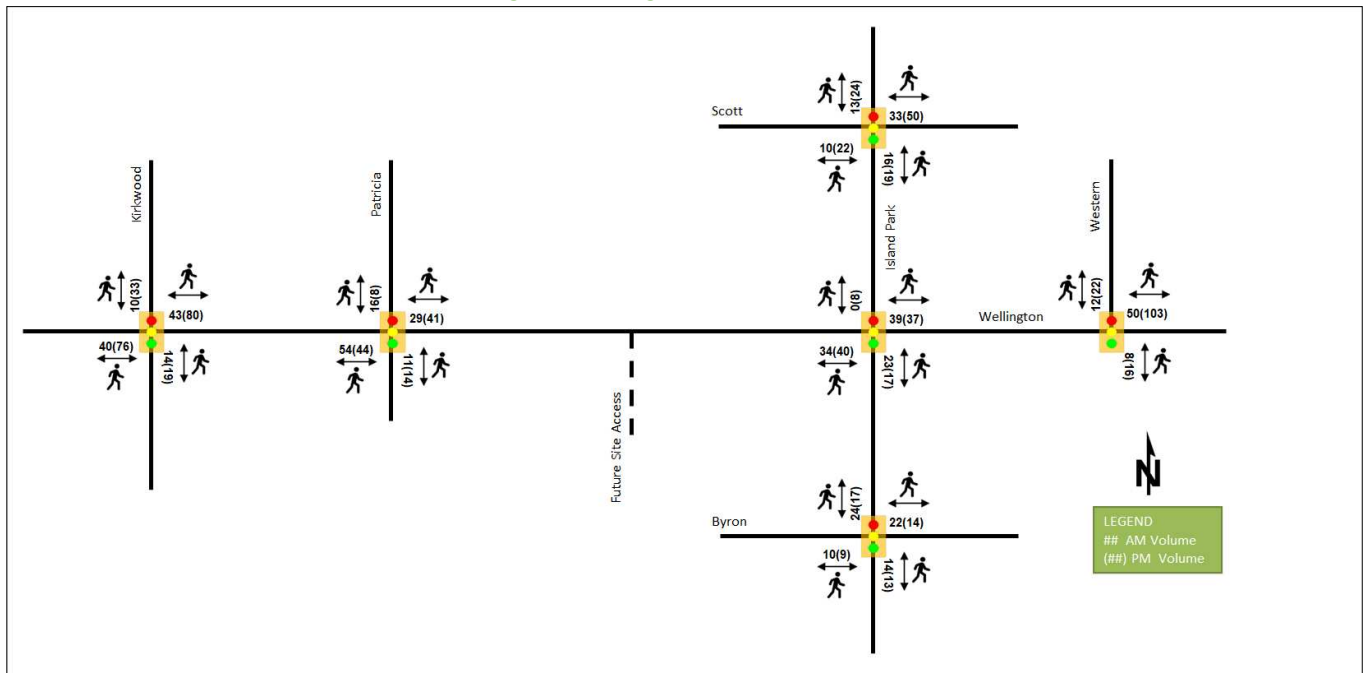
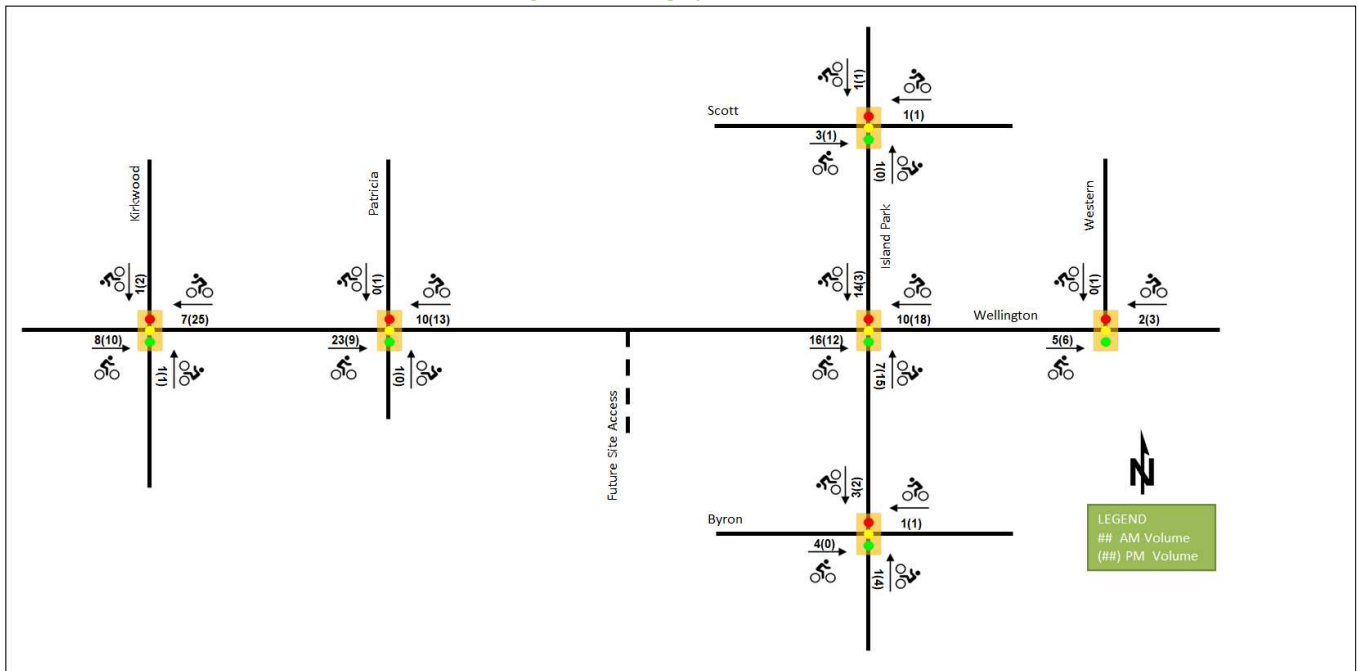


Figure 6: Existing Cyclist Volumes



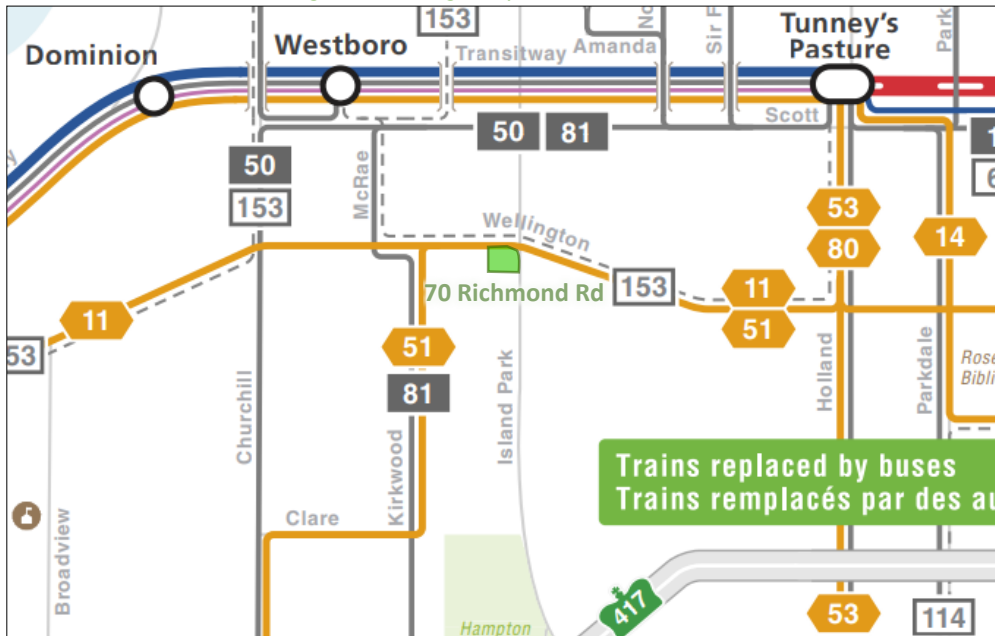
2.2.5 Existing Transit

The study area is served by the following transit routes: #11, #51, #153 travel along Richmond Road and Wellington Street West; Routes #50, #81 travel along Scott Street. Routes #51 and #81 continue along Kirkwood Avenue. As of July 2020, the frequency of these routes within proximity of the proposed site, are:

- Route # 11 – 15-minute service all day, 30-minute service after 9:00pm
- Route # 50 – 30-minute service all day
- Route # 51 – 15-minute service all day, 30-minute service after 7:00pm
- Route # 81 – 30-minute service all day
- Route # 153 – Five buses per day per direction

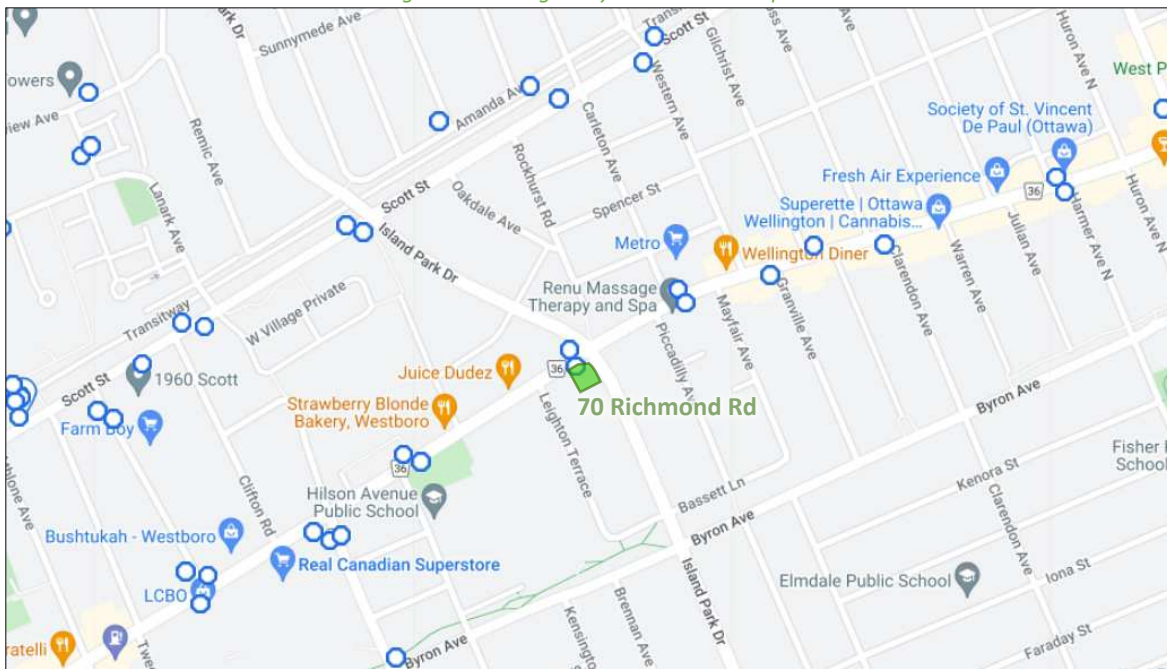
Figure 7 illustrates the transit system map in the study area and Figure 8 illustrates nearby transit stops.

Figure 7: Existing Study Area Transit Service



Source: <http://www.octranspo.com/> Accessed: May 4, 2022

Figure 8: Existing Study Area Transit Stops



Source: <http://www.octranspo.com/> Accessed: May 4, 2022

2.2.6 Existing Area Traffic Management Measures

Within the study area, traffic calming measures consist of on-street parking on Richmond Road and Wellington Street West and curb extensions on Wellington Street West framing parking lanes, and on Western Avenue.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing Study Area intersections. Counts conducted within the past three years are considered to be representatively valid in the modelling of existing conditions. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date
Scott Street & Island Park Drive	Tuesday, March 28, 2017
Richmond Road & Kirkwood Avenue	Thursday, April 20, 2017
Richmond Road & Patricia Avenue	Tuesday, April 25, 2017
Richmond Road/Wellington Street & Island Park Drive	Tuesday, April 25, 2017
Wellington Street & Western Avenue	Thursday, February 22, 2018
Byron Avenue & Island Park Drive	Thursday, January 23, 2020

Figure 9 illustrates the existing traffic counts and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on volume to capacity ratio (v/c) calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.

Figure 9: Existing Traffic Counts

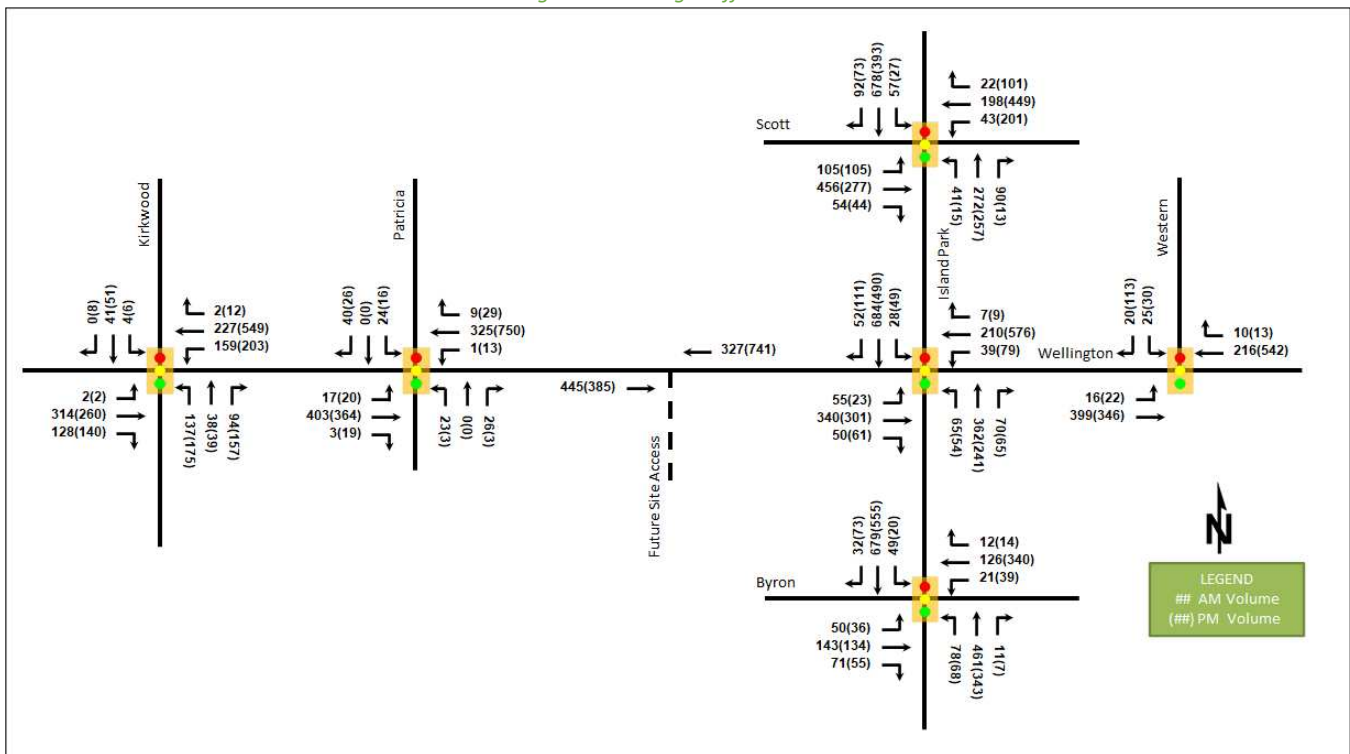


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Richmond Road/Wellington Street W & Island Park Drive <i>Signalized</i>	EB	A	0.50	25.4	50.6	A	0.38	18.1	35.0
	WB	A	0.30	22.9	29.4	B	0.69	25.3	70.6
	NBL	B	0.65	45.5	m15.2	A	0.40	19.4	m8.4
	NBT/R	A	0.55	19.6	81.8	A	0.44	12.4	m37.0
	SBL	A	0.09	3.7	m0.9	A	0.14	14.5	11.8
	SBT/R	E	0.92	14.3	m19.2	D	0.85	32.2	#154.8
	Overall	C	0.74	20.0	-	C	0.77	23.6	-
Richmond Road & Kirkwood Avenue <i>Signalized</i>	EB	A	0.35	11.2	27.5	A	0.24	5.5	20.0
	WB	A	0.45	16.0	32.7	A	0.58	12.6	70.9
	NBL	A	0.31	18.0	28.0	B	0.62	36.9	43.4
	NBT/R	A	0.22	6.5	14.1	A	0.45	9.5	20.2
	SB	A	0.07	14.8	10.6	A	0.19	22.2	16.5
	Overall	A	0.39	13.2	-	A	0.59	13.5	-
Richmond Road & Patricia Avenue <i>Signalized</i>	EB	A	0.19	3.7	19.2	A	0.18	3.0	17.6
	WB	A	0.15	3.5	15.0	A	0.34	3.7	38.6
	NB	A	0.22	13.9	10.1	A	0.03	0.2	0.0
	SB	A	0.29	16.2	12.8	A	0.22	16.8	10.2
	Overall	A	0.21	5.1	-	A	0.34	3.9	-
Wellington Street & Western Avenue <i>Signalized</i>	EB	A	0.18	3.5	19.5	A	0.22	6.6	17.7
	WB	A	0.18	3.9	23.1	A	0.57	11.1	72.0
	NB	-	-	-	-	-	-	-	-
	SB	A	0.15	1.0	0.2	A	0.37	10.2	17.8
	Overall	A	0.19	3.5	-	A	0.51	9.4	-
Scott Street & Island Park Drive <i>Signalized</i>	EBL	A	0.33	24.4	29.3	A	0.52	27.5	34.3
	EBT	C	0.77	35.1	#119.7	A	0.35	16.6	53.6
	EBR	A	0.11	9.7	10.0	A	0.07	4.1	5.5
	WBL	A	0.29	26.7	15.7	A	0.50	21.6	49.5
	WBT/R	A	0.38	22.8	50.3	C	0.73	25.4	130.2
	NB	F	1.33	193.1	#170.3	A	0.56	29.0	74.3
	SBL	A	0.16	15.0	13.9	A	0.10	21.4	10.0
	SBT/R	F	1.02	61.5	#237.5	D	0.81	39.2	#140.4
Overall	F	1.09	71.8	-	C	0.76	27.2	-	
Byron Avenue & Island Park Drive <i>Signalized</i>	EB	D	0.86	56.6	#83.6	A	0.57	27.5	51.3
	WB	A	0.50	35.5	45.3	D	0.87	45.9	#107.8
	NB	B	0.68	16.1	113.1	A	0.59	17.4	82.4
	SB	D	0.81	13.0	m61.7	C	0.78	29.8	m133.2
	Overall	D	0.82	22.7	-	D	0.81	30.2	-

Notes: Saturation flow rate of 1800 veh/h/lane
Peak Hour Factor = 0.90
Queue is measured in metres

Delay is measured in seconds
m = metered queue
= volume for the 95th %ile cycle exceeds capacity

During the AM peak hour, the intersection of Scott Street and Island Park Drive is over capacity on the northbound and southbound shared through/right-turn movements with high delays and extended queues. The overall intersection is over capacity due to these movements. The eastbound through movement is also noted to have extended queues. During the PM peak, the southbound shared through/right-turn lane will have extended queues. A northbound left-turn lane would improve the intersection operations to a LOS E, with the northbound lane operations to LOS B or better. Due to the BRT/LRT underpass, the southbound approach cannot be improved through the introduction of a right-turn lane.

Extended queues are noted at the Byron Avenue and Island Park Drive intersection during the AM peak on the eastbound approach and on the westbound approach during the PM peak, and at the Richmond Road/Wellington Street W & Island Park Drive during the PM peak on the southbound shared through/right-turn lane.

The remaining study area intersections operate satisfactorily during the peak hours.

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 area road network. Table 3 summarizes the collisions types and conditions in the study area, Figure 10 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, 2016-2020

Total Collisions		Number	%
		51	100%
Classification	Fatality	0	0%
	Non-Fatal Injury	8	15%
	Property Damage Only	44	85%
Initial Impact Type	Angled	6	12%
	Rear end	11	21%
	Sideswipe	15	29%
	Turning Movement	11	21%
	SMV Unattended	7	13%
	SMV Other	2	4%
Road Surface Condition	Dry	29	56%
	Wet	18	35%
	Loose Snow	2	4%
	Slush	2	4%
	Ice	1	2%
Pedestrian Involved		1	2%
Cyclists Involved		2	4%

Figure 10: Study Area Collision Records – Representation of Study Area Collisions

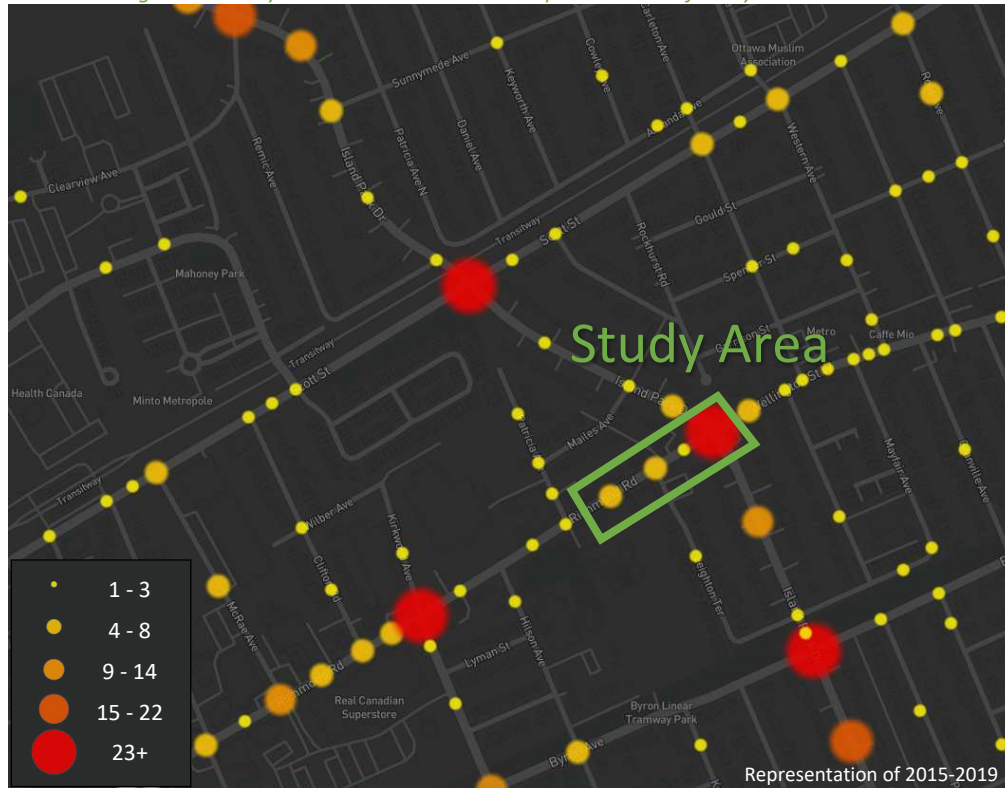


Table 4: Summary of Collision Locations, 2016-2020

Intersections / Segments	Number	%
	51	100%
Leighton Ter @ Richmond Rd	3	2%
Island Park Dr @ Richmond Rd/Wellington St W	41	23%
Richmond Rd btwn Patricia Ave & Leighton Ter	4	2%
Richmond Rd btwn Leighton Ter & Island Park Dr	4	2%

Collisions within the study area generally follow a pattern representative of typical Ottawa urban areas. High congestion during peak periods is correlated with the collision types of rear end, sideswipe, and turning movement. The collision types at the intersection of Richmond Road/Wellington Street West at Island Park Drive are summarized in Table 5.

Table 5: Richmond Road/Wellington St W at Island Park Drive Collision Summary

Total Collisions		Number	%
		41	100%
Classification	Fatality	0	0%
	Non-Fatal Injury	7	17%
	Property Damage Only	34	83%
Initial Impact Type	Angled	4	10%
	Rear end	11	27%
	Sideswipe	12	29%
	Turning Movement	11	27%
	SMV Unattended	1	2%
	SMV Other	2	5%

		Number	%
Total Collisions		41	100%
Road Surface Condition	Dry	22	54%
	Wet	15	37%
	Loose Snow	1	2%
	Slush	2	5%
	Ice	1	2%
Pedestrian Involved		1	2%
Cyclists Involved		2	5%

The of Richmond Road/Wellington Street West at Island Park Drive intersection had a total of 41 collisions during the 2016-2020 time period, with 34 involving property damage only and the remaining seven having non-fatal injuries. The three primary collision types were sideswipe with 12 collisions, and turning movement and rear end with 11 collisions each. The City has completed a review of this intersection through the Cycling Safety Review of High-Volume Intersections Report (2020) detailing a recommended plan to address the collision frequency and examine both pedestrian and cycling safety improvements. The recommendations include separated facilities along Richmond Road for cycling, reduced turning radii as no truck movements are permitted along Island Park Drive, signal timing improvements and no right-turn on red, and additional considerations such as reducing Richmond Road to 3 travel lanes to reduce side swipes. The City is currently planning the functional design and implementation.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

The subject development is within the Richmond Road/Westboro Secondary Plan and related CDP area. Both contemplate an additional 3970 dwelling units by 2021 within the Secondary Plan area. A Transportation Management Implementation Plan ("TMP") was produced in 2011, and is to be implemented over 15 years, with a view to lowering auto modal share to accommodate anticipated development. The portion of the TMP covering the study area is illustrated in Figure 11. Treatments within the vicinity of the site include a proposed bicycle lane on Richmond Road, new bus stop shelters (which have not yet been constructed), and pedestrian countdown signals, which have since been installed. It should be noted that the proposed bicycle lane along Richmond Road does not appear in the Ottawa Cycling Plan produced in 2013.

Within the TMP, the Rapid Transit and Transit Priority Network – Affordable Network diagram shows isolated transit priority measures along Richmond Road/Wellington Street West. No other changes are outlined in the TMP, nor are any outlined in the Ottawa Planned Construction Projects portal.

Figure 11: Richmond Road/Westboro Transportation Management Implementation Plan



Source: Richmond Road/Westboro Transportation Management Implementation Plan, Accessed: July 22, 2020

As noted in Section 2.2.8, the City is currently planning the improvement of the Richmond Road and Island Park Drive intersection. No plans are currently available at this time.

2.3.2 Other Study Area Developments

190 Richmond Road

The proposed development application proposes a 187-dwelling unit apartment building. The development is anticipated to generate 82 new two-way AM peak hour auto trips and 97 new two-way PM peak hour auto trips (LEA, 2017).

175 Richmond Road

The proposed development application proposes a nine-storey mixed-use building with 675 m² of ground floor retail and 241 residential dwelling units. The redevelopment of the site is anticipated to generate a net increase of 40 two-way AM peak hour auto trips and 23 two-way PM peak hour auto trips (Novatech, 2011).

114 Richmond Road

The proposed development application proposes the conversion of an existing structure to a mixed-use building and the addition of nine storeys of apartment dwellings. No TIA is included as part of this application.

89 Richmond Road

The proposed development application proposes a six-storey mixed-use building with a spa and health centre and 14 residential dwelling units. A TIA screening form determined no TIA was required for this site.

1445-1451 Wellington Street W

The proposed development application proposes to permit the construction of a 12-storey mixed-use building with 2740 sq. ft. ground floor retail and 114 residential dwelling units. It is anticipated that 50 new two-way AM peak hour auto trips and 53 new two-way PM peak hour auto trips (Delcan, 2013).

1391 Wellington Street W

The proposed development application proposes to permit a “broadcasting studio”. No TIA is included as part of this application.

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of:

- Island Park Drive at:
 - Scott Street
 - Richmond Road/Wellington Street West
 - Byron Avenue
- Richmond Road at:
 - Kirkwood Avenue
 - Patricia Avenue
 - Future Site Access
- Wellington Street West at Western Avenue

The boundary roads will be Richmond Road and Island Park Drive, and no screenlines are present within proximity to the site.

3.2 Time Periods

As the proposed development is composed of residential units and has only a small ground-floor retail component, the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year is 2023. As a result, the full build-out plus five years horizon year is 2028.

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
	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
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Component			

Module	Element	Explanation	Exempt/Required
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	Exempt (No network impact components required due to trip generation trigger) A TDM worksheet will be provided and summarized
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	Exempt (No network impact components required due to trip generation trigger)
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 (No network impact components required due to trip generation trigger)

As the Screening Form does not identify the need for a full TIA, Table 7 outlines the additional exemptions recommended for this TIA.

Table 7: Recommended Additional Exemptions

Module	Element	Explanation
Forecasting		
3.1 Development-Generated Travel Demand	All Elements	Trip generation trigger was not met
3.3 Demand Rationalization	All Elements	As trip generation trigger was not met, no demand rationalization is required
Design Review Component		
4.4 Access Intersection Design	4.4.2 Access Intersection Control	Private approach does not require review for a roundabout, signal warrant or transit priority impacts
	4.4.3 Access Intersection Design	Access is not provided through a signalized intersection
Network Impact Component		
4.7 Transit	All Elements	No network impact components required due to trip generation trigger
4.9 Network Intersection Design	All Elements	No network impact components required due to trip generation trigger

5 Background Network Travel Demands

5.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3. The transit signal priority on Richmond Road/Wellington Street is the only confirmed project within the study horizons and is not considered to have any notable impact on the study area traffic volumes and travel patterns.

5.2 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. Table 8 summarizes the results of the model, and the projections are provided in Appendix E.

Table 8: TRANS Regional Model Projections – Study Area Growth Rates

Street	Direction Growth Percentage	
	Eastbound	Westbound
Scott	-1.12%	1.55%
Richmond	0.31%	1.27%
Wellington	0.35%	1.42%
Byron	1.95%	0.15%
	Northbound	Southbound
Kirkwood	-0.39%	1.83%
Patricia	-6.87%	-0.73%
Island Park	1.53%	-0.24%
Western	0.66%	5.17%

In general, the TRANS projections identify a growth rate range of -1.12% and 1.95%, with low-volume outliers excluded. Appropriate growth rates rounded to the nearest 0.25% will be peak-directionally applied to the mainline volumes and major turning movements of identified links with negative growth rates being applied at zero.

5.3 Other Developments

The background developments were described in Section 2.3.2. Those development applications with traffic studies have been explicitly considered in the background volumes.

5.4 2023 Future Background Intersection Operations

Figure 12 illustrates the 2023 background volumes and Table 9 summarizes the 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. The Synchro worksheets are provided in Appendix F.

Figure 12: 2023 Future Background Volumes

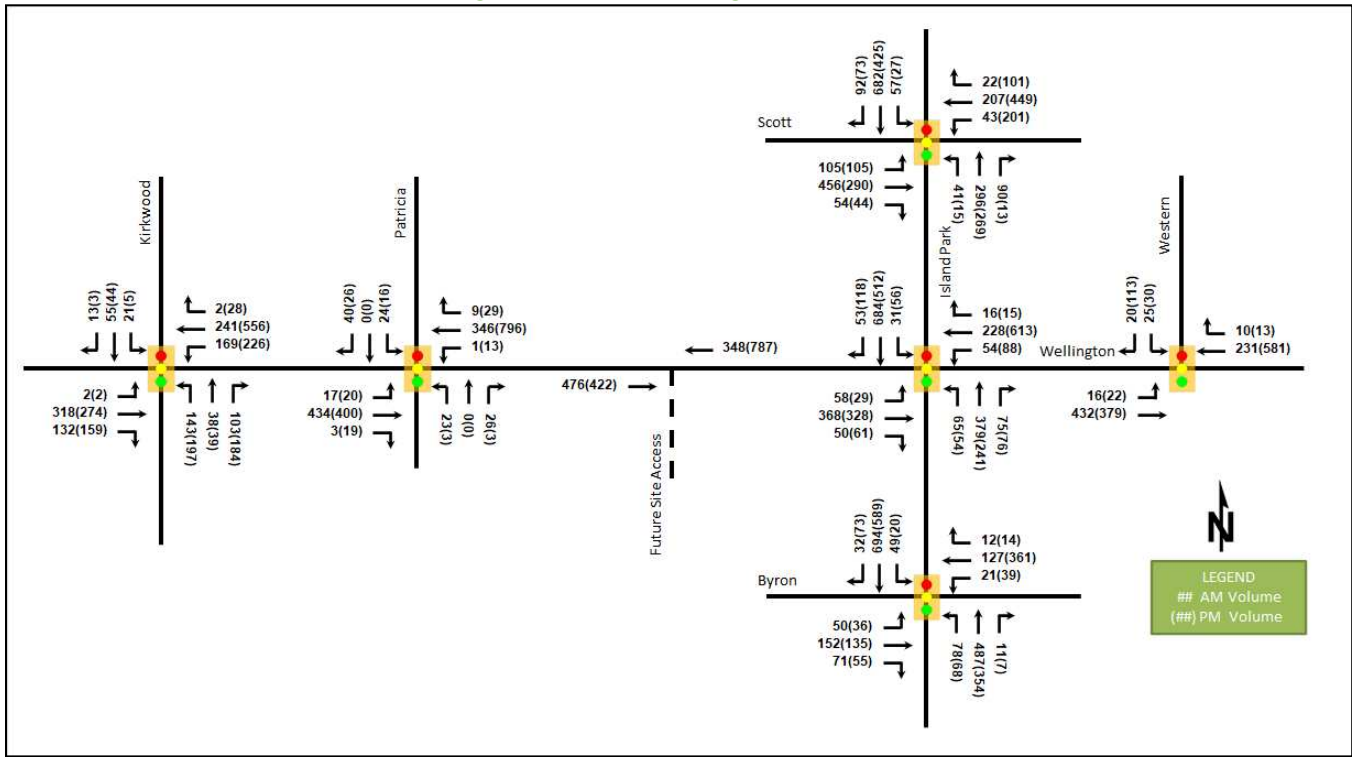


Table 9: 2023 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Richmond Road/Wellington Street W & Island Park Drive <i>Signalized</i>	EB	A	0.48	25.0	48.5	A	0.37	18.1	34.4
	WB	A	0.32	23.0	30.7	B	0.67	24.7	67.9
	NBL	A	0.40	24.6	m13.9	A	0.31	15.2	m7.4
	NBT/R	A	0.52	18.0	74.2	A	0.41	11.1	m29.5
	SBL	A	0.09	3.8	m0.9	A	0.14	14.5	12.0
	SBT/R	D	0.83	10.1	m18.5	C	0.80	28.7	#140.8
Overall	B	0.68	17.5	-	C	0.74	22.1	-	
Richmond Road & Kirkwood Avenue <i>Signalized</i>	EB	A	0.32	10.5	24.6	A	0.24	5.4	19.0
	WB	A	0.42	15.6	30.7	A	0.56	12.2	66.5
	NBL	A	0.30	18.0	26.5	B	0.70	41.9	45.3
	NBT/R	A	0.21	6.3	13.4	A	0.46	9.2	19.6
	SB	A	0.14	13.6	15.3	A	0.13	22.7	13.1
	Overall	A	0.37	12.8	-	A	0.60	13.8	-
Richmond Road & Patricia Avenue <i>Signalized</i>	EB	A	0.18	3.7	18.6	A	0.18	3.0	17.3
	WB	A	0.14	3.5	14.3	A	0.32	3.6	36.3
	NB	A	0.20	12.8	8.8	A	0.03	0.3	0.0
	SB	A	0.26	15.7	11.9	A	0.20	15.2	9.0
	Overall	A	0.20	4.9	-	A	0.32	3.7	-
Wellington Street & Western Avenue <i>Signalized</i>	EB	A	0.18	3.5	18.8	A	0.21	6.6	17.3
	WB	A	0.17	3.9	22.1	A	0.55	10.7	68.3
	NB	-	-	-	-	-	-	-	-
	SB	A	0.14	0.8	0.0	A	0.34	9.9	16.2
	Overall	A	0.19	3.5	-	A	0.49	9.1	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Scott Street & Island Park Drive <i>Signalized</i>	EBL	A	0.29	23.4	26.2	A	0.40	21.3	26.5
	EBT	B	0.69	31.4	103.7	A	0.33	16.3	50.1
	EBR	A	0.10	9.0	8.9	A	0.06	4.2	5.2
	WBL	A	0.21	23.6	13.5	A	0.44	19.8	42.9
	WBT/R	A	0.35	22.5	47.3	B	0.66	22.7	110.3
	NB	E	0.91	50.5	#89.5	A	0.49	27.0	67.0
	SBL	A	0.14	14.6	12.7	A	0.08	21.2	9.1
	SBT/R	E	0.92	40.9	#203.7	C	0.78	37.0	#124.6
	Overall	D	0.82	36.1	-	C	0.71	25.2	-
Byron Avenue & Island Park Drive <i>Signalized</i>	EB	D	0.83	53.3	69.5	A	0.52	26.3	45.5
	WB	A	0.47	35.6	41.3	D	0.84	44.1	#92.9
	NB	B	0.61	13.6	98.9	A	0.52	15.3	72.2
	SB	C	0.72	10.0	m64.9	C	0.72	27.3	m132.0
		Overall	C	0.75	20.1	-	C	0.76	28.2

Notes: Saturation flow rate of 1800 veh/h/lane
Peak Hour Factor = 1.00
Queue is measured in metres

Delay is measured in seconds
m = metered queue
= volume for the 95th %ile cycle exceeds capacity

The study area intersection operations for the 2023 future background horizon generally operate similarly to existing operations at peak hours. The peak hour factor increasing from 0.90 to 1.00 improves the operations for all study area intersections when compared to the existing conditions, and in the case of the northbound approach at the Scot Street and Island Park Drive intersection during the AM peak, this effect is significant. This illustrates that the northbound approach along Island Park Drive is extremely sensitive to any changes in the analysis parameters and network volumes.

5.5 2028 Future Background Intersection Operations

Figure 13 illustrates the 2028 background volumes and Table 10 summarizes the 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. The Synchro worksheets are provided in Appendix G.

Figure 13: 2028 Future Background Volumes

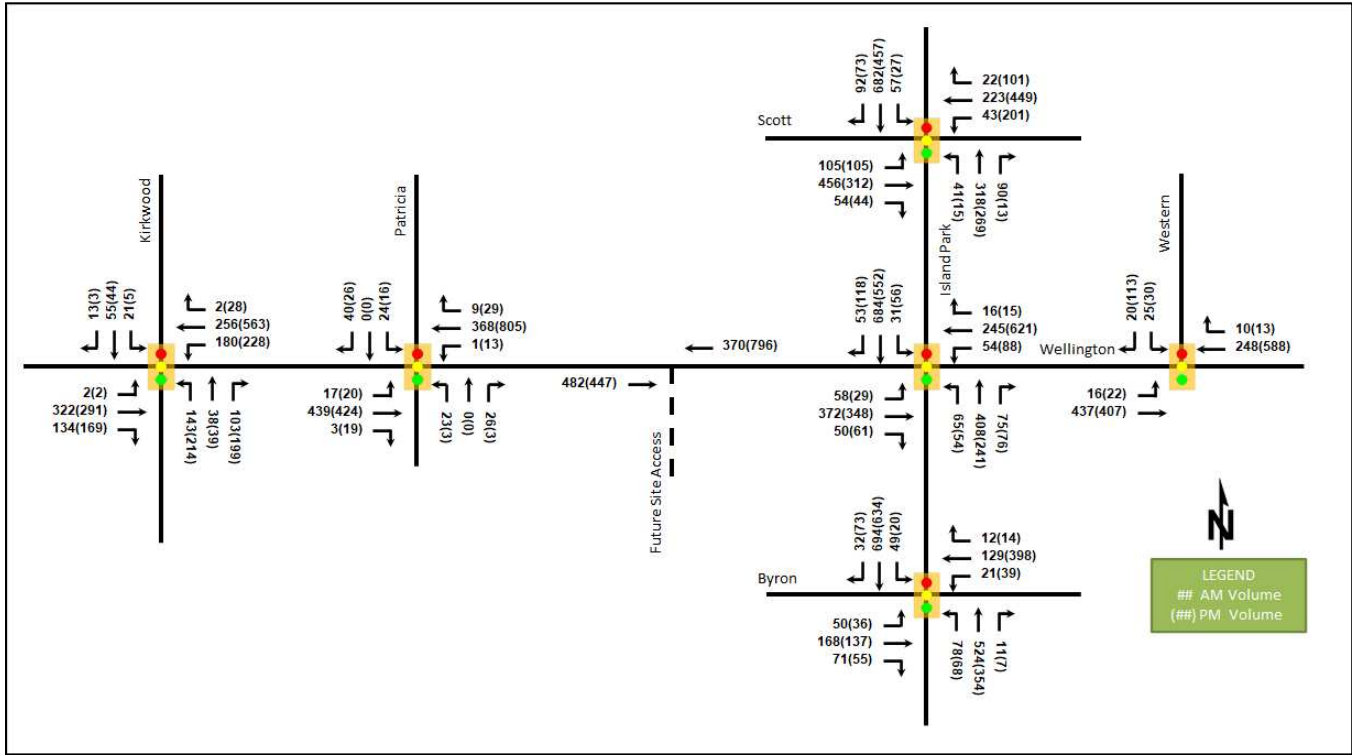


Table 10: 2028 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Richmond Road/Wellington Street W & Island Park Drive <i>Signalized</i>	EB	A	0.49	25.2	49.1	A	0.39	18.5	36.3
	WB	A	0.34	23.4	32.6	B	0.68	25.0	69.1
	NBL	A	0.40	25.4	m13.2	A	0.36	17.5	m7.2
	NBT/R	A	0.55	19.6	81.3	A	0.41	11.2	m30.2
	SBL	A	0.09	3.8	m0.9	A	0.14	14.5	12.0
	SBT/R	D	0.83	10.1	m18.5	D	0.85	32.5	#155.7
	Overall	B	0.68	18.1	-	C	0.77	23.6	-
Richmond Road & Kirkwood Avenue <i>Signalized</i>	EB	A	0.33	10.6	25.0	A	0.26	5.8	21.4
	WB	A	0.45	16.0	33.1	A	0.59	13.3	71.7
	NBL	A	0.30	18.0	26.5	C	0.72	42.4	48.0
	NBT/R	A	0.21	6.3	13.4	A	0.46	8.6	19.4
	SB	A	0.14	13.6	15.3	A	0.13	21.8	12.7
	Overall	A	0.38	13.0	-	B	0.62	14.5	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Richmond Road & Patricia Avenue <i>Signalized</i>	EB	A	0.18	3.7	18.7	A	0.19	3.0	18.3
	WB	A	0.15	3.5	15.2	A	0.32	3.6	36.7
	NB	A	0.20	12.8	8.8	A	0.03	0.3	0.0
	SB	A	0.26	15.7	11.9	A	0.20	15.2	9.0
	Overall	A	0.20	4.9	-	A	0.32	3.7	-
Wellington Street & Western Avenue <i>Signalized</i>	EB	A	0.18	3.5	19.1	A	0.23	6.7	18.6
	WB	A	0.18	3.9	23.6	A	0.56	10.8	69.4
	NB	-	-	-	-	-	-	-	-
	SB	A	0.14	0.8	0.0	A	0.34	9.9	16.2
	Overall	A	0.19	3.5	-	A	0.49	9.2	-
Scott Street & Island Park Drive <i>Signalized</i>	EBL	A	0.30	23.7	26.5	A	0.40	21.3	26.5
	EBT	B	0.69	31.4	103.7	A	0.36	16.7	54.2
	EBR	A	0.10	9.0	8.9	A	0.06	4.2	5.2
	WBL	A	0.21	23.6	13.5	A	0.45	20.4	43.7
	WBT/R	A	0.38	22.9	50.8	B	0.66	22.7	110.3
	NB	E	0.95	57.5	#127.3	A	0.52	27.9	68.6
	SBL	A	0.15	14.8	12.7	A	0.08	21.2	9.1
	SBT/R	E	0.92	40.9	#203.7	D	0.83	40.7	#145.4
	Overall	D	0.83	37.7	-	C	0.73	26.4	-
Byron Avenue & Island Park Drive <i>Signalized</i>	EB	D	0.84	54.0	#76.7	A	0.51	25.5	46.3
	WB	A	0.47	34.9	41.9	D	0.88	46.7	#112.2
	NB	B	0.65	15.0	109.8	A	0.54	16.3	72.7
	SB	C	0.73	10.4	m64.9	C	0.78	30.4	m134.0
	Overall	C	0.76	20.9	-	D	0.82	30.5	-

Notes: Saturation flow rate of 1800 veh/h/lane
Peak Hour Factor = 1.00
Queue is measured in metres

Delay is measured in seconds
m = metered queue
= volume for the 95th %ile cycle exceeds capacity

The study area intersection operations for the 2028 future background horizon operate similarly to the 2023 future background horizon.

6 Development Design

6.1 Design for Sustainable Modes

Bicycle and auto parking are located across two underground parking levels, and hard surface connections are provided from the building entrances to existing area pedestrian facilities.

Area transit route stops are within 400 metres walking distance to the building entrances.

6.2 Circulation and Access

Access to the site is provided via a public lane to Richmond Road. The right of way of the public laneway is 4.9 metres, and a 1.1-metre-wide building setback is provided the east side to permit the lane to function with a width of 6.0 metres. The loading area and parking garage have been recessed from the laneway. Emergency services are able to access the site via the two public road frontages.

The designation of a drop-off area is proposed to the east of the public laneway on Richmond Road via a signed five-minute parking zone. While currently permitted with the existing signage (No Parking) the designation of such a zone would aim to encourage its use as such.

7 Parking

7.1 Parking Supply

The site provides 63 resident vehicle parking spaces and eight visitor vehicle parking spaces across two underground parking levels and 96 total bicycle parking stalls.

Required parking from the zoning by-law is 38 vehicle spaces for tenants (at a rate of 0.5 spaces per unit after the first 12, reduced by 10% as all spaces are located underground), eight vehicle spaces for visitors (at a rate of 0.1 spaces per unit after the first 12 units), and 48 bicycle spaces (at a rate of 0.5 spaces per unit). No vehicle spaces are required for the retail component, given it is on the main floor and its gross floor area is less than 500 m².

The proposed parking meets the minimum requirements including the minimum visitor parking and bicycle parking requirements.

8 Boundary Street Design

Table 11 summarizes the MMLOS analysis for the boundary streets of Richmond Road and Island Park. The existing and future conditions for both intersections will be the same and are considered in one row. The boundary street analysis is based on the policy area of “Within 300m of a school” where both site frontages are within the specified distance of Hilson Avenue Public School. The MMLOS worksheet has been provided in Appendix H.

Table 11: Boundary Street MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Richmond Road	A	A	E	C	D	D	C	D
Island Park Drive	C	A	F	D	N/A	D	N/A	E

Island Park Drive does not meet pedestrian LOS targets and both Richmond Road and Island Park Drive do not meet the cycling LOS targets. The traffic volumes on Island Park Drive are above MMLOS thresholds. Bicycle LOS was limited on Richmond Road by mixed traffic conditions, operating speeds, and cross-sectional width and was limited on Island Park Drive by the taper width for the development of the bike lane beyond the intersection limits. Richmond Road would require curbside bike lanes at a minimum to meet its BLOS targets and would require a corridor level study by the City to determine how and where a cycling facility could be implemented. The planned protected intersection implementation at the intersection of Richmond Road/Wellington Street West at Island Park Drive may improve the cycling conditions along the site frontage in future. Transit and truck LOS targets are met on boundary roads.

Crowding PLOS is not considered in the PLOS due to the high-volume threshold. At the lowest threshold given, of 250 pedestrians per hour, the minimum effective sidewalk width required to achieve LOS A would be 3.0 metres, whereby nearly any sidewalk considered for installation in the City would not be able to meet this target.

9 Access Intersections Design

9.1 Location and Design of Access

The residential access will be the public laneway onto Richmond Road, in the existing location of the laneway's right of way. This laneway is located approximately 30 metres west of the signalized intersection of Richmond Road at Island Park Drive. The access is proposed as permitting full movements, 6.0 metres in width, and with a throat length of approximately 16.5 metres. The access meets the minimum width from the zoning by-law's parking queueing and loading provisions.

The proposed access generally meets the Private Approach By-Law (PABL) requirement for a site access. The utilization of the public laneway right-of-way on the western edge of the property removes the access requirements regarding adjacent property limit offset. Within the laneway right-of-way itself, no laneway can sufficiently be located to meet an offset of 3.0 metres, or potential 0.3 metre offset from the adjacent property line. Further to this, the limited site frontage along both Island Park Drive and Richmond Road would not meet the PABL preferred distance requirements for an access to be located 30.0 metres from an adjacent access. The laneway is situated approximately in a midblock location, approximately 24.6 metres from Leighton Terrace and approximately 27.9 metres from Island Park Drive.

Overall, the unique nature of the public laneway is considered to meet the intent of the PABL for the geometry requirements and is located in the optimal location to limit additional accesses within close proximity to the Richmond and Island Park Drive intersection.

10 Transportation Demand Management

10.1 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 include:

- Display local area maps with walking and cycling routes, and transit route information and schedules at major entrances
- Provide online links to OC Transpo and STO information
- Inclusion of a 1-month Presto card for first time new townhome purchase and 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 purchase or rental costs

11 Summary of Improvements Indicated and Modifications Options

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

Proposed Site and Screening

- The proposal for a nine-storey, 96-residential dwelling unit building with 1,455 sq. ft. of ground floor retail uses
- Accesses will be provided along via a public laneway onto Richmond Road, west of its intersection with Island Park Drive
- The development is proposed to be completed as a single phase by 2023
- Only the Location and Safety triggers were met for the TIA Screening

Existing Conditions

- Richmond Road, Wellington Street West, Island Park Drive, Scott Street, and Kirkwood Avenue are arterial roads, and Byron Avenue is a collector road in the study area
- Sidewalks/MUPs are generally provided on both sides of the study area roadways, and on-street bike lanes on both sides of the roadway on Island Park Drive and on the south side of Scott Street and the north side of Byron Avenue
- The high-volume roadways have produced a high number of collisions at the study area intersections, typical of urban areas in Ottawa

- The collisions are predominantly rear end, sideswipe, and turning movement collisions indicating that they are generally lower speed and a result of congestion, and the City completed a review of the intersection and detailed a recommended plan to address collisions including lane reductions, separated cycling facilities, and radii reduction
- Queuing, capacity issues and delays are noted on the northbound and southbound movements of the intersection of Scott Street and Island Park Drive during the AM peak hour. Extended queuing is noted on five additional peak direction movements scattered throughout the study area, but generally the intersections operate well

Background Conditions

- The background developments with traffic studies were explicitly included in the background conditions, along with a total background growth of rounded TRANS rates along appropriate links' mainline volumes and major turning movements
- All study area intersections at will operate similar to the existing conditions with improvements due to the increase in peak hour factor

Development Design

- The bike and auto parking areas are to be located internal to the building
- Pedestrian connections will be made from the building entrance to the sidewalk along Richmond Road and Island Park Drive
- A five-minute designated drop-off area is proposed on Richmond Road between the access and the bus stop through revised road signage
- A loading area and garage ramp have been recessed from the laneway, and emergency services are to access the site via the two public road frontages

Parking

- A total of 63 parking stalls are provided for resident, eight visitor parking stalls and 96 bike stalls are provided, all of which are within the underground garage
- The above parking numbers meet the minimum parking requirements for the site

Boundary Street Design

- The boundary streets will not meet pedestrian MMLOS targets along Island Park Drive and bicycle MMLOS targets along Richmond Road and Island Park Drive
- No improvements are recommended on the federally owned Island Park Drive to address pedestrian LOS which cannot be met given the auto volumes
- No bike lane improvements are recommended for the development recognizing its limited frontage along Richmond Road which would require study by the City for the coordination of facilities along the corridor
- The City's improvement of the Richmond Road and Island Park Drive intersection may improve the cycling and pedestrian levels of service one upgraded to a protected intersection
- Transit and truck LOS targets are met on boundary streets

Access Intersections Design

- A single 6.0 metre-wide full-movements access approximately 30 metres west of the intersection of Richmond Road at Island Park Drive, with a throat length of approximately 16.5 metres

- The access is within a public laneway right-of-way, generally meeting PABL requirements, but given location constraints, is not able to provide an offset from the laneway property line, and is mid-block between Island Park Drive and Leighton Terrace slightly below the required 30 metres distance from each

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 online links to OC Transpo and STO information
 - Inclusion of a 1-month Presto card for first time new townhome purchase and 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 purchase or rental costs

12 Conclusion

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

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Appendix A

TIA Screening Form and PM Certification Form

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 19-Oct-22
Project Number: 2022-072
Project Reference: 70 Richmond Road

1.1 Description of Proposed Development	
Municipal Address	70 Richmond Road
Description of Location	SW corner of Island Park Dr @ Richmond Rd/Wellington St W Intersection
Land Use Classification	TM[2792] S 461
Development Size	96 dwelling units, 1,318 sq. ft. retail
Accesses	Access via an existing rear laneway
Phase of Development	One
Buildout Year	2023
TIA Requirement	Design Review Component

1.2 Trip Generation Trigger	
Land Use Type	Townhomes or apartments
Development Size	96 Units
Trip Generation Trigger	See TRANS Trip Generation Manual (2020) site trip generation attached No

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?	Yes
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	Yes
Location Trigger	Yes

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)?	Yes
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?	Yes
Does the development include a drive-thru facility?	No
Safety Trigger	Yes

Table 1: Trip Generation Person Trip Rates by Peak Period

Land Use	Land Use Code	Peak Period	Vehicle Trip Rate	Person Trip Rates
Multi-Unit High-Rise	221 & 222 (TRANS)	AM	-	0.80
		PM	-	0.90
Land Use	Land Use Code	Peak Hour	Vehicle Trip Rate	Person Trip Rates
Retail (<40k sq. ft.)	820 (ITE)	AM	2.36	3.02
		PM	6.59	8.44

Table 2: 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	96	24	53	77	50	36	86
Land Use	GFA (sq. ft.)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Retail (<40k sq. ft.)	1,455	2	2	4	6	6	12

Table 3: 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	28%	3	7	11	33%	7	5	12
	Auto Passenger	11%	1	3	4	11%	3	2	4
	Transit	41%	6	12	18	26%	6	4	10
	Cycling	3%	1	1	1	7%	2	1	3
	Walking	16%	2	5	7	23%	6	4	10
	Total	100%	13	28	41	100%	24	16	39
Retail (<40k sq. ft.)	Auto Driver	55%	0	0	0	50%	1	1	1
	Auto Passenger	11%	0	0	0	16%	1	1	2
	Transit	11%	0	0	0	11%	1	1	1
	Cycling	0%	0	0	0	5%	0	0	1
	Walking	23%	0	0	1	18%	1	1	2
	Pass-by	40%	-1	-1	-2	40%	-2	-2	-4
	Internal Capture	varies	0	0	0	varies	0	-1	-1
Total	100%	0	0	1	100%	4	4	7	
Total	Auto Driver	-	3	7	11	-	8	6	13
	Auto Passenger	-	1	3	4	-	4	3	6
	Transit	-	6	12	18	-	7	5	11
	Cycling	-	1	1	1	-	2	1	4
	Walking	-	2	5	8	-	7	5	12
	Total	-	13	28	42	-	28	20	46

As shown above, a total of 43 AM and 46 PM new peak hour two-way person trips are projected as a result of the proposed development.



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 licensed¹ or registered² 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
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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 this 20 day of September, 2018.
(City)

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

ISLAND PARK DR @ SCOTT ST

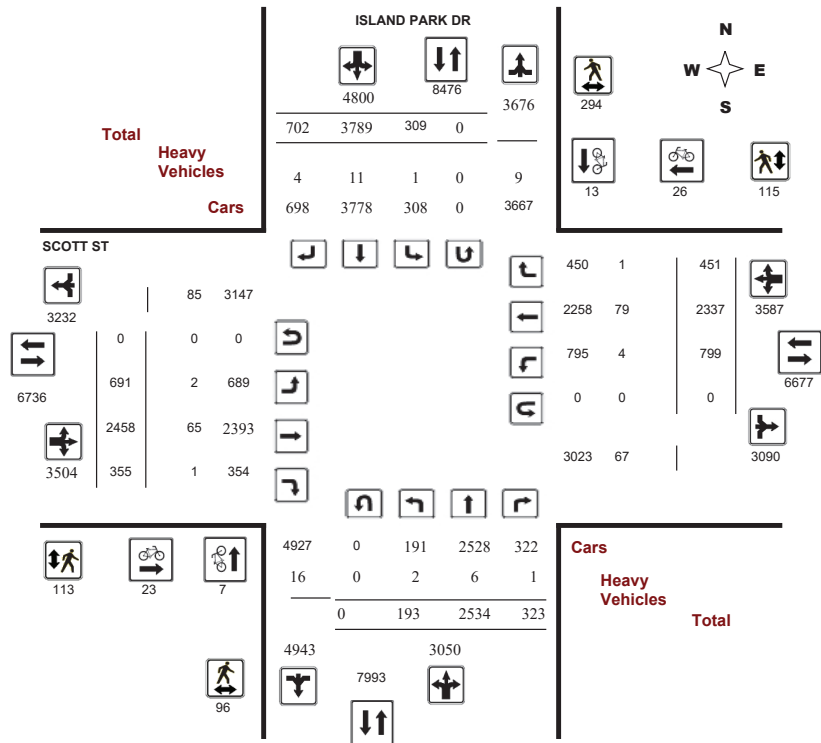
Survey Date: Tuesday, March 28, 2017

WO No: 36808

Start Time: 07:00

Device: Miovision

Full Study Diagram



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ SCOTT ST

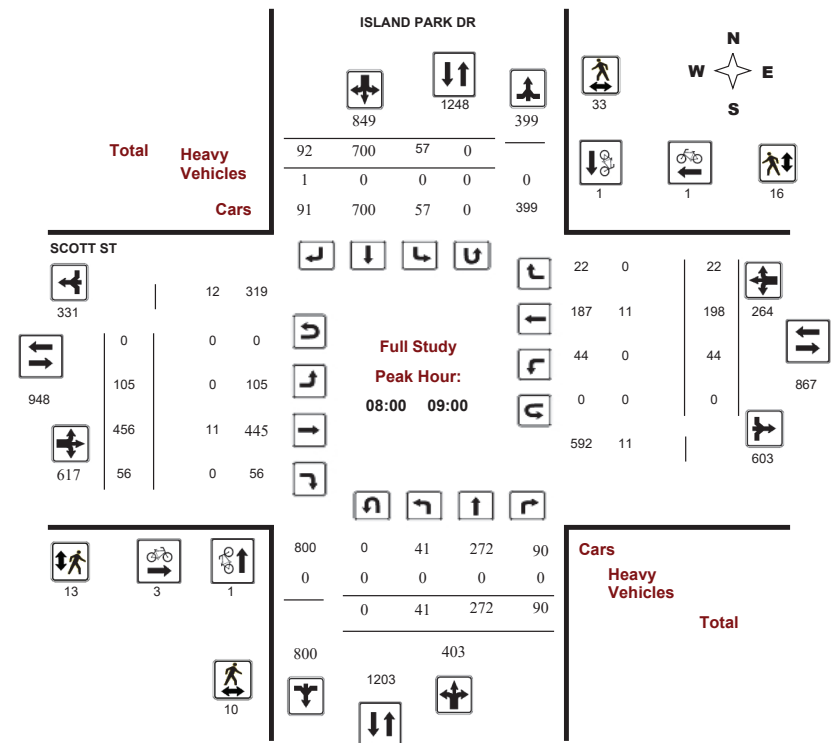
Survey Date: Tuesday, March 28, 2017

WO No: 36808

Start Time: 07:00

Device: Miovision

Full Study Peak Hour Diagram





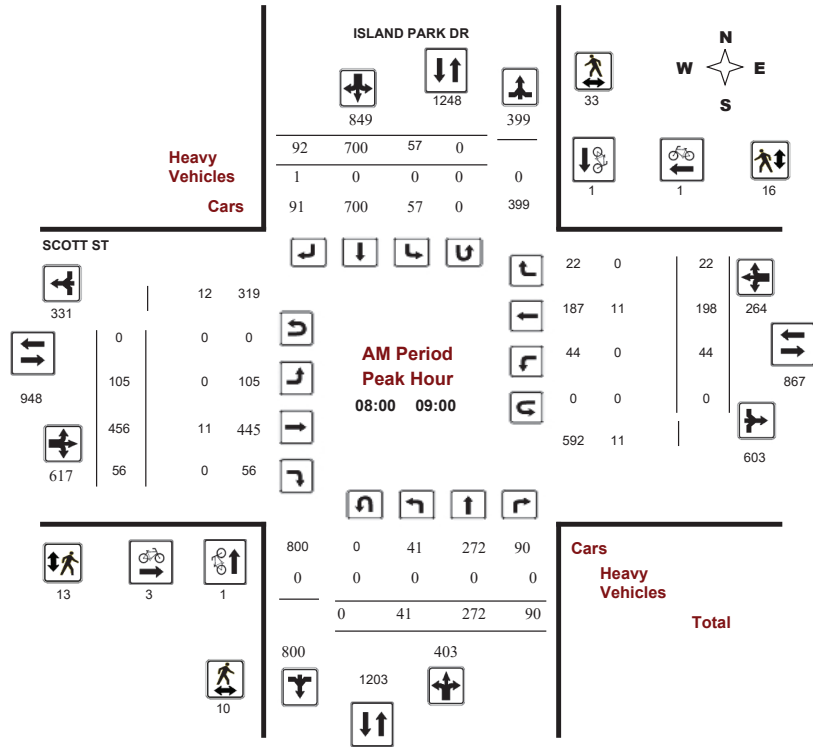
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017
Start Time: 07:00

WO No: 36808
Device: Miovision



Comments



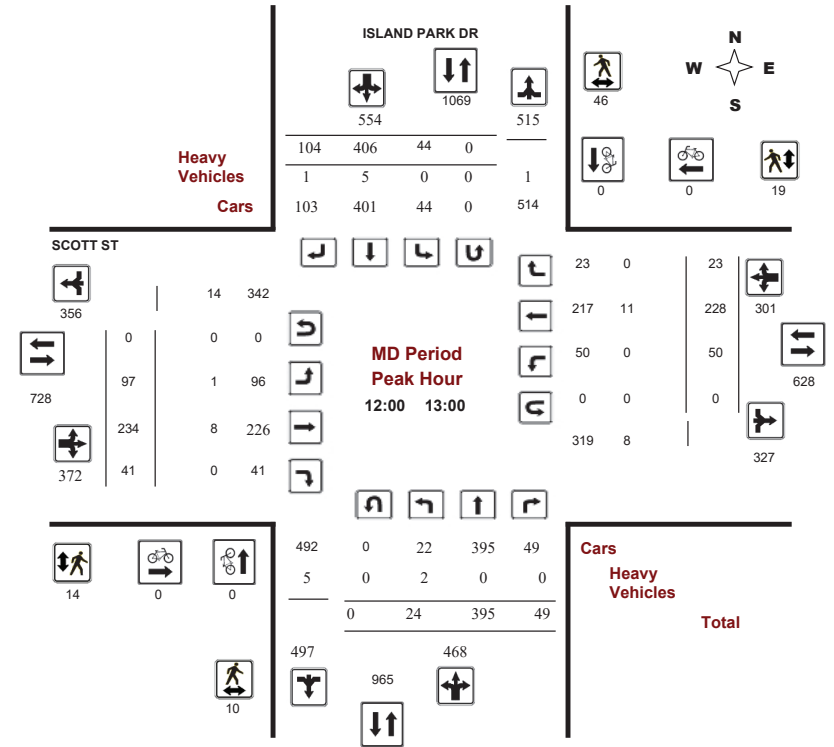
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017
Start Time: 07:00

WO No: 36808
Device: Miovision



Comments



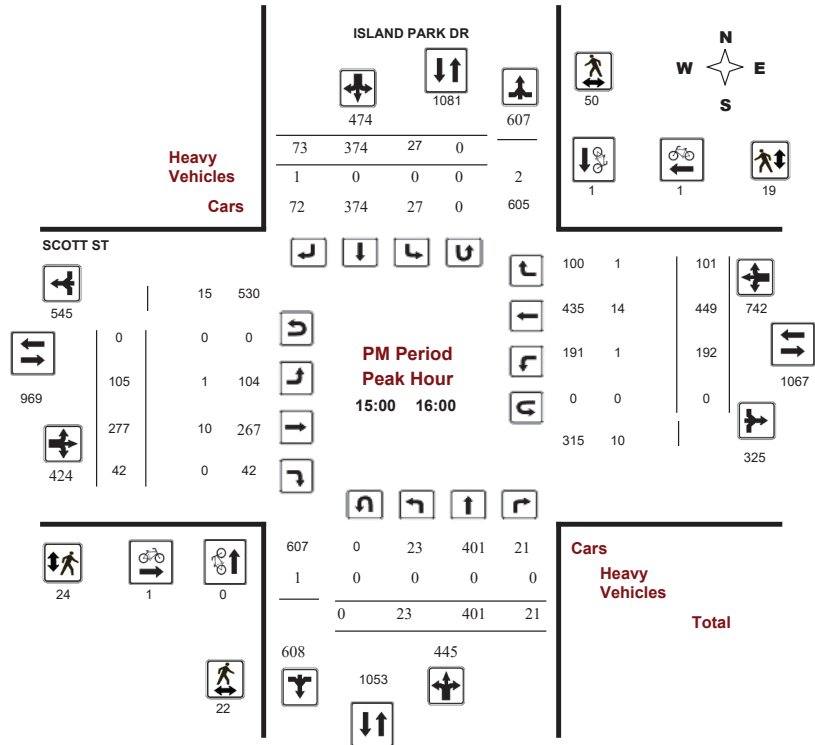
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017
Start Time: 07:00

WO No: 36808
Device: Miovision



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017
Start Time: 07:00

WO No: 36808
Device: Miovision

Full Study Summary (8 HR Standard)

Survey Date: Tuesday, March 28, 2017

Total Observed U-Turns
Northbound: 0 Southbound: 0
Eastbound: 0 Westbound: 0

AADT Factor
1.00

Period	ISLAND PARK DR								SCOTT ST								Grand Total		
	Northbound				Southbound				Eastbound				Westbound						
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT		STR TOT	
07:00-08:00	20	242	79	341	32	696	66	794	1135	48	373	40	461	24	149	6	179	640	1775
08:00-09:00	41	272	90	403	57	700	92	849	1252	105	456	56	617	44	198	22	264	881	2133
09:00-10:00	37	313	34	384	42	542	107	691	1075	69	270	32	371	37	196	14	247	618	1693
11:30-12:30	24	378	36	438	27	397	100	524	962	81	223	46	350	54	238	22	314	664	1626
12:30-13:30	34	408	38	480	40	387	83	510	990	107	222	27	356	51	207	30	288	644	1634
15:00-16:00	23	401	21	445	27	374	73	474	919	105	277	42	424	192	449	101	742	1166	2085
16:00-17:00	5	204	9	218	38	330	84	452	670	80	309	56	445	244	449	150	843	1288	1958
17:00-18:00	9	316	16	341	46	363	97	506	847	96	328	56	480	153	451	106	710	1190	2037
Sub Total	193	2534	323	3050	309	3789	702	4800	7850	691	2458	355	3504	799	2337	451	3587	7091	14941
U Turns	0				0				0				0				0	0	0
Total	193	2534	323	3050	309	3789	702	4800	7850	691	2458	355	3504	799	2337	451	3587	7091	14941
EQ 12Hr	268	3522	449	4240	430	5267	976	6672	10912	960	3417	493	4871	1111	3248	627	4986	9856	20768
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.																1.39			
AVG 12Hr	253	3320	423	3996	405	4964	920	6288	10912	905	3220	465	4590	1047	3061	591	4699	9856	20768
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.																1			
AVG 24Hr	331	4349	554	5234	530	6502	1205	8237	13471	1186	4218	609	6013	1371	4011	774	6156	12169	25640
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

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017

WO No: 36808

Start Time: 07:00

Device: Miovision

Full Study 15 Minute Increments

Table with columns for Time Period, Northbound, Southbound, Eastbound, Westbound, and Grand Total. Rows represent 15-minute intervals from 07:00 to 18:00.

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017

WO No: 36808

Start Time: 07:00

Device: Miovision

Full Study Cyclist Volume

Table with columns for Time Period, Northbound, Southbound, Street Total, Eastbound, Westbound, Street Total, and Grand Total. Rows represent 15-minute intervals from 07:00 to 18:00.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017

WO No: 36808

Start Time: 07:00

Device: Miovision

Full Study Pedestrian Volume

ISLAND PARK DR SCOTT ST

Table with columns: 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. Rows show pedestrian counts for various time intervals from 07:00 to 18:00.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017

WO No: 36808

Start Time: 07:00

Device: Miovision

Full Study Heavy Vehicles

ISLAND PARK DR SCOTT ST

Table with columns: Time Period, Northbound (LT, ST, RT, N TOT), Southbound (LT, ST, RT, S TOT, STR TOT), Eastbound (LT, ST, RT, E TOT), Westbound (LT, ST, RT, W TOT, STR TOT), Grand Total. Rows show heavy vehicle counts for various time intervals from 07:00 to 18:00.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ SCOTT ST

Survey Date: Tuesday, March 28, 2017

WO No: 36808

Start Time: 07:00

Device: Miovision

Full Study 15 Minute U-Turn Total

Time Period	ISLAND PARK DR		SCOTT ST		Total
	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn 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	0	0	0
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	0	0	0



Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

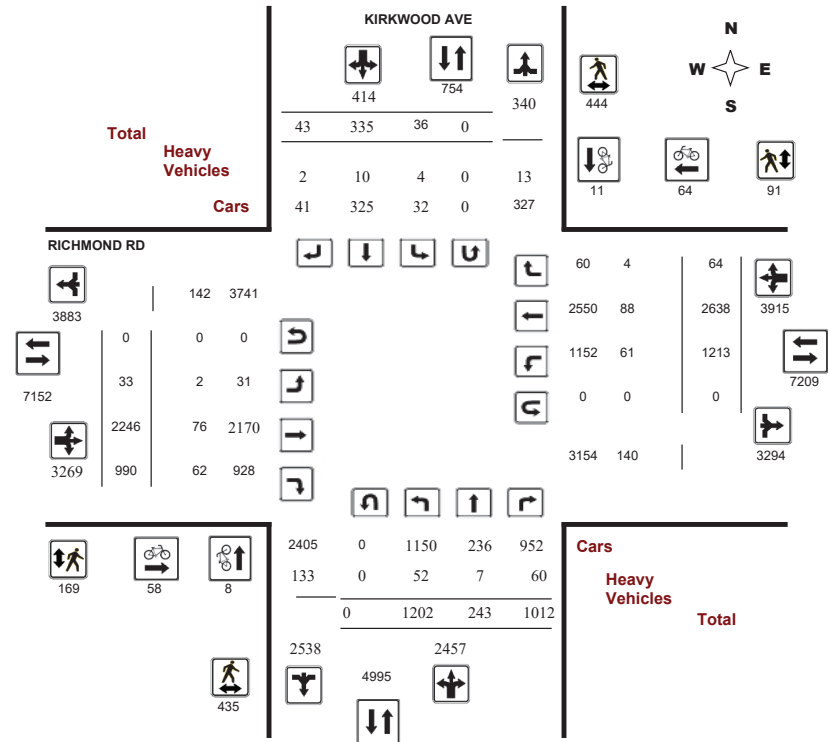
Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study Diagram





Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

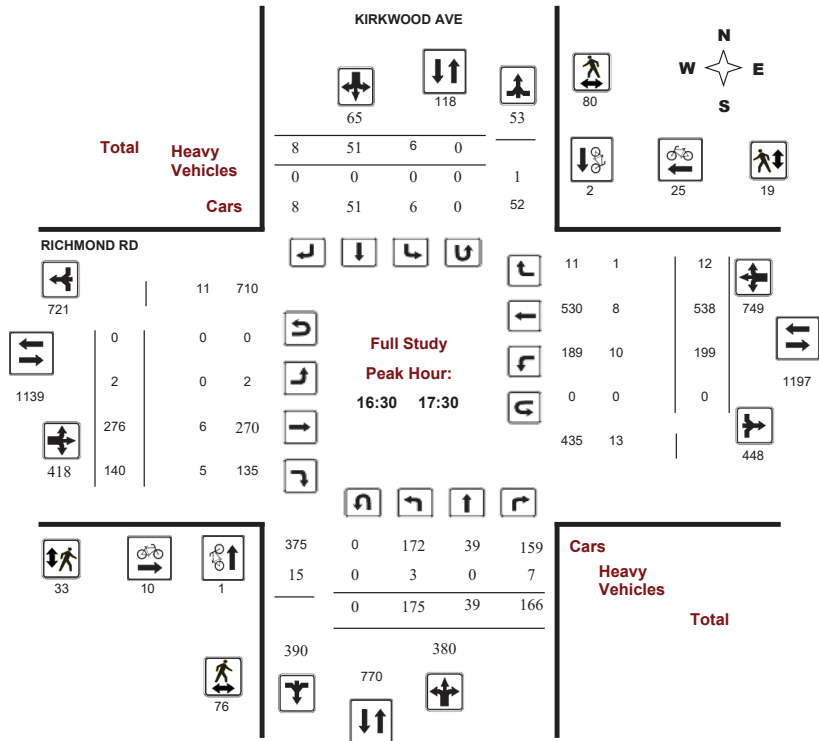
Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study Peak Hour Diagram



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

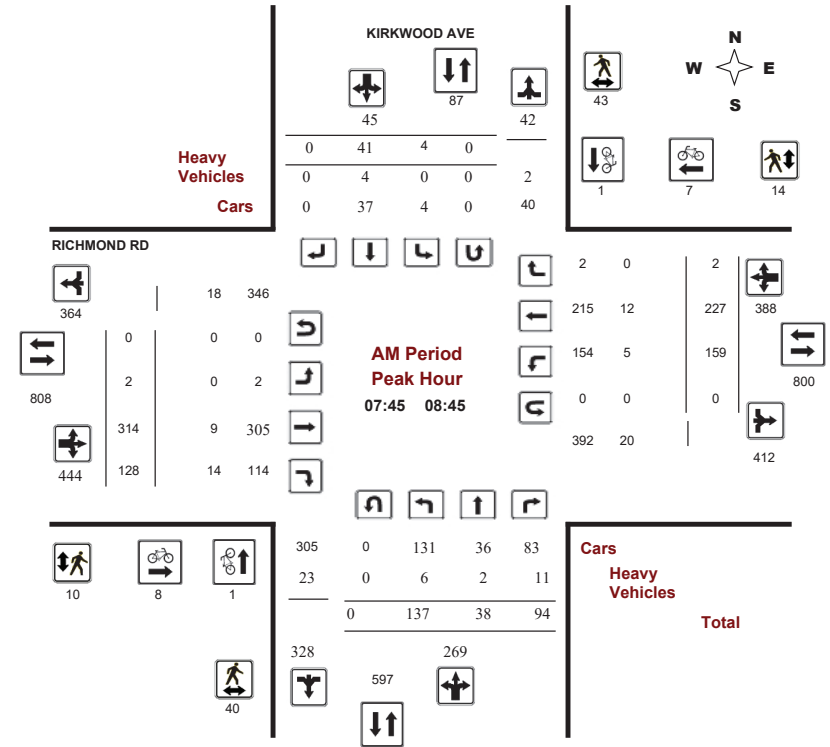
KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision



Comments



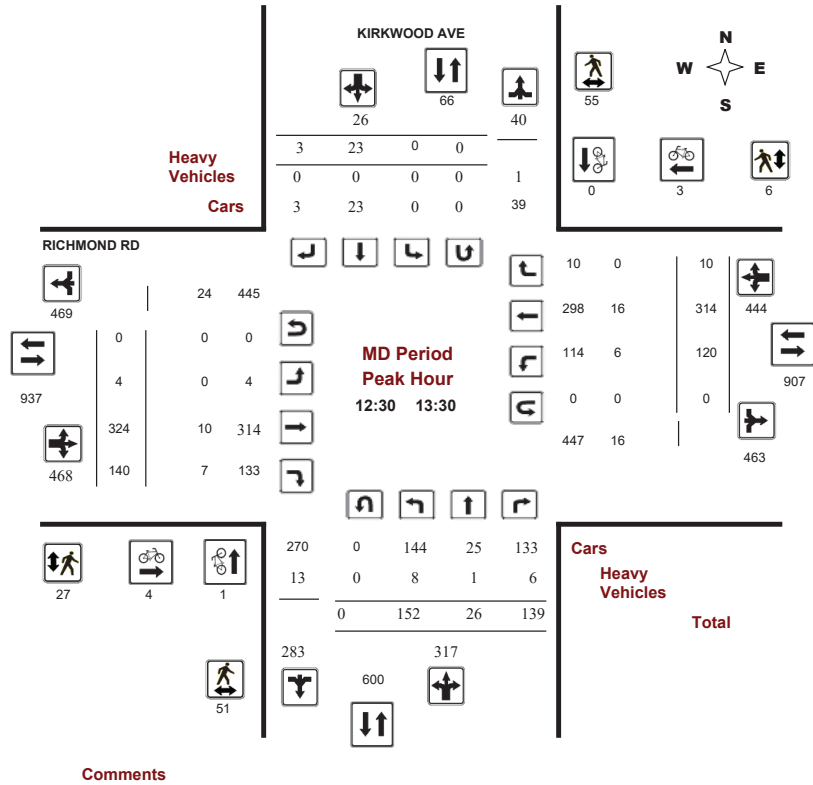
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017
Start Time: 07:00

WO No: 36956
Device: Miovision



Comments



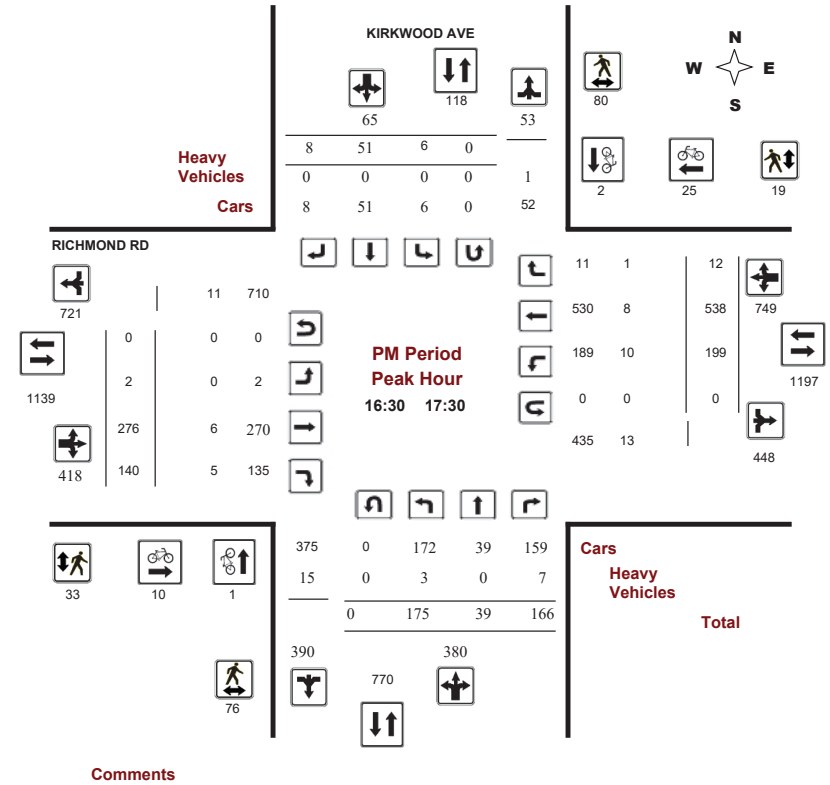
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017
Start Time: 07:00

WO No: 36956
Device: Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study Summary (8 HR Standard)

Survey Date: Thursday, April 20, 2017

Total Observed U-Turns AADT Factor
Northbound: 0 Southbound: 0 Eastbound: 0 Westbound: 0 .90

Table with columns for Period, Northbound, Southbound, Eastbound, Westbound, and Grand Total. Includes sub-totals for U Turns, EQ 12Hr, and AVG 24Hr.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study 15 Minute Increments

Table with columns for Time Period, Northbound, Southbound, Eastbound, Westbound, and Grand Total. Shows 15-minute increments from 07:00 to 18:00.

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study Cyclist Volume

Time Period	KIRKWOOD AVE			RICHMOND RD			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 07:15	0	0	0	4	1	5	5
07:15 07:30	0	0	0	2	2	4	4
07:30 07:45	1	0	1	5	1	6	7
07:45 08:00	0	0	0	2	1	3	3
08:00 08:15	0	0	0	1	3	4	4
08:15 08:30	1	0	1	2	1	3	4
08:30 08:45	0	1	1	3	2	5	6
08:45 09:00	0	0	0	2	2	4	4
09:00 09:15	0	0	0	0	1	1	1
09:15 09:30	0	1	1	3	2	5	6
09:30 09:45	0	0	0	1	1	2	2
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	1	0	1	0	3	3	4
11:45 12:00	1	1	2	1	1	2	4
12:00 12:15	1	0	1	0	0	0	1
12:15 12:30	0	0	0	1	0	1	1
12:30 12:45	1	0	1	1	1	2	3
12:45 13:00	0	0	0	1	1	2	2
13:00 13:15	0	0	0	2	0	2	2
13:15 13:30	0	0	0	0	1	1	1
15:00 15:15	0	0	0	1	1	2	2
15:15 15:30	0	0	0	2	0	2	2
15:30 15:45	0	0	0	0	2	2	2
15:45 16:00	0	1	1	2	2	4	5
16:00 16:15	0	4	4	2	0	2	6
16:15 16:30	0	0	0	0	2	2	2
16:30 16:45	0	0	0	3	5	8	8
16:45 17:00	0	2	2	4	8	12	14
17:00 17:15	0	0	0	1	3	4	4
17:15 17:30	1	0	1	2	9	11	12
17:30 17:45	0	1	1	5	5	10	11
17:45 18:00	1	0	1	5	3	8	9
Total	8	11	19	58	64	122	141



Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study Pedestrian Volume

Time Period	KIRKWOOD AVE			RICHMOND RD			Grand Total
	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	
07:00 07:15	0	3	3	1	0	1	4
07:15 07:30	3	7	10	1	2	3	13
07:30 07:45	9	7	16	6	4	10	26
07:45 08:00	16	14	30	1	4	5	35
08:00 08:15	14	9	23	1	5	6	29
08:15 08:30	7	11	18	3	4	7	25
08:30 08:45	3	9	12	5	1	6	18
08:45 09:00	10	11	21	1	0	1	22
09:00 09:15	8	3	11	3	1	4	15
09:15 09:30	13	6	19	1	1	2	21
09:30 09:45	8	15	23	6	2	8	31
09:45 10:00	14	14	28	1	0	1	29
11:30 11:45	16	17	33	2	1	3	36
11:45 12:00	13	14	27	2	1	3	30
12:00 12:15	13	19	32	10	3	13	45
12:15 12:30	11	19	30	2	2	4	34
12:30 12:45	11	11	22	5	2	7	29
12:45 13:00	8	17	25	8	1	9	34
13:00 13:15	16	14	30	7	2	9	39
13:15 13:30	16	13	29	7	1	8	37
15:00 15:15	15	22	37	11	3	14	51
15:15 15:30	21	12	33	1	1	2	35
15:30 15:45	22	13	35	10	6	16	51
15:45 16:00	13	20	33	5	4	9	42
16:00 16:15	25	15	40	14	5	19	59
16:15 16:30	13	11	24	7	3	10	34
16:30 16:45	22	19	41	2	5	7	48
16:45 17:00	18	17	35	5	6	11	46
17:00 17:15	16	23	39	8	2	10	49
17:15 17:30	20	21	41	18	6	24	65
17:30 17:45	21	20	41	9	9	18	59
17:45 18:00	20	18	38	6	4	10	48
Total	435	444	879	169	91	260	1139



Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study Heavy Vehicles

Table with columns for Time Period, Northbound (LT, ST, RT, N TOT, STR TOT), Southbound (LT, ST, RT, S TOT, STR TOT), Eastbound (LT, ST, RT, E TOT), Westbound (LT, ST, RT, W TOT, STR TOT), and Grand Total. Rows represent 15-minute intervals from 07:00 to 18:00.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

KIRKWOOD AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO No: 36956

Start Time: 07:00

Device: Miovision

Full Study 15 Minute U-Turn Total

Table with columns for Time Period, Northbound U-Turn Total, Southbound U-Turn Total, Eastbound U-Turn Total, Westbound U-Turn Total, and Total. Rows represent 15-minute intervals from 07:00 to 18:00.



Transportation Services - Traffic Services W.O. 36949
Turning Movement Count - 15 Minute Summary Report

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017 **Total Observed U-Turns**
 Northbound: 0 Southbound: 0
 Eastbound: 4 Westbound: 1

Time Period	PATRICIA AVE Northbound			PATRICIA AVE Southbound			RICHMOND RD Eastbound			RICHMOND RD Westbound			W TOT	STR TOT	Grand Total				
	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT				E TOT	LT	ST	RT
07:00 07:15	2	0	1	3	4	0	8	12	15	8	40	1	49	1	52	4	57	106	121
07:15 07:30	2	0	8	10	6	0	7	13	23	2	60	0	62	0	52	0	52	114	137
07:30 07:45	3	0	5	8	0	0	10	10	18	5	71	1	78	1	62	2	65	143	161
07:45 08:00	3	0	11	14	8	0	9	17	31	4	125	1	130	0	82	3	85	215	246
08:00 08:15	13	0	4	17	7	0	7	14	31	3	99	1	103	1	76	4	81	184	215
08:15 08:30	6	0	6	12	4	0	11	15	27	7	89	1	97	0	76	2	78	175	202
08:30 08:45	1	0	5	6	5	0	13	18	24	3	96	0	99	0	85	0	85	184	208
08:45 09:00	4	0	3	7	3	0	3	6	13	2	95	2	99	0	83	3	86	185	198
09:00 09:15	1	0	2	3	1	0	2	3	6	5	92	0	97	0	89	6	95	192	198
09:15 09:30	1	0	2	3	5	0	5	10	13	1	77	2	80	0	95	0	95	175	188
09:30 09:45	1	0	2	3	5	0	10	15	18	2	92	1	95	0	91	1	92	187	205
09:45 10:00	1	0	4	5	2	0	2	4	9	2	79	0	81	1	102	1	104	185	194
11:30 11:45	3	0	2	5	3	0	5	8	13	4	92	2	98	0	103	2	105	203	216
11:45 12:00	2	0	0	2	2	0	6	8	10	7	89	1	98	0	117	6	123	221	231
12:00 12:15	1	0	0	1	3	0	6	9	10	8	101	2	111	0	109	7	116	227	237
12:15 12:30	1	0	2	3	1	0	4	5	8	2	108	2	112	0	103	4	107	219	227
12:30 12:45	1	0	0	1	5	0	6	11	12	4	119	2	125	1	111	1	113	238	250
12:45 13:00	0	0	1	1	3	0	5	8	9	6	108	1	115	1	103	3	107	222	231
13:00 13:15	1	0	0	1	2	0	3	5	6	7	104	3	114	1	88	1	90	204	210
13:15 13:30	1	0	3	4	0	0	6	6	10	5	97	2	104	2	92	1	95	199	209
15:00 15:15	0	0	1	1	2	0	8	10	11	7	111	2	120	0	115	5	120	240	251
15:15 15:30	2	0	4	6	3	0	2	5	11	6	104	2	112	1	153	3	157	269	280
15:30 15:45	0	0	1	1	6	0	6	12	13	2	107	1	110	0	134	1	135	245	258
15:45 16:00	0	0	0	0	6	0	7	13	13	4	91	4	99	2	141	6	149	248	261
16:00 16:15	0	0	1	1	1	0	1	2	3	5	107	3	115	2	188	2	192	307	310
16:15 16:30	1	0	1	2	1	0	4	5	7	6	99	3	108	2	192	5	199	307	314
16:30 16:45	0	0	1	1	4	0	7	11	12	4	108	7	120	1	238	4	244	364	376
16:45 17:00	0	0	1	1	5	0	8	13	14	6	109	4	119	2	230	9	241	360	374
17:00 17:15	1	0	1	2	5	0	5	10	12	4	131	3	138	4	194	8	206	344	356
17:15 17:30	2	0	0	2	2	0	6	8	10	5	112	5	122	5	208	8	221	343	353
17:30 17:45	0	0	3	3	4	0	7	11	14	4	119	9	133	1	194	5	200	333	347
17:45 18:00	1	0	1	2	3	0	8	11	13	5	95	4	104	3	203	3	209	313	326
TOTAL:	55	0	76	131	111	0	197	308	439	145	3126	72	3347	32	3961	110	4104	7451	7890

Note: U-Turns are included in Totals.

Comment:



Transportation Services - Traffic Services
Turning Movement Count - Cyclist Volume Report

Work Order
36949

PATRICIA AVE @ RICHMOND RD

Count Date: Tuesday, April 25, 2017 **Start Time:** 07:00

Time Period	PATRICIA AVE			RICHMOND RD			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 08:00	3	2	5	17	6	23	28
08:00 09:00	1	0	1	15	7	22	23
09:00 10:00	1	2	3	11	3	14	17
11:30 12:30	0	1	1	9	12	21	22
12:30 13:30	0	2	2	13	6	19	21
15:00 16:00	0	1	1	6	6	12	13
16:00 17:00	0	2	2	12	10	22	24
17:00 18:00	0	3	3	12	16	28	31
Total	5	13	18	95	66	161	179

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

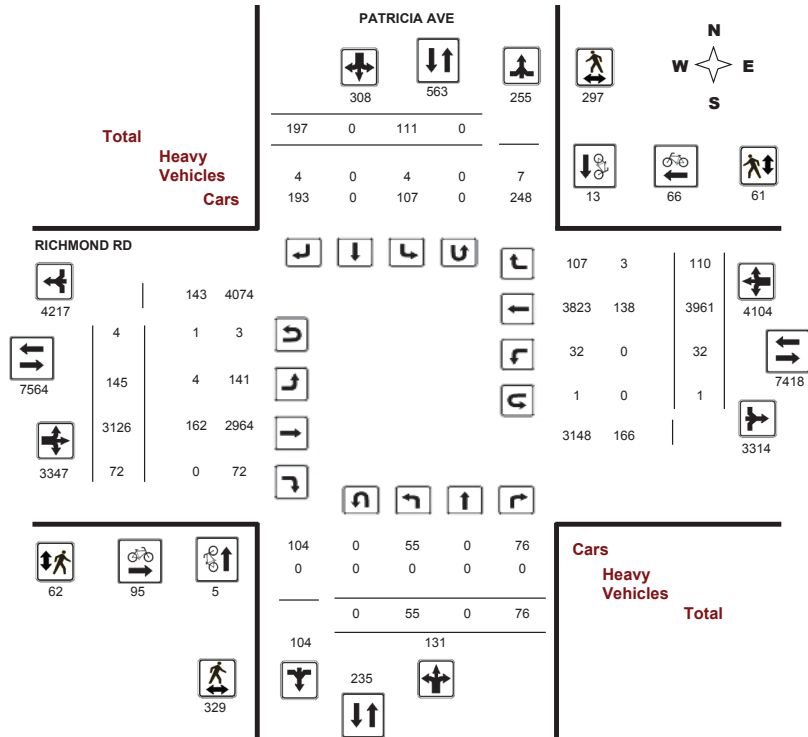


Transportation Services - Traffic Services
Turning Movement Count - Full Study Diagram

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

WO#: 36949
 Device: Miovision



Comments



Transportation Services - Traffic Services
Turning Movement Count - Heavy Vehicle Report

W.O.
36949

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

Time Period	PATRICIA AVE								RICHMOND RD								W TOT	STR TOT	Grand Total	
	Northbound				Southbound				Eastbound				Westbound							
	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT				TOT
07:00	0	0	0	0	0	0	0	1	1	1	1	22	0	23	0	8	0	8	31	32
08:00	0	0	0	0	0	0	0	1	1	1	0	23	0	23	0	16	0	16	39	40
09:00	0	0	0	0	2	0	0	2	2	1	28	0	29	0	20	0	20	49	51	
11:30	0	0	0	0	1	0	0	1	1	1	23	0	24	0	23	3	26	50	51	
12:30	0	0	0	0	0	0	0	1	1	1	28	0	29	0	27	0	27	56	57	
15:00	0	0	0	0	1	0	1	2	2	0	14	0	14	0	15	0	15	29	31	
16:00	0	0	0	0	0	0	0	0	0	0	14	0	15	0	14	0	14	29	29	
17:00	0	0	0	0	0	0	0	0	0	0	10	0	10	0	15	0	15	25	25	
Sub Total	0	0	0	0	4	0	4	8	8	4	162	0	167	0	138	3	141	308	316	
U-Turns (Heavy Vehicles)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	
Total	0	0	0	0	4	0	4	8	8	4	162	0	168	0	138	3	141	309	317	

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.



Transportation Services - Traffic Services
Turning Movement Count - Pedestrian Volume Report

Work Order
36949

PATRICIA AVE @ RICHMOND RD

Count Date: Tuesday, April 25, 2017 Start Time: 07:00

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	3	2	5	1	1	2	7
07:15 07:30	7	3	10	3	1	4	14
07:30 07:45	10	4	14	1	1	2	16
07:45 08:00	19	9	28	5	3	8	36
07:00 08:00	39	18	57	10	6	16	73
08:00 08:15	13	9	22	4	3	7	29
08:15 08:30	15	3	18	5	0	5	23
08:30 08:45	7	8	15	2	5	7	22
08:45 09:00	0	7	7	0	2	2	9
08:00 09:00	35	27	62	11	10	21	83
09:00 09:15	4	9	13	2	1	3	16
09:15 09:30	15	4	19	2	0	2	21
09:30 09:45	9	6	15	2	0	2	17
09:45 10:00	3	8	11	1	0	1	12
09:00 10:00	31	27	58	7	1	8	66
11:30 11:45	8	15	23	2	1	3	26
11:45 12:00	8	26	34	6	4	10	44
12:00 12:15	15	11	26	3	1	4	30
12:15 12:30	22	19	41	2	2	4	45
11:30 12:30	53	71	124	13	8	21	145
12:30 12:45	12	15	27	0	0	0	27
12:45 13:00	18	19	37	4	0	4	41
13:00 13:15	17	12	29	1	1	2	31
13:15 13:30	9	4	13	2	0	2	15
12:30 13:30	56	50	106	7	1	8	114
15:00 15:15	5	11	16	0	5	5	21
15:15 15:30	9	9	18	2	4	6	24
15:30 15:45	8	9	17	0	0	0	17
15:45 16:00	9	7	16	1	4	5	21
15:00 16:00	31	36	67	3	13	16	83
16:00 16:15	8	12	20	1	0	1	21
16:15 16:30	8	3	11	2	5	7	18
16:30 16:45	6	11	17	4	3	7	24
16:45 17:00	10	12	22	3	3	6	28
16:00 17:00	32	38	70	10	11	21	91
17:00 17:15	14	10	24	1	3	4	28
17:15 17:30	14	8	22	0	5	5	27
17:30 17:45	17	7	24	0	1	1	25
17:45 18:00	7	5	12	0	2	2	14
17:00 18:00	52	30	82	1	11	12	94
Total	329	297	626	62	61	123	749

Comment:



Transportation Services - Traffic Services

Work Order
36949

Turning Movement Count - Full Study Summary Report

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

Total Observed U-Turns

AADT Factor

Northbound: 0 Southbound: 0
Eastbound: 4 Westbound: 1 .90

Full Study

Period	PATRICIA AVE								RICHMOND RD								STR TOT	Grand Total	
	Northbound				Southbound				Eastbound				Westbound						
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT			
07:00 08:00	10	0	25	35	18	0	34	52	87	19	296	3	318	2	248	9	259	577	664
08:00 09:00	24	0	18	42	19	0	34	53	95	15	379	4	398	1	320	9	330	728	823
09:00 10:00	4	0	10	14	13	0	19	32	46	10	340	3	353	1	377	8	386	739	785
11:30 12:30	7	0	4	11	9	0	21	30	41	21	390	7	418	0	432	19	451	869	910
12:30 13:30	3	0	4	7	10	0	20	30	37	22	428	8	458	5	394	6	405	863	900
15:00 16:00	2	0	6	8	17	0	23	40	48	19	413	9	441	3	543	15	561	1002	1050
16:00 17:00	1	0	4	5	11	0	20	31	36	21	423	17	461	7	848	20	875	1336	1372
17:00 18:00	4	0	5	9	14	0	26	40	49	18	457	21	496	13	799	24	836	1332	1381
Sub Total	55	0	76	131	111	0	197	308	439	145	3126	72	3343	32	3961	110	4103	7446	7885
U Turns				0				0	0				4				1	5	5
Total	55	0	76	131	111	0	197	308	439	145	3126	72	3347	32	3961	110	4104	7451	7890
EQ 12Hr	76	0	106	182	154	0	274	428	610	202	4345	100	4652	44	5506	153	5705	10357	10967
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													1.39						
AVG 12Hr	69	0	95	164	139	0	246	385	549	181	3911	90	4187	40	4955	138	5134	9321	9870
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													.90						
AVG 24Hr	90	0	125	215	182	0	323	505	720	238	5123	118	5485	52	6491	180	6726	12211	12931
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													1.31						

Comments:

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



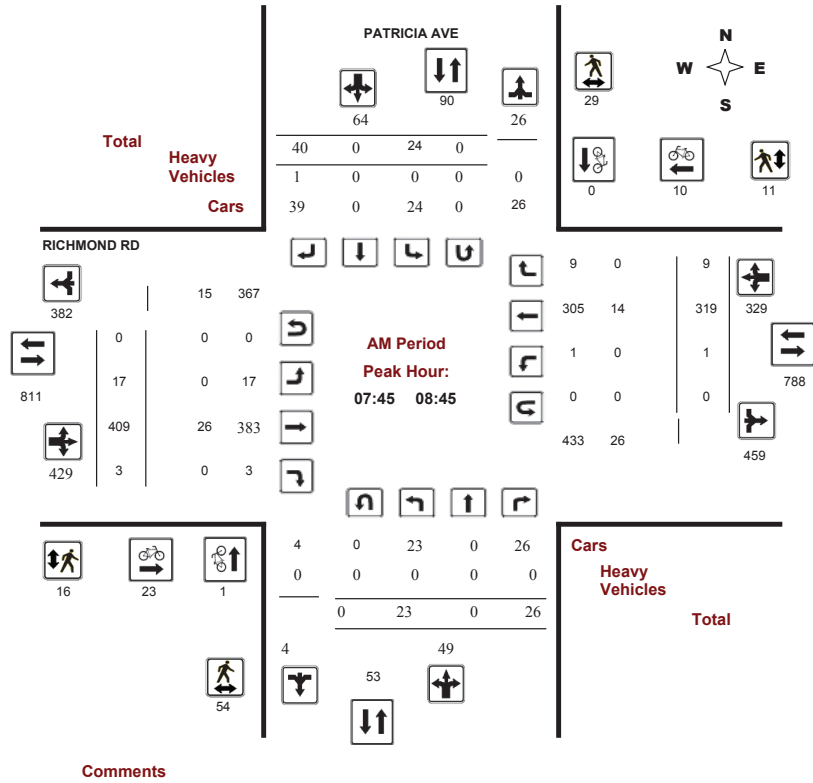
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017
Start Time: 07:00

WO No: 36949
Device: Miovision



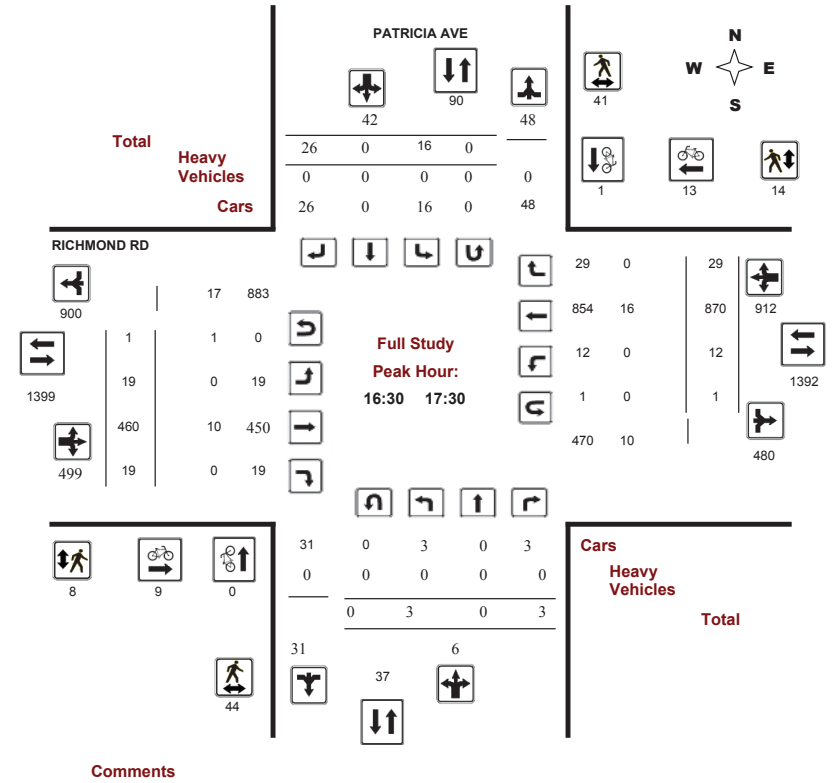
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017
Start Time: 07:00

WO No: 36949
Device: Miovision





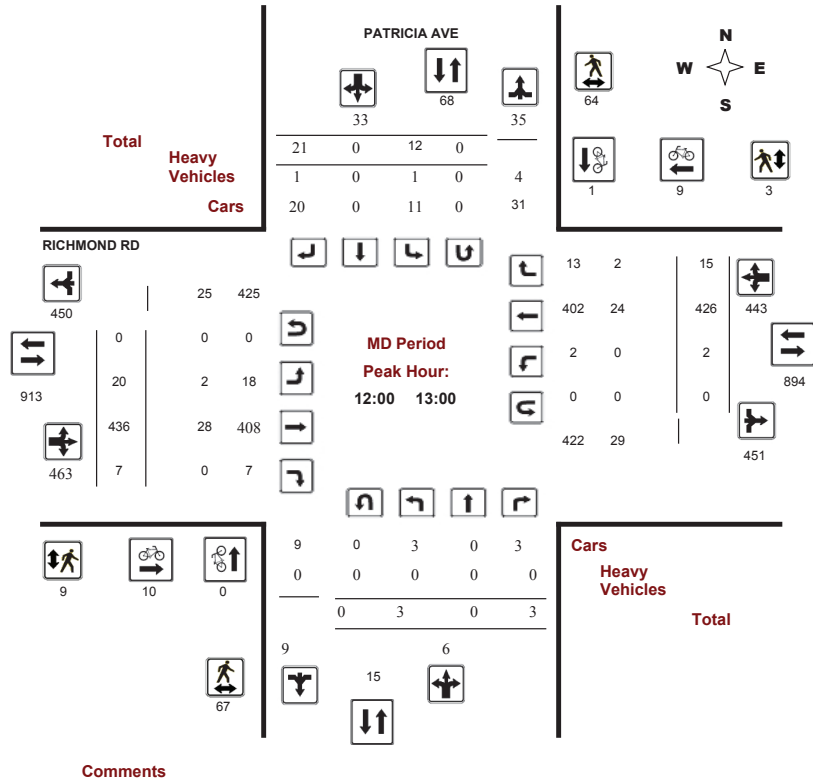
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017
Start Time: 07:00

WO No: 36949
Device: Miovision



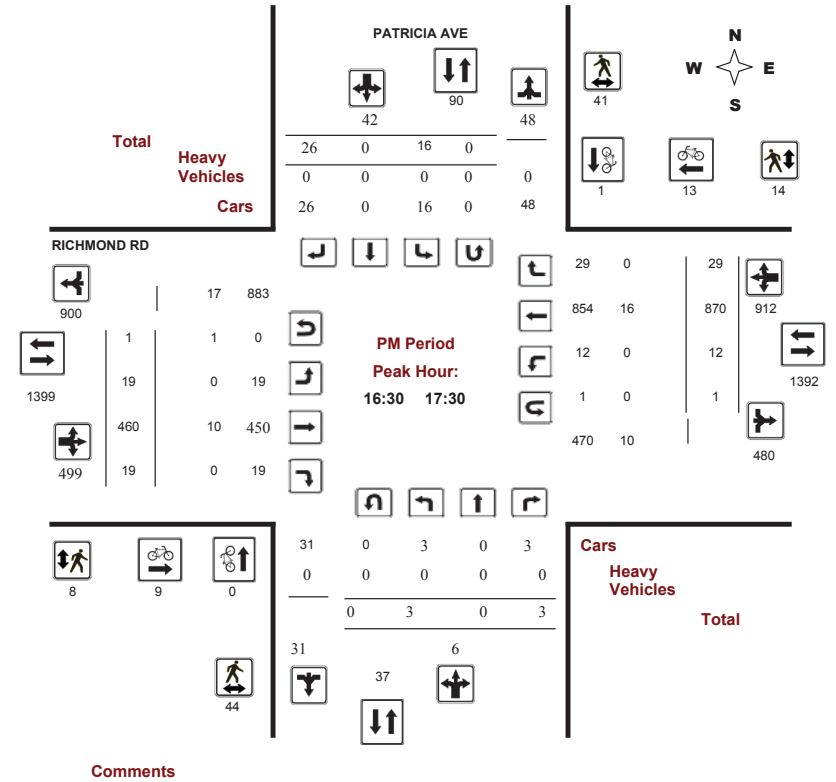
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017
Start Time: 07:00

WO No: 36949
Device: Miovision





Transportation Services - Traffic Services

Work Order
36949

Turning Movement Count - 15 Min U-Turn Total Report

PATRICIA AVE @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

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	1	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	0	0	0	0
08:30 - 08:45	0	0	0	0	0
08:45 - 09:00	0	0	0	0	0
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	1	0	1
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	1	1	2
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	1	0	1
17:45 - 18:00	0	0	0	0	0
Total	0	0	4	1	5



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ RICHMOND RD

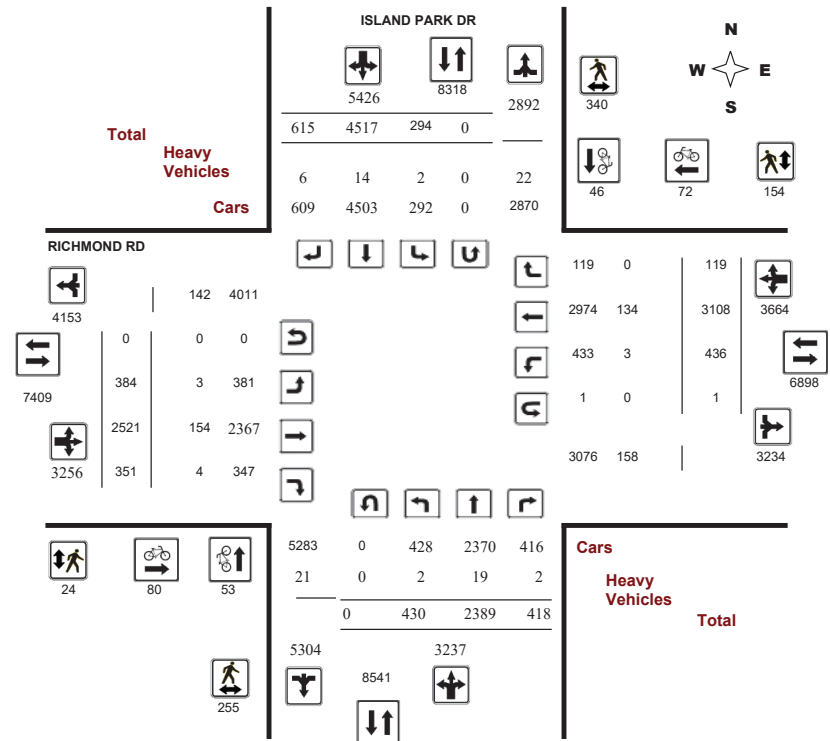
Survey Date: Tuesday, April 25, 2017

WO No: 36954

Start Time: 07:00

Device: Miovision

Full Study Diagram





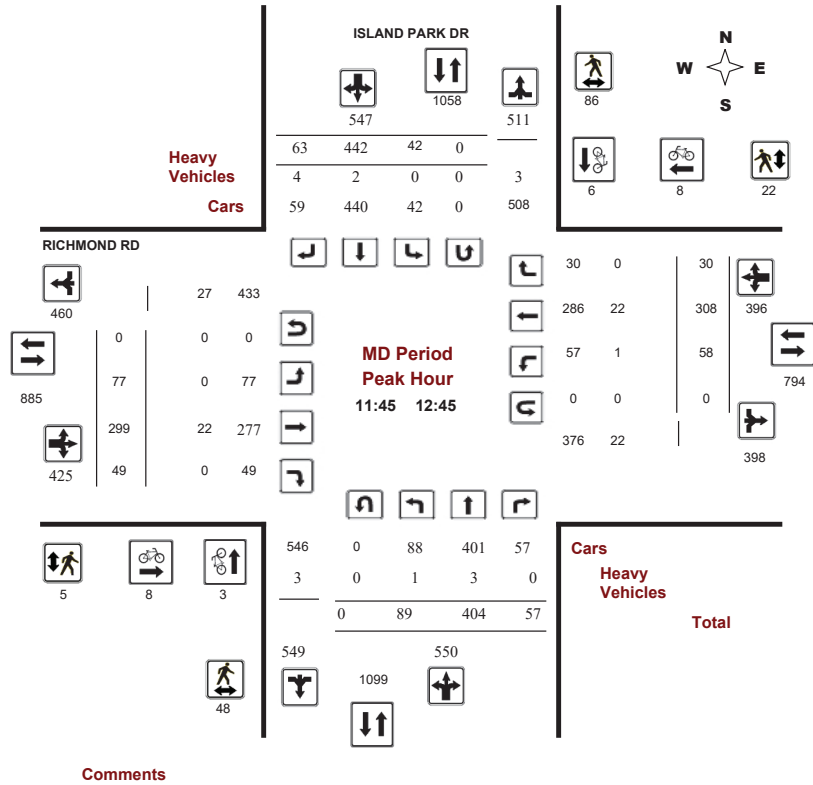
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017
Start Time: 07:00

WO No: 36954
Device: Miovision



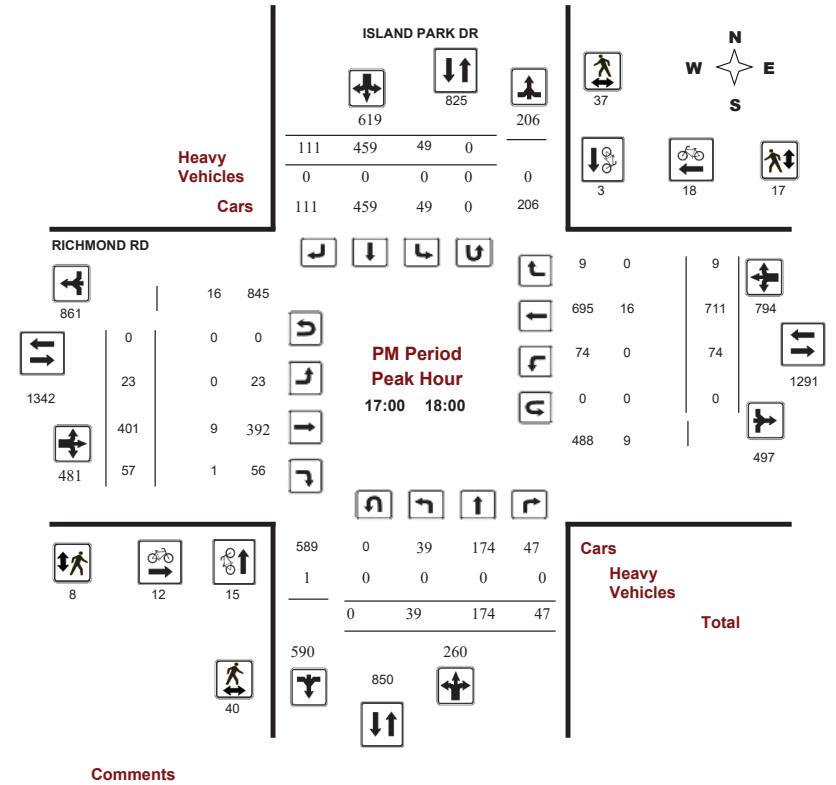
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017
Start Time: 07:00

WO No: 36954
Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

WO No: 36954

Start Time: 07:00

Device: Miovision

Full Study Summary (8 HR Standard)

Survey Date: Tuesday, April 25, 2017

Total Observed U-Turns

ADT Factor

Northbound: 0 Southbound: 0
Eastbound: 0 Westbound: 1

Table with columns for Period, Northbound (LT, ST, RT, NB TOT), Southbound (LT, ST, RT, SB TOT), Eastbound (LT, ST, RT, EB TOT), Westbound (LT, ST, RT, WB TOT), STR TOT, Grand Total. Includes sub-totals for U Turns, EQ 12Hr, and AVG 24Hr.

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



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

WO No: 36954

Start Time: 07:00

Device: Miovision

Full Study 15 Minute Increments

Table with columns for Time Period, Northbound (LT, ST, RT, N TOT), Southbound (LT, ST, RT, S TOT), Eastbound (LT, ST, RT, E TOT), Westbound (LT, ST, RT, W TOT), STR TOT, Grand Total. Shows 15-minute increments from 07:00 to 18:45.

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

WO No: 36954

Start Time: 07:00

Device: Miovision

Full Study Cyclist Volume

Time Period	ISLAND PARK DR			RICHMOND RD			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 07:15	3	1	4	6	1	7	11
07:15 07:30	1	3	4	4	0	4	8
07:30 07:45	3	6	9	4	3	7	16
07:45 08:00	3	1	4	8	4	12	16
08:00 08:15	1	8	9	5	4	9	18
08:15 08:30	2	2	4	2	1	3	7
08:30 08:45	1	3	4	1	1	2	6
08:45 09:00	2	2	4	0	0	0	4
09:00 09:15	1	1	2	2	1	3	5
09:15 09:30	1	1	2	4	0	4	6
09:30 09:45	2	1	3	4	2	6	9
09:45 10:00	0	0	0	2	1	3	3
11:30 11:45	1	1	2	1	3	4	6
11:45 12:00	1	3	4	3	1	4	8
12:00 12:15	1	1	2	1	2	3	5
12:15 12:30	1	2	3	3	2	5	8
12:30 12:45	0	0	0	1	3	4	4
12:45 13:00	0	0	0	0	1	1	1
13:00 13:15	0	1	1	0	0	0	1
13:15 13:30	0	0	0	0	3	3	3
15:00 15:15	2	0	2	2	2	4	6
15:15 15:30	1	0	1	2	3	5	6
15:30 15:45	1	0	1	1	3	4	5
15:45 16:00	2	0	2	1	0	1	3
16:00 16:15	2	2	4	0	2	2	6
16:15 16:30	3	2	5	8	5	13	18
16:30 16:45	2	1	3	1	2	3	6
16:45 17:00	1	1	2	2	4	6	8
17:00 17:15	5	2	7	5	5	10	17
17:15 17:30	3	1	4	3	5	8	12
17:30 17:45	3	0	3	3	2	5	8
17:45 18:00	4	0	4	1	6	7	11
Total	53	46	99	80	72	152	251



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

WO No: 36954

Start Time: 07:00

Device: Miovision

Full Study Pedestrian Volume

Time Period	ISLAND PARK DR			RICHMOND RD			Grand Total
	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	
07:00 07:15	3	3	6	0	3	3	9
07:15 07:30	4	4	8	2	0	2	10
07:30 07:45	5	13	18	0	7	7	25
07:45 08:00	15	12	27	0	5	5	32
08:00 08:15	5	12	17	0	4	4	21
08:15 08:30	10	8	18	0	6	6	24
08:30 08:45	4	7	11	0	8	8	19
08:45 09:00	0	11	11	0	11	11	22
09:00 09:15	3	10	13	0	0	0	13
09:15 09:30	11	9	20	1	5	6	26
09:30 09:45	8	7	15	0	4	4	19
09:45 10:00	3	11	14	0	2	2	16
11:30 11:45	4	17	21	0	8	8	29
11:45 12:00	6	28	34	0	5	5	39
12:00 12:15	7	14	21	1	3	4	25
12:15 12:30	23	28	51	2	11	13	64
12:30 12:45	12	16	28	2	3	5	33
12:45 13:00	15	16	31	1	7	8	39
13:00 13:15	10	13	23	0	6	6	29
13:15 13:30	9	9	18	0	1	1	19
15:00 15:15	7	3	10	1	3	4	14
15:15 15:30	6	9	15	4	5	9	24
15:30 15:45	14	6	20	1	15	16	36
15:45 16:00	7	6	13	1	5	6	19
16:00 16:15	8	7	15	0	2	2	17
16:15 16:30	9	6	15	0	3	3	18
16:30 16:45	3	9	12	0	3	3	15
16:45 17:00	4	9	13	0	2	2	15
17:00 17:15	15	6	21	2	2	4	25
17:15 17:30	10	14	24	4	6	10	34
17:30 17:45	9	8	17	0	5	5	22
17:45 18:00	6	9	15	2	4	6	21
Total	255	340	595	24	154	178	773



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

WO No: 36954

Start Time: 07:00

Device: Miovision

Full Study Heavy Vehicles

ISLAND PARK DR										RICHMOND RD										Grand Total
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		
07:00	07:15	0	0	0	0	1	0	0	1	1	0	3	0	3	0	1	0	1	4	5
07:15	07:30	0	0	0	0	1	0	1	1	0	6	0	6	0	3	0	3	9	10	
07:30	07:45	0	2	0	2	0	1	0	1	3	0	3	0	3	0	2	0	2	5	8
07:45	08:00	0	0	0	0	0	0	0	0	0	9	2	11	0	2	0	2	13	13	
08:00	08:15	0	0	1	1	0	0	0	0	1	0	5	0	5	0	2	0	2	7	8
08:15	08:30	0	0	0	0	0	0	0	0	0	0	4	0	4	0	5	0	5	9	9
08:30	08:45	0	1	0	1	0	0	0	0	1	1	5	0	6	0	4	0	4	10	11
08:45	09:00	0	2	1	3	0	0	0	0	3	0	6	0	6	1	4	0	5	11	14
09:00	09:15	0	0	0	0	0	2	0	2	2	0	7	0	7	0	4	0	4	11	13
09:15	09:30	0	3	0	3	0	1	0	1	4	0	4	0	4	0	4	0	4	8	12
09:30	09:45	0	0	0	0	0	0	1	1	1	0	10	1	11	0	8	0	8	19	20
09:45	10:00	0	0	0	0	0	0	0	0	0	1	5	0	6	0	7	0	7	13	13
11:30	11:45	0	2	0	2	0	1	0	1	3	0	6	0	6	1	7	0	8	14	17
11:45	12:00	0	1	0	1	0	0	1	1	2	0	6	0	6	0	9	0	9	15	17
12:00	12:15	0	1	0	1	0	1	0	1	2	0	4	0	4	0	5	0	5	9	11
12:15	12:30	1	1	0	2	0	1	0	1	3	0	5	0	5	1	2	0	3	8	11
12:30	12:45	0	0	0	0	0	0	3	3	3	0	7	0	7	0	6	0	6	13	16
12:45	13:00	0	3	0	3	0	1	0	1	4	0	9	0	9	0	7	0	7	16	20
13:00	13:15	0	1	0	1	0	0	0	0	1	0	7	0	7	0	5	0	5	12	13
13:15	13:30	1	0	0	1	1	0	0	1	2	0	7	0	7	0	4	0	4	11	13
15:00	15:15	0	1	0	1	0	0	0	0	1	0	4	0	4	0	2	0	2	6	7
15:15	15:30	0	0	0	0	0	1	0	1	1	1	4	0	5	0	6	0	6	11	12
15:30	15:45	0	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	1	4	4
15:45	16:00	0	0	0	0	0	1	1	2	2	0	3	0	3	0	4	0	4	7	9
16:00	16:15	0	0	0	0	0	3	0	3	3	0	5	0	5	0	2	0	2	7	10
16:15	16:30	0	1	0	1	0	0	0	0	1	0	2	0	2	0	3	0	3	5	6
16:30	16:45	0	0	0	0	0	0	0	0	0	0	2	0	2	0	6	0	6	8	8
16:45	17:00	0	0	0	0	0	0	0	0	0	0	4	0	4	0	3	0	3	7	7
17:00	17:15	0	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	3	6	6
17:15	17:30	0	0	0	0	0	0	0	0	0	0	1	0	1	0	4	0	4	5	5
17:30	17:45	0	0	0	0	0	0	0	0	0	0	3	1	4	0	5	0	5	9	9
17:45	18:00	0	0	0	0	0	0	0	0	0	0	2	0	2	0	4	0	4	6	6
Total:	None	2	19	2	23	2	14	6	22	45	3	154	4	161	3	134	0	137	298	343



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ISLAND PARK DR @ RICHMOND RD

Survey Date: Tuesday, April 25, 2017

WO No: 36954

Start Time: 07:00

Device: Miovision

Full Study 15 Minute U-Turn Total

		ISLAND PARK DR				RICHMOND RD
		Northbound	Southbound	Eastbound	Westbound	Total
Time Period		U-Turn Total	U-Turn Total	U-Turn Total	U-Turn 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	0	0	0
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	1	1
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	0	1	1



Transportation Services - Traffic Services

Turning Movement Count - Study Results

WESTERN AVE @ WELLINGTON ST

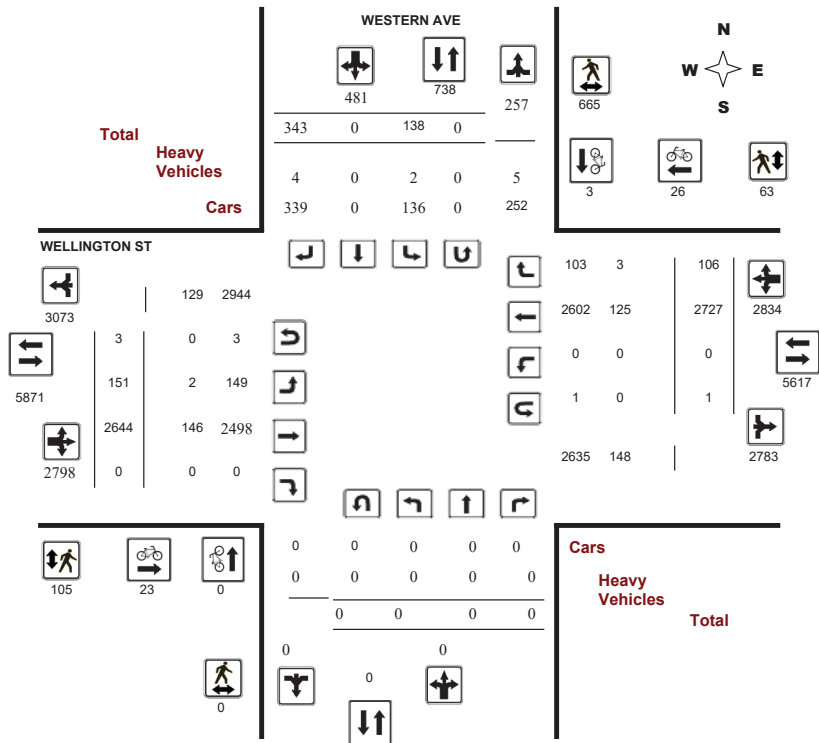
Survey Date: Thursday, February 22, 2018

WO No: 37567

Start Time: 07:00

Device: Miovision

Full Study Diagram



Transportation Services - Traffic Services

Turning Movement Count - Study Results

WESTERN AVE @ WELLINGTON ST

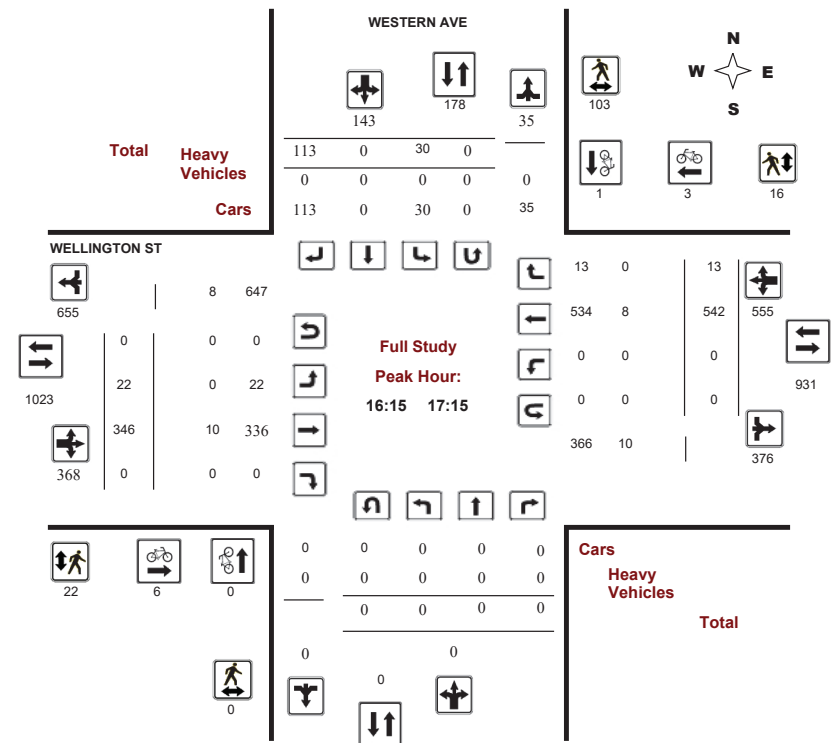
Survey Date: Thursday, February 22, 2018

WO No: 37567

Start Time: 07:00

Device: Miovision

Full Study Peak Hour Diagram





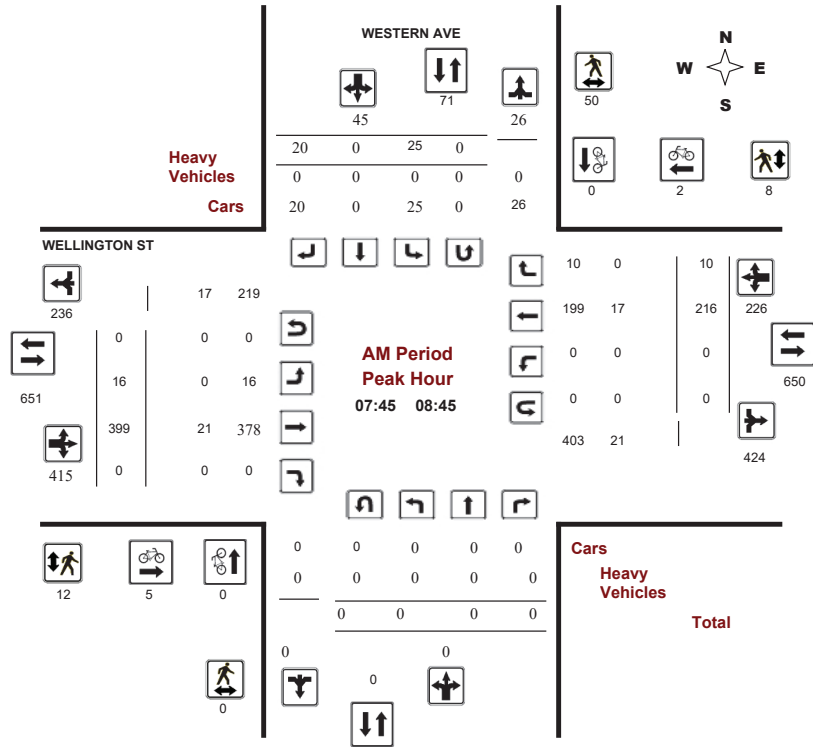
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018
Start Time: 07:00

WO No: 37567
Device: Miovision



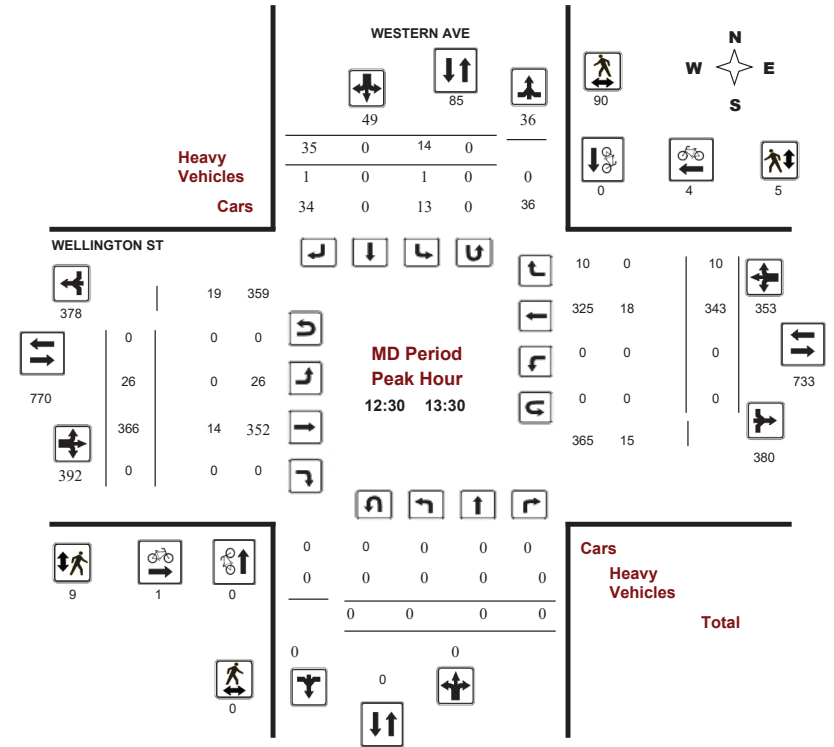
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018
Start Time: 07:00

WO No: 37567
Device: Miovision





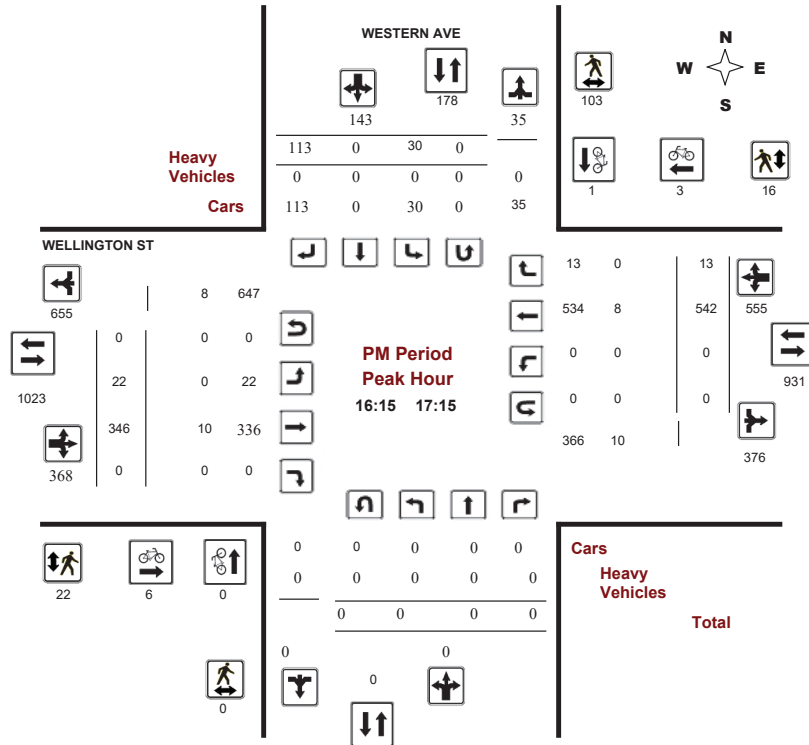
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018
Start Time: 07:00

WO No: 37567
Device: Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Study Results

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018
Start Time: 07:00

WO No: 37567
Device: Miovision

Full Study Summary (8 HR Standard)

Survey Date: Thursday, February 22, 2018

Total Observed U-Turns
Northbound: 0 Southbound: 0
Eastbound: 3 Westbound: 1

AADT Factor
.90

Period	WESTERN AVE								WELLINGTON ST								Grand Total		
	Northbound				Southbound				Eastbound				Westbound						
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT			
07:00-08:00	0	0	0	0	5	0	17	22	22	14	269	0	283	0	166	9	175	458	480
08:00-09:00	0	0	0	0	29	0	19	48	48	13	373	0	386	0	235	10	245	631	679
09:00-10:00	0	0	0	0	12	0	13	25	25	13	272	0	285	0	231	10	241	526	551
11:30-12:30	0	0	0	0	12	0	31	43	43	25	382	0	407	0	306	21	327	734	777
12:30-13:30	0	0	0	0	14	0	35	49	49	26	366	0	392	0	343	10	353	745	794
15:00-16:00	0	0	0	0	16	0	48	64	64	20	302	0	322	0	422	14	436	758	822
16:00-17:00	0	0	0	0	33	0	110	143	143	20	328	0	348	0	549	9	558	906	1049
17:00-18:00	0	0	0	0	17	0	70	87	87	20	352	0	372	0	475	23	498	870	957
Sub Total	0	0	0	0	138	0	343	481	481	151	2644	0	2795	0	2727	106	2833	5628	6109
U Turns	0	0	0	0	0	0	0	0	0	3	0	0	3	0	1	4	4	4	4
Total	0	0	0	0	138	0	343	481	481	151	2644	0	2798	0	2727	106	2834	5632	6113
EQ 12Hr	0	0	0	0	192	0	477	669	669	210	3675	0	3889	0	3791	147	3939	7828	8497
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													1.39						
AVG 12Hr	0	0	0	0	163	0	404	567	602	178	3117	0	3299	0	3215	125	3341	7045	7647
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													0.9						
AVG 24Hr	0	0	0	0	213	0	530	743	743	233	4084	0	4321	0	4212	164	4377	8698	9441
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

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018

WO No: 37567

Start Time: 07:00

Device: Miovision

Full Study 15 Minute Increments

Table with columns for Time Period, Northbound (LT, ST, RT, N TOT, STR TOT), Southbound (LT, ST, RT, S TOT, STR TOT), Eastbound (LT, ST, RT, E TOT), Westbound (LT, ST, RT, W TOT, STR TOT), and Grand Total. Rows represent 15-minute intervals from 07:00 to 17:30.

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018

WO No: 37567

Start Time: 07:00

Device: Miovision

Full Study Cyclist Volume

Table with columns for Time Period, WESTERN AVE (Northbound, Southbound, Street Total), WELLINGTON ST (Eastbound, Westbound, Street Total), and Grand Total. Rows represent 15-minute intervals from 07:00 to 17:30.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018

WO No: 37567

Start Time: 07:00

Device: Miovision

Full Study Pedestrian Volume

WESTERN AVE

WELLINGTON ST

Table with columns: 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. Rows show pedestrian counts from 07:00 to 17:30.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018

WO No: 37567

Start Time: 07:00

Device: Miovision

Full Study Heavy Vehicles

WESTERN AVE

WELLINGTON ST

Table with columns: Time Period, Northbound (LT, ST, RT, N TOT), Southbound (LT, ST, RT, S TOT, STR TOT), Eastbound (LT, ST, RT, E TOT), Westbound (LT, ST, RT, W TOT, STR TOT), Grand Total. Rows show heavy vehicle counts from 07:00 to 17:30.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

WESTERN AVE @ WELLINGTON ST

Survey Date: Thursday, February 22, 2018

WO No: 37567

Start Time: 07:00

Device: Miovision

Full Study 15 Minute U-Turn Total

Time Period	WESTERN AVE		WELLINGTON ST		Total
	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn 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	0	1	1
09:00 - 09:15	0	0	1	0	1
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	1	0	1
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	1	0	1
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
Total	0	0	3	1	4



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

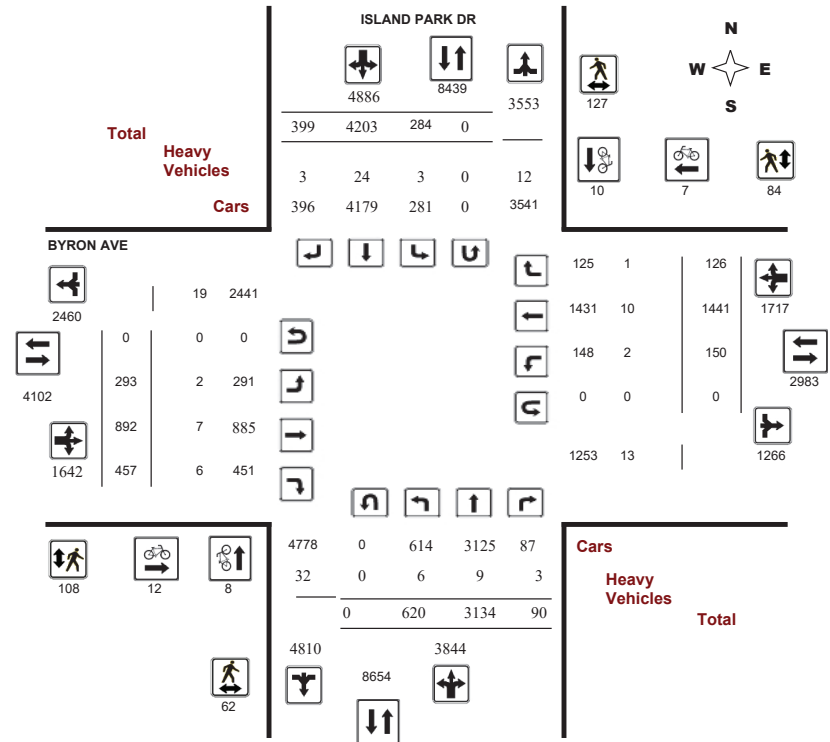
Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study Diagram



5472208 - THU JAN 23, 2020 - 8HRS - LORETTA



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

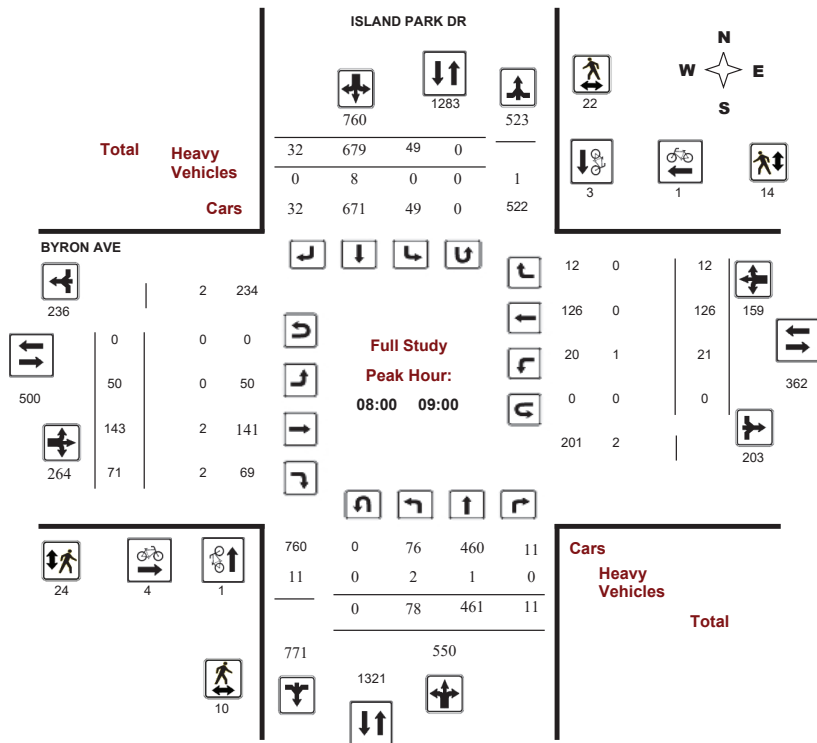
Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study Peak Hour Diagram



5472208 - THU JAN 23, 2020 - 8HRS - LORETTA



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

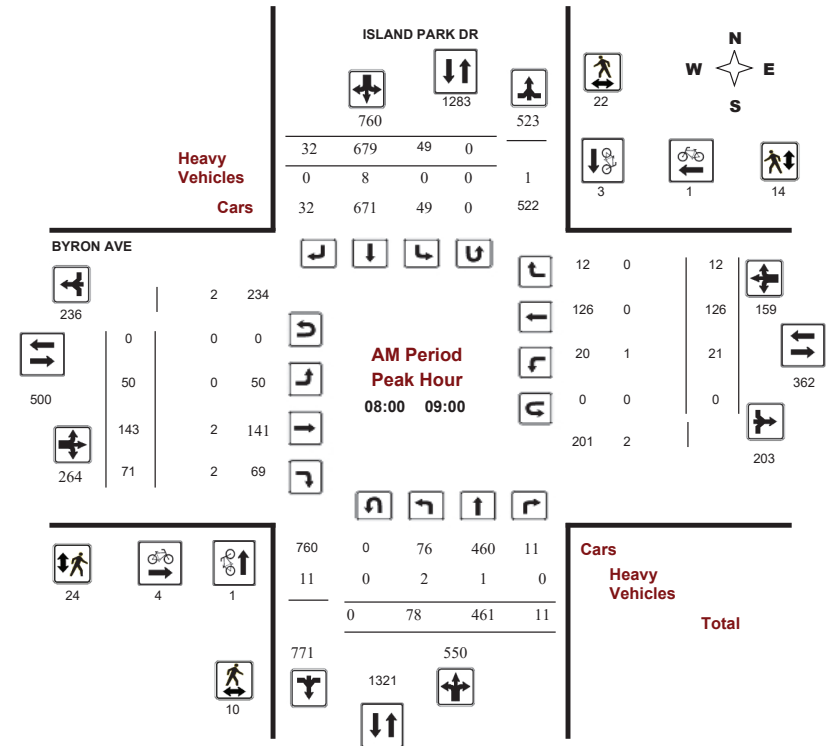
BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision



Comments 5472208 - THU JAN 23, 2020 - 8HRS - LORETTA



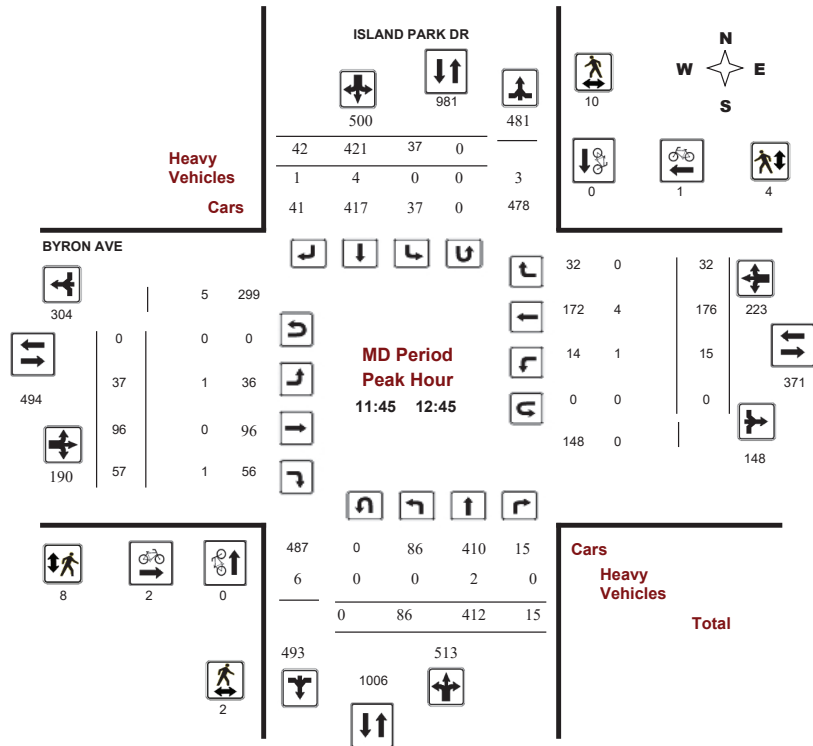
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020
Start Time: 07:00

WO No: 39390
Device: Miovision



Comments 5472208 - THU JAN 23, 2020 - 8HRS - LORETTA



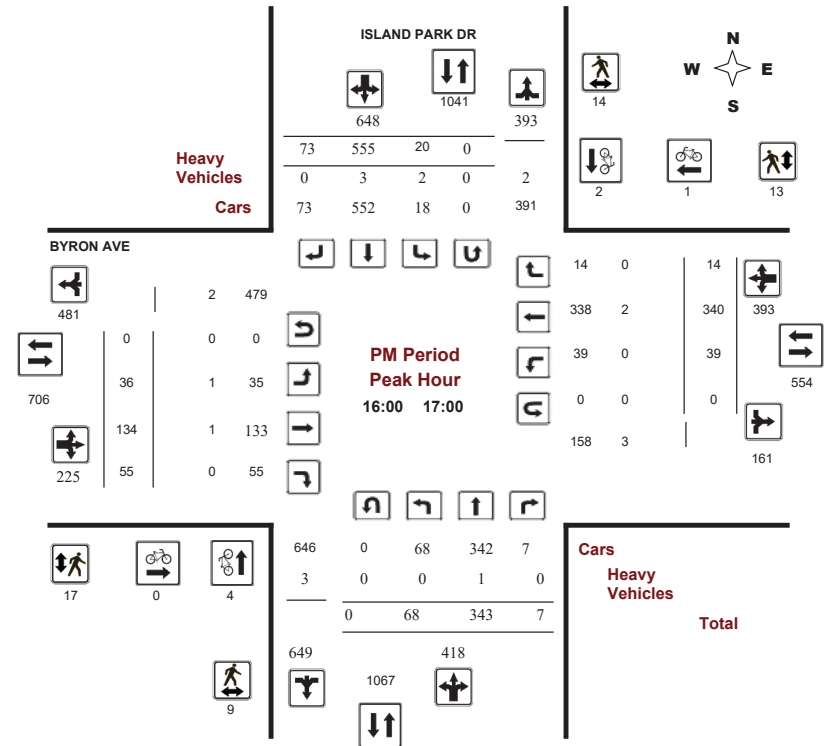
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020
Start Time: 07:00

WO No: 39390
Device: Miovision



Comments 5472208 - THU JAN 23, 2020 - 8HRS - LORETTA



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study Summary (8 HR Standard)

Survey Date: Thursday, January 23, 2020

Total Observed U-Turns AADT Factor
Northbound: 0 Southbound: 0 Eastbound: 0 Westbound: 0 1.00

Table with columns for ISLAND PARK DR and BYRON AVE, including Northbound, Southbound, Eastbound, and Westbound traffic counts, U-Turns, EQ 12Hr, and AVG 24Hr volumes.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study 15 Minute Increments

Table with columns for ISLAND PARK DR and BYRON AVE, including Northbound, Southbound, Eastbound, and Westbound traffic counts for 15-minute increments, and Grand Total.

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study Cyclist Volume

Table with columns: Time Period, Northbound, Southbound, Street Total, Eastbound, Westbound, Street Total, Grand Total. Rows show cyclist volume data for various time intervals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study Pedestrian Volume

Table with columns: Time Period, NB Approach, SB Approach, Total, EB Approach, WB Approach, Total, Grand Total. Rows show pedestrian volume data for various time intervals.

5472208 - THU JAN 23, 2020 - 8HRS - LORETTA



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study Heavy Vehicles

ISLAND PARK DR				BYRON AVE				ISLAND PARK DR				BYRON AVE				Grand Total				
Northbound		Southbound		Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound						
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	0	0	0	0	0	0	0		
07:15	07:30	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1		
07:30	07:45	0	0	1	1	0	1	0	1	2	0	0	0	0	1	0	1	3		
07:45	08:00	1	0	0	1	0	1	0	1	2	0	0	0	0	0	0	0	2		
08:00	08:15	0	1	0	1	0	2	0	2	3	0	0	0	0	0	0	0	3		
08:15	08:30	2	0	0	2	0	0	0	2	0	0	1	0	1	0	0	0	3		
08:30	08:45	0	0	0	0	0	4	0	4	4	0	1	2	3	1	0	0	8		
08:45	09:00	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	2		
09:00	09:15	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1		
09:15	09:30	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1		
09:30	09:45	0	1	0	1	0	0	0	0	1	0	0	0	0	0	1	1	2		
09:45	10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:30	11:45	0	2	0	2	0	0	0	0	2	0	0	0	0	0	0	0	2		
11:45	12:00	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	1	2		
12:00	12:15	0	1	0	1	0	1	1	2	3	0	0	0	0	1	2	0	6		
12:15	12:30	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1		
12:30	12:45	0	0	0	0	0	3	0	3	3	1	0	0	1	0	1	2	5		
12:45	13:00	0	0	1	1	1	0	0	1	2	0	0	0	0	0	0	0	2		
13:00	13:15	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1		
13:15	13:30	0	1	0	1	0	0	1	1	2	0	0	1	1	0	1	2	4		
15:00	15:15	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	2		
15:15	15:30	0	0	0	0	0	0	0	0	0	0	2	1	3	0	1	4	4		
15:30	15:45	0	0	0	0	0	2	1	3	3	0	0	0	0	0	0	0	3		
15:45	16:00	2	1	1	4	0	0	0	0	4	0	1	0	1	0	0	0	5		
16:00	16:15	0	0	0	0	1	3	0	4	4	1	0	0	1	0	1	0	6		
16:15	16:30	0	1	0	1	1	0	0	1	2	0	0	0	0	1	0	1	3		
16:30	16:45	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1		
16:45	17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
17:00	17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
17:15	17:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1		
17:30	17:45	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	2		
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total:	None	6	9	3	18	3	24	3	30	48	2	7	6	15	2	10	1	13	28	76



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BYRON AVE @ ISLAND PARK DR

Survey Date: Thursday, January 23, 2020

WO No: 39390

Start Time: 07:00

Device: Miovision

Full Study 15 Minute U-Turn Total

Time Period		ISLAND PARK DR Northbound U-Turn Total	ISLAND PARK DR Southbound U-Turn Total	BYRON AVE Eastbound U-Turn Total	BYRON AVE 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	0	0	0
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	0	0	0

Appendix C

Synchro Intersection Worksheets – Existing Conditions

Lanes, Volumes, Timings
1: Island Park & Scott

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	105	456	54	43	198	22	41	272	90	57	678	92
Future Volume (vph)	105	456	54	43	198	22	41	272	90	57	678	92
Satd. Flow (prot)	1658	1745	1483	1658	1705	0	0	1666	0	1658	1705	0
Fit Permitted	0.552			0.250				0.398		0.454		
Satd. Flow (perm)	924	1745	1423	434	1705	0	0	667	0	783	1705	0
Satd. Flow (RTOR)			40		7			21			10	
Lane Group Flow (vph)	117	507	60	48	244	0	0	448	0	63	855	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		34.5	34.5		34.5	34.5	
Total Split (s)	42.0	42.0	42.0	42.0	42.0		53.0	53.0		53.0	53.0	
Total Split (%)	44.2%	44.2%	44.2%	44.2%	44.2%		55.8%	55.8%		55.8%	55.8%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	36.0	36.0	36.0	36.0	36.0		46.5	46.5		46.5	46.5	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38		0.49	0.49		0.49	0.49	
v/c Ratio	0.33	0.77	0.11	0.29	0.38		1.33	1.33		0.16	1.02	
Control Delay	24.4	35.1	9.7	26.7	22.8		193.1	193.1		15.0	61.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.4	35.1	9.7	26.7	22.8		193.1	193.1		15.0	61.5	
LOS	C	D	A	C	C		F	F		B	E	
Approach Delay		31.0			23.5		193.1	193.1		58.3		
Approach LOS		C			C		F	F		E		
Queue Length 50th (m)	15.0	80.0	2.3	6.1	30.8		~106.9	~106.9		6.2	~158.3	
Queue Length 95th (m)	29.3	#119.7	10.0	15.7	50.3		#170.3	#170.3		13.9	#237.5	
Internal Link Dist (m)		206.8			289.3		318.7	318.7			431.8	
Turn Bay Length (m)	50.0		25.0	245.0						25.0		
Base Capacity (vph)	350	661	564	164	650		337	337		383	839	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.33	0.77	0.11	0.29	0.38		1.33	1.33		0.16	1.02	

Intersection Summary

Cycle Length: 95
 Actuated Cycle Length: 95
 Offset: 38 (40%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
1: Island Park & Scott

07-21-2020

Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 71.8
 Intersection Capacity Utilization 107.7%
 Analysis Period (min) 15
 Description: As per signal timing plan provided on July 21, 2020.
 ~ 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: Island Park & Scott



Lanes, Volumes, Timings
2: Kirkwood & Richmond

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔	↔		↔		
Traffic Volume (vph)	2	314	128	159	227	2	137	38	94	4	41	0
Future Volume (vph)	2	314	128	159	227	2	137	38	94	4	41	0
Satd. Flow (prot)	0	3095	0	0	3245	0	1658	1529	0	0	1738	0
Fit Permitted		0.954			0.645		0.724				0.984	
Satd. Flow (perm)	0	2953	0	0	2110	0	1251	1529	0	0	1716	0
Satd. Flow (RTOR)		106			1		104					
Lane Group Flow (vph)	0	493	0	0	431	0	152	146	0	0	50	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.1	31.1		31.1	31.1		27.6	27.6		27.6	27.6	
Total Split (s)	40.0	40.0		40.0	40.0		35.0	35.0		35.0	35.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.1			6.1		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)		33.9			33.9		29.4	29.4			29.4	
Actuated g/C Ratio		0.45			0.45		0.39	0.39			0.39	
v/c Ratio		0.35			0.45		0.31	0.22			0.07	
Control Delay		11.2			16.0		18.0	6.5			14.8	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		11.2			16.0		18.0	6.5			14.8	
LOS		B			B		B	A			B	
Approach Delay		11.2			16.0		12.4				14.8	
Approach LOS		B			B		B				B	
Queue Length 50th (m)		17.4			21.1		14.5	3.6			4.3	
Queue Length 95th (m)		27.5			32.7		28.0	14.1			10.6	
Internal Link Dist (m)		282.3			180.4		201.3				128.2	
Turn Bay Length (m)												
Base Capacity (vph)		1392			954		490	662			672	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.35			0.45		0.31	0.22			0.07	

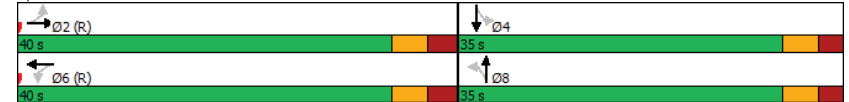
Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	25 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated

Lanes, Volumes, Timings
2: Kirkwood & Richmond

07-21-2020

Maximum v/c Ratio: 0.45	Intersection LOS: B
Intersection Signal Delay: 13.2	ICU Level of Service D
Intersection Capacity Utilization 74.8%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	
Advance pedestrian time assumed in phase timing.	

Splits and Phases: 2: Kirkwood & Richmond



Lanes, Volumes, Timings
3: Private/Patricia & Richmond

07-21-2020

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕			↕	
Traffic Volume (vph)	17	403	3	1	325	9	23	0	26	24	0	40
Future Volume (vph)	17	403	3	1	325	9	23	0	26	24	0	40
Satd. Flow (prot)	0	3304	0	0	3297	0	0	1560	0	0	1535	0
Fit Permitted		0.935			0.954			0.846			0.852	
Satd. Flow (perm)	0	3092	0	0	3145	0	0	1338	0	0	1326	0
Satd. Flow (RTOR)		2			7			41			44	
Lane Group Flow (vph)	0	470	0	0	372	0	0	55	0	0	71	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	33.8	33.8		33.8	33.8		21.5	21.5		21.5	21.5	
Total Split (s)	53.0	53.0		53.0	53.0		22.0	22.0		22.0	22.0	
Total Split (%)	70.7%	70.7%		70.7%	70.7%		29.3%	29.3%		29.3%	29.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.8			5.8			5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		55.8			55.8			11.1			11.1	
Actuated g/C Ratio		0.80			0.80			0.16			0.16	
v/c Ratio		0.19			0.15			0.22			0.29	
Control Delay		3.7			3.5			13.9			16.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		3.7			3.5			13.9			16.2	
LOS		A			A			B			B	
Approach Delay		3.7			3.5			13.9			16.2	
Approach LOS		A			A			B			B	
Queue Length 50th (m)		9.3			7.0			1.6			3.1	
Queue Length 95th (m)		19.2			15.0			10.1			12.8	
Internal Link Dist (m)		180.4			177.6			16.2			168.6	
Turn Bay Length (m)												
Base Capacity (vph)		2481			2525			349			348	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.19			0.15			0.16			0.20	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	69.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.29

Lanes, Volumes, Timings
3: Private/Patricia & Richmond

07-21-2020

Intersection Signal Delay: 5.1	Intersection LOS: A
Intersection Capacity Utilization 44.9%	ICU Level of Service A
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	

Splits and Phases: 3: Private/Patricia & Richmond



Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Traffic Volume (vph)	55	340	50	39	210	7	65	362	70	28	684	52
Future Volume (vph)	55	340	50	39	210	7	65	362	70	28	684	52
Satd. Flow (prot)	0	3204	0	0	3267	0	1658	1688	0	1658	1724	0
Fit Permitted	0.862				0.819	0.122				0.382		
Satd. Flow (perm)	0	2761	0	0	2685	0	213	1688	0	657	1724	0
Satd. Flow (RTOR)	16				3	15				6		
Lane Group Flow (vph)	0	495	0	0	284	0	72	480	0	31	818	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2				6	8				4	4	
Permitted Phases	2				6	8				4	4	
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.3	31.3		31.3	31.3		21.9	21.9		21.9	21.9	
Total Split (s)	40.0	40.0		40.0	40.0		55.0	55.0		55.0	55.0	
Total Split (%)	42.1%	42.1%		42.1%	42.1%		57.9%	57.9%		57.9%	57.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0				0.0	0.0				0.0	0.0	
Total Lost Time (s)	6.3				6.3	5.9				5.9	5.9	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)	33.7				33.7	49.1				49.1	49.1	
Actuated g/C Ratio	0.35				0.35	0.52				0.52	0.52	
v/c Ratio	0.50				0.30	0.65				0.09	0.92	
Control Delay	25.4				22.9	45.5				19.6	3.7	
Queue Delay	0.0				0.0	0.0				0.0	0.0	
Total Delay	25.4				22.9	45.5				19.6	3.7	
LOS	C				C	D				B	A	
Approach Delay	25.4				22.9	23.0				13.9		
Approach LOS	C				C	C				C	B	
Queue Length 50th (m)	35.7				19.3	7.9				44.6	0.6	
Queue Length 95th (m)	50.6				29.4	m15.2				81.8	m0.9	
Internal Link Dist (m)	177.6				213.6	268.0				318.7		
Turn Bay Length (m)						15.0				10.0		
Base Capacity (vph)	989				954	110				879	339	
Starvation Cap Reductn	0				0	0				0	0	
Spillback Cap Reductn	0				0	0				0	0	
Storage Cap Reductn	0				0	0				0	0	
Reduced v/c Ratio	0.50				0.30	0.65				0.55	0.09	

Intersection Summary

Cycle Length: 95
Actuated Cycle Length: 95
Offset: 28 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

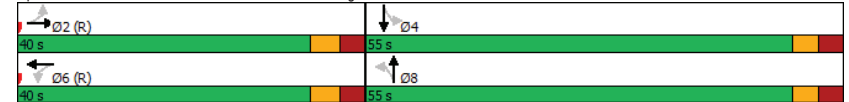
Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

07-21-2020

Maximum v/c Ratio: 0.92	Intersection LOS: C
Intersection Signal Delay: 20.0	ICU Level of Service H
Intersection Capacity Utilization 111.7%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Island Park & Richmond/Wellington



Lanes, Volumes, Timings
5: Private/Western & Wellington

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Traffic Volume (vph)	16	399	0	0	216	10	0	0	0	25	0	20
Future Volume (vph)	16	399	0	0	216	10	0	0	0	25	0	20
Satd. Flow (prot)	0	3309	0	0	1724	0	0	1745	0	0	1578	0
Fit Permitted	0.941										0.950	
Satd. Flow (perm)	0	3110	0	0	1724	0	0	1745	0	0	1541	0
Satd. Flow (RTOR)					4						116	
Lane Group Flow (vph)	0	461	0	0	251	0	0	0	0	0	50	0
Turn Type	Perm	NA			NA					Perm	NA	
Protected Phases	2				6				3		4	
Permitted Phases	2				6		3				4	
Detector Phase	2	2		6	6		3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		10.0	10.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		10.5	10.5		22.5	22.5	
Total Split (s)	41.0	41.0		41.0	41.0		11.0	11.0		23.0	23.0	
Total Split (%)	54.7%	54.7%		54.7%	54.7%		14.7%	14.7%		30.7%	30.7%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)	0.0				0.0				0.0		0.0	
Total Lost Time (s)	5.5				5.5				5.5		5.5	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	C-Max	C-Max		None	None		None	None		None	None	
Act Effct Green (s)	61.0				61.0						11.4	
Actuated g/C Ratio	0.81				0.81						0.15	
v/c Ratio	0.18				0.18						0.15	
Control Delay	3.5				3.9						1.0	
Queue Delay	0.0				0.0						0.0	
Total Delay	3.5				3.9						1.0	
LOS	A				A						A	
Approach Delay	3.5				3.9						1.0	
Approach LOS	A				A						A	
Queue Length 50th (m)	9.0				9.2						0.0	
Queue Length 95th (m)	19.5				23.1						0.2	
Internal Link Dist (m)	213.6				167.2		9.8				311.8	
Turn Bay Length (m)												
Base Capacity (vph)	2529				1403						448	
Starvation Cap Reductn	0				0						0	
Spillback Cap Reductn	0				0						0	
Storage Cap Reductn	0				0						0	
Reduced v/c Ratio	0.18				0.18						0.11	

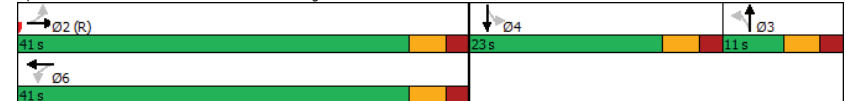
Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	27 (36%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle:	55
Control Type:	Actuated-Coordinated

Lanes, Volumes, Timings
5: Private/Western & Wellington

07-21-2020

Maximum v/c Ratio: 0.18	Intersection LOS: A
Intersection Signal Delay: 3.5	ICU Level of Service A
Intersection Capacity Utilization 43.4%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	

Splits and Phases: 5: Private/Western & Wellington



Lanes, Volumes, Timings
6: Island Park & Byron

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	50	143	71	21	126	12	78	461	11	49	679	32
Future Volume (vph)	50	143	71	21	126	12	78	461	11	49	679	32
Satd. Flow (prot)	0	1643	0	0	1707	0	0	1726	0	0	1725	0
Fit Permitted		0.877			0.904			0.803			0.932	
Satd. Flow (perm)	0	1443	0	0	1550	0	0	1394	0	0	1611	0
Satd. Flow (RTOR)		19			4							
Lane Group Flow (vph)	0	294	0	0	176	0	0	611	0	0	844	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		32.7	32.7		32.7	32.7	
Total Split (s)	31.0	31.0		31.0	31.0		64.0	64.0		64.0	64.0	
Total Split (%)	32.6%	32.6%		32.6%	32.6%		67.4%	67.4%		67.4%	67.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		21.6			21.6			61.7			61.7	
Actuated g/C Ratio		0.23			0.23			0.65			0.65	
v/c Ratio		0.86			0.50			0.68			0.81	
Control Delay		56.6			35.5			16.1			13.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		56.6			35.5			16.1			13.0	
LOS		E			D			B			B	
Approach Delay		56.6			35.5			16.1			13.0	
Approach LOS		E			D			B			B	
Queue Length 50th (m)		47.7			26.9			66.5			47.6	
Queue Length 95th (m)		#83.6			45.3			113.1			m61.7	
Internal Link Dist (m)		377.2			388.4			224.9			268.0	
Turn Bay Length (m)												
Base Capacity (vph)		393			410			905			1046	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.75			0.43			0.68			0.81	

Intersection Summary

Cycle Length: 95
 Actuated Cycle Length: 95
 Offset: 73 (77%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
6: Island Park & Byron

07-21-2020

Maximum v/c Ratio: 0.86	Intersection LOS: C
Intersection Signal Delay: 22.7	ICU Level of Service E
Intersection Capacity Utilization 85.9%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 6: Island Park & Byron



Lanes, Volumes, Timings
1: Island Park & Scott

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Traffic Volume (vph)	105	277	44	201	449	101	15	257	13	27	393	73
Future Volume (vph)	105	277	44	201	449	101	15	257	13	27	393	73
Satd. Flow (prot)	1658	1745	1483	1658	1662	0	0	1725	0	1658	1688	0
Fit Permitted	0.263			0.523				0.878		0.487		
Satd. Flow (perm)	429	1745	1391	890	1662	0	0	1519	0	834	1688	0
Satd. Flow (RTOR)			49		16			3			11	
Lane Group Flow (vph)	117	308	49	223	611	0	0	317	0	30	518	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	
Protected Phases	4			8		8		2		6		6
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		34.5	34.5		34.5	34.5	
Total Split (s)	56.0	56.0	56.0	56.0	56.0		44.0	44.0		44.0	44.0	
Total Split (%)	56.0%	56.0%	56.0%	56.0%	56.0%		44.0%	44.0%		44.0%	44.0%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	50.0	50.0	50.0	50.0	50.0		37.5	37.5		37.5	37.5	
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.50		0.38	0.38		0.38	0.38	
v/c Ratio	0.55	0.35	0.07	0.50	0.73		0.56	0.10		0.81		
Control Delay	29.1	16.6	4.1	21.6	25.4		29.0	21.4		39.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0		
Total Delay	29.1	16.6	4.1	21.6	25.4		29.0	21.4		39.2		
LOS	C	B	A	C	C		C	C		D	D	
Approach Delay		18.4			24.4		29.0			38.2		
Approach LOS		B			C		C			D		
Queue Length 50th (m)	15.0	34.8	0.0	27.7	87.1		47.3	3.7		87.1		
Queue Length 95th (m)	35.5	53.6	5.5	49.5	130.2		74.3	10.0		#140.4		
Internal Link Dist (m)		206.8			289.3		318.7			431.8		
Turn Bay Length (m)	50.0		25.0	245.0				25.0				
Base Capacity (vph)	214	872	720	445	839		571	312		639		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.55	0.35	0.07	0.50	0.73		0.56	0.10		0.81		

Intersection Summary

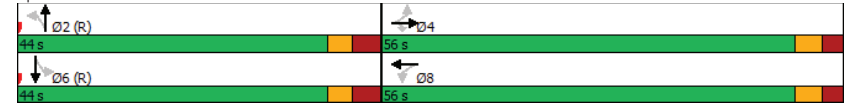
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SRTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
1: Island Park & Scott

07-21-2020

Maximum v/c Ratio: 0.81	Intersection LOS: C
Intersection Signal Delay: 27.2	ICU Level of Service E
Intersection Capacity Utilization 84.1%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Island Park & Scott



Lanes, Volumes, Timings
2: Kirkwood & Richmond

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔		↔		↔		↔		↔	
Traffic Volume (vph)	2	260	140	203	549	12	175	39	157	6	51	8
Future Volume (vph)	2	260	140	203	549	12	175	39	157	6	51	8
Satd. Flow (prot)	0	2975	0	0	3257	0	1658	1494	0	0	1696	0
Fit Permitted	0.953				0.711		0.804				0.965	
Satd. Flow (perm)	0	2834	0	0	2304	0	1353	1494	0	0	1643	0
Satd. Flow (RTOR)	154				2		174				9	
Lane Group Flow (vph)	0	447	0	0	849	0	194	217	0	0	73	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	2				6		8				4	
Permitted Phases	2				6		8				4	
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.1	31.1		31.1	31.1		27.6	27.6		27.6	27.6	
Total Split (s)	45.0	45.0		45.0	45.0		40.0	40.0		40.0	40.0	
Total Split (%)	52.9%	52.9%		52.9%	52.9%		47.1%	47.1%		47.1%	47.1%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0				0.0		0.0				0.0	
Total Lost Time (s)	6.1				6.1		5.6				5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	53.8				53.8		19.5				19.5	
Actuated g/C Ratio	0.63				0.63		0.23				0.23	
v/c Ratio	0.24				0.58		0.62				0.19	
Control Delay	5.5				12.4		37.3				22.3	
Queue Delay	0.0				0.0		0.0				0.0	
Total Delay	5.5				12.4		37.3				22.3	
LOS	A				B		D				A	
Approach Delay	5.5				12.4		22.7				22.3	
Approach LOS	A				B		C				C	
Queue Length 50th (m)	10.1				41.3		27.3				8.0	
Queue Length 95th (m)	19.8				70.1		43.7				16.6	
Internal Link Dist (m)	282.3				180.4		201.3				128.2	
Turn Bay Length (m)												
Base Capacity (vph)	1849				1457		547				670	
Starvation Cap Reductn	0				0		0				0	
Spillback Cap Reductn	0				0		0				0	
Storage Cap Reductn	0				0		0				0	
Reduced v/c Ratio	0.24				0.58		0.35				0.11	

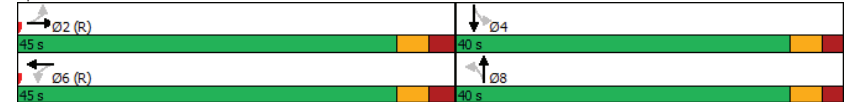
Intersection Summary	
Cycle Length:	85
Actuated Cycle Length:	85
Offset:	79 (93%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated

Lanes, Volumes, Timings
2: Kirkwood & Richmond

07-21-2020

Maximum v/c Ratio: 0.62	Intersection LOS: B
Intersection Signal Delay: 13.5	ICU Level of Service D
Intersection Capacity Utilization 76.0%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	
Advance pedestrian time assumed in the phase timing.	

Splits and Phases: 2: Kirkwood & Richmond



Lanes, Volumes, Timings
3: Private/Patricia & Richmond

07-21-2020

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕			↕	
Traffic Volume (vph)	20	364	19	13	750	29	3	0	3	16	0	26
Future Volume (vph)	20	364	19	13	750	29	3	0	3	16	0	26
Satd. Flow (prot)	0	3272	0	0	3285	0	0	1561	0	0	1545	0
Fit Permitted		0.897			0.946			0.829			0.872	
Satd. Flow (perm)	0	2935	0	0	3109	0	0	1318	0	0	1362	0
Satd. Flow (RTOR)		13			10			36			36	
Lane Group Flow (vph)	0	447	0	0	879	0	0	6	0	0	47	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	33.8	33.8		33.8	33.8		21.5	21.5		21.5	21.5	
Total Split (s)	63.0	63.0		63.0	63.0		22.0	22.0		22.0	22.0	
Total Split (%)	74.1%	74.1%		74.1%	74.1%		25.9%	25.9%		25.9%	25.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.8			5.8			5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		69.7			69.7			11.2			11.2	
Actuated g/C Ratio		0.84			0.84			0.13			0.13	
v/c Ratio		0.18			0.34			0.03			0.22	
Control Delay		3.0			3.7			0.2			16.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		3.0			3.7			0.2			16.8	
LOS		A			A			A			B	
Approach Delay		3.0			3.7			0.2			16.8	
Approach LOS		A			A			A			B	
Queue Length 50th (m)		8.6			20.6			0.0			1.8	
Queue Length 95th (m)		17.6			38.6			0.0			10.2	
Internal Link Dist (m)		180.4			177.6			16.2			168.6	
Turn Bay Length (m)												
Base Capacity (vph)		2461			2606			291			300	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.18			0.34			0.02			0.16	

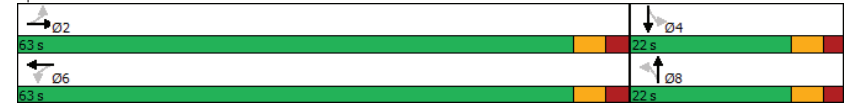
Intersection Summary	
Cycle Length:	85
Actuated Cycle Length:	83.2
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.34

Lanes, Volumes, Timings
3: Private/Patricia & Richmond

07-21-2020

Intersection Signal Delay: 3.9	Intersection LOS: A
Intersection Capacity Utilization 52.4%	ICU Level of Service A
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	

Splits and Phases: 3: Private/Patricia & Richmond



Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔	↔		↔	↔	
Traffic Volume (vph)	23	301	61	79	576	9	54	241	65	49	490	111
Future Volume (vph)	23	301	61	79	576	9	54	241	65	49	490	111
Satd. Flow (prot)	0	3177	0	0	3285	0	1658	1673	0	1658	1688	0
Fit Permitted		0.880			0.823		0.189			0.488		
Satd. Flow (perm)	0	2797	0	0	2708	0	330	1673	0	839	1688	0
Satd. Flow (RTOR)		30			2		21			18		
Lane Group Flow (vph)	0	428	0	0	738	0	60	340	0	54	667	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.3	31.3		31.3	31.3		21.9	21.9		21.9	21.9	
Total Split (s)	40.0	40.0		40.0	40.0		45.0	45.0		45.0	45.0	
Total Split (%)	47.1%	47.1%		47.1%	47.1%		52.9%	52.9%		52.9%	52.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.3			6.3		5.9	5.9		5.9	5.9	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)		33.7			33.7		39.1	39.1		39.1	39.1	
Actuated g/C Ratio		0.40			0.40		0.46	0.46		0.46	0.46	
v/c Ratio		0.38			0.69		0.40	0.44		0.14	0.85	
Control Delay		18.1			25.3		19.4	12.4		14.5	32.2	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		18.1			25.3		19.4	12.4		14.5	32.2	
LOS		B			C		B	B		B	C	
Approach Delay		18.1			25.3			13.5			30.9	
Approach LOS		B			C			B			C	
Queue Length 50th (m)		23.4			50.9		3.4	17.5		4.9	90.0	
Queue Length 95th (m)		35.0			70.6		m8.4	m37.0		11.8	#154.8	
Internal Link Dist (m)		177.6			213.6			268.0			318.7	
Turn Bay Length (m)							15.0			10.0		
Base Capacity (vph)		1127			1074		151	780		385	786	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.38			0.69		0.40	0.44		0.14	0.85	

Intersection Summary	
Cycle Length:	85
Actuated Cycle Length:	85
Offset:	53 (62%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	65
Control Type:	Actuated-Coordinated

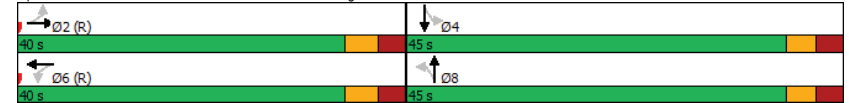
Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

07-21-2020

Maximum v/c Ratio: 0.85	Intersection LOS: C
Intersection Signal Delay: 23.6	ICU Level of Service G
Intersection Capacity Utilization 104.5%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Island Park & Richmond/Wellington



Lanes, Volumes, Timings
5: Private/Western & Wellington

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Traffic Volume (vph)	22	346	0	0	542	13	0	0	0	30	0	113
Future Volume (vph)	22	346	0	0	542	13	0	0	0	30	0	113
Satd. Flow (prot)	0	3306	0	0	1729	0	0	1745	0	0	1492	0
Fit Permitted	0.908						0.950					
Satd. Flow (perm)	0	2979	0	0	1729	0	0	1745	0	0	1432	0
Satd. Flow (RTOR)	2						126					
Lane Group Flow (vph)	0	408	0	0	616	0	0	0	0	0	159	0
Turn Type	Perm	NA			NA			Perm	NA			
Protected Phases	2		6		3		4		4			
Permitted Phases	2	6		3		4		4				
Detector Phase	2	2	6	6	3	3	4	4	4	4		
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	5.0	10.0	10.0				
Minimum Split (s)	20.5	20.5	20.5	20.5	10.5	10.5	22.5	22.5				
Total Split (s)	41.0	41.0	41.0	41.0	11.0	11.0	23.0	23.0				
Total Split (%)	54.7%	54.7%	54.7%	54.7%	14.7%	14.7%	30.7%	30.7%				
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3				
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2				
Lost Time Adjust (s)	0.0		0.0		0.0		0.0					
Total Lost Time (s)	5.5		5.5		5.5		5.5					
Lead/Lag					Lag	Lag	Lead	Lead				
Lead-Lag Optimize?					Yes	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None		None	None	None	None				
Act Effct Green (s)	46.5		46.5		17.5		17.5					
Actuated g/C Ratio	0.62		0.62		0.23		0.23					
v/c Ratio	0.22		0.57		0.37		0.37					
Control Delay	6.6		11.1		10.2		10.2					
Queue Delay	0.0		0.0		0.0		0.0					
Total Delay	6.6		11.1		10.2		10.2					
LOS	A		B		B		B					
Approach Delay	6.6		11.1		10.2		10.2					
Approach LOS	A		B		B		B					
Queue Length 50th (m)	11.8		45.3		3.7		3.7					
Queue Length 95th (m)	17.8		72.0		17.8		17.8					
Internal Link Dist (m)	213.6		167.2		9.8		311.8					
Turn Bay Length (m)												
Base Capacity (vph)	1846		1072		430		430					
Starvation Cap Reductn	0		0		0		0					
Spillback Cap Reductn	0		0		0		0					
Storage Cap Reductn	0		0		0		0					
Reduced v/c Ratio	0.22		0.57		0.37		0.37					

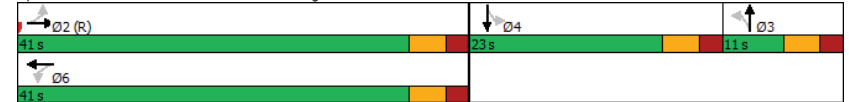
Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated

Lanes, Volumes, Timings
5: Private/Western & Wellington

07-21-2020

Maximum v/c Ratio: 0.57	Intersection LOS: A
Intersection Signal Delay: 9.4	ICU Level of Service A
Intersection Capacity Utilization 53.0%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	

Splits and Phases: 5: Private/Western & Wellington



Lanes, Volumes, Timings
6: Island Park & Byron

07-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	36	134	55	39	340	14	68	343	7	20	555	73
Future Volume (vph)	36	134	55	39	340	14	68	343	7	20	555	73
Satd. Flow (prot)	0	1657	0	0	1724	0	0	1726	0	0	1706	0
Fit Permitted		0.831			0.947			0.813			0.980	
Satd. Flow (perm)	0	1382	0	0	1639	0	0	1414	0	0	1675	0
Satd. Flow (RTOR)		21			2							
Lane Group Flow (vph)	0	250	0	0	437	0	0	465	0	0	720	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		32.7	32.7		32.7	32.7	
Total Split (s)	35.0	35.0		35.0	35.0		50.0	50.0		50.0	50.0	
Total Split (%)	41.2%	41.2%		41.2%	41.2%		58.8%	58.8%		58.8%	58.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		26.1			26.1			47.2			47.2	
Actuated g/C Ratio		0.31			0.31			0.56			0.56	
v/c Ratio		0.57			0.87			0.59			0.78	
Control Delay		27.5			45.9			17.4			29.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		27.5			45.9			17.4			29.8	
LOS		C			D			B			C	
Approach Delay		27.5			45.9			17.4			29.8	
Approach LOS		C			D			B			C	
Queue Length 50th (m)		29.8			63.6			49.5			104.6	
Queue Length 95th (m)		51.4			#107.8			82.4			m133.2	
Internal Link Dist (m)		377.2			388.4			224.9			268.0	
Turn Bay Length (m)												
Base Capacity (vph)		485			560			784			929	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.52			0.78			0.59			0.78	

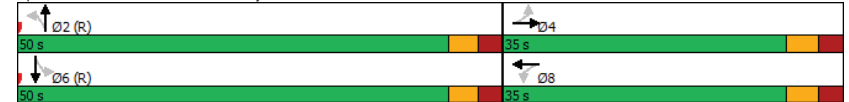
Intersection Summary	
Cycle Length:	85
Actuated Cycle Length:	85
Offset:	82 (96%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated

Lanes, Volumes, Timings
6: Island Park & Byron

07-21-2020

Maximum v/c Ratio: 0.87	Intersection LOS: C
Intersection Signal Delay: 30.2	ICU Level of Service E
Intersection Capacity Utilization 89.9%	
Analysis Period (min) 15	
Description: As per signal timing plan provided on July 21, 2020.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 6: Island Park & Byron



Appendix D

Collision Data

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition
2015-01-29	2015	16:12	BASSETT LANE @ ISLAND PARK DR	03 - Snow	05 - Dusk	02 - Stop sign		03 - P.D. only	07 - SMV other	03 - Loose snow
2016-12-03	2016	20:33	BASSETT LANE @ ISLAND PARK DR	01 - Clear	07 - Dark	02 - Stop sign		02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-01-16	2014	20:12	BYRON AVE @ ISLAND PARK DR	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2014-08-22	2014	17:30	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-01-05	2015	7:45	BYRON AVE @ ISLAND PARK DR	01 - Clear	03 - Dawn	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-02-02	2015	15:15	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	07 - SMV other	03 - Loose snow
2015-03-22	2015	0:48	BYRON AVE @ ISLAND PARK DR	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-05-30	2015	9:12	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-08-24	2015	12:00	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-11-19	2015	15:04	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-11-27	2015	17:46	BYRON AVE @ ISLAND PARK DR	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2016-11-22	2016	12:49	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-02-12	2017	18:02	BYRON AVE @ ISLAND PARK DR	03 - Snow	07 - Dark	01 - Traffic signal		03 - P.D. only	05 - Turning movement	03 - Loose snow
2017-03-08	2017	8:01	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	02 - Wet
2017-08-14	2017	15:09	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	03 - Rear end	01 - Dry
2017-09-01	2017	9:40	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-10-30	2017	9:17	BYRON AVE @ ISLAND PARK DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2017-12-10	2017	11:19	BYRON AVE @ ISLAND PARK DR	03 - Snow	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2017-12-11	2017	10:10	BYRON AVE @ ISLAND PARK DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-01-05	2018	17:50	BYRON AVE @ ISLAND PARK DR (0006365)	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2018-07-20	2018	15:00	BYRON AVE @ ISLAND PARK DR (0006365)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-08-15	2018	10:49	BYRON AVE @ ISLAND PARK DR (0006365)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-08-19	2018	16:00	BYRON AVE @ ISLAND PARK DR (0006365)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2014-01-05	2014	11:42	HILSON AVE @ RICHMOND RD	03 - Snow	01 - Daylight	02 - Stop sign		02 - Non-fatal injury	07 - SMV other	03 - Loose snow
2017-03-05	2017	3:40	ISLAND PARK DR @ MAILES AVE	01 - Clear	07 - Dark	02 - Stop sign		03 - P.D. only	03 - Rear end	01 - Dry
2014-01-07	2014	17:40	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	03 - Loose snow
2014-01-20	2014	12:15	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2014-07-08	2014	16:44	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	05 - Turning movement	02 - Wet
2014-07-11	2014	17:48	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2014-08-02	2014	15:11	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2014-08-24	2014	12:19	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2014-09-17	2014	8:40	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2014-10-04	2014	11:50	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	02 - Wet
2014-10-04	2014	13:00	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	02 - Wet
2014-10-18	2014	13:40	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	07 - SMV other	02 - Wet
2014-11-02	2014	19:05	ISLAND PARK DR @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-02-01	2015	16:45	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-02-14	2015	14:00	ISLAND PARK DR @ RICHMOND RD	03 - Snow	01 - Daylight	01 - Traffic signal		03 - P.D. only	99 - Other	04 - Slush
2015-02-28	2015	11:31	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-03-18	2015	10:27	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2015-04-21	2015	22:30	ISLAND PARK DR @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-04-28	2015	18:26	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-05-23	2015	16:30	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-05-26	2015	21:33	ISLAND PARK DR @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	01 - Dry
2015-07-17	2015	13:40	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-07-31	2015	15:29	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2015-10-10	2015	12:46	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-10-24	2015	21:56	ISLAND PARK DR @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	01 - Dry
2015-10-27	2015	9:40	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-01-09	2016	12:37	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2016-06-04	2016	14:00	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2016-06-07	2016	18:37	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	02 - Wet
2016-08-31	2016	15:30	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-09-02	2016	7:27	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	01 - Dry
2016-10-13	2016	20:10	ISLAND PARK DR @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		02 - Non-fatal injury	05 - Turning movement	01 - Dry
2016-10-28	2016	17:30	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2016-12-11	2016	3:04	ISLAND PARK DR @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	07 - SMV other	06 - Ice
2017-01-03	2017	13:29	ISLAND PARK DR @ RICHMOND RD	04 - Freezing Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	04 - Slush
2017-01-20	2017	12:54	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2017-03-28	2017	17:56	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	02 - Wet
2017-04-30	2017	11:15	ISLAND PARK DR @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2017-09-26	2017	15:26	ISLAND PARK DR @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2018-02-03	2018	15:04	ISLAND PARK DR @ RICHMOND RD (0002125)	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	05 - Turning movement	01 - Dry
2018-04-10	2018	14:40	ISLAND PARK DR @ RICHMOND RD (0002125)	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	01 - Dry
2018-05-29	2018	14:56	ISLAND PARK DR @ RICHMOND RD (0002125)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2018-06-23	2018	20:51	ISLAND PARK DR @ RICHMOND RD (0002125)	02 - Rain	05 - Dusk	01 - Traffic signal		03 - P.D. only	05 - Turning movement	02 - Wet
2018-09-28	2018	21:55	ISLAND PARK DR @ RICHMOND RD (0002125)	02 - Rain	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2018-10-09	2018	12:02	ISLAND PARK DR @ RICHMOND RD (0002125)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2018-10-27	2018	18:11	ISLAND PARK DR @ RICHMOND RD (0002125)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2018-11-26	2018	17:25	ISLAND PARK DR @ RICHMOND RD (0002125)	02 - Rain	07 - Dark	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2018-12-27	2018	20:23	ISLAND PARK DR @ RICHMOND RD (0002125)	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2014-04-01	2014	20:20	ISLAND PARK DR @ SCOTT ST	01 - Clear	07 - Dark	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	01 - Dry
2015-01-31	2015	12:54	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-02-19	2015	16:45	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	06 - Ice
2015-06-13	2015	11:18	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2015-08-25	2015	17:33	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-10-29	2015	6:15	ISLAND PARK DR @ SCOTT ST	02 - Rain	03 - Dawn	01 - Traffic signal		03 - P.D. only	05 - Turning movement	02 - Wet
2015-11-23	2015	8:31	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-01-21	2016	16:43	ISLAND PARK DR @ SCOTT ST	01 - Clear	05 - Dusk	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-03-24	2016	16:30	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2016-06-04	2016	16:20	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2016-07-15	2016	16:00	ISLAND PARK DR @ SCOTT ST	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2016-07-15	2016	16:04	ISLAND PARK DR @ SCOTT ST	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2016-08-25	2016	11:53	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2016-08-31	2016	15:25	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2016-09-07	2016	17:45	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2016-09-21	2016	16:00	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-12-26	2016	18:29	ISLAND PARK DR @ SCOTT ST	01 - Clear	07 - Dark	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	04 - Slush
2017-01-20	2017	17:25	ISLAND PARK DR @ SCOTT ST	02 - Rain	05 - Dusk	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2017-06-09	2017	17:27	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	03 - Rear end	01 - Dry
2017-06-19	2017	17:39	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	01 - Approaching	01 - Dry
2017-08-27	2017	10:35	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2017-10-20	2017	9:50	ISLAND PARK DR @ SCOTT ST	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-11-26	2017</									

2018-09-27	2018	20:33	ISLAND PARK DR @ SCOTT ST (0002126)	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2018-10-17	2018	19:08	ISLAND PARK DR @ SCOTT ST (0002126)	01 - Clear	07 - Dark	01 - Traffic signal	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2018-11-11	2018	17:15	ISLAND PARK DR @ SCOTT ST (0002126)	01 - Clear	05 - Dusk	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2018-12-17	2018	15:30	ISLAND PARK DR @ SCOTT ST (0002126)	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	02 - Wet
2016-07-23	2016	11:15	ISLAND PARK DR btwn BASSETT LANE & BYRON AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	03 - Rear end	01 - Dry
2018-03-29	2018	9:45	ISLAND PARK DR btwn BASSETT LANE & BYRON AVE (_32A234)	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2014-03-12	2014	15:45	ISLAND PARK DR btwn MAILES AVE & RICHMOND RD	03 - Snow	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	04 - Slush
2015-10-16	2015	17:00	ISLAND PARK DR btwn MAILES AVE & RICHMOND RD	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-05-18	2016	9:57	ISLAND PARK DR btwn MAILES AVE & RICHMOND RD	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2018-01-07	2018	18:35	ISLAND PARK DR btwn MAILES AVE & RICHMOND RD (_32A236)	03 - Snow	07 - Dark	10 - No control	03 - P.D. only	07 - SMV other	03 - Loose snow
2018-01-31	2018	15:00	ISLAND PARK DR btwn MAILES AVE & RICHMOND RD (_32A236)	03 - Snow	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	03 - Loose snow
2018-10-29	2018	20:15	ISLAND PARK DR btwn MAILES AVE & RICHMOND RD (_32A236)	02 - Rain	07 - Dark	10 - No control	03 - P.D. only	01 - Approaching	02 - Wet
2014-10-04	2014	16:00	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	02 - Wet
2014-10-28	2014	18:30	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	02 - Rain	07 - Dark	10 - No control	03 - P.D. only	03 - Rear end	02 - Wet
2015-07-10	2015	13:04	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	03 - Rear end	01 - Dry
2015-10-13	2015	13:18	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2016-01-30	2016	17:30	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	01 - Clear	05 - Dusk	10 - No control	03 - P.D. only	03 - Rear end	02 - Wet
2016-05-17	2016	15:10	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2016-06-15	2016	16:49	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2016-06-19	2016	14:02	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2017-12-26	2017	18:05	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE	03 - Snow	07 - Dark	10 - No control	03 - P.D. only	07 - SMV other	03 - Loose snow
2018-02-12	2018	9:17	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE (_32A235)	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2018-03-18	2018	6:45	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE (_32A235)	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2018-06-29	2018	14:55	ISLAND PARK DR btwn RICHMOND RD & BASSETT LANE (_32A235)	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2014-11-14	2014	16:00	ISLAND PARK DR btwn SCOTT ST & MAILES AVE	01 - Clear	05 - Dusk	10 - No control	03 - P.D. only	02 - Angle	01 - Dry
2018-01-25	2018	15:19	ISLAND PARK DR btwn SCOTT ST & MAILES AVE (_32A237)	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2014-02-18	2014	17:20	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2014-02-21	2014	13:00	KIRKWOOD AVE @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	02 - Wet
2014-03-18	2014	12:42	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2014-09-08	2014	15:42	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2014-09-08	2014	17:53	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2014-09-15	2014	0:34	KIRKWOOD AVE @ RICHMOND RD	02 - Rain	07 - Dark	01 - Traffic signal	03 - P.D. only	07 - SMV other	02 - Wet
2014-09-18	2014	17:32	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2014-12-08	2014	14:44	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-01-31	2015	10:40	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2015-06-18	2015	15:29	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	04 - Sideswipe	01 - Dry	01 - Dry
2015-10-28	2015	13:51	KIRKWOOD AVE @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	03 - Rear end	02 - Wet
2016-02-12	2016	14:42	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	02 - Wet
2016-06-11	2016	20:41	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	05 - Dusk	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	01 - Dry
2016-07-19	2016	16:21	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-10-08	2016	19:37	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-12-18	2016	18:00	KIRKWOOD AVE @ RICHMOND RD	03 - Snow	07 - Dark	01 - Traffic signal	02 - Non-fatal injury	05 - Turning movement	04 - Slush
2017-01-04	2017	15:00	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2017-06-14	2017	21:35	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2017-08-16	2017	16:18	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2017-09-20	2017	15:49	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2017-11-06	2017	20:00	KIRKWOOD AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2018-05-22	2018	14:59	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2018-06-09	2018	13:17	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2018-06-09	2018	14:46	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2018-08-11	2018	10:30	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2018-08-31	2018	10:07	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	02 - Angle	01 - Dry
2018-09-10	2018	20:00	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	07 - Dark	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	02 - Wet
2018-09-12	2018	16:25	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2018-09-13	2018	18:05	KIRKWOOD AVE @ RICHMOND RD (0002080)	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2014-12-27	2014	21:50	LEIGHTON TER @ RICHMOND RD	01 - Clear	07 - Dark	02 - Stop sign	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2015-07-24	2015	14:36	LEIGHTON TER @ RICHMOND RD	01 - Clear	01 - Daylight	02 - Stop sign	02 - Non-fatal injury	02 - Angle	01 - Dry
2018-01-27	2018	21:30	LEIGHTON TER @ RICHMOND RD (0002037)	01 - Clear	07 - Dark	02 - Stop sign	02 - Non-fatal injury	02 - Angle	02 - Wet
2018-10-26	2018	15:10	LEIGHTON TER @ RICHMOND RD (0002037)	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	02 - Angle	01 - Dry
2018-11-18	2018	15:35	LEIGHTON TER @ RICHMOND RD (0002037)	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	04 - Sideswipe	03 - Loose snow
2014-04-06	2014	2:05	PATRICIA AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	07 - SMV other	01 - Dry
2016-01-31	2016	15:34	PATRICIA AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	02 - Wet
2018-06-13	2018	10:47	PATRICIA AVE @ RICHMOND RD (0005608)	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	01 - Dry
2014-09-03	2014	16:32	RICHMOND RD btwn HILSON AVE & PATRICIA AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	03 - Rear end	01 - Dry
2017-11-20	2017	15:13	RICHMOND RD btwn HILSON AVE & PATRICIA AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2016-08-10	2016	8:45	RICHMOND RD btwn KIRKWOOD AVE & HILSON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	01 - Approaching	01 - Dry
2018-04-19	2018	10:06	RICHMOND RD btwn KIRKWOOD AVE & HILSON AVE (_32A40G)	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2014-11-24	2014	15:58	RICHMOND RD btwn LEIGHTON TER & ISLAND PARK DR	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	05 - Turning movement	01 - Dry
2016-07-06	2016	21:30	RICHMOND RD btwn LEIGHTON TER & ISLAND PARK DR	02 - Rain	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2014-01-09	2014	22:22	RICHMOND RD btwn PATRICIA AVE & LEIGHTON TER	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2014-07-16	2014	14:15	RICHMOND RD btwn PATRICIA AVE & LEIGHTON TER	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-11-24	2014	15:01	RICHMOND RD btwn PATRICIA AVE & LEIGHTON TER	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2015-07-22	2015	19:00	RICHMOND RD btwn PATRICIA AVE & LEIGHTON TER	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2016-05-09	2016	16:00	RICHMOND RD btwn PATRICIA AVE & LEIGHTON TER	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	06 - SMV unattended vehicle	01 - Dry
2018-02-14	2018	10:10	RICHMOND RD btwn PATRICIA AVE & LEIGHTON TER (_32A4PL)	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2018-11-21	2018	12:32	RICHMOND RD btwn PATRICIA AVE & LEIGHTON TER (_32A4PL)	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2014-08-20	2014	17:30	WELLINGTON ST W btwn ISLAND PARK DR & PICCADILLY AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	05 - Turning movement	01 - Dry
2016-03-22	2016	20:05	WELLINGTON ST W btwn ISLAND PARK DR & PICCADILLY AVE	03 - Snow	07 - Dark	10 - No control	03 - P.D. only	04 - Sideswipe	02 - Wet
2016-10-28	2016	14:25	WELLINGTON ST W btwn ISLAND PARK DR & PICCADILLY AVE	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	02 - Angle	02 - Wet

Appendix E

TRANS Model Plots

TRANS Regional Model

Version 2.15 - Assigned June 16, 2020

AM Peak Hour Total Traffic Volume

Richmond Road Area Growth

2011 Model - Basecase

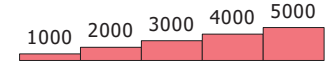
N/A

User Initials: TIMW
Plot Prepared: August 10, 2020
EMME Scenario: 21711



Legend

AM Peak Hour Total Traffic Volume



Distance (m)



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 2.15 - Assigned June 16, 2020

AM Peak Hour Total Traffic Volume Richmond Road Area Growth

2031 Model - Basecase

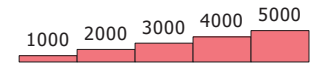
N/A

User Initials: TIMW
Plot Prepared: August 10, 2020
EMME Scenario: 21711



Legend

AM Peak Hour Total Traffic Volume



Distance (m)



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.



Appendix F

Synchro Intersection Worksheets – 2022 Future Background Conditions

Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	105	456	54	43	207	22	41	296	90	57	682	92
Future Volume (vph)	105	456	54	43	207	22	41	296	90	57	682	92
Satd. Flow (prot)	1658	1745	1483	1658	1707	0	0	1671	0	1658	1705	0
Fit Permitted	0.571			0.305				0.561		0.467		
Satd. Flow (perm)	954	1745	1423	528	1707	0	0	942	0	805	1705	0
Satd. Flow (RTOR)			40		6			20			10	
Lane Group Flow (vph)	105	456	54	43	229	0	0	427	0	57	774	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		34.5	34.5		34.5	34.5	
Total Split (s)	42.0	42.0	42.0	42.0	42.0		53.0	53.0		53.0	53.0	
Total Split (%)	44.2%	44.2%	44.2%	44.2%	44.2%		55.8%	55.8%		55.8%	55.8%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	36.0	36.0	36.0	36.0	36.0		46.5	46.5		46.5	46.5	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38		0.49	0.49		0.49	0.49	
v/c Ratio	0.29	0.69	0.10	0.21	0.35		0.91	0.14		0.92		
Control Delay	23.4	31.4	9.0	23.6	22.5		50.5	14.6		40.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0		
Total Delay	23.4	31.4	9.0	23.6	22.5		50.5	14.6		40.9		
LOS	C	C	A	C	C		D	B		D		
Approach Delay		28.0			22.7		50.5			39.1		
Approach LOS		C			C		D			D		
Queue Length 50th (m)	13.2	69.1	1.6	5.3	28.8		70.9	5.5		125.5		
Queue Length 95th (m)	26.2	103.7	8.9	13.5	47.3		#89.5	12.7		#203.7		
Internal Link Dist (m)		206.8			289.3		317.7			431.8		
Turn Bay Length (m)	50.0		25.0	245.0				25.0				
Base Capacity (vph)	361	661	564	200	650		471	394		839		
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	0.29	0.69	0.10	0.21	0.35		0.91	0.14		0.92		

Intersection Summary

Cycle Length: 95
 Actuated Cycle Length: 95
 Offset: 38 (40%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated

Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Maximum v/c Ratio: 0.92	Intersection LOS: D
Intersection Signal Delay: 36.1	ICU Level of Service G
Intersection Capacity Utilization 108.8%	Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Island Park & Scott



Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
Page 2

Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

	↖	→	↗	↖	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔			↔		↔	↔				↔	
Traffic Volume (vph)	2	318	132	169	241	2	143	38	103	21	55	13	
Future Volume (vph)	2	318	132	169	241	2	143	38	103	21	55	13	
Satd. Flow (prot)	0	3091	0	0	3245	0	1658	1523	0	0	1684	0	
Fit Permitted		0.954			0.662		0.699				0.927		
Satd. Flow (perm)	0	2948	0	0	2163	0	1208	1523	0	0	1576	0	
Satd. Flow (RTOR)		109			1			103			13		
Lane Group Flow (vph)	0	452	0	0	412	0	143	141	0	0	89	0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA		
Protected Phases		2			6			8			4		
Permitted Phases	2			6			8			4			
Detector Phase	2	2		6	6		8	8		4	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0		
Minimum Split (s)	31.1	31.1		31.1	31.1		27.6	27.6		27.6	27.6		
Total Split (s)	40.0	40.0		40.0	40.0		35.0	35.0		35.0	35.0		
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%		
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3		
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3		
Lost Time Adjust (s)		0.0			0.0			0.0			0.0		
Total Lost Time (s)		6.1			6.1			5.6			5.6		
Lead/Lag													
Lead-Lag Optimize?													
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max		
Act Effct Green (s)		33.9			33.9		29.4	29.4			29.4		
Actuated g/C Ratio		0.45			0.45		0.39	0.39			0.39		
v/c Ratio		0.32			0.42		0.30	0.21			0.14		
Control Delay		10.5			15.6		18.0	6.3			13.6		
Queue Delay		0.0			0.0		0.0	0.0			0.0		
Total Delay		10.5			15.6		18.0	6.3			13.6		
LOS		B			B		B	A			B		
Approach Delay		10.5			15.6			12.2			13.6		
Approach LOS		B			B			B			B		
Queue Length 50th (m)		15.1			19.7		13.6	3.3			6.7		
Queue Length 95th (m)		24.6			30.7		26.5	13.4			15.3		
Internal Link Dist (m)		282.3			180.4			201.3			128.2		
Turn Bay Length (m)													
Base Capacity (vph)		1392			978		473	659			625		
Starvation Cap Reductn		0			0		0	0			0		
Spillback Cap Reductn		0			0		0	0			0		
Storage Cap Reductn		0			0		0	0			0		
Reduced v/c Ratio		0.32			0.42		0.30	0.21			0.14		

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	25 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road AM Peak Hour FB 2023

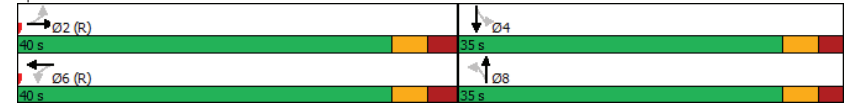
Synchro 11 Report
Page 3

Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

Maximum v/c Ratio: 0.42	Intersection LOS: B
Intersection Signal Delay: 12.8	ICU Level of Service D
Intersection Capacity Utilization 80.2%	
Analysis Period (min) 15	

Splits and Phases: 2: Kirkwood & Richmond



Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

	↖	→	↘	↙	←	↖	↙	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	17	434	3	1	346	9	23	0	26	24	0	40
Future Volume (vph)	17	434	3	1	346	9	23	0	26	24	0	40
Satd. Flow (prot)	0	3303	0	0	3297	0	0	1559	0	0	1536	0
Fit Permitted		0.938			0.954			0.818			0.856	
Satd. Flow (perm)	0	3102	0	0	3145	0	0	1292	0	0	1332	0
Satd. Flow (RTOR)		2			7			41			41	
Lane Group Flow (vph)	0	454	0	0	356	0	0	49	0	0	64	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	33.8	33.8		33.8	33.8		21.5	21.5		21.5	21.5	
Total Split (s)	53.0	53.0		53.0	53.0		22.0	22.0		22.0	22.0	
Total Split (%)	70.7%	70.7%		70.7%	70.7%		29.3%	29.3%		29.3%	29.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.8			5.8			5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		55.8			55.8			11.1			11.1	
Actuated g/C Ratio		0.80			0.80			0.16			0.16	
v/c Ratio		0.18			0.14			0.20			0.26	
Control Delay		3.7			3.5			12.8			15.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		3.7			3.5			12.8			15.7	
LOS		A			A			B			B	
Approach Delay		3.7			3.5			12.8			15.7	
Approach LOS		A			A			B			B	
Queue Length 50th (m)		9.0			6.6			0.9			2.6	
Queue Length 95th (m)		18.6			14.3			8.8			11.9	
Internal Link Dist (m)		180.4			177.6			16.2			168.6	
Turn Bay Length (m)												
Base Capacity (vph)		2489			2525			338			347	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.18			0.14			0.14			0.18	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	69.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.26

Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

Intersection Signal Delay: 4.9	Intersection LOS: A
Intersection Capacity Utilization 45.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Private/Patricia & Richmond



Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	58	368	50	54	228	16	65	379	75	31	684	53
Future Volume (vph)	58	368	50	54	228	16	65	379	75	31	684	53
Satd. Flow (prot)	0	3209	0	0	3242	0	1658	1686	0	1658	1724	0
Fit Permitted		0.862			0.791		0.182			0.403		
Satd. Flow (perm)	0	2766	0	0	2573	0	318	1686	0	693	1724	0
Satd. Flow (RTOR)		15			7			16			6	
Lane Group Flow (vph)	0	476	0	0	298	0	65	454	0	31	737	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.3	31.3		31.3	31.3		21.9	21.9		21.9	21.9	
Total Split (s)	40.0	40.0		40.0	40.0		55.0	55.0		55.0	55.0	
Total Split (%)	42.1%	42.1%		42.1%	42.1%		57.9%	57.9%		57.9%	57.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.3			6.3		5.9	5.9		5.9	5.9	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)		33.7			33.7		49.1	49.1		49.1	49.1	
Actuated g/C Ratio		0.35			0.35		0.52	0.52		0.52	0.52	
v/c Ratio		0.48			0.32		0.40	0.52		0.09	0.83	
Control Delay		25.0			23.0		24.6	18.0		3.8	10.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		25.0			23.0		24.6	18.0		3.8	10.1	
LOS		C			C		C	B		A	B	
Approach Delay		25.0			23.0			18.9			9.9	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		34.1			20.1		5.3	34.4		0.6	14.8	
Queue Length 95th (m)		48.5			30.7		m13.9	74.2		m0.9	m18.5	
Internal Link Dist (m)		177.6			213.6			268.0			318.7	
Turn Bay Length (m)							15.0			10.0		
Base Capacity (vph)		990			917		164	879		358	893	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.48			0.32		0.40	0.52		0.09	0.83	

Intersection Summary	
Cycle Length:	95
Actuated Cycle Length:	95
Offset:	28 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated

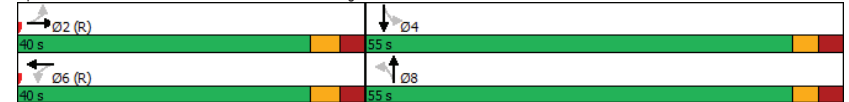
Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

Maximum v/c Ratio: 0.83	Intersection Signal Delay: 17.5	Intersection LOS: B
Intersection Capacity Utilization 111.7%	ICU Level of Service H	
Analysis Period (min) 15		
m Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 4: Island Park & Richmond/Wellington



Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	16	432	0	0	231	10	0	0	0	25	0	20
Future Volume (vph)	16	432	0	0	231	10	0	0	0	25	0	20
Satd. Flow (prot)	0	3309	0	0	1724	0	0	1745	0	0	1577	0
Fit Permitted		0.943									0.950	
Satd. Flow (perm)	0	3117	0	0	1724	0	0	1745	0	0	1539	0
Satd. Flow (RTOR)					4						116	
Lane Group Flow (vph)	0	448	0	0	241	0	0	0	0	0	45	0
Turn Type	Perm	NA			NA					Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6			3			4		
Detector Phase	2	2		6	6		3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		10.0	10.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		10.5	10.5		22.5	22.5	
Total Split (s)	41.0	41.0		41.0	41.0		11.0	11.0		23.0	23.0	
Total Split (%)	54.7%	54.7%		54.7%	54.7%		14.7%	14.7%		30.7%	30.7%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.5			5.5			5.5			5.5	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	C-Max	C-Max		None	None		None	None		None	None	
Act Effct Green (s)		61.0			61.0						11.4	
Actuated g/C Ratio		0.81			0.81						0.15	
v/c Ratio		0.18			0.17						0.14	
Control Delay		3.5			3.9						0.8	
Queue Delay		0.0			0.0						0.0	
Total Delay		3.5			3.9						0.8	
LOS		A			A						A	
Approach Delay		3.5			3.9						0.8	
Approach LOS		A			A						A	
Queue Length 50th (m)		8.7			8.7						0.0	
Queue Length 95th (m)		18.8			22.1						0.0	
Internal Link Dist (m)		213.6			167.2			9.8			311.8	
Turn Bay Length (m)												
Base Capacity (vph)		2535			1403						448	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.18			0.17						0.10	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	27 (36%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle:	55
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Maximum v/c Ratio: 0.18	Intersection LOS: A
Intersection Signal Delay: 3.5	ICU Level of Service A
Intersection Capacity Utilization 44.3%	
Analysis Period (min) 15	

Splits and Phases: 5: Private/Western & Wellington



Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	50	152	71	21	127	12	78	487	11	49	694	32
Future Volume (vph)	50	152	71	21	127	12	78	487	11	49	694	32
Satd. Flow (prot)	0	1646	0	0	1705	0	0	1726	0	0	1725	0
Fit Permitted		0.895			0.909			0.822			0.938	
Satd. Flow (perm)	0	1475	0	0	1558	0	0	1427	0	0	1622	0
Satd. Flow (RTOR)		18			4							
Lane Group Flow (vph)	0	273	0	0	160	0	0	576	0	0	775	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		32.7	32.7		32.7	32.7	
Total Split (s)	31.0	31.0		31.0	31.0		64.0	64.0		64.0	64.0	
Total Split (%)	32.6%	32.6%		32.6%	32.6%		67.4%	67.4%		67.4%	67.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		20.4			20.4			62.9			62.9	
Actuated g/C Ratio		0.21			0.21			0.66			0.66	
v/c Ratio		0.83			0.47			0.61			0.72	
Control Delay		53.3			35.6			13.6			10.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		53.3			35.6			13.6			10.0	
LOS		D			D			B			B	
Approach Delay		53.3			35.6			13.6			10.0	
Approach LOS		D			D			B			B	
Queue Length 50th (m)		44.4			24.8			55.1			36.6	
Queue Length 95th (m)		69.5			41.3			98.9			64.8	
Internal Link Dist (m)		377.2			388.4			224.9			268.0	
Turn Bay Length (m)												
Base Capacity (vph)		401			412			944			1073	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.68			0.39			0.61			0.72	

Intersection Summary	
Cycle Length:	95
Actuated Cycle Length:	95
Offset:	73 (77%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	65
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road AM Peak Hour FB 2023

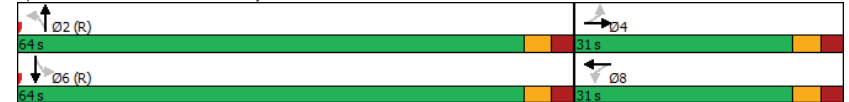
Synchro 11 Report
Page 11

Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Maximum v/c Ratio: 0.83	Intersection LOS: C
Intersection Signal Delay: 20.1	ICU Level of Service E
Intersection Capacity Utilization 88.0%	
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 6: Island Park & Byron



Scenario: 70 Richmond Road AM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (vph)	105	290	44	201	449	101	15	269	13	27	425	73
Future Volume (vph)	105	290	44	201	449	101	15	269	13	27	425	73
Satd. Flow (prot)	1658	1745	1483	1658	1660	0	0	1725	0	1658	1691	0
Fit Permitted	0.312			0.540				0.939		0.506		
Satd. Flow (perm)	528	1745	1391	918	1660	0	0	1624	0	866	1691	0
Satd. Flow (RTOR)			44		16			3			10	
Lane Group Flow (vph)	105	290	44	201	550	0	0	297	0	27	498	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8	2	2			6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0	34.5	34.5	34.5	34.5	34.5	34.5	34.5
Total Split (s)	56.0	56.0	56.0	56.0	56.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (%)	56.0%	56.0%	56.0%	56.0%	56.0%	44.0%	44.0%	44.0%	44.0%	44.0%	44.0%	44.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0			6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	50.0	50.0	50.0	50.0	50.0		37.5		37.5		37.5	
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.50		0.38		0.38		0.38	
v/c Ratio	0.40	0.33	0.06	0.44	0.66		0.49		0.08		0.78	
Control Delay	21.3	16.3	4.2	19.8	22.7		27.0		21.2		37.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0		0.0	
Total Delay	21.3	16.3	4.2	19.8	22.7		27.0		21.2		37.0	
LOS	C	B	A	B	C		C		C		D	
Approach Delay		16.3			21.9		27.0				36.2	
Approach LOS		B			C		C				D	
Queue Length 50th (m)	12.2	32.3	0.0	23.9	74.0		42.9		3.3		82.3	
Queue Length 95th (m)	26.5	50.1	5.2	42.9	110.3		67.0		9.1		#124.6	
Internal Link Dist (m)		206.8			289.3		318.7				431.8	
Turn Bay Length (m)	50.0		25.0	245.0					25.0			
Base Capacity (vph)	264	872	717	459	838		610		324		640	
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	0.40	0.33	0.06	0.44	0.66		0.49		0.08		0.78	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SRTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Scenario: 70 Richmond Road PM Peak Hour FB 2023

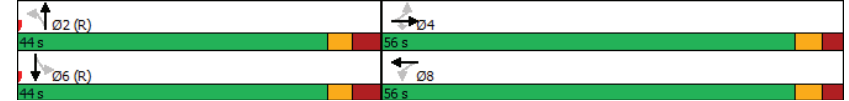
Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Maximum v/c Ratio: 0.78	Intersection LOS: C
Intersection Signal Delay: 25.2	ICU Level of Service E
Intersection Capacity Utilization 84.8%	
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Island Park & Scott



Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
Page 2

Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔			↔	
Traffic Volume (vph)	2	274	159	226	556	28	197	39	184	5	44	3
Future Volume (vph)	2	274	159	226	556	28	197	39	184	5	44	3
Satd. Flow (prot)	0	2957	0	0	3234	0	1658	1486	0	0	1717	0
Fit Permitted		0.953			0.709		0.723				0.968	
Satd. Flow (perm)	0	2818	0	0	2280	0	1218	1486	0	0	1668	0
Satd. Flow (RTOR)		159			5			184			3	
Lane Group Flow (vph)	0	435	0	0	810	0	197	223	0	0	52	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.1	31.1		31.1	31.1		27.6	27.6		27.6	27.6	
Total Split (s)	45.0	45.0		45.0	45.0		40.0	40.0		40.0	40.0	
Total Split (%)	52.9%	52.9%		52.9%	52.9%		47.1%	47.1%		47.1%	47.1%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.1			6.1		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)		53.5			53.5		19.8	19.8			19.8	
Actuated g/C Ratio		0.63			0.63		0.23	0.23			0.23	
v/c Ratio		0.24			0.56		0.70	0.46			0.13	
Control Delay		5.4			12.2		41.9	9.2			22.7	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		5.4			12.2		41.9	9.2			22.7	
LOS		A			B		D	A			C	
Approach Delay		5.4			12.2			24.5			22.7	
Approach LOS		A			B			C			C	
Queue Length 50th (m)		9.4			38.3		28.3	4.8			6.1	
Queue Length 95th (m)		19.0			66.5		45.3	19.6			13.1	
Internal Link Dist (m)		282.3			180.4			201.3			128.2	
Turn Bay Length (m)												
Base Capacity (vph)		1832			1436		492	710			676	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.24			0.56		0.40	0.31			0.08	

Intersection Summary	
Cycle Length:	85
Actuated Cycle Length:	85
Offset:	79 (93%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road PM Peak Hour FB 2023

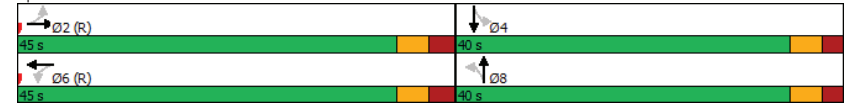
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Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

Maximum v/c Ratio: 0.70	Intersection LOS: B
Intersection Signal Delay: 13.8	ICU Level of Service D
Intersection Capacity Utilization 78.2%	
Analysis Period (min) 15	

Splits and Phases: 2: Kirkwood & Richmond



Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕			↕↔			↕↔				↕↔
Traffic Volume (vph)	20	400	19	13	796	29	3	0	3	16	0	26
Future Volume (vph)	20	400	19	13	796	29	3	0	3	16	0	26
Satd. Flow (prot)	0	3276	0	0	3286	0	0	1561	0	0	1543	0
Fit Permitted		0.905			0.947			0.830			0.872	
Satd. Flow (perm)	0	2968	0	0	3113	0	0	1319	0	0	1360	0
Satd. Flow (RTOR)		12			9			36			36	
Lane Group Flow (vph)	0	439	0	0	838	0	0	6	0	0	42	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	33.8	33.8		33.8	33.8		21.5	21.5		21.5	21.5	
Total Split (s)	63.0	63.0		63.0	63.0		22.0	22.0		22.0	22.0	
Total Split (%)	74.1%	74.1%		74.1%	74.1%		25.9%	25.9%		25.9%	25.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.8			5.8			5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		70.2			70.2			11.2			11.2	
Actuated g/C Ratio		0.84			0.84			0.13			0.13	
v/c Ratio		0.18			0.32			0.03			0.20	
Control Delay		3.0			3.6			0.3			15.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		3.0			3.6			0.3			15.2	
LOS		A			A			A			B	
Approach Delay		3.0			3.6			0.3			15.2	
Approach LOS		A			A			A			B	
Queue Length 50th (m)		8.4			19.2			0.0			1.0	
Queue Length 95th (m)		17.3			36.3			0.0			9.0	
Internal Link Dist (m)		180.4			177.6			16.2			168.6	
Turn Bay Length (m)												
Base Capacity (vph)		2492			2613			290			298	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.18			0.32			0.02			0.14	
Intersection Summary												
Cycle Length: 85												
Actuated Cycle Length: 83.6												
Natural Cycle: 60												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.32												

Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

Intersection Signal Delay: 3.7	Intersection LOS: A
Intersection Capacity Utilization 53.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Private/Patricia & Richmond



Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Traffic Volume (vph)	29	328	61	88	613	15	54	241	76	56	512	118
Future Volume (vph)	29	328	61	88	613	15	54	241	76	56	512	118
Satd. Flow (prot)	0	3187	0	0	3279	0	1658	1664	0	1658	1688	0
Fit Permitted		0.870			0.823		0.221			0.511		
Satd. Flow (perm)	0	2777	0	0	2703	0	386	1664	0	878	1688	0
Satd. Flow (RTOR)		27			3			25			18	
Lane Group Flow (vph)	0	418	0	0	716	0	54	317	0	56	630	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.3	31.3		31.3	31.3		21.9	21.9		21.9	21.9	
Total Split (s)	40.0	40.0		40.0	40.0		45.0	45.0		45.0	45.0	
Total Split (%)	47.1%	47.1%		47.1%	47.1%		52.9%	52.9%		52.9%	52.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.3			6.3		5.9	5.9		5.9	5.9	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)		33.7			33.7		39.1	39.1		39.1	39.1	
Actuated g/C Ratio		0.40			0.40		0.46	0.46		0.46	0.46	
v/c Ratio		0.37			0.67		0.31	0.41		0.14	0.80	
Control Delay		18.1			24.7		15.2	11.1		14.5	28.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		18.1			24.7		15.2	11.1		14.5	28.7	
LOS		B			C		B	B		B	C	
Approach Delay		18.1			24.7			11.7			27.5	
Approach LOS		B			C			B			C	
Queue Length 50th (m)		23.0			48.8		3.1	15.9		5.1	81.9	
Queue Length 95th (m)		34.4			67.9		m7.4	m29.5		12.0	#140.8	
Internal Link Dist (m)		177.6			213.6			268.0			318.7	
Turn Bay Length (m)							15.0			10.0		
Base Capacity (vph)		1117			1073		177	778		403	786	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.37			0.67		0.31	0.41		0.14	0.80	

Intersection Summary

Cycle Length: 85
Actuated Cycle Length: 85
Offset: 53 (62%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Scenario: 70 Richmond Road PM Peak Hour FB 2023

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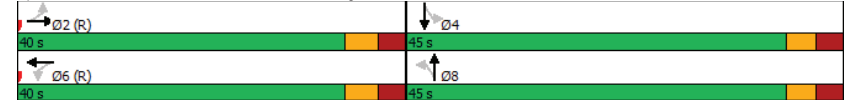
Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

Maximum v/c Ratio: 0.80	Intersection LOS: C
Intersection Signal Delay: 22.1	ICU Level of Service G
Intersection Capacity Utilization 106.5%	Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Island Park & Richmond/Wellington



Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	22	379	0	0	581	13	0	0	0	30	0	113
Future Volume (vph)	22	379	0	0	581	13	0	0	0	30	0	113
Satd. Flow (prot)	0	3306	0	0	1729	0	0	1745	0	0	1492	0
Fit Permitted		0.914									0.950	
Satd. Flow (perm)	0	3019	0	0	1729	0	0	1745	0	0	1432	0
Satd. Flow (RTOR)					2						116	
Lane Group Flow (vph)	0	401	0	0	594	0	0	0	0	0	143	0
Turn Type	Perm	NA			NA					Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6			3			4		
Detector Phase	2	2		6	6		3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		10.0	10.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		10.5	10.5		22.5	22.5	
Total Split (s)	41.0	41.0		41.0	41.0		11.0	11.0		23.0	23.0	
Total Split (%)	54.7%	54.7%		54.7%	54.7%		14.7%	14.7%		30.7%	30.7%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.5			5.5			5.5			5.5	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	C-Max	C-Max		None	None		None	None		None	None	
Act Effct Green (s)		46.6			46.6						17.4	
Actuated g/C Ratio		0.62			0.62						0.23	
v/c Ratio		0.21			0.55						0.34	
Control Delay		6.6			10.7						9.9	
Queue Delay		0.0			0.0						0.0	
Total Delay		6.6			10.7						9.9	
LOS		A			B						A	
Approach Delay		6.6			10.7						9.9	
Approach LOS		A			B						A	
Queue Length 50th (m)		11.5			42.8						3.0	
Queue Length 95th (m)		17.3			68.3						16.2	
Internal Link Dist (m)		213.6			167.2			9.8			311.8	
Turn Bay Length (m)												
Base Capacity (vph)		1873			1073						423	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.21			0.55						0.34	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road PM Peak Hour FB 2023

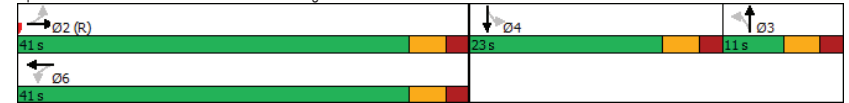
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Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Maximum v/c Ratio: 0.55	Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 55.1%	ICU Level of Service B	
Analysis Period (min) 15		

Splits and Phases: 5: Private/Western & Wellington



Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	36	135	55	39	361	14	68	354	7	20	589	73
Future Volume (vph)	36	135	55	39	361	14	68	354	7	20	589	73
Satd. Flow (prot)	0	1657	0	0	1724	0	0	1726	0	0	1710	0
Fit Permitted		0.845			0.952			0.834			0.983	
Satd. Flow (perm)	0	1408	0	0	1648	0	0	1450	0	0	1682	0
Satd. Flow (RTOR)		21			2							
Lane Group Flow (vph)	0	226	0	0	414	0	0	429	0	0	682	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		32.7	32.7		32.7	32.7	
Total Split (s)	35.0	35.0		35.0	35.0		50.0	50.0		50.0	50.0	
Total Split (%)	41.2%	41.2%		41.2%	41.2%		58.8%	58.8%		58.8%	58.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		25.2			25.2			48.1			48.1	
Actuated g/C Ratio		0.30			0.30			0.57			0.57	
v/c Ratio		0.52			0.84			0.52			0.72	
Control Delay		26.3			44.1			15.3			27.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		26.3			44.1			15.3			27.3	
LOS		C			D			B			C	
Approach Delay		26.3			44.1			15.3			27.3	
Approach LOS		C			D			B			C	
Queue Length 50th (m)		26.7			60.8			41.5			96.5	
Queue Length 95th (m)		45.5			#92.9			72.2			m132.0	
Internal Link Dist (m)		377.2			388.4			224.9			268.0	
Turn Bay Length (m)												
Base Capacity (vph)		494			563			819			951	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.46			0.74			0.52			0.72	

Intersection Summary	
Cycle Length:	85
Actuated Cycle Length:	85
Offset:	82 (96%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated

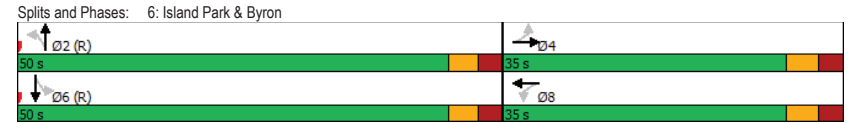
Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
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Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Maximum v/c Ratio: 0.84	Intersection LOS: C
Intersection Signal Delay: 28.2	ICU Level of Service F
Intersection Capacity Utilization 92.3%	
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	



Scenario: 70 Richmond Road PM Peak Hour FB 2023

Synchro 11 Report
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Appendix G

Synchro Intersection Worksheets – 2027 Future Background Conditions

Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	105	456	54	43	223	22	41	318	90	57	682	92
Future Volume (vph)	105	456	54	43	223	22	41	318	90	57	682	92
Satd. Flow (prot)	1658	1745	1483	1658	1710	0	0	1673	0	1658	1705	0
Fit Permitted	0.551			0.305				0.564		0.452		
Satd. Flow (perm)	921	1745	1423	528	1710	0	0	949	0	779	1705	0
Satd. Flow (RTOR)			40		6			19			10	
Lane Group Flow (vph)	105	456	54	43	245	0	0	449	0	57	774	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		34.5	34.5		34.5	34.5	
Total Split (s)	42.0	42.0	42.0	42.0	42.0		53.0	53.0		53.0	53.0	
Total Split (%)	44.2%	44.2%	44.2%	44.2%	44.2%		55.8%	55.8%		55.8%	55.8%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	36.0	36.0	36.0	36.0	36.0		46.5	46.5		46.5	46.5	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38		0.49	0.49		0.49	0.49	
v/c Ratio	0.30	0.69	0.10	0.21	0.38		0.95	0.15		0.92	0.15	
Control Delay	23.7	31.4	9.0	23.6	22.9		57.5	14.8		40.9	14.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.7	31.4	9.0	23.6	22.9		57.5	14.8		40.9	14.8	
LOS	C	C	A	C	C		E	B		D	D	
Approach Delay		28.1			23.0		57.5			39.1		
Approach LOS		C			C		E			D		
Queue Length 50th (m)	13.3	69.1	1.6	5.3	31.1		75.7	5.5		125.5	5.5	
Queue Length 95th (m)	26.5	103.7	8.9	13.5	50.8		#127.3	12.7		#203.7	12.7	
Internal Link Dist (m)		206.8			289.3		318.7			431.8		
Turn Bay Length (m)	50.0		25.0	245.0				25.0				
Base Capacity (vph)	349	661	564	200	651		474	381		839	381	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.30	0.69	0.10	0.21	0.38		0.95	0.15		0.92	0.15	

Intersection Summary

Cycle Length: 95
 Actuated Cycle Length: 95
 Offset: 38 (40%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated

Scenario: 70 Richmond Road AM Peak Hour FB 2028

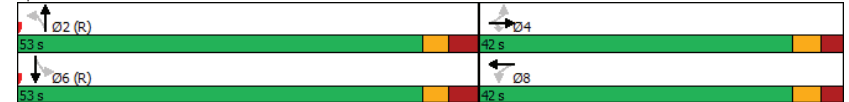
Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Maximum v/c Ratio: 0.95	Intersection LOS: D
Intersection Signal Delay: 37.7	ICU Level of Service H
Intersection Capacity Utilization 109.9%	
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Island Park & Scott



Scenario: 70 Richmond Road AM Peak Hour FB 2028

Synchro 11 Report
Page 2

Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔			↔	
Traffic Volume (vph)	2	322	134	180	256	2	143	38	103	21	55	13
Future Volume (vph)	2	322	134	180	256	2	143	38	103	21	55	13
Satd. Flow (prot)	0	3091	0	0	3245	0	1658	1523	0	0	1684	0
Fit Permitted		0.954			0.659		0.699				0.927	
Satd. Flow (perm)	0	2948	0	0	2154	0	1209	1523	0	0	1576	0
Satd. Flow (RTOR)		110			1		103				13	
Lane Group Flow (vph)	0	458	0	0	438	0	143	141	0	0	89	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.1	31.1		31.1	31.1		27.6	27.6		27.6	27.6	
Total Split (s)	40.0	40.0		40.0	40.0		35.0	35.0		35.0	35.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.1			6.1		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)		33.9			33.9		29.4	29.4			29.4	
Actuated g/C Ratio		0.45			0.45		0.39	0.39			0.39	
v/c Ratio		0.33			0.45		0.30	0.21			0.14	
Control Delay		10.6			16.0		18.0	6.3			13.6	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		10.6			16.0		18.0	6.3			13.6	
LOS		B			B		B	A			B	
Approach Delay		10.6			16.0			12.2			13.6	
Approach LOS		B			B			B			B	
Queue Length 50th (m)		15.4			21.3		13.6	3.3			6.7	
Queue Length 95th (m)		25.0			33.1		26.5	13.4			15.3	
Internal Link Dist (m)		282.3			180.4			201.3			128.2	
Turn Bay Length (m)												
Base Capacity (vph)		1392			974		473	659			625	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.33			0.45		0.30	0.21			0.14	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	25 (33%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road AM Peak Hour FB 2028

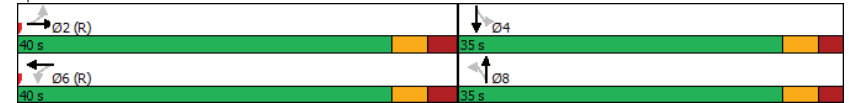
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Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

Maximum v/c Ratio: 0.45	Intersection LOS: B
Intersection Signal Delay: 13.0	ICU Level of Service D
Intersection Capacity Utilization 80.2%	
Analysis Period (min) 15	

Splits and Phases: 2: Kirkwood & Richmond



Scenario: 70 Richmond Road AM Peak Hour FB 2028

Synchro 11 Report
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Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

	↖	→	↘	↙	←	↖	↙	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	17	439	3	1	368	9	23	0	26	24	0	40
Future Volume (vph)	17	439	3	1	368	9	23	0	26	24	0	40
Satd. Flow (prot)	0	3304	0	0	3297	0	0	1559	0	0	1536	0
Fit Permitted		0.937			0.954			0.818			0.856	
Satd. Flow (perm)	0	3099	0	0	3145	0	0	1292	0	0	1332	0
Satd. Flow (RTOR)		2			6			41			41	
Lane Group Flow (vph)	0	459	0	0	378	0	0	49	0	0	64	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	33.8	33.8		33.8	33.8		21.5	21.5		21.5	21.5	
Total Split (s)	53.0	53.0		53.0	53.0		22.0	22.0		22.0	22.0	
Total Split (%)	70.7%	70.7%		70.7%	70.7%		29.3%	29.3%		29.3%	29.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.8			5.8			5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		55.8			55.8			11.1			11.1	
Actuated g/C Ratio		0.80			0.80			0.16			0.16	
v/c Ratio		0.18			0.15			0.20			0.26	
Control Delay		3.7			3.5			12.8			15.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		3.7			3.5			12.8			15.7	
LOS		A			A			B			B	
Approach Delay		3.7			3.5			12.8			15.7	
Approach LOS		A			A			B			B	
Queue Length 50th (m)		9.1			7.1			0.9			2.6	
Queue Length 95th (m)		18.7			15.2			8.8			11.9	
Internal Link Dist (m)		180.4			177.6			16.2			168.6	
Turn Bay Length (m)												
Base Capacity (vph)		2486			2524			338			347	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.18			0.15			0.14			0.18	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	69.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.26

Scenario: 70 Richmond Road AM Peak Hour FB 2028

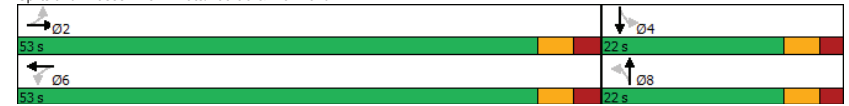
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Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

Intersection Signal Delay: 4.9	Intersection LOS: A
Intersection Capacity Utilization 45.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Private/Patricia & Richmond



Scenario: 70 Richmond Road AM Peak Hour FB 2028

Synchro 11 Report
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Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

	↖	→	↘	↙	←	↖	↙	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔	↔		↔	↔	
Traffic Volume (vph)	58	372	50	54	245	16	65	408	75	31	684	53
Future Volume (vph)	58	372	50	54	245	16	65	408	75	31	684	53
Satd. Flow (prot)	0	3210	0	0	3246	0	1658	1690	0	1658	1724	0
Fit Permitted	0.859				0.796	0.182				0.379		
Satd. Flow (perm)	0	2757	0	0	2591	0	318	1690	0	652	1724	0
Satd. Flow (RTOR)	14				6	14				6		
Lane Group Flow (vph)	0	480	0	0	315	0	65	483	0	31	737	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	2				6	8				4	4	
Permitted Phases	2				6	8				4	4	
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.3	31.3		31.3	31.3		21.9	21.9		21.9	21.9	
Total Split (s)	40.0	40.0		40.0	40.0		55.0	55.0		55.0	55.0	
Total Split (%)	42.1%	42.1%		42.1%	42.1%		57.9%	57.9%		57.9%	57.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0				0.0	0.0				0.0	0.0	
Total Lost Time (s)	6.3				6.3	5.9				5.9	5.9	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)	33.7				33.7	49.1				49.1	49.1	
Actuated g/C Ratio	0.35				0.35	0.52				0.52	0.52	
v/c Ratio	0.49				0.34	0.40				0.09	0.83	
Control Delay	25.2				23.4	25.4				3.8	10.1	
Queue Delay	0.0				0.0	0.0				0.0	0.0	
Total Delay	25.2				23.4	25.4				3.8	10.1	
LOS	C				C	C				A	B	
Approach Delay	25.2				23.4	20.3				9.9		
Approach LOS	C				C	C				A		
Queue Length 50th (m)	34.5				21.5	6.0				0.6	14.8	
Queue Length 95th (m)	49.1				32.6	m13.2				m0.9	m18.5	
Internal Link Dist (m)	177.6				213.6	268.0				318.7		
Turn Bay Length (m)						15.0				10.0		
Base Capacity (vph)	987				922	164				336	893	
Starvation Cap Reductn	0				0	0				0	0	
Spillback Cap Reductn	0				0	0				0	0	
Storage Cap Reductn	0				0	0				0	0	
Reduced v/c Ratio	0.49				0.34	0.40				0.09	0.83	

Intersection Summary	
Cycle Length:	95
Actuated Cycle Length:	95
Offset:	28 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated

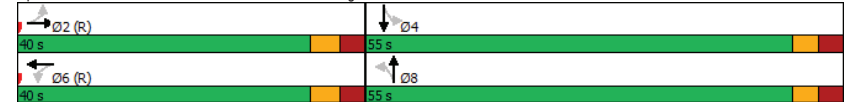
Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

Maximum v/c Ratio: 0.83	Intersection LOS: B
Intersection Signal Delay: 18.1	ICU Level of Service H
Intersection Capacity Utilization 111.7%	
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Island Park & Richmond/Wellington



Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	16	437	0	0	248	10	0	0	0	25	0	20
Future Volume (vph)	16	437	0	0	248	10	0	0	0	25	0	20
Satd. Flow (prot)	0	3309	0	0	1727	0	0	1745	0	0	1577	0
Fit Permitted		0.943									0.950	
Satd. Flow (perm)	0	3117	0	0	1727	0	0	1745	0	0	1539	0
Satd. Flow (RTOR)					4						116	
Lane Group Flow (vph)	0	453	0	0	258	0	0	0	0	0	45	0
Turn Type	Perm	NA			NA					Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6			3			4		
Detector Phase	2	2		6	6		3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		10.0	10.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		10.5	10.5		22.5	22.5	
Total Split (s)	41.0	41.0		41.0	41.0		11.0	11.0		23.0	23.0	
Total Split (%)	54.7%	54.7%		54.7%	54.7%		14.7%	14.7%		30.7%	30.7%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.5			5.5			5.5			5.5	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	C-Max	C-Max		None	None		None	None		None	None	
Act Effct Green (s)		61.0			61.0						11.4	
Actuated g/C Ratio		0.81			0.81						0.15	
v/c Ratio		0.18			0.18						0.14	
Control Delay		3.5			3.9						0.8	
Queue Delay		0.0			0.0						0.0	
Total Delay		3.5			3.9						0.8	
LOS		A			A						A	
Approach Delay		3.5			3.9						0.8	
Approach LOS		A			A						A	
Queue Length 50th (m)		8.8			9.5						0.0	
Queue Length 95th (m)		19.1			23.6						0.0	
Internal Link Dist (m)		213.6			167.2			9.8			311.8	
Turn Bay Length (m)												
Base Capacity (vph)		2535			1405						448	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.18			0.18						0.10	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	27 (36%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle:	55
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road AM Peak Hour FB 2028

Synchro 11 Report
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Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Maximum v/c Ratio: 0.18	Intersection LOS: A
Intersection Signal Delay: 3.5	ICU Level of Service A
Intersection Capacity Utilization 44.5%	
Analysis Period (min) 15	

Splits and Phases: 5: Private/Western & Wellington



Scenario: 70 Richmond Road AM Peak Hour FB 2028

Synchro 11 Report
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Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	50	168	71	21	129	12	78	524	11	49	694	32
Future Volume (vph)	50	168	71	21	129	12	78	524	11	49	694	32
Satd. Flow (prot)	0	1651	0	0	1707	0	0	1730	0	0	1725	0
Fit Permitted		0.904			0.907			0.830			0.934	
Satd. Flow (perm)	0	1495	0	0	1555	0	0	1442	0	0	1615	0
Satd. Flow (RTOR)		17			4							
Lane Group Flow (vph)	0	289	0	0	162	0	0	613	0	0	775	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		32.7	32.7		32.7	32.7	
Total Split (s)	31.0	31.0		31.0	31.0		64.0	64.0		64.0	64.0	
Total Split (%)	32.6%	32.6%		32.6%	32.6%		67.4%	67.4%		67.4%	67.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		21.1			21.1			62.2			62.2	
Actuated g/C Ratio		0.22			0.22			0.65			0.65	
v/c Ratio		0.84			0.47			0.65			0.73	
Control Delay		54.0			34.9			15.0			10.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		54.0			34.9			15.0			10.4	
LOS		D			C			B			B	
Approach Delay		54.0			34.9			15.0			10.4	
Approach LOS		D			C			B			B	
Queue Length 50th (m)		47.2			24.8			63.4			36.9	
Queue Length 95th (m)		#76.7			41.9			109.8			m64.9	
Internal Link Dist (m)		377.2			388.4			224.9			268.0	
Turn Bay Length (m)												
Base Capacity (vph)		405			412			943			1057	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.71			0.39			0.65			0.73	

Intersection Summary	
Cycle Length:	95
Actuated Cycle Length:	95
Offset:	73 (77%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	65
Control Type:	Actuated-Coordinated

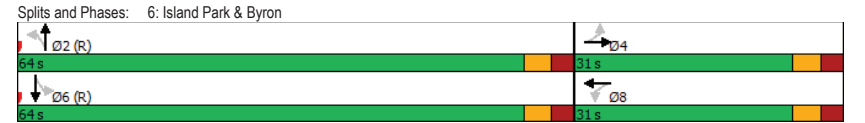
Scenario: 70 Richmond Road AM Peak Hour FB 2028

Synchro 11 Report
Page 11

Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Maximum v/c Ratio: 0.84	Intersection Signal Delay: 20.9	Intersection LOS: C
Intersection Capacity Utilization 90.7%	ICU Level of Service E	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		
m Volume for 95th percentile queue is metered by upstream signal.		



Scenario: 70 Richmond Road AM Peak Hour FB 2028

Synchro 11 Report
Page 12

Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Traffic Volume (vph)	105	312	44	201	449	101	15	269	13	27	457	73
Future Volume (vph)	105	312	44	201	449	101	15	269	13	27	457	73
Satd. Flow (prot)	1658	1745	1483	1658	1660	0	0	1725	0	1658	1694	0
Fit Permitted	0.312			0.520				0.883		0.506		
Satd. Flow (perm)	528	1745	1391	885	1660	0	0	1527	0	866	1694	0
Satd. Flow (RTOR)			44		16			3			9	
Lane Group Flow (vph)	105	312	44	201	550	0	0	297	0	27	530	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8	2	2			6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0	34.5	34.5	34.5	34.5	34.5	34.5	34.5
Total Split (s)	56.0	56.0	56.0	56.0	56.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (%)	56.0%	56.0%	56.0%	56.0%	56.0%	44.0%	44.0%	44.0%	44.0%	44.0%	44.0%	44.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0			6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	50.0	50.0	50.0	50.0	50.0		37.5		37.5		37.5	
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.50		0.38		0.38		0.38	
v/c Ratio	0.40	0.36	0.06	0.45	0.66		0.52		0.08		0.83	
Control Delay	21.3	16.7	4.2	20.4	22.7		27.9		21.2		40.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0		0.0	
Total Delay	21.3	16.7	4.2	20.4	22.7		27.9		21.2		40.7	
LOS	C	B	A	C	C		C		C		D	
Approach Delay		16.6			22.0		27.9				39.8	
Approach LOS		B			C		C				D	
Queue Length 50th (m)	12.2	35.3	0.0	24.2	74.0		43.5		3.3		90.3	
Queue Length 95th (m)	26.5	54.2	5.2	43.7	110.3		68.6		9.1		#145.4	
Internal Link Dist (m)		206.8			289.3		318.7				431.8	
Turn Bay Length (m)	50.0		25.0	245.0					25.0			
Base Capacity (vph)	264	872	717	442	838		574		324		640	
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	0.40	0.36	0.06	0.45	0.66		0.52		0.08		0.83	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 2 (2%), Referenced to phase 2:NBT and 6:SBL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Scenario: 70 Richmond Road PM Peak Hour FB 2028

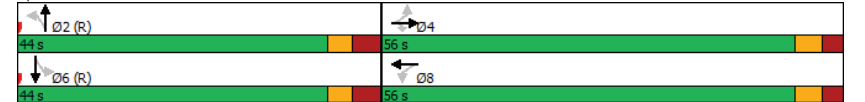
Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: Island Park & Scott

08-19-2020

Maximum v/c Ratio: 0.83	Intersection LOS: C
Intersection Signal Delay: 26.4	ICU Level of Service E
Intersection Capacity Utilization 86.3%	
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Island Park & Scott



Scenario: 70 Richmond Road PM Peak Hour FB 2028

Synchro 11 Report
Page 2

Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔	↔		↔		
Traffic Volume (vph)	2	291	169	228	563	28	214	39	199	5	44	3
Future Volume (vph)	2	291	169	228	563	28	214	39	199	5	44	3
Satd. Flow (prot)	0	2957	0	0	3234	0	1658	1483	0	0	1717	0
Fit Permitted	0.953		0.701		0.723		0.968					
Satd. Flow (perm)	0	2818	0	0	2257	0	1217	1483	0	0	1668	0
Satd. Flow (RTOR)	169		5		199		3					
Lane Group Flow (vph)	0	462	0	0	819	0	214	238	0	0	52	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	2		6		8		4		4			
Permitted Phases	2		6		8		8		4			
Detector Phase	2		2		6		6		8		8	
Switch Phase	2		2		6		6		8		8	
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.1	31.1		31.1	31.1		27.6	27.6		27.6	27.6	
Total Split (s)	45.0	45.0		45.0	45.0		40.0	40.0		40.0	40.0	
Total Split (%)	52.9%	52.9%		52.9%	52.9%		47.1%	47.1%		47.1%	47.1%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0		0.0		0.0		0.0		0.0			
Total Lost Time (s)	6.1		6.1		5.6		5.6		5.6			
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)	52.5		52.5		20.8		20.8		20.8			
Actuated g/C Ratio	0.62		0.62		0.24		0.24		0.24			
v/c Ratio	0.26		0.59		0.72		0.46		0.13			
Control Delay	5.8		13.3		42.4		8.6		21.8			
Queue Delay	0.0		0.0		0.0		0.0		0.0			
Total Delay	5.8		13.3		42.4		8.6		21.8			
LOS	A		B		D		A		C			
Approach Delay	5.8		13.3		24.6		21.8					
Approach LOS	A		B		C		C					
Queue Length 50th (m)	10.1		39.2		31.2		4.8		6.1			
Queue Length 95th (m)	21.4		71.7		48.0		19.4		12.7			
Internal Link Dist (m)	282.3		180.4		201.3		128.2					
Turn Bay Length (m)												
Base Capacity (vph)	1805		1396		492		718		676			
Starvation Cap Reductn	0		0		0		0		0			
Spillback Cap Reductn	0		0		0		0		0			
Storage Cap Reductn	0		0		0		0		0			
Reduced v/c Ratio	0.26		0.59		0.43		0.33		0.08			
Intersection Summary												
Cycle Length: 85												
Actuated Cycle Length: 85												
Offset: 79 (93%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 60												
Control Type: Actuated-Coordinated												

Scenario: 70 Richmond Road PM Peak Hour FB 2028

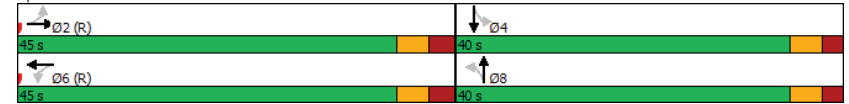
Synchro 11 Report
Page 3

Lanes, Volumes, Timings
2: Kirkwood & Richmond

08-19-2020

Maximum v/c Ratio: 0.72	Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 79.4%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 2: Kirkwood & Richmond



Scenario: 70 Richmond Road PM Peak Hour FB 2028

Synchro 11 Report
Page 4

Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕↕				↕↕
Traffic Volume (vph)	20	424	19	13	805	29	3	0	3	16	0	26
Future Volume (vph)	20	424	19	13	805	29	3	0	3	16	0	26
Satd. Flow (prot)	0	3277	0	0	3286	0	0	1561	0	0	1543	0
Fit Permitted		0.907			0.947			0.830			0.872	
Satd. Flow (perm)	0	2976	0	0	3113	0	0	1319	0	0	1360	0
Satd. Flow (RTOR)		11			9			36			36	
Lane Group Flow (vph)	0	463	0	0	847	0	0	6	0	0	42	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	33.8	33.8		33.8	33.8		21.5	21.5		21.5	21.5	
Total Split (s)	63.0	63.0		63.0	63.0		22.0	22.0		22.0	22.0	
Total Split (%)	74.1%	74.1%		74.1%	74.1%		25.9%	25.9%		25.9%	25.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.8			5.8			5.5			5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		70.2			70.2			11.2			11.2	
Actuated g/C Ratio		0.84			0.84			0.13			0.13	
v/c Ratio		0.19			0.32			0.03			0.20	
Control Delay		3.0			3.6			0.3			15.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		3.0			3.6			0.3			15.2	
LOS		A			A			A			B	
Approach Delay		3.0			3.6			0.3			15.2	
Approach LOS		A			A			A			B	
Queue Length 50th (m)		9.0			19.5			0.0			1.0	
Queue Length 95th (m)		18.3			36.7			0.0			9.0	
Internal Link Dist (m)		180.4			177.6			16.2			168.6	
Turn Bay Length (m)												
Base Capacity (vph)		2499			2613			290			298	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.19			0.32			0.02			0.14	
Intersection Summary												
Cycle Length: 85												
Actuated Cycle Length: 83.6												
Natural Cycle: 60												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.32												

Scenario: 70 Richmond Road PM Peak Hour FB 2028

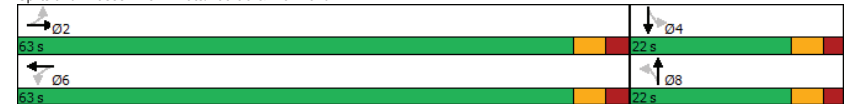
Synchro 11 Report
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Lanes, Volumes, Timings
3: Private/Patricia & Richmond

08-19-2020

Intersection Signal Delay: 3.7	Intersection LOS: A
Intersection Capacity Utilization 54.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Private/Patricia & Richmond



Scenario: 70 Richmond Road PM Peak Hour FB 2028

Synchro 11 Report
Page 6

Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

	↖	→	↘	↙	←	↖	↙	↑	↘	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	29	348	61	88	621	15	54	241	76	56	552	118
Future Volume (vph)	29	348	61	88	621	15	54	241	76	56	552	118
Satd. Flow (prot)	0	3193	0	0	3279	0	1658	1664	0	1658	1692	0
Fit Permitted		0.872			0.819		0.187			0.511		
Satd. Flow (perm)	0	2789	0	0	2690	0	326	1664	0	878	1692	0
Satd. Flow (RTOR)		25			3		25			17		
Lane Group Flow (vph)	0	438	0	0	724	0	54	317	0	56	670	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6		8			4		4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.3	31.3		31.3	31.3		21.9	21.9		21.9	21.9	
Total Split (s)	40.0	40.0		40.0	40.0		45.0	45.0		45.0	45.0	
Total Split (%)	47.1%	47.1%		47.1%	47.1%		52.9%	52.9%		52.9%	52.9%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.3			6.3		5.9	5.9		5.9	5.9	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Act Effct Green (s)		33.7			33.7		39.1	39.1		39.1	39.1	
Actuated g/C Ratio		0.40			0.40		0.46	0.46		0.46	0.46	
v/c Ratio		0.39			0.68		0.36	0.41		0.14	0.85	
Control Delay		18.5			25.0		17.5	11.2		14.5	32.5	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		18.5			25.0		17.5	11.2		14.5	32.5	
LOS		B			C		B	B		B	C	
Approach Delay		18.5			25.0		12.1			31.1		
Approach LOS		B			C		B			C		
Queue Length 50th (m)		24.4			49.6		3.0	15.5		5.1	90.8	
Queue Length 95th (m)		36.3			69.1		m7.2	m30.2		12.0	#155.7	
Internal Link Dist (m)		177.6			213.6			268.0			318.7	
Turn Bay Length (m)							15.0			10.0		
Base Capacity (vph)		1120			1068		149	778		403	787	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.39			0.68		0.36	0.41		0.14	0.85	
Intersection Summary												
Cycle Length: 85												
Actuated Cycle Length: 85												
Offset: 53 (62%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 70												
Control Type: Actuated-Coordinated												

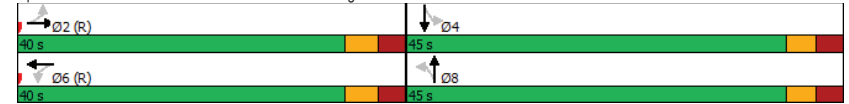
Lanes, Volumes, Timings

4: Island Park & Richmond/Wellington

08-19-2020

Maximum v/c Ratio: 0.85	Intersection LOS: C
Intersection Signal Delay: 23.6	ICU Level of Service G
Intersection Capacity Utilization 106.8%	
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Island Park & Richmond/Wellington



Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	22	407	0	0	588	13	0	0	0	30	0	113
Future Volume (vph)	22	407	0	0	588	13	0	0	0	30	0	113
Satd. Flow (prot)	0	3306	0	0	1730	0	0	1745	0	0	1492	0
Fit Permitted		0.916									0.950	
Satd. Flow (perm)	0	3028	0	0	1730	0	0	1745	0	0	1432	0
Satd. Flow (RTOR)					2						116	
Lane Group Flow (vph)	0	429	0	0	601	0	0	0	0	0	143	0
Turn Type	Perm	NA			NA					Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6			3			4		
Detector Phase	2	2		6	6		3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		10.0	10.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		10.5	10.5		22.5	22.5	
Total Split (s)	41.0	41.0		41.0	41.0		11.0	11.0		23.0	23.0	
Total Split (%)	54.7%	54.7%		54.7%	54.7%		14.7%	14.7%		30.7%	30.7%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2		2.2	2.2		2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.5			5.5			5.5			5.5	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	C-Max	C-Max		None	None		None	None		None	None	
Act Effct Green (s)		46.6			46.6						17.4	
Actuated g/C Ratio		0.62			0.62						0.23	
v/c Ratio		0.23			0.56						0.34	
Control Delay		6.7			10.8						9.9	
Queue Delay		0.0			0.0						0.0	
Total Delay		6.7			10.8						9.9	
LOS		A			B						A	
Approach Delay		6.7			10.8						9.9	
Approach LOS		A			B						A	
Queue Length 50th (m)		12.5			43.7						3.0	
Queue Length 95th (m)		18.6			69.4						16.2	
Internal Link Dist (m)		213.6			167.2			9.8			311.8	
Turn Bay Length (m)												
Base Capacity (vph)		1879			1074						423	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.23			0.56						0.34	

Intersection Summary	
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated

Scenario: 70 Richmond Road PM Peak Hour FB 2028

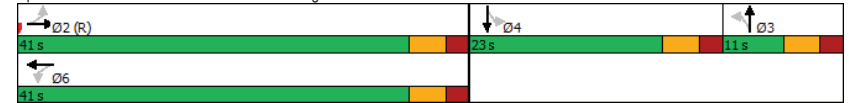
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Lanes, Volumes, Timings
5: Private/Western & Wellington

08-19-2020

Maximum v/c Ratio: 0.56	Intersection LOS: A
Intersection Signal Delay: 9.2	ICU Level of Service B
Intersection Capacity Utilization 55.5%	
Analysis Period (min) 15	

Splits and Phases: 5: Private/Western & Wellington



Scenario: 70 Richmond Road PM Peak Hour FB 2028

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Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	36	137	55	39	398	14	68	354	7	20	634	73
Future Volume (vph)	36	137	55	39	398	14	68	354	7	20	634	73
Satd. Flow (prot)	0	1657	0	0	1728	0	0	1726	0	0	1711	0
Fit Permitted		0.840			0.954			0.824			0.984	
Satd. Flow (perm)	0	1400	0	0	1653	0	0	1432	0	0	1685	0
Satd. Flow (RTOR)		20			2							
Lane Group Flow (vph)	0	228	0	0	451	0	0	429	0	0	727	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		32.7	32.7		32.7	32.7	
Total Split (s)	35.0	35.0		35.0	35.0		50.0	50.0		50.0	50.0	
Total Split (%)	41.2%	41.2%		41.2%	41.2%		58.8%	58.8%		58.8%	58.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.7	2.7		2.7	2.7	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		26.4			26.4			46.9			46.9	
Actuated g/C Ratio		0.31			0.31			0.55			0.55	
v/c Ratio		0.51			0.88			0.54			0.78	
Control Delay		25.5			46.7			16.3			30.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		25.5			46.7			16.3			30.4	
LOS		C			D			B			C	
Approach Delay		25.5			46.7			16.3			30.4	
Approach LOS		C			D			B			C	
Queue Length 50th (m)		26.2			65.7			44.4			105.8	
Queue Length 95th (m)		46.3			#112.2			72.7			m134.0	
Internal Link Dist (m)		377.2			388.4			224.9			268.0	
Turn Bay Length (m)												
Base Capacity (vph)		490			565			790			929	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.47			0.80			0.54			0.78	

Intersection Summary	
Cycle Length:	85
Actuated Cycle Length:	85
Offset:	82 (96%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated

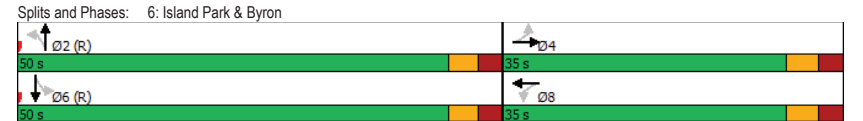
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Lanes, Volumes, Timings
6: Island Park & Byron

08-19-2020

Maximum v/c Ratio: 0.88	Intersection LOS: C
Intersection Signal Delay: 30.5	ICU Level of Service F
Intersection Capacity Utilization 95.3%	
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	



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Appendix H

MMLOS Analysis

Multi-Modal Level of Service - Segments Form

Consultant Scenario Comments	CGH Transportation Inc.	Project Date	2018-08
	Existing / Future		2022-05-11

SEGMENTS		Street A	Richmond	Island Park	-
			1	2	3
Pedestrian	Sidewalk Width	-	≥ 2 m	1.8 m	
	Boulevard Width		0.5 - 2 m	> 2 m	
	Avg Daily Curb Lane Traffic Volume		≤ 3000	> 3000	
	Operating Speed		> 50 to 60 km/h	> 30 to 50 km/h	
	On-Street Parking		yes	no	
	Exposure to Traffic PLoS		A	C	-
	Effective Sidewalk Width				
Pedestrian Volume					
Crowding PLoS	-	-	-		
Level of Service	-	-	-		
Bicycle	Type of Cycling Facility	F	Mixed Traffic	Curbside Bike Lane	
	Number of Travel Lanes		4-5 lanes total	≤ 1 each direction	
	Operating Speed		≥ 50 to 60 km/h	≤ 50 km/h	
	# of Lanes & Operating Speed LoS		E	A	-
	Bike Lane (+ Parking Lane) Width			<1.2 m	
	Bike Lane Width LoS		-	F	-
	Bike Lane Blockages			Rare	
	Blockage LoS		-	A	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge	
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	
	Sidestreet Operating Speed		>40 to 50 km/h	>40 to 50 km/h	
Unsignalized Crossing - Lowest LoS	B	A	-		
Level of Service	E	F	-		
Transit	Facility Type	D	Mixed Traffic		
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8		
	Level of Service		D	-	-
Truck	Truck Lane Width	C	≤ 3.3 m		
	Travel Lanes per Direction		> 1		
	Level of Service		C	-	-
Auto	Level of Service	Not Applicable			

Appendix I

TDM Checklist

TDM Measures Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

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: Non-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	<input type="checkbox"/>
1.2 Travel surveys		
BETTER	1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	<input type="checkbox"/>
2. WALKING AND CYCLING		
2.1 Information on walking/cycling routes & destinations		
BASIC	2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances	<input checked="" type="checkbox"/>
2.2 Bicycle skills training		
<i>Commuter travel</i>		
BETTER	★ 2.2.1 Offer on-site cycling courses for commuters, or subsidize off-site courses	<input type="checkbox"/>
2.3 Valet bike parking		
<i>Visitor travel</i>		
BETTER	2.3.1 Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	<input type="checkbox"/>

TDM measures: Non-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	<input checked="" type="checkbox"/>
BASIC	3.1.2 Provide online links to OC Transpo and STO information	<input checked="" type="checkbox"/>
BETTER	3.1.3 Provide real-time arrival information display at entrances	<input type="checkbox"/>
3.2 Transit fare incentives		
<i>Commuter travel</i>		
BETTER	3.2.1 Offer preloaded PRESTO cards to encourage commuters to use transit	<input type="checkbox"/>
BETTER	★ 3.2.2 Subsidize or reimburse monthly transit pass purchases by employees	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	3.2.3 Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	<input type="checkbox"/>
3.3 Enhanced public transit service		
<i>Commuter travel</i>		
BETTER	3.3.1 Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	3.3.2 Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	<input type="checkbox"/>
3.4 Private transit service		
<i>Commuter travel</i>		
BETTER	3.4.1 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	3.4.2 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	<input type="checkbox"/>

TDM measures: <i>Non-residential developments</i>		Check if proposed & add descriptions
4. RIDESHARING		
4.1 Ridematching service		
<i>Commuter travel</i>		
BASIC ★	4.1.1 Provide a dedicated ridematching portal at OttawaRideMatch.com	<input type="checkbox"/>
4.2 Carpool parking price incentives		
<i>Commuter travel</i>		
BETTER	4.2.1 Provide discounts on parking costs for registered carpools	<input type="checkbox"/>
4.3 Vanpool service		
<i>Commuter travel</i>		
BETTER	4.3.1 Provide a vanpooling service for long-distance commuters	<input type="checkbox"/>
5. CARSHARING & BIKESHARING		
5.1 Bikeshare stations & memberships		
BETTER	5.1.1 Contract with provider to install on-site bikeshare station for use by commuters and visitors	<input type="checkbox"/>
<i>Commuter travel</i>		
BETTER	5.1.2 Provide employees with bikeshare memberships for local business travel	<input type="checkbox"/>
5.2 Carshare vehicles & memberships		
<i>Commuter travel</i>		
BETTER	5.2.1 Contract with provider to install on-site carshare vehicles and promote their use by tenants	<input type="checkbox"/>
BETTER	5.2.2 Provide employees with carshare memberships for local business travel	<input type="checkbox"/>
6. PARKING		
6.1 Priced parking		
<i>Commuter travel</i>		
BASIC ★	6.1.1 Charge for long-term parking (daily, weekly, monthly)	<input type="checkbox"/>
BASIC	6.1.2 Unbundle parking cost from lease rates at multi-tenant sites	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER	6.1.3 Charge for short-term parking (hourly)	<input type="checkbox"/>

TDM measures: <i>Non-residential developments</i>		Check if proposed & add descriptions
7. TDM MARKETING & COMMUNICATIONS		
7.1 Multimodal travel information		
<i>Commuter travel</i>		
BASIC ★	7.1.1 Provide a multimodal travel option information package to new/relocating employees and students	<input type="checkbox"/>
<i>Visitor travel</i>		
BETTER ★	7.1.2 Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	<input type="checkbox"/>
7.2 Personalized trip planning		
<i>Commuter travel</i>		
BETTER ★	7.2.1 Offer personalized trip planning to new/relocating employees	<input type="checkbox"/>
7.3 Promotions		
<i>Commuter travel</i>		
BETTER	7.3.1 Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	<input type="checkbox"/>
8. OTHER INCENTIVES & AMENITIES		
8.1 Emergency ride home		
<i>Commuter travel</i>		
BETTER ★	8.1.1 Provide emergency ride home service to non-driving commuters	<input type="checkbox"/>
8.2 Alternative work arrangements		
<i>Commuter travel</i>		
BASIC ★	8.2.1 Encourage flexible work hours	<input type="checkbox"/>
BETTER	8.2.2 Encourage compressed workweeks	<input type="checkbox"/>
BETTER ★	8.2.3 Encourage telework	<input type="checkbox"/>
8.3 Local business travel options		
<i>Commuter travel</i>		
BASIC ★	8.3.1 Provide local business travel options that minimize the need for employees to bring a personal car to work	<input type="checkbox"/>
8.4 Commuter incentives		
<i>Commuter travel</i>		
BETTER	8.4.1 Offer employees a taxable, mode-neutral commuting allowance	<input type="checkbox"/>
8.5 On-site amenities		
<i>Commuter travel</i>		
BETTER	8.5.1 Provide on-site amenities/services to minimize mid-day or mid-commute errands	<input type="checkbox"/>

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

Legend	
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance
★	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

TDM measures: 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	<input type="checkbox"/>
1.2 Travel surveys		
BETTER	1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	<input type="checkbox"/>
2. WALKING AND CYCLING		
2.1 Information on walking/cycling routes & destinations		
BASIC	2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances (multi-family, condominium)	<input checked="" type="checkbox"/>
2.2 Bicycle skills training		
BETTER	2.2.1 Offer on-site cycling courses for residents, or subsidize off-site courses	<input type="checkbox"/>

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

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	<input type="checkbox"/>
6.2 Personalized trip planning		
BETTER ★	6.2.1 Offer personalized trip planning to new residents	<input type="checkbox"/>

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

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

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

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

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

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

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

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

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

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

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

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
2. WALKING & CYCLING: END-OF-TRIP FACILITIES		
2.1 Bicycle parking		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see <i>Official Plan policy 4.3.6</i>)	<input checked="" type="checkbox"/>
REQUIRED	2.1.2 Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see <i>Zoning By-law Section 111</i>)	<input checked="" type="checkbox"/>
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see <i>Zoning By-law Section 111</i>)	<input checked="" type="checkbox"/>
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	<input type="checkbox"/>
2.2 Secure bicycle parking		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see <i>Zoning By-law Section 111</i>)	<input checked="" type="checkbox"/>
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	<input checked="" type="checkbox"/>
2.3 Bicycle repair station		
BETTER	2.3.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input type="checkbox"/>
3. TRANSIT		
3.1 Customer amenities		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	<input type="checkbox"/>
BASIC	3.1.2 Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	<input type="checkbox"/>
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	<input type="checkbox"/>

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