

MAINLAND COMMON TRAFFIC IMPACT STUDY

FINAL REPORT



PREPARED FOR:
RANK INC

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Project No. CA0004090.6438



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1 INTRODUCTION

Background

Plans are being prepared for a multi-use development consisting of 2,750 residential units and 143,380 square feet of commercial space north of the Bayers Lake Business Park in Halifax, Nova Scotia, see Figure 1. Buildout of the development is expected by 2034. The Halifax Regional Municipality (HRM) has requested that a Traffic Impact Study (TIS) be completed to review the impacts to the adjacent transportation network. WSP Canada Inc. has been retained to complete a TIS for the proposed Mainland Common development.

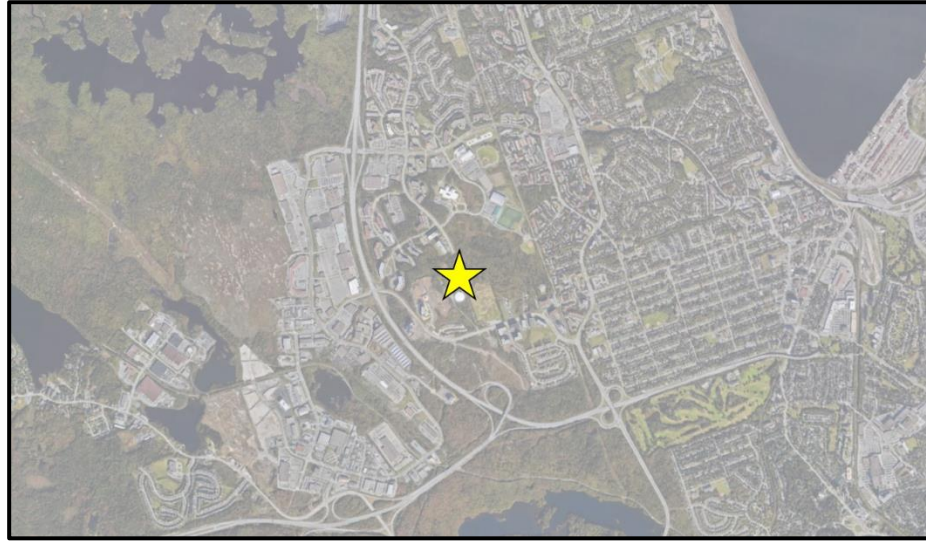


Figure 1 – Development Location

A Traffic Impact Study Usually Considers Four Questions

A TIS usually consists of determining answers to the following questions:

1. **What is the existing transportation situation** adjacent to the study site? How have volumes changed historically?
2. **What transportation changes are expected** at key Study Area locations? How many vehicle trips are expected to be generated by the proposed development during weekday peak hours? What routes are the trips expected to use to travel within and through the Study Area?
3. **What transportation impacts will occur** on Study Area roads, sidewalks, and intersections?
4. **What transportation improvements are required** to mitigate project impacts on Study Area travel? Are there transportation modifications that should be made to improve the travel experience for all users?

Study Objectives

The objectives of the traffic impact study are to:

1. Develop projected 2034 background weekday AM and PM peak hourly traffic volumes for Study Intersections. This includes connection of Regency Park Drive and diverted traffic but does not include site development.
2. Estimate the number of weekday AM and PM peak hour vehicle trips that will be generated by the proposed development.
3. Distribute and assign site generated trips to Study Intersections to project 2034 peak hourly volumes that include site generated trips.
4. Evaluate impacts of site generated traffic on the performance of Study Intersections.
5. Complete warrant analyses, as necessary, for Study Intersections and recommend improvements that may be needed at Study Intersections to mitigate the impacts of site development.



2 STUDY AREA DESCRIPTIONS

Description of Existing Development

The proposed development area is on the vacant land bounded by Washmill Lake Drive and Thomas Raddall Drive.

Description of Proposed Development

The proposed development is planned to include 264 mid-rise residential units, 2,486 high-rise residential units, and 143,380 square feet of retail space. The study will consider the build out development scenario with a study horizon year of 2034.

A concept of the proposed development is shown in Figure 2. The proposed development consists of 12 residential towers, of which many will have commercial space.



Figure 2 - Site Concept

Existing Study Road Descriptions

Washmill Lake Drive is a four-lane major collector through Clayton Park, running from Chain Lake Drive in the west to Dunbrack Street in the east with a speed limit of 60 km/h in this area. There are sidewalks and dedicated bicycle lanes on both sides of Washmill Lake Drive.

Regency Park Drive is a two-lane major collector with a speed limit of 50 km/h that runs south from Lacewood Drive about 850m to its current terminus. There are sidewalks on both sides of the road and no existing dedicated bicycle lanes.

Parkland Drive is a two-lane major collector with a speed limit of 50 km/h. Parkland Drive is a continuation of Regency Park Drive north of Lacewood Drive. There are sidewalks on both sides of the road and no dedicated bicycle lanes.

Lacewood Drive is a four-lane arterial with a posted speed limit of 60 km/h at the study intersection with Regency Park Drive. There are sidewalks on both sides of the road and no dedicated bicycle lanes.

The traffic study includes review of two intersections around the site. These intersections are shown in Figure 3 and a description of each is provided below.

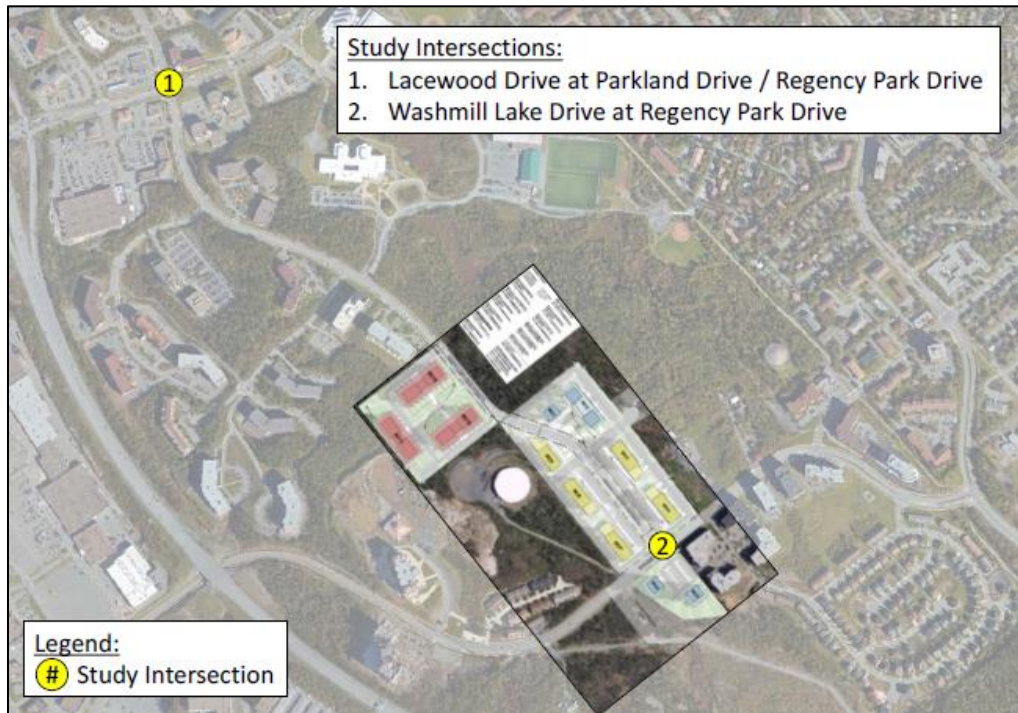


Figure 3 - Study Intersections

Intersection #1 – Lacewood Drive at Parkland Drive/Regency Park Drive is a 4-leg signalized intersection with a left-turn lane, two through lanes, and a right-turn channelized lane in the eastbound and westbound directions; and a left-turn lane, a through lane, and a right-turn channelized lane in the northbound and southbound directions. All approaches have marked pedestrian crossings.

Intersection #2 – Washmill Lake Drive at Regency Park Drive is a proposed 4-leg intersection. Washmill Lake Drive is a four-lane roadway running east west with a proposed street connection (Regency Park Drive) as the southbound approach and a driveway for the development forming the northbound approach.



3 BACKGROUND TRAFFIC

***Turning
Movement
Counts***

Turning movement counts were collected at the Lacewood Drive at Regency Park Drive / Parkland Drive and Washmill Lake Drive at Bently Drive intersections on Wednesday, June 21, 2023 for the PM peak period and on Thursday, June 22, 2023 for the AM peak period. The counts at the Bently Drive intersection were used to estimate the two-way volumes along Washmill Lake Drive fronting the site and project the future volumes at the Washmill Lake Drive at Regency Park Drive intersection.

Intersection counts have been tabulated in 15-minute intervals with peak hours indicated by shaded areas. Pedestrian volumes are summarized in hourly increments. Turning movement counts are summarized in Tables A-1 to A-2, Appendix A, and illustrated diagrammatically in Figure A-1, Appendix A.

***Traffic Growth
Rate***

An annual growth rate of 0.5% was applied to project the 2034 Future Background Volumes (see Figure A-2, Appendix A). This is expected to account for continuing development in the area in additional vehicle trips generated by population increases in the area and coincides with the HRM 0.5% annual traffic growth target.

***Redistribution
of Background
Traffic to the
Extended
Regency Park
Drive***

With the proposed extension of Regency Park Drive, it is anticipated that some background traffic in the current roadway network will redistribute their trips to the extended roadway. The projected 2034 Future Background Volumes with the Extension of Regency Park Drive are shown in Figure A-3, Appendix A.

4 ACTIVE TRANSPORTATION AND TRANSIT

Active Transportation

Sidewalk facilities are available along each of the study roads and sidewalk is planned for both sides along the extended Regency Park Drive. Bicycle facilities are also planned for the extended Regency Park Drive and the developer intends to work with HRM to ensure the desired bicycle facility type is put in place with the road extension. It is understood that HRM is currently undertaking a project that would see bicycle facilities installed on Parkland Drive up to Lacewood Drive and will include options for providing bicycle facilities crossing at the Lacewood Drive intersection. While the exact bicycle facility type proposed for Parkland Drive is not yet known, it is recommended that HRM consider extending the preferred bicycle facility type along the current Regency Park Drive, which could continue onto the extension of the street and connect to the existing bicycle lanes along Washmill Lake Drive. Figure 4 shows the existing and candidate bicycle facility routes within the surrounding area.

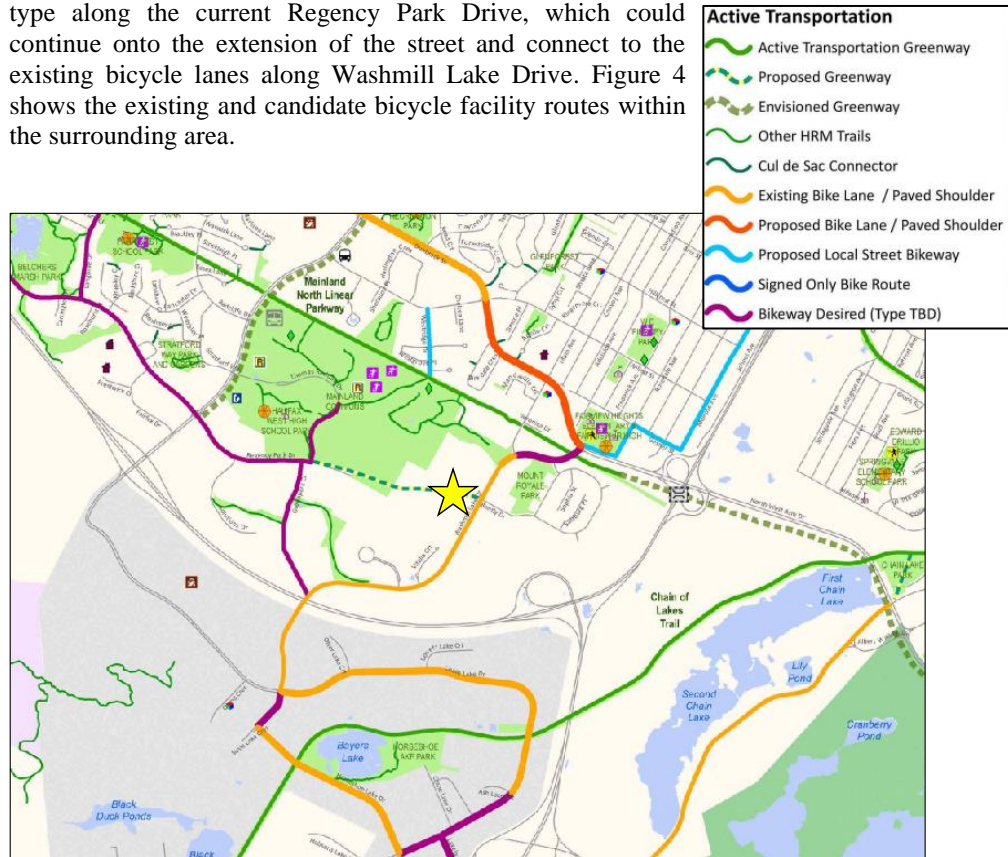


Figure 4 – Candidate Bicycle Facilities
Extracted from Map 2C, Making Connections, Halifax

Transit

There are many transit stops in the area (#6719 and #7446 along Washmill Lake Drive near Bently Drive just to the east of the site, as well as several transit routes along the existing portion of Regency Park Drive and Thomas Raddall Drive). The site is about 1.3km from the Lacewood Terminal, which is serviced by Halifax Transit routes #2, #3, #4, #21, #28, #30, #39, #135, #136, #137, #138, and #433. The existing transit network in the area is shown in Figure 5.

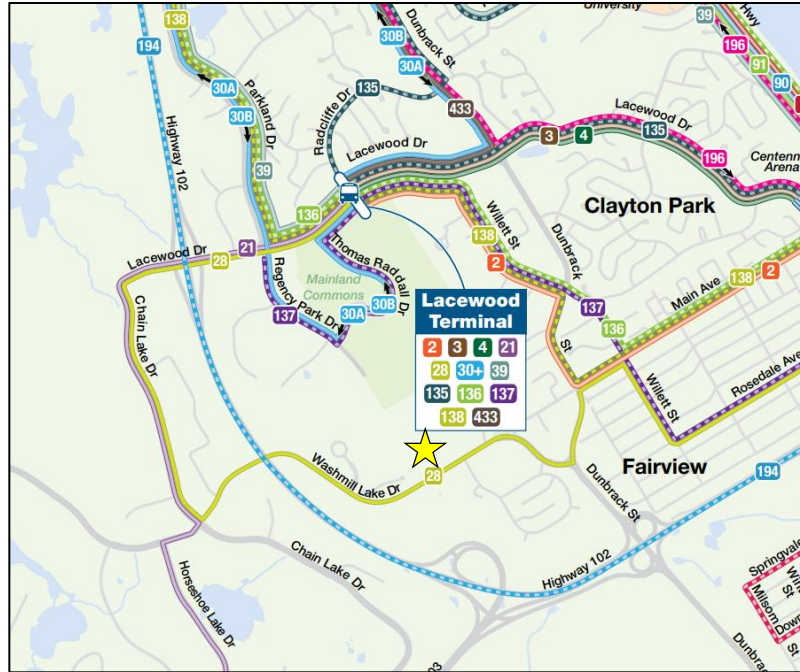


Figure 5 – Existing Halifax Transit Routes

A transit route (#137, Regency Park Express) running along the extended Regency Park Drive fronting the site and connecting to Scotia Square (AM) and Lacewood Terminal (PM) was proposed in Map 1 of the Council Approved Halifax Transit Moving Forward Together Plan (See Figure 6). It is anticipated that the extended street will include routing of transit fronting the site given the current routing along Regency Park Drive and Washmill Lake Drive and the proximity to the Lacewood Terminal.



Figure 6 – Proposed Transit Routes in the project area
Extracted from Map 1, Halifax Transit Moving Forward Together Plan



5 TRIP GENERATION, DISTRIBUTION, AND ASSIGNMENT

Prepared Trip Generation Estimates

When using the published trip generation rates in the Trip Generation Manual, the transportation engineer’s objective should be to provide a realistic estimate of the number of trips that will be generated by the proposed development.

Existing & Proposed Redevelopment

The proposed development is expected to include 264 mid-rise residential units, 2,486 high-rise residential units, and 143,380 square feet of commercial development. The site currently services commercial and office land uses.

Anticipated Land Use for the Proposed Development

Trips generated by Mid-Rise Multifamily Housing (Land Use 221), High-Rise Multifamily Housing (Land Use 222), and Shopping Plaza (Land Use 821) are estimated for the AM and PM peak hours by the number of dwelling units (residential) and square footage (commercial). Trip generation estimates for the proposed development were prepared using published rates and equations from *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, Washington, 2021).

Trips Generated by the Proposed Development – Total Trips Generated

Trip generation estimates for the proposed development is summarized in Table 1 without accounting for internal on-site synergies or non-auto trips. It is estimated that the development will generate:

- 918 two-way trips (370 entering and 548 exiting) during the AM peak hour; and,
- 1518 two-way trips (803 entering and 715 exiting) during the PM peak hour.

Table 1 –Total Trip Generation Estimates for the Proposed Development

Land Use ¹	Units ²	Trip Generation Rates ³				Trip Generation Estimates ³			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Multifamily Housing (Mid Rise) (Dwelling Units) 221	264	Equations from Page 292 & 293				24	81	63	40
Multifamily Housing (High Rise) 222	2486	Equations from Page 307 & 308				192	373	375	295
Shopping Plaza (40-150k GLA) 821	143.38 KGLA	Rates from Pages 213 & 214				154	94	365	380
Total Trip Estimate for the Proposed Development						370	548	803	715

NOTES: 1. Rates and equations are from *Trip Generation, 11th Edition*, Institute of Transportation Engineers, 2021.
 2. KGLA is 'Gross Leasable Area x 1000 SF'.
 3. Rates are 'vehicles per hour per unit'; trips generated are 'vehicles per hour for peak hours'.

Trips Generated by the Proposed Development – Internal Capture

The site is located near the Lacewood Transit Terminal and several transit routes and there are existing or planned bicycle facilities along Washmill Lake Drive, Regency Park Drive, and Parkland Drive with existing or planned active transportation connections to the Mainland North Trail, the Burnside Business Park, and the Chain of Lakes Trail (See Section 4). Non-auto reductions (10% for retail trips and 15% for residential trips) have been applied to the estimated trips. These non-auto reductions are conservative compared to the 26% target set out in HRM’s Integrated Mobility Plan for the Inner Suburban Area. Many vehicle trips generated by large scale development with multiple land uses are isolated within the development site. The National Cooperative Highway Research Program (NCHRP) Report 684 – *Enhancing Internal Trip Capture for Mixed-Use Developments* provides an estimation tool for reducing vehicle trips, visible on pages B-5 and B-6, Appendix B. Results are summarized in Table 2. It is estimated that the development will generate:

- 777 two-way vehicle trips (314 entering and 463 exiting) during the AM peak hour; and,
- 1107 two-way vehicle trips (589 entering and 518 exiting) during the PM peak hour.



Table 2 –Total Trip Generation Estimates for the Proposed Development

Land Use ¹	Units ²	NCHRP Internal Trip Reduction				Trip Generation Estimates ³			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Multifamily Housing (Mid Rise) (Dwelling Units) 221	264					24	80	49	36
Multifamily Housing (High Rise) 222	2486	2%	1%	23%	9%	188	369	289	268
Shopping Plaza (40-150k GLA) 821	143	3%	4%	8%	24%	149	90	335	288
Total						361	539	673	592
Reduction for non-auto Trips⁴						47	76	84	74
Vehicle Trip Estimate for the Proposed Development						314	463	589	518

NOTES: 1. Rates and equations are from *Trip Generation, 11th Edition*, Institute of Transportation Engineers, 2021.
 2. KGLA is 'Gross Leasable Area x 1000 SF'.
 3. Trips generated are 'vehicles per hour for peak hours'.
 4. A reduction has been applied to account for non-auto trips; 10% for shopping centre trips and 15% for residential trips.

Trip Distribution and Assignment

The proposed development generated trips were distributed to the Study Intersections based on counted volumes and review of travel origin and destinations around the site. For retail development attraction, regional residential development has been considered. For new residential development, employment densities and retail draws have been considered. The estimated directional distributions are provided below.

Direction	Residential	Commercial
North on Parkland Street	5%	5%
South/West on Washmill Lake Drive	25%	30%
North/East to Lacewood Drive	15%	15%
East on Washmill Lake Drive	30%	25%
North/West to Lacewood Drive	25%	25%

Volume Figures

Weekday AM and PM peak hourly estimated site generated vehicle volumes were distributed and assigned to external streets and intersections in the study area using the above assumptions. Assigned AM and PM peak hourly site generated volumes are illustrated diagrammatically in Figure A-4, Appendix A. Assigned site development trips were added to background volumes with redistribution for the extended Regency Park Drive (Figure A-3) to provide estimates of the AM and PM peak hour volumes at study area intersections for development build-out which are illustrated diagrammatically on Figure A-5, Appendix A.



6 INTERSECTION OPERATIONAL ANALYSIS

Intersection Level of Service (LOS) Analysis was completed to estimate how intersections may be expected to operate into the future without and with site generated trips. This section of the report addresses how left-turn lane warrants and traffic signal warrants were conducted and how each intersection was evaluated. The following subsections identify each study intersection and summarize the results of the operational analysis.

Left-Turn Lane Warrant Analysis

Left-turn movements on a two-lane street may cause both operational and safety problems. Operational problems result as a vehicle stopped waiting for an opportunity to turn across ‘heavy’ opposing traffic causes a queue of stopped vehicles to form. Safety problems result from rear end collisions when a stopped left-turning vehicle is struck by an advancing vehicle, or from head-on or right-angle collisions when a left-turning vehicle is struck by an opposing vehicle.

The *Geometric Design Standards for Ontario Highways Manual* contains a nomograph for left-turn lane analysis for four lane undivided streets at unsignalized intersections. The analysis method, which is normally used by WSP Atlantic to evaluate the warrant for left-turn lanes along four lane roadways, uses a nomograph that considers left-turning volume and opposing volume. A point, based on left turning and ‘opposing’ volumes, plotted to the right of the ‘warrant line’ indicates that a left-turn lane is warranted for the conditions used in the analysis. Similarly, a point that is plotted to the left of the warrant line indicates that a left-turn lane is not warranted.

Evaluation of left turn lane warrants were completed for the Washmill Lake Drive at Regency Park Drive using 2034 traffic volumes with redistribution of existing traffic onto the extended Regency Park Drive without and with the proposed development and **a left-turn lane is warranted** in the eastbound direction on Washmill Lake Drive at Regency Park Drive without and with the addition of site generated trips. A westbound left turn lane is found to be warranted with the addition of site generated trips. Left-turn lane warrant results are available in Figure B-1, Appendix B.

The addition of a warranted left-turn lane has been identified based on safety of left turning vehicles but are at the discretion of HRM based on operational needs and right-of-way limitations.

Traffic Signal Warrant Analysis

A signal warrant analysis is completed to determine if the installation of traffic signals at an intersection will provide a positive impact on total intersection operation. That is, the benefits in time saved and improved safety that will accrue to vehicles entering from a side street will exceed the impact that signals will have in time lost and potential additional collisions for vehicles approaching the intersection on the main street.

The *Canadian Traffic Signal Warrant Matrix Analysis (Transportation Association of Canada (TAC), 2005)* considers 100 warrant points as an indication that traffic signals will provide a positive impact. Signal warrant analysis uses vehicular and pedestrian volumes, and intersection, roadway and study area characteristics to calculate a warrant point value.

Evaluation of traffic signal warrants were completed for appropriate intersection using 2034 traffic volumes with the proposed development and **traffic signals are warranted** (184 warrant points) at the unsignalized study intersection (Washmill Lake Drive at Regency Park Drive) with the addition of site generated trips. Signal warrant results are available in Tables B-1 and B-2, Appendix B.

Intersection Capacity Analysis Results

Synchro II software has been used for performance evaluation of signalized and STOP controlled Study Intersections. Summaries of the results are provided in the following sub-sections and detailed results of the analyses are included in Appendix C.



6.1 ANALYSIS SCENARIOS

**Summary
Analysis
Scenarios
Considered**

Scenario 1A - Future 2034 without Site: Represents future 2034 traffic volumes on the existing road network, including the existing traffic control and lane configurations of the Study Intersections.

Scenario 1B - Future 2034 without Site – Diverted Trips: Represents future 2034 traffic volumes with future diverted trips onto the Regency Park Drive connection. The study intersections have been modified to accommodate a westbound left-turn lane on Washmill Lake Drive at Regency Park Drive based on the warrants summarized in Appendix B.

Scenario 2 - Future 2034 with Site: Represents future 2034 traffic volumes on the existing road network, including the existing traffic control and lane configurations of the Study Intersections with buildout of the proposed development. The study intersections have been modified to accommodate left-turn lanes and traffic signalization at the Washmill Lake Drive at Regency Park Drive intersection based on the warrants summarized in Appendix B.

6.2 INT #1: LACEWOOD DRIVE AT REGENCY PARK DRIVE

Operational performance results for this intersection are provided in Table 4 for both the AM and PM peak hours for each of the analysis scenarios.

The intersection is expected to operate within HRM acceptable limits laid out in HRM’s current TIS Guidelines during the AM and PM peak hours without and with site generated trips. The maximum v/c ratio is projected to be 0.78 for the northbound left-turn movement. Some changes in the operational performance of this intersection are expected with the addition of the proposed development.

Table 3 - Intersection Capacity Analysis: Lacewood Drive at Regency Park Drive

LOS Criteria	Control Delay (sec/veh), Level of Service (LOS), v/c Ratio, and 95 th %ile Queue (m) by Intersection Movement												Overall Intersection	
	Lacewood Drive						Regency Park Drive			Parkland Drive			Delay	Control
	EB-L	EB-TT	EB-R	WB-L	WB-TT	WB-R	NB-L	NB-T	NB-R	SB-L	SB-T	SB-R		
Scenario 1A - 2034 Future without Site AM Peak Hour (Page C-1)														
Delay	6.4	15.7	8.9	6.4	13.7	6.7	20.7	15.1	5.6	21.2	16.1	2.6	12.3	
v/c	0.15	0.34	0.30	0.18	0.25	0.18	0.41	0.08	0.27	0.45	0.17	0.34		
Queue	9.5	25.3	17.1	10.8	21.7	11.3	23.1	7.9	10.1	25.3	14.2	11.5		
Scenario 1B - 2034 Future without Site AM Peak Hour (Page C-3)														
Delay	6.2	16.0	8.4	6.5	13.3	6.2	20.0	15.8	5.7	21.3	17.4	6.0	12.3	
v/c	0.12	0.31	0.27	0.22	0.22	0.17	0.37	0.14	0.32	0.44	0.28	0.29		
Queue	8.0	23.3	14.7	12.9	19.6	10.2	20.0	11.5	10.9	24.3	20.2	10.7		
Scenario 2 - 2034 Future with Site AM Peak Hour (Page C-7)														
Delay	9.2	21.3	11.5	10.2	16.2	7.3	27.8	15.6	4.7	19.1	16.6	6.3	14.6	
v/c	0.14	0.37	0.47	0.34	0.21	0.17	0.67	0.15	0.43	0.37	0.25	0.26		
Queue	11.6	29.6	25.2	27.7	25.1	12.2	45.8	16.0	14.1	26.0	24.2	12.3		
Scenario 1A - 2034 Future without Site PM Peak Hour (Page C-2)														
Delay	10.9	18.0	13.3	8.3	19.6	9.6	27.6	17.6	5.7	22.4	18.4	5.5	15.8	
v/c	0.50	0.51	0.41	0.27	0.57	0.29	0.59	0.09	0.28	0.40	0.18	0.35		
Queue	29.2	53.0	36.3	16.7	48.9	18.6	41.0	11.1	11.5	28.9	18.3	13.2		
Scenario 1B - 2034 Future without Site PM Peak Hour (Page C-5)														
Delay	8.7	19.3	13.0	8.7	18.6	9.2	25.9	18.3	5.6	22.6	18.9	6.5	15.4	
v/c	0.36	0.56	0.42	0.36	0.52	0.28	0.55	0.23	0.38	0.42	0.28	0.31		
Queue	22.4	45.9	29.0	21.2	42.6	17.3	33.4	20.4	13.1	26.7	24.3	12.7		
Scenario 2 - 2034 Future with Site PM Peak Hour (Page C-9)														
Delay	14.1	26.7	26.8	16.3	22.2	10.8	38.0	19.5	5.6	21.8	19.9	7.7	21.1	
v/c	0.43	0.59	0.75	0.59	0.48	0.28	0.78	0.22	0.42	0.32	0.26	0.26		
Queue	32.0	62.1	72.7	45.6	53.4	20.6	76.3	28.2	18.5	30.3	33.5	16.6		

6.3 INT #2: WASHMILL LAKE DRIVE AT REGENCY PARK DRIVE

Operational performance results for this intersection are provided in Table 4 for both the AM and PM peak hours for each of the analysis scenarios. Left-turn lanes and signals are included as warranted.

With added left turn lanes as warranted and with signalization in Scenario 2, the intersection is expected to operate within HRM acceptable limits during the AM and PM peak hours without and with site generated trips. The maximum v/c ratio is projected to be 0.77 in the westbound direction during the PM peak hour.

Table 4 - Intersection Capacity Analysis: Washmill Lake Drive at Regency Park Drive

LOS Criteria	Control Delay (sec/veh), Level of Service (LOS), v/c Ratio, and 95 th %ile Queue (m) by Intersection Movement							Overall Intersection	
	Washmill Lake Drive			Access	Regency Park Drive			Delay	Control
	EB-L	EB-TT	WB-TTR		SB-LR				
Scenario 1B - 2034 Future without Site AM Peak Hour (Page C-4)									
Delay	8.8	0.0	0.0		-	13.4		1.6	
v/c	0.07	0.12	0.21		-	0.17			
Queue	1.7	0.0	0.0		-	5.0			
	EB-L	EB-TT	WB-L	WB-TTR	NB-LTR	SB-L	SB-TR	Delay	Control
Scenario 2 - 2034 Future with Site AM Peak Hour (Page C-8)									
Delay	5.9	6.3	13.0	13.8	13.2	22.0	7.0	11.2	
v/c	0.21	0.19	0.02	0.42	0.18	0.44	0.33		
Queue	11.9	18.6	3.5	43.1	12.0	25.1	13.0		
	EB-L	EB-TT	WB-TTR			SB-LR		Delay	Control
Scenario 1B - 2034 Future without Site PM Peak Hour (Page C-6)									
Delay	10.1	0.0	0.0		-	25.3		2.4	
v/c	0.17	0.27	0.29		-	0.43			
Queue	4.7	0.0	0.0		-	16.5			
	EB-L	EB-TT	WB-L	WB-TTR	NB-LTR	SB-L	SB-TR	Delay	Control
Scenario 2 - 2034 Future with Site PM Peak Hour (Page C-10)									
Delay	12.3	8.9	14.6	20.4	14.8	34.3	8.0	15.6	
v/c	0.55	0.47	0.10	0.77	0.12	0.67	0.40		
Queue	25.8	49.5	6.0	76.3	10.3	45.6	17.3		

7 SUMMARY & RECOMMENDATIONS

7.1 SUMMARY

Background	1. Plans are being prepared for a multi-use development consisting of 2,750 residential units and 143,380 square feet of commercial space north of the Bayers Lake Business Park in Halifax, Nova Scotia. Buildout of the development is expected by 2034.
Description of Existing Development	2. The proposed development area is on the vacant land bounded by Washmill Lake Drive and Thomas Raddall Drive.
Description of Proposed Development	3. The proposed development is expected to include 264 mid-rise residential units, 2,486 high-rise residential units, and 143,380 square feet of commercial development.
Proposed Site Access	4. The proposed development is proposed along an extension of Regency Park Drive through to Washmill Lake Drive with several small accesses along Washmill Lake Drive.
Study Area Roads	5. The study considers Washmill Lake Drive, Regency Park Drive, Lacewood Drive, and Parkland Drive.
Turning Movement Counts	6. Turning movement counts were collected by WSP on Wednesday, June 21, 2023 (PM peak period), and on Thursday, June 22, 2023 (AM peak period).
Background Traffic Volumes	7. Projected 2034 peak hour future background volumes include an annual growth of 0.5% between 2023 and 2034. 8. Some background traffic in the current roadway network will be redistributed to the extension of Regency Park Drive. A separate volume scenario has been prepared that considers these redistributed background trips.
Estimation of Existing & Proposed Development Trips	9. Trip generation estimates for the proposed development were prepared using rates published in <i>Trip Generation, 11th Edition</i> (Institute of Transportation Engineers, Washington, 2021). 10. Trip generation estimates were reduced considering non-auto modes and for internal capture using methodology from The National Cooperative Highway Research Program (NCHRP) Report 684 – <i>Enhancing Internal Trip Capture for Mixed-Use Developments</i> . 11. It is estimated that the development will generate: <ul style="list-style-type: none"> • 777 two-way vehicle trips (314 entering and 463 exiting) during the AM peak hour; and, • 1107 two-way vehicle trips (589 entering and 518 exiting) during the PM peak hour.
Trip Distribution and Assignment	12. Proposed development generated trips were distributed to the Study Intersections based on counted volumes considering major trip origins and destinations in the region. Retail trips have been assigned considering regional residential development, while residential trips have been assigned considering employment densities and retail draws.
Warrant Analysis Summary	13. Warrant reviews were completed for left-turn lanes and traffic signals with the projected traffic volumes without and with site generated trips. 14. It was determined that: <ul style="list-style-type: none"> • An eastbound left turn lane will be warranted along Washmill Lake Drive at Regency Park Drive without and with site generated trips.

- A westbound left turn lane will be warranted along Washmill Lake Drive at Regency Park Drive with site generated trips.
- Traffic signals will be warranted at Washmill Lake Drive at Regency Park Drive with site generated trips.

**Summary –
Intersection
Capacity
Analysis**

15. Intersection performance analysis was completed using *Synchro 11* at the Study Intersections.
 16. The **Lacewood Drive at Regency Park Drive/Parkland Drive intersection** is expected to operate well and within HRM acceptable limits during the AM and PM peak periods in all scenarios.
 17. The **Washmill Lake Drive at Regency Park Drive intersection** is expected to operate well and within HRM guidelines with added turn lanes and traffic signalization, as warranted, during both the AM and PM peak periods.
-

7.2 RECOMMENDATIONS

**Recommend-
ations**

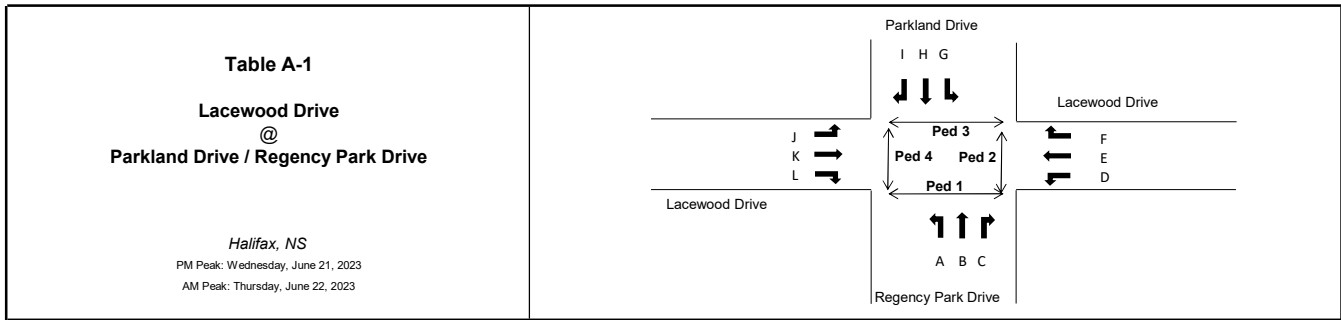
18. It is recommended that at the new Washmill Lake Drive at Regency Park Drive intersection:
 - a) Install left turn eastbound and westbound left turn lanes on Washmill Lake Drive when connection to Regency Park Drive is completed.
 - b) Install traffic signals at the intersection (warranted with site development).
 19. HRM should consider the type of bicycle connections appropriate for the existing and new portions of Regency Park Drive. It is likely that the bicycle facilities along Regency Park Drive will extend what is determined for Parkland Drive and connect to the existing bicycle lanes along Washmill Lake Drive at the proposed signalized intersection.
 20. Halifax Transit should continue to plan for transit routing along Regency Park Drive between Washmill Lake Drive and Lacewood Drive.
-

APPENDIX

A

TRAFFIC VOLUME DATA





AM Peak Period Volume Data

Time		Regency Park Drive Northbound Approach			Lacewood Drive Westbound Approach			Parkland Drive Southbound Approach			Lacewood Drive Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
07:00	07:15	24	5	21	24	36	4	41	9	39	13	39	11	266
07:15	07:30	15	7	28	12	39	6	33	13	20	13	56	12	254
07:30	07:45	17	10	36	22	52	4	39	7	44	19	64	12	326
07:45	08:00	27	8	21	27	63	14	32	7	33	25	85	23	365
08:00	08:15	28	9	25	35	57	15	38	13	36	25	68	23	372
08:15	08:30	21	2	29	23	71	29	36	11	33	22	69	32	378
08:30	08:45	22	9	43	17	48	22	27	23	29	17	83	41	381
08:45	09:00	38	8	13	18	83	30	21	17	47	17	75	41	408
AM Peak Hour		109	28	110	93	259	96	122	64	145	81	295	137	1539
07:00	08:00	83	30	106	85	190	28	145	36	136	70	244	58	1211
08:00	09:00	109	28	110	93	259	96	122	64	145	81	295	137	1539
		Ped 1			Ped 2			Ped 3			Ped 4			Total Peds
07:00	08:00	8			5			4			10			27
08:00	09:00	13			9			19			15			56

PM Peak Period Volume Data

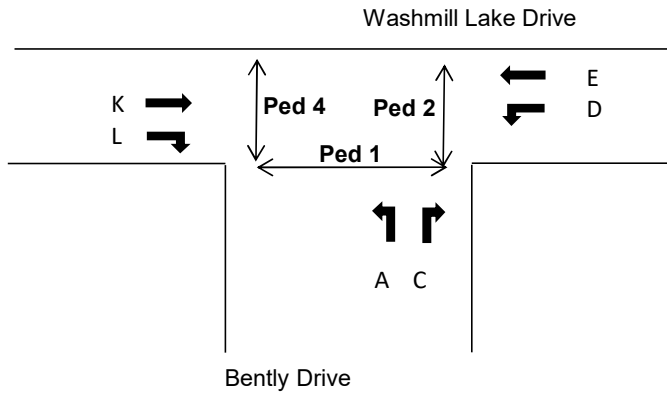
Time		Regency Park Drive Northbound Approach			Lacewood Drive Westbound Approach			Parkland Drive Southbound Approach			Lacewood Drive Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
16:00	16:15	49	25	28	43	135	30	31	21	48	67	113	39	629
16:15	16:30	34	22	23	42	114	27	27	16	39	56	123	40	563
16:30	16:45	35	16	35	41	108	36	28	22	36	57	123	41	578
16:45	17:00	36	10	25	34	119	37	26	22	47	52	139	62	609
17:00	17:15	50	8	44	24	134	28	33	22	35	53	145	62	638
17:15	17:30	39	9	25	25	130	26	20	12	41	63	109	40	539
17:30	17:45	42	11	27	36	130	42	38	16	40	49	159	59	649
17:45	18:00	26	12	20	22	98	23	33	26	27	69	148	58	562
PM Peak Hour		167	38	121	119	513	133	117	72	163	217	552	223	2435
16:00	17:00	154	73	111	160	476	130	112	81	170	232	498	182	2379
17:00	18:00	157	40	116	107	492	119	124	76	143	234	561	219	2388
		Ped 1			Ped 2			Ped 3			Ped 4			Total Peds
16:00	17:00	19			6			23			10			58
17:00	18:00	17			3			12			14			46

Table A-2
Washmill Lake Drive
@
Bently Drive

Halifax, NS

PM Peak: Wednesday, June 21, 2023

AM Peak: Thursday, June 22, 2023

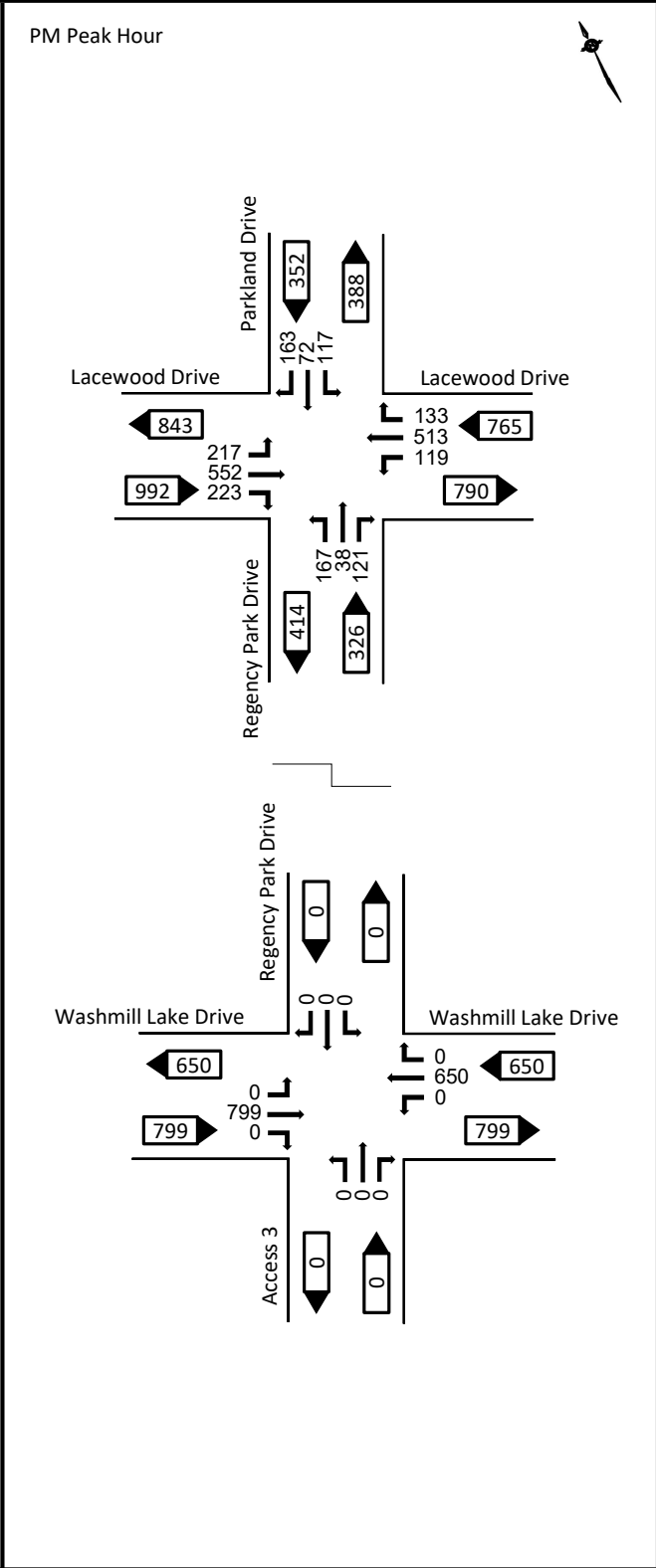
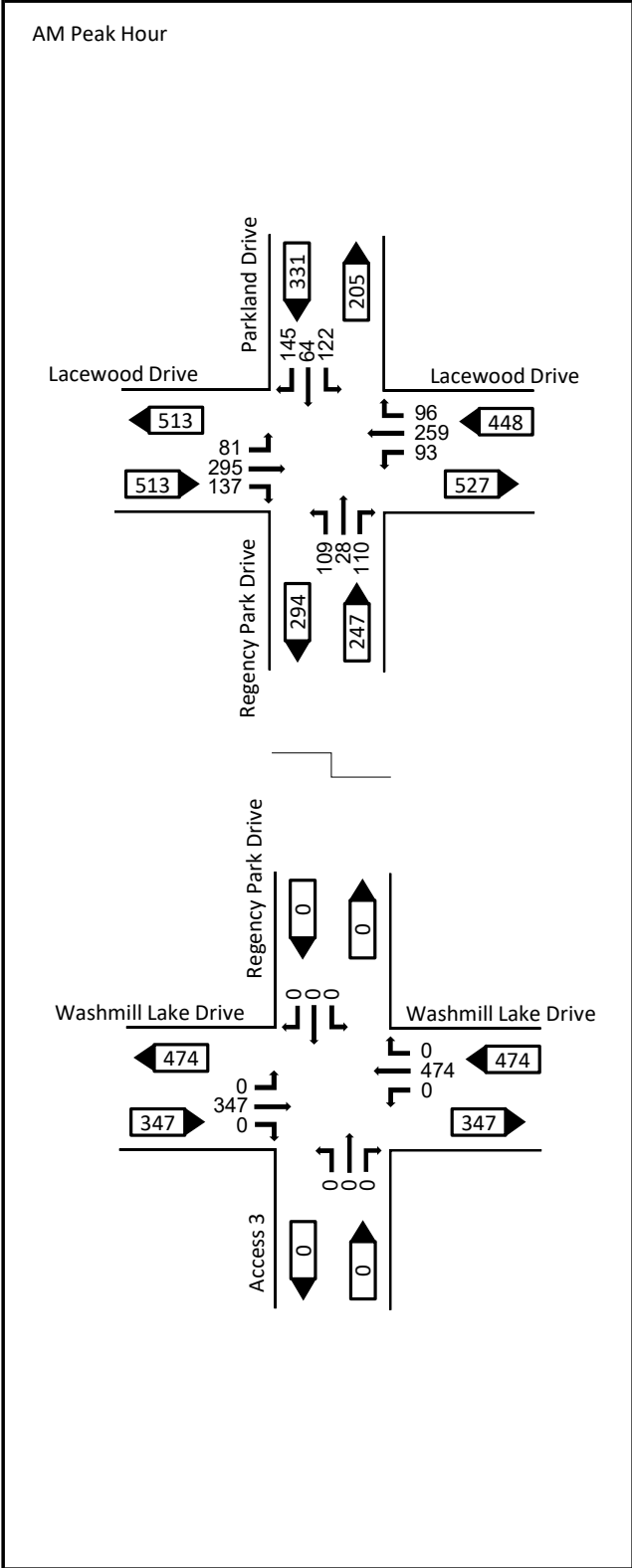


AM Peak Period Volume Data

Time	Bently Drive Northbound Approach		Washmill Lake Drive Westbound Approach		Washmill Lake Drive Eastbound Approach		Total Vehicles
	A	C	D	E	K	L	
07:00 - 07:15	3	20	3	65	63	2	156
07:15 - 07:30	2	14	4	89	58	2	169
07:30 - 07:45	2	25	6	79	55	0	167
07:45 - 08:00	4	15	8	122	80	2	231
08:00 - 08:15	5	27	8	102	86	2	230
08:15 - 08:30	7	18	11	112	80	6	234
08:30 - 08:45	4	25	5	118	88	3	243
08:45 - 09:00	3	8	8	126	64	3	212
AM Peak Hour	20	85	32	454	334	13	938
07:00 - 08:00	11	74	21	355	256	6	723
08:00 - 09:00	19	78	32	458	318	14	919
	Ped 1		Ped 2		Ped 4		Total Peds
07:00 - 08:00	7		4		0		11
08:00 - 09:00	6		5		0		11

PM Peak Period Volume Data

Time	Bently Drive Northbound Approach		Washmill Lake Drive Westbound Approach		Washmill Lake Drive Eastbound Approach		Total Vehicles
	A	C	D	E	K	L	
16:00 - 16:15	4	11	15	158	174	8	370
16:15 - 16:30	3	7	16	161	150	5	342
16:30 - 16:45	4	16	10	161	181	6	378
16:45 - 17:00	3	8	20	174	199	9	413
17:00 - 17:15	4	10	21	153	219	9	416
17:15 - 17:30	4	13	19	147	169	7	359
17:30 - 17:45	3	13	17	144	163	13	353
17:45 - 18:00	5	18	14	170	147	8	362
PM Peak Hour	15	47	70	635	768	31	1566
16:00 - 17:00	14	42	61	654	704	28	1503
17:00 - 18:00	16	54	71	614	698	37	1490
	Ped 1		Ped 2		Ped 4		Total Peds
16:00 - 17:00	5		1		0		6
17:00 - 18:00	2		3		0		5

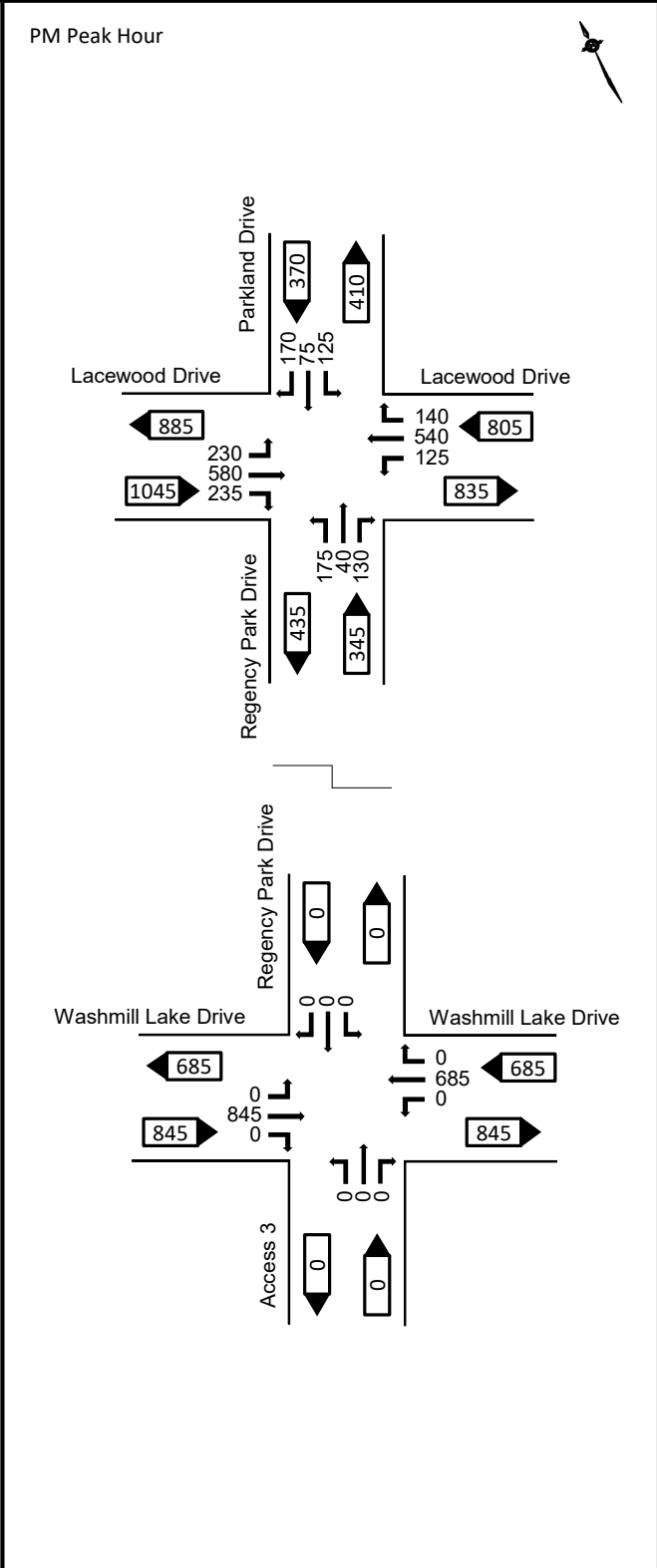
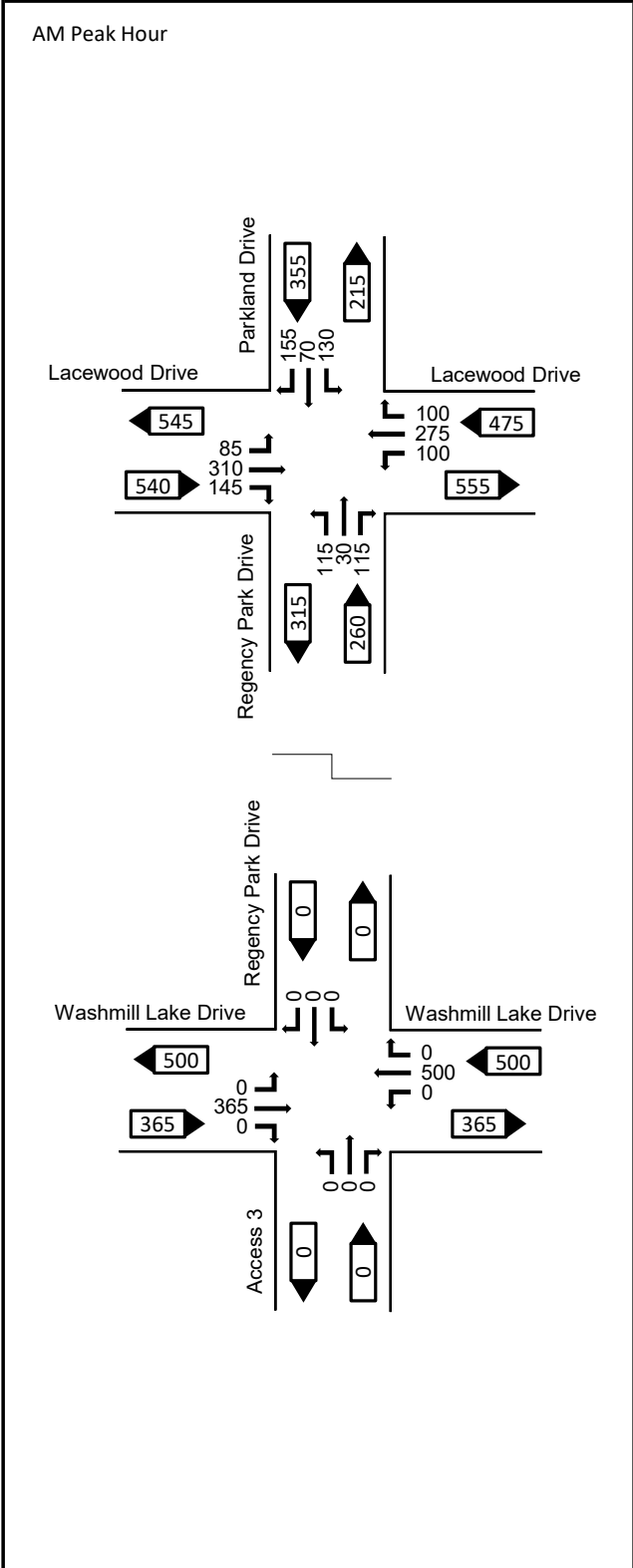


Mainland Common Development - TIS
Halifax, NS

Figure A-1

Weekday AM and PM Peak Hour
2023 Counted Traffic Volumes

June 2023

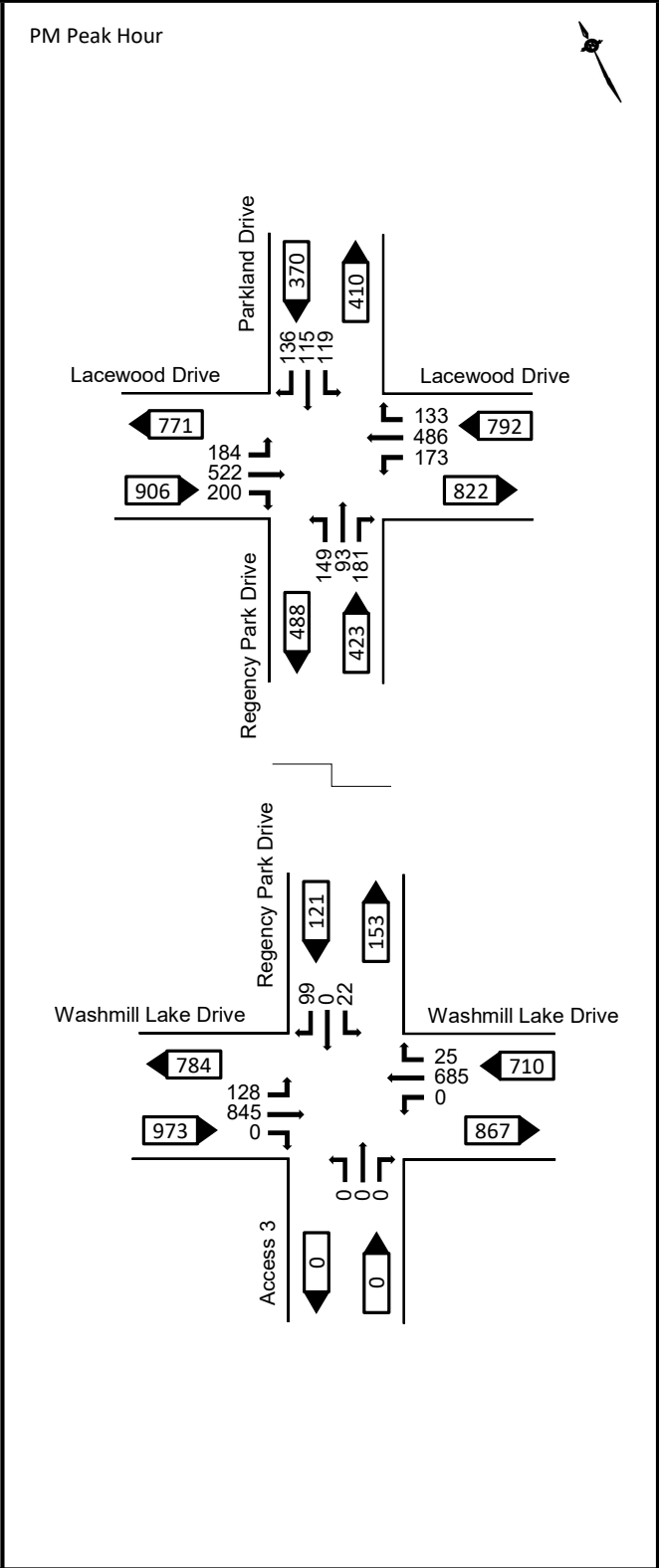
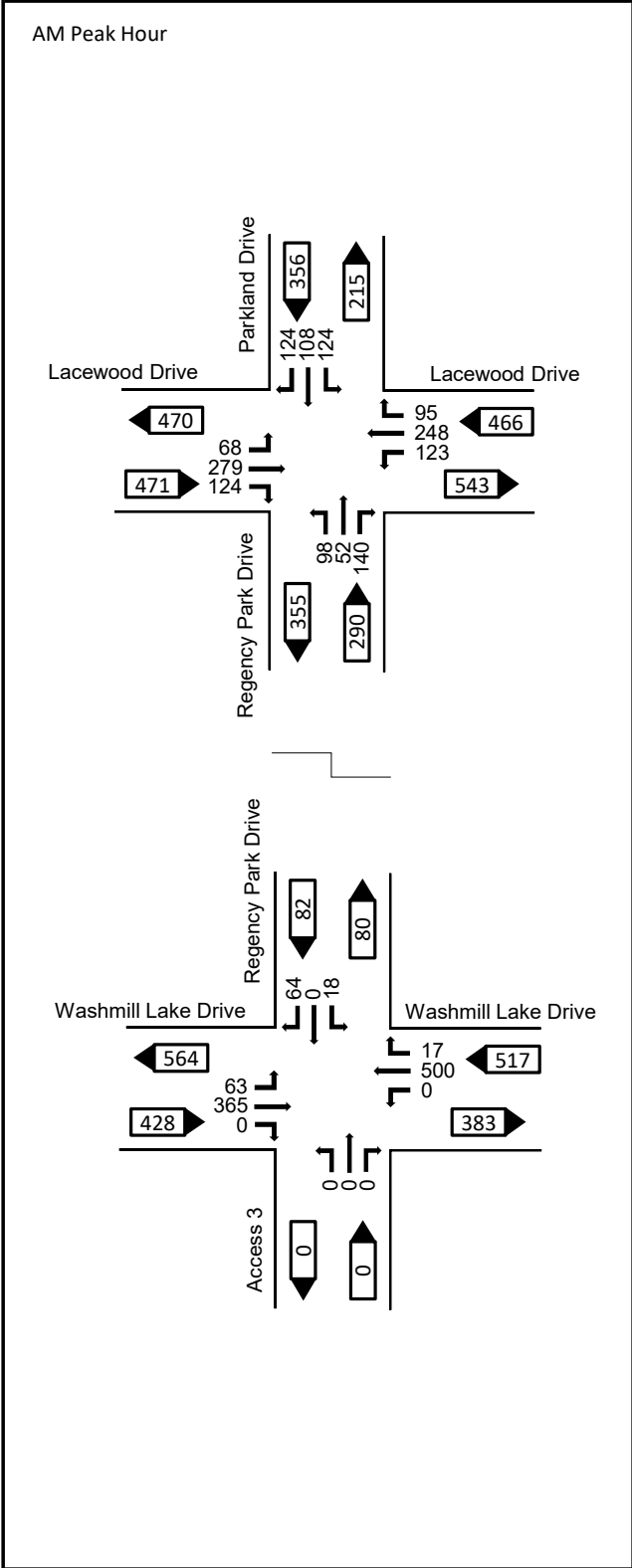


Mainland Common Development - TIS
Halifax, NS

Figure A-2

Weekday AM and PM Peak Hour
2034 Future Background Traffic Volumes

June 2023

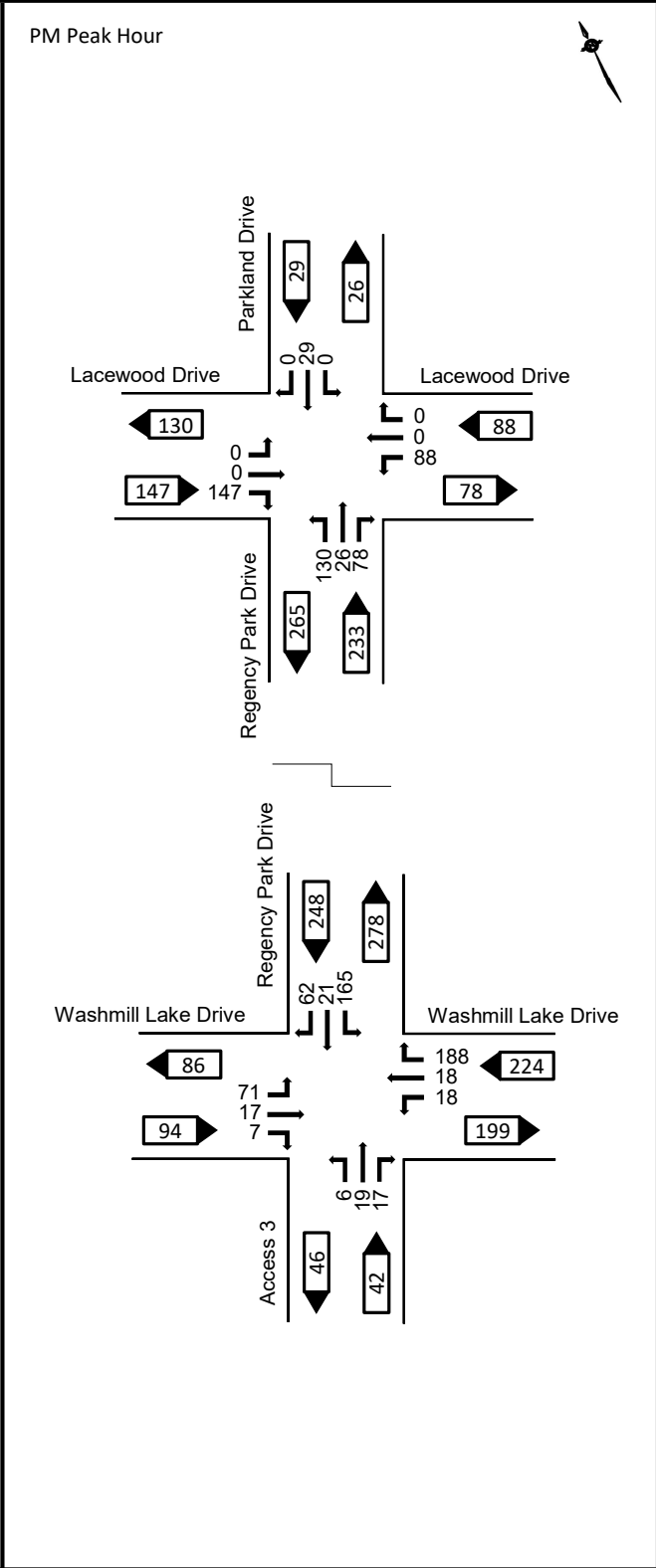
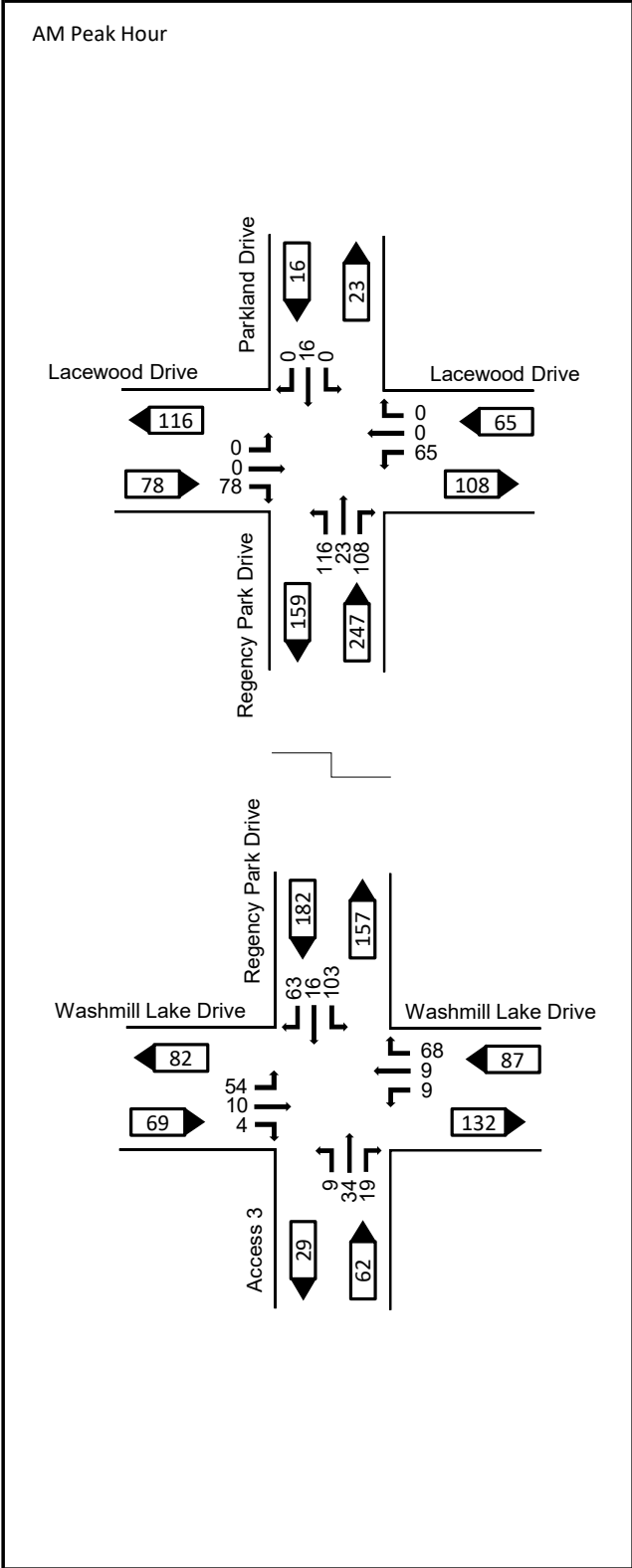


Mainland Common Development - TIS
Halifax, NS

Figure A-3

Weekday AM and PM Peak Hour
2034 Future Background Traffic Volumes - Diverted Trips

June 2023

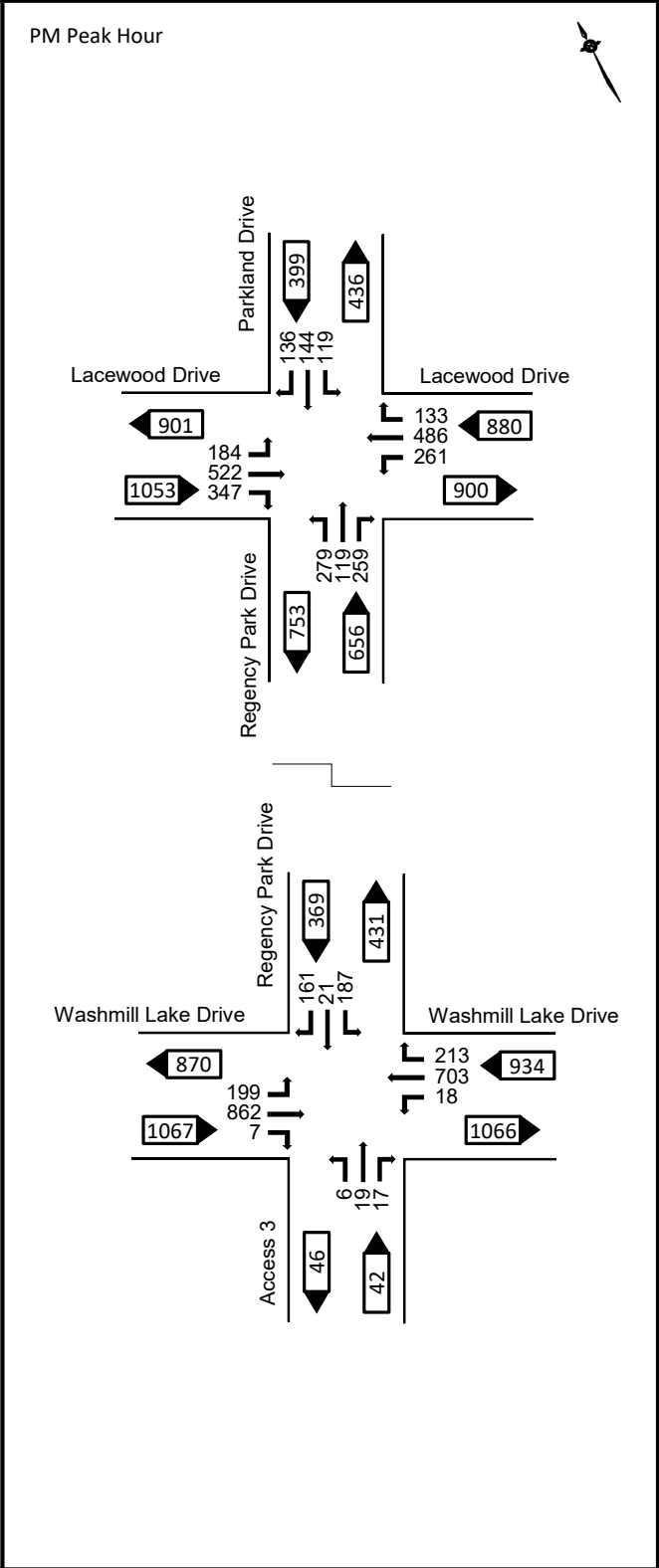
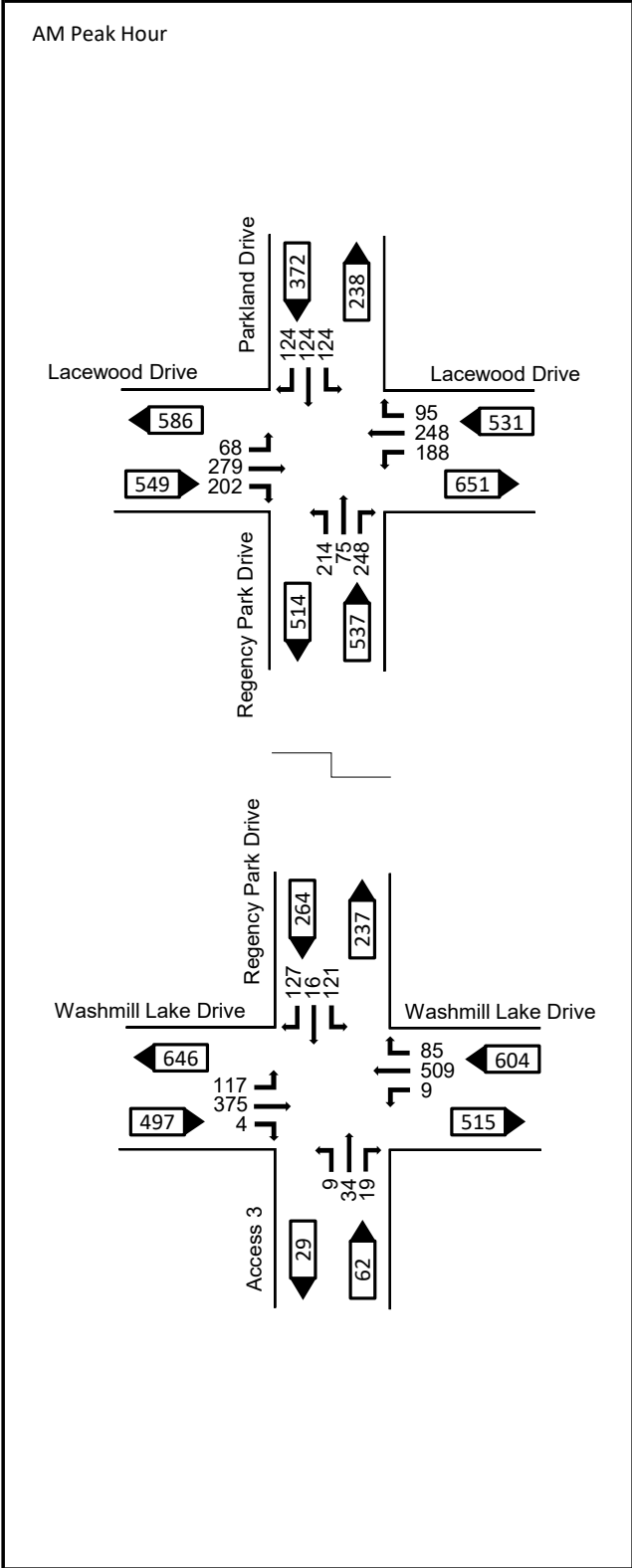


Mainland Common Development - TIS
Halifax, NS

Figure A-4

Weekday AM and PM Peak Hour
Trip Assignment

June 2023



Mainland Common Development - TIS
 Halifax, NS

Figure A-5

Weekday AM and PM Peak Hour
 2034 Total Traffic with Site Generated Trips

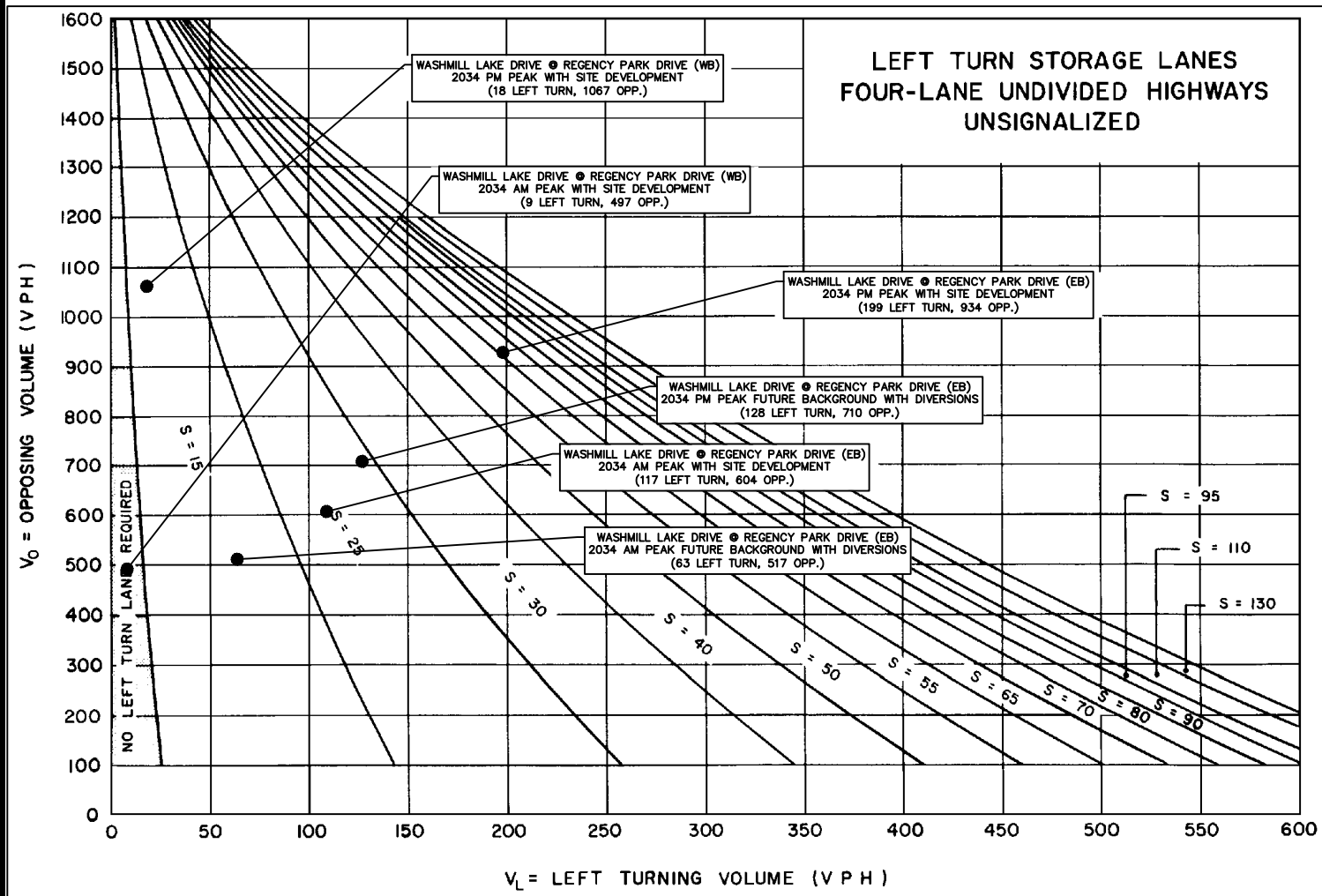
June 2023

APPENDIX

B

WARRANT ANALYSIS





2005 Canadian Traffic Signal Warrant Matrix Analysis

Table: B-2 - Washmill Lake Drive @ Regency Park Drive
2034 Future Background with Trips Diverted

Main Street (name)	Washmill Lake Drive	Direction (EW or NS)	EW	Date:	June 2023
Side Street (name)	Regency Park Drive	Direction (EW or NS)	NS	City:	Halifax, NS

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Washmill Lake Drive	WB			1	1			
Washmill Lake Drive	EB		1	1				
Washmill Lake Drive	NB							
Regency Park Drive	SB			1				

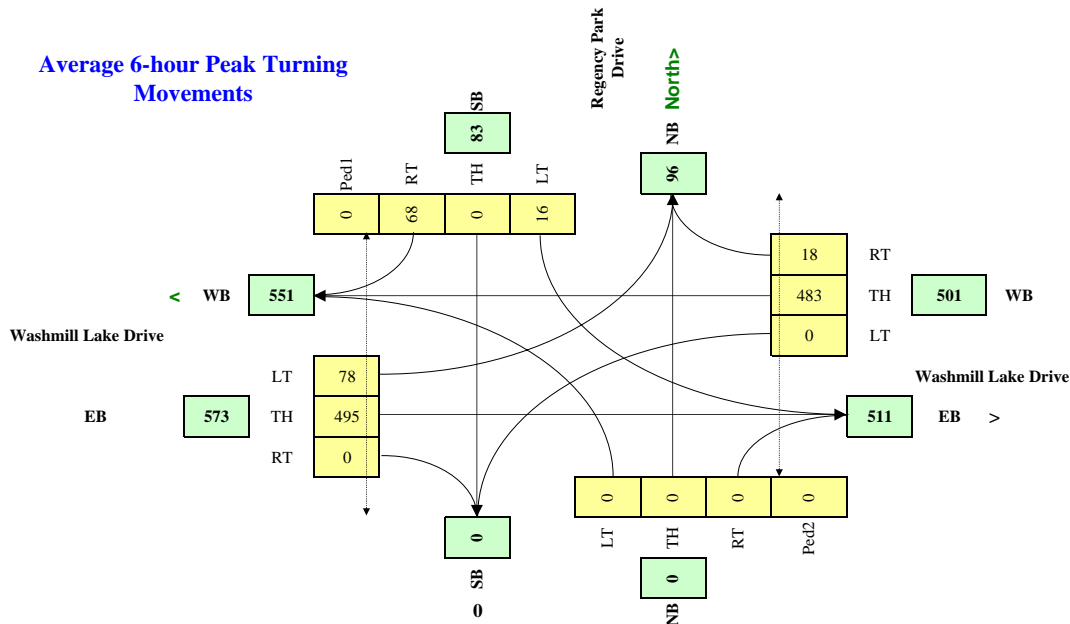
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Washmill Lake Drive	EW	50	2.0%	y	0.0
Regency Park Drive	NS	50	2.0%	y	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
7:00 - 8:00				
8:00 - 9:00				
11:30 - 12:30				
12:30 - 13:30				
15:30 - 16:30				
16:30 - 17:30				
Total (6-hour peak)	0	0	0	0
Average (6-hour peak)	0	0	0	0

Demographics		
Elementary School	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	500,000
Central Business District	(y/n)	y

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:00 - 8:00	0	0	0	15	0	55	0	425	15	55	310	0
8:00 - 9:00	0	0	0	20	0	65	0	500	15	65	365	0
11:30 - 12:30	0	0	0	10	0	50	0	355	15	55	365	0
12:30 - 13:30	0	0	0	10	0	50	0	355	15	55	365	0
15:30 - 16:30	0	0	0	20	0	100	0	685	25	130	845	0
16:30 - 17:30	0	0	0	20	0	85	0	580	20	110	720	0
Total (6-hour peak)	0	0	0	95	0	405	0	2,900	105	470	2,970	0
Average (6-hour peak)	0	0	0	16	0	68	0	483	18	78	495	0

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p})L) / K_2] \times C_i$$

W =	39	39	0
		Veh	Ped
NOT Warranted			

2005 Canadian Traffic Signal Warrant Matrix Analysis

Table: B-1 - Washmill Lake Drive @ Regency Park Drive
2034 Future with Site Generated Trips

Main Street (name)	Washmill Lake Drive	Direction (EW or NS)	EW	Date:	June 2023
Side Street (name)	Regency Park Drive	Direction (EW or NS)	NS	City:	Halifax, NS

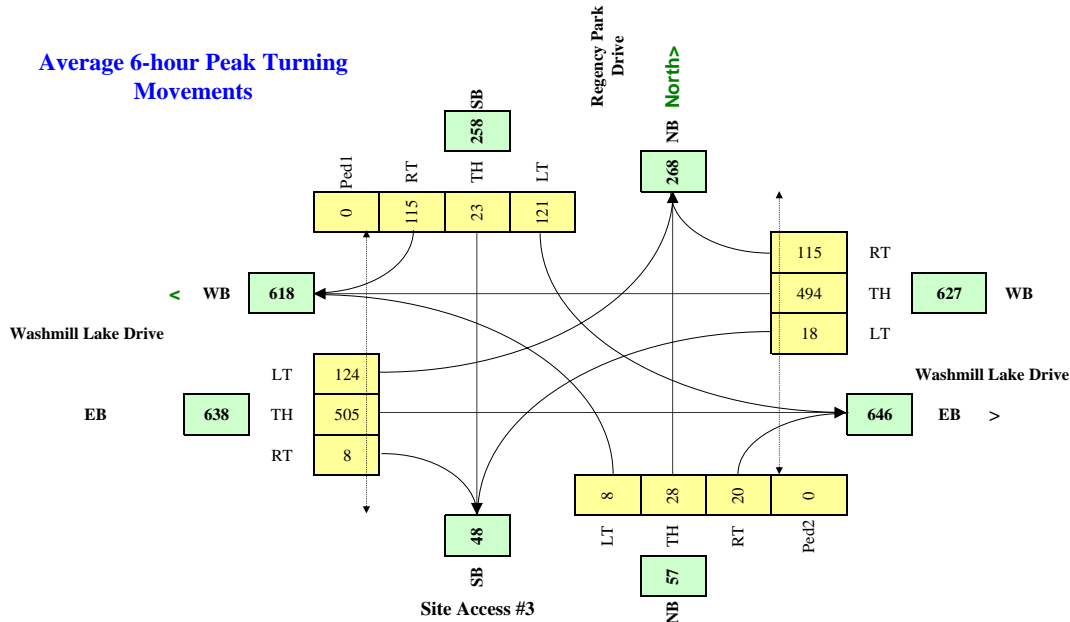
Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Washmill Lake Drive	WB		1		1			
Washmill Lake Drive	EB		1		1			
Site Access #3	NB			1				
Regency Park Drive	SB			1				

Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Washmill Lake Drive	EW	50	2.0%	y	0.0
Regency Park Drive	NS	50	2.0%	y	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
7:00 - 8:00				
8:00 - 9:00				
11:30 - 12:30				
12:30 - 13:30				
15:30 - 16:30				
16:30 - 17:30				
Total (6-hour peak)	0	0	0	0
Average (6-hour peak)	0	0	0	0

Demographics		
Elementary School	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	500,000
Central Business District	(y/n)	y

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:00 - 8:00	10	30	15	95	20	105	10	430	70	95	320	10
8:00 - 9:00	10	35	20	110	20	120	10	510	80	110	375	10
11:30 - 12:30	5	20	15	90	15	85	15	365	85	90	370	5
12:30 - 13:30	5	20	15	90	15	85	15	365	85	90	370	5
15:30 - 16:30	10	35	30	185	35	160	30	700	200	195	860	10
16:30 - 17:30	10	30	25	155	30	135	25	595	170	165	735	10
Total (6-hour peak)	50	170	120	725	135	690	105	2,965	690	745	3,030	50
Average (6-hour peak)	8	28	20	121	23	115	18	494	115	124	505	8



$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p})L) / K_2] \times C_i$$

W =	184	184	0
		Veh	Ped
Warranted			

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Mainland Common	Organization:	WSP		
Project Location:	Regency Park Drive	Performed By:	Brianna Rietzel		
Scenario Description:	AM Peak Hour	Date:	2023-06-26		
Analysis Year:	2034	Checked By:			
Analysis Period:	AM Street Peak Hour	Date:			

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				248	154	94
Restaurant				0		
Cinema/Entertainment				0		
Residential				670	216	454
Hotel				0		
All Other Land Uses ²				0		
				918	370	548

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.27			1.27		
Retail	1.27			1.27		
Restaurant	1.27			1.27		
Cinema/Entertainment	1.27			1.27		
Residential	1.27			1.27		
Hotel	1.27			1.27		
All Other Land Uses ²	1.27			1.27		

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	5	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	6	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,166	470	696
Internal Capture Percentage	2%	2%	2%
External Vehicle-Trips ⁵	902	362	540
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	3%	4%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Mainland Common			Organization:	WSP
Project Location:	Regency Park Drive			Performed By:	Brianna Rietzel
Scenario Description:	PM Peak Hour			Date:	2023-06-26
Analysis Year:	2034			Checked By:	
Analysis Period:	PM Street Peak Hour			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				804	386	418
Restaurant				0		
Cinema/Entertainment				0		
Residential				768	438	330
Hotel				0		
All Other Land Uses ²				0		
				1,572	824	748

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.27			1.27		
Retail	1.27			1.27		
Restaurant	1.27			1.27		
Cinema/Entertainment	1.27			1.27		
Residential	1.27			1.27		
Hotel	1.27			1.27		
All Other Land Uses ²	1.27			1.27		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					1000	
Restaurant						
Cinema/Entertainment						
Residential		1000				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	128	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	37	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,996	1,046	950
Internal Capture Percentage	17%	16%	17%
External Vehicle-Trips ⁵	1,312	694	618
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	8%	24%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	23%	9%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX

C

INTERSECTION PERFORMANCE ANALYSIS



Appendix C - Intersection Performance Analysis
 1: Regency Park Drive/Parkland Drive & Lacewood Drive

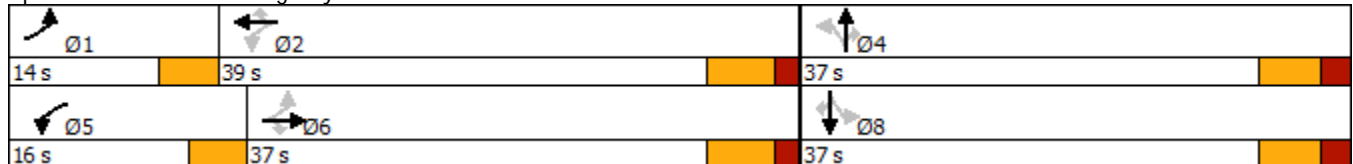
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	311	145	98	273	101	115	30	116	129	68	153
Future Volume (vph)	85	311	145	98	273	101	115	30	116	129	68	153
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.570			0.487			0.709			0.736		
Satd. Flow (perm)	1062	3539	1583	907	3539	1583	1321	1863	1583	1371	1863	1583
Satd. Flow (RTOR)			101			88			126			166
Lane Group Flow (vph)	92	338	158	107	297	110	125	33	126	140	74	166
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4		4	8		8
Total Split (s)	14.0	37.0	37.0	16.0	39.0	39.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Lost Time (s)	4.0	6.3	6.3	4.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Act Effect Green (s)	20.7	12.7	12.7	22.1	15.3	15.3	10.3	10.3	10.3	10.3	10.3	10.3
Actuated g/C Ratio	0.46	0.28	0.28	0.49	0.34	0.34	0.23	0.23	0.23	0.23	0.23	0.23
v/c Ratio	0.15	0.34	0.30	0.18	0.25	0.18	0.41	0.08	0.27	0.45	0.17	0.34
Control Delay	6.4	15.7	8.9	6.4	13.7	6.7	20.7	15.1	5.6	21.2	16.1	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	15.7	8.9	6.4	13.7	6.7	20.7	15.1	5.6	21.2	16.1	5.6
LOS	A	B	A	A	B	A	C	B	A	C	B	A
Approach Delay		12.4			10.7			13.4			13.4	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	3.1	12.0	3.6	3.6	10.4	1.4	9.1	2.2	0.0	10.3	5.1	0.0
Queue Length 95th (m)	9.5	25.3	17.1	10.8	21.7	11.3	23.1	7.9	10.1	25.3	14.2	11.5
Internal Link Dist (m)		125.4			242.6			314.2			320.2	
Turn Bay Length (m)	55.0		7.0	50.0		7.0	35.0		7.0	35.0		7.0
Base Capacity (vph)	698	2501	1148	720	2640	1203	933	1316	1156	969	1316	1167
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.14	0.14	0.15	0.11	0.09	0.13	0.03	0.11	0.14	0.06	0.14

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 44.9
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 12.3
 Intersection Capacity Utilization 43.5%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 1: Regency Park Drive/Parkland Drive & Lacewood Drive



Appendix C - Intersection Performance Analysis
 1: Regency Park Drive/Parkland Drive & Lacewood Drive

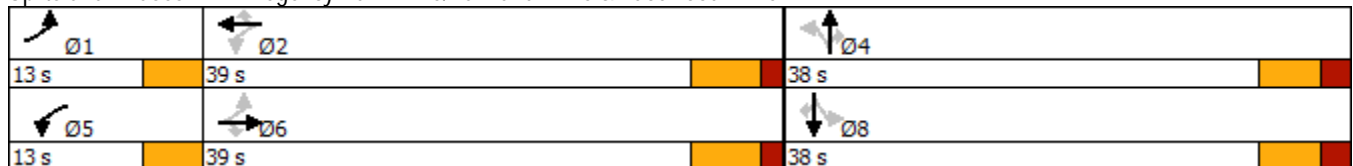
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	229	582	235	126	541	140	176	40	128	123	76	172
Future Volume (vph)	229	582	235	126	541	140	176	40	128	123	76	172
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.341			0.412			0.703			0.729		
Satd. Flow (perm)	635	3539	1583	767	3539	1583	1310	1863	1583	1358	1863	1583
Satd. Flow (RTOR)			90			88			139			187
Lane Group Flow (vph)	249	633	255	137	588	152	191	43	139	134	83	187
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4		4	8		8
Total Split (s)	13.0	39.0	39.0	13.0	39.0	39.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Lost Time (s)	4.0	6.3	6.3	4.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Act Effect Green (s)	29.0	19.8	19.8	26.9	16.4	16.4	13.8	13.8	13.8	13.8	13.8	13.8
Actuated g/C Ratio	0.52	0.35	0.35	0.48	0.29	0.29	0.25	0.25	0.25	0.25	0.25	0.25
v/c Ratio	0.50	0.51	0.41	0.27	0.57	0.29	0.59	0.09	0.28	0.40	0.18	0.35
Control Delay	10.9	18.0	13.3	8.3	19.6	9.6	27.6	17.6	5.7	22.4	18.4	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.9	18.0	13.3	8.3	19.6	9.6	27.6	17.6	5.7	22.4	18.4	5.5
LOS	B	B	B	A	B	A	C	B	A	C	B	A
Approach Delay		15.4			16.1			18.3			13.8	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	11.5	29.0	13.2	5.9	27.4	4.9	17.3	3.4	0.0	11.5	6.7	0.0
Queue Length 95th (m)	29.2	53.0	36.3	16.7	48.9	18.6	41.0	11.1	11.5	28.9	18.3	13.2
Internal Link Dist (m)		125.4			242.6			314.2			320.2	
Turn Bay Length (m)	55.0		7.0	50.0		7.0	35.0		7.0	35.0		7.0
Base Capacity (vph)	517	2130	988	550	2130	987	764	1087	981	792	1087	1001
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.30	0.26	0.25	0.28	0.15	0.25	0.04	0.14	0.17	0.08	0.19

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 56
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 15.8
 Intersection Capacity Utilization 57.9%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 1: Regency Park Drive/Parkland Drive & Lacewood Drive



Appendix C - Intersection Performance Analysis
 1: Regency Park Drive/Parkland Drive & Lacewood Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	279	124	123	248	95	98	52	140	124	108	124
Future Volume (vph)	68	279	124	123	248	95	98	52	140	124	108	124
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.585			0.484			0.682			0.720		
Satd. Flow (perm)	1090	3539	1583	902	3539	1583	1270	1863	1583	1341	1863	1583
Satd. Flow (RTOR)			97			88			152			131
Lane Group Flow (vph)	74	303	135	134	270	103	107	57	152	135	117	135
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4		4	8		8
Total Split (s)	14.0	37.0	37.0	16.0	39.0	39.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Lost Time (s)	4.0	6.3	6.3	4.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Act Effect Green (s)	20.3	12.5	12.5	22.7	15.6	15.6	10.2	10.2	10.2	10.2	10.2	10.2
Actuated g/C Ratio	0.45	0.28	0.28	0.50	0.35	0.35	0.23	0.23	0.23	0.23	0.23	0.23
v/c Ratio	0.12	0.31	0.27	0.22	0.22	0.17	0.37	0.14	0.32	0.44	0.28	0.29
Control Delay	6.2	16.0	8.4	6.5	13.3	6.2	20.0	15.8	5.7	21.3	17.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	16.0	8.4	6.5	13.3	6.2	20.0	15.8	5.7	21.3	17.4	6.0
LOS	A	B	A	A	B	A	C	B	A	C	B	A
Approach Delay		12.6			10.1			12.4			14.8	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	2.5	10.8	2.4	4.6	9.4	0.9	7.8	3.9	0.0	10.1	8.4	0.3
Queue Length 95th (m)	8.0	23.3	14.7	12.9	19.6	10.2	20.0	11.5	10.9	24.3	20.2	10.7
Internal Link Dist (m)		125.4			242.6			314.2			320.2	
Turn Bay Length (m)	55.0		7.0	50.0		7.0	35.0		7.0	35.0		7.0
Base Capacity (vph)	698	2496	1145	723	2635	1201	896	1314	1161	946	1314	1155
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.12	0.12	0.19	0.10	0.09	0.12	0.04	0.13	0.14	0.09	0.12

Intersection Summary











Cycle Length: 90
 Actuated Cycle Length: 45
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.44
 Intersection Signal Delay: 12.3
 Intersection Capacity Utilization 44.2%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 1: Regency Park Drive/Parkland Drive & Lacewood Drive

14 s	39 s	37 s
16 s	37 s	37 s

Appendix C - Intersection Performance Analysis 2: Washmill Lake Drive & Regency Park Drive

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	63	365	500	17	18	64
Future Volume (Veh/h)	63	365	500	17	18	64
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	397	543	18	20	70
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	561				886	280
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	561				886	280
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				92	90
cM capacity (veh/h)	1006				265	717
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	68	198	198	362	199	90
Volume Left	68	0	0	0	0	20
Volume Right	0	0	0	0	18	70
cSH	1006	1700	1700	1700	1700	519
Volume to Capacity	0.07	0.12	0.12	0.21	0.12	0.17
Queue Length 95th (m)	1.7	0.0	0.0	0.0	0.0	5.0
Control Delay (s)	8.8	0.0	0.0	0.0	0.0	13.4
Lane LOS	A					B
Approach Delay (s)	1.3			0.0		13.4
Approach LOS						B
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			32.8%		ICU Level of Service	A
Analysis Period (min)			15			

Appendix C - Intersection Performance Analysis
 1: Regency Park Drive/Parkland Drive & Lacewood Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	522	200	173	486	133	149	93	181	119	115	136
Future Volume (vph)	184	522	200	173	486	133	149	93	181	119	115	136
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.446			0.399			0.677			0.692		
Satd. Flow (perm)	831	3539	1583	743	3539	1583	1261	1863	1583	1289	1863	1583
Satd. Flow (RTOR)			88			88			197			137
Lane Group Flow (vph)	200	567	217	188	528	145	162	101	197	129	125	148
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4		4	8		8
Total Split (s)	13.0	39.0	39.0	13.0	39.0	39.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Lost Time (s)	4.0	6.3	6.3	4.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Act Effect Green (s)	25.8	15.2	15.2	26.1	15.3	15.3	12.6	12.6	12.6	12.6	12.6	12.6
Actuated g/C Ratio	0.48	0.29	0.29	0.49	0.29	0.29	0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.36	0.56	0.42	0.36	0.52	0.28	0.55	0.23	0.38	0.42	0.28	0.31
Control Delay	8.7	19.3	13.0	8.7	18.6	9.2	25.9	18.3	5.6	22.6	18.9	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	19.3	13.0	8.7	18.6	9.2	25.9	18.3	5.6	22.6	18.9	6.5
LOS	A	B	B	A	B	A	C	B	A	C	B	A
Approach Delay		15.7			14.8			15.5			15.5	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	8.3	25.1	9.9	7.7	22.8	4.1	14.1	8.1	0.0	10.9	10.2	0.9
Queue Length 95th (m)	22.4	45.9	29.0	21.2	42.6	17.3	33.4	20.4	13.1	26.7	24.3	12.7
Internal Link Dist (m)		125.4			242.6			314.2			320.2	
Turn Bay Length (m)	55.0		7.0	50.0		7.0	35.0		7.0	35.0		7.0
Base Capacity (vph)	580	2230	1029	553	2230	1029	770	1137	1043	787	1137	1020
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.25	0.21	0.34	0.24	0.14	0.21	0.09	0.19	0.16	0.11	0.15

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 53.2

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 15.4

Intersection Capacity Utilization 52.8%

Analysis Period (min) 15











Intersection LOS: B

ICU Level of Service A

Splits and Phases: 1: Regency Park Drive/Parkland Drive & Lacewood Drive

13 s	39 s	38 s
13 s	39 s	38 s

Appendix C - Intersection Performance Analysis
2: Washmill Lake Drive & Regency Park Drive

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	128	845	685	25	22	99
Future Volume (Veh/h)	128	845	685	25	22	99
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	918	745	27	24	108
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	772				1496	386
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	772				1496	386
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				75	82
cM capacity (veh/h)	839				95	612
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	139	459	459	497	275	132
Volume Left	139	0	0	0	0	24
Volume Right	0	0	0	0	27	108
cSH	839	1700	1700	1700	1700	307
Volume to Capacity	0.17	0.27	0.27	0.29	0.16	0.43
Queue Length 95th (m)	4.7	0.0	0.0	0.0	0.0	16.5
Control Delay (s)	10.1	0.0	0.0	0.0	0.0	25.3
Lane LOS	B					D
Approach Delay (s)	1.3			0.0		25.3
Approach LOS						D
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			44.1%		ICU Level of Service	A
Analysis Period (min)			15			

Appendix C - Intersection Performance Analysis
 1: Regency Park Drive/Parkland Drive & Lacewood Drive

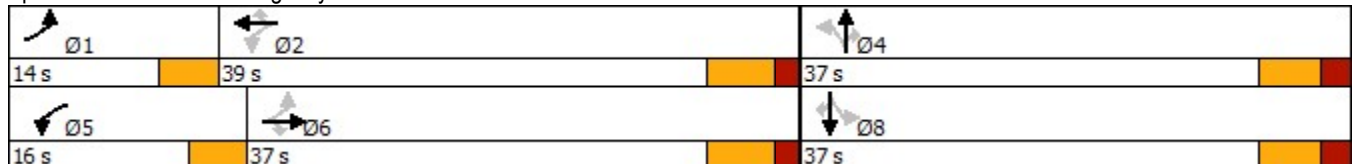
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	279	202	188	248	95	214	75	248	124	124	124
Future Volume (vph)	68	279	202	188	248	95	214	75	248	124	124	124
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.585			0.446			0.671			0.704		
Satd. Flow (perm)	1063	3539	1497	812	3539	1497	1231	1863	1536	1290	1863	1536
Satd. Flow (RTOR)			157			88			270			114
Lane Group Flow (vph)	74	303	220	204	270	103	233	82	270	135	135	135
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4		4	8		8
Total Split (s)	14.0	37.0	37.0	16.0	39.0	39.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Lost Time (s)	4.0	6.3	6.3	4.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Act Effct Green (s)	22.9	13.0	13.0	29.1	20.6	20.6	16.0	16.0	16.0	16.0	16.0	16.0
Actuated g/C Ratio	0.41	0.23	0.23	0.52	0.37	0.37	0.29	0.29	0.29	0.29	0.29	0.29
v/c Ratio	0.14	0.37	0.47	0.34	0.21	0.17	0.67	0.15	0.43	0.37	0.25	0.26
Control Delay	9.2	21.3	11.5	10.2	16.2	7.3	27.8	15.6	4.7	19.1	16.6	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	21.3	11.5	10.2	16.2	7.3	27.8	15.6	4.7	19.1	16.6	6.3
LOS	A	C	B	B	B	A	C	B	A	B	B	A
Approach Delay		16.2			12.5			15.4			14.0	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	3.4	13.8	5.2	10.0	11.2	1.1	20.7	6.2	0.0	10.9	10.5	1.5
Queue Length 95th (m)	11.6	29.6	25.2	27.7	25.1	12.2	45.8	16.0	14.1	26.0	24.2	12.3
Internal Link Dist (m)		125.4			242.6			314.2			320.2	
Turn Bay Length (m)	55.0		7.0	50.0		7.0	35.0		7.0	35.0		7.0
Base Capacity (vph)	614	1987	909	635	2117	930	691	1046	981	724	1046	912
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.15	0.24	0.32	0.13	0.11	0.34	0.08	0.28	0.19	0.13	0.15

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 56
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 14.6
 Intersection Capacity Utilization 64.8%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 1: Regency Park Drive/Parkland Drive & Lacewood Drive



Appendix C - Intersection Performance Analysis
 2: Access #3/Regency Park Drive & Washmill Lake Drive

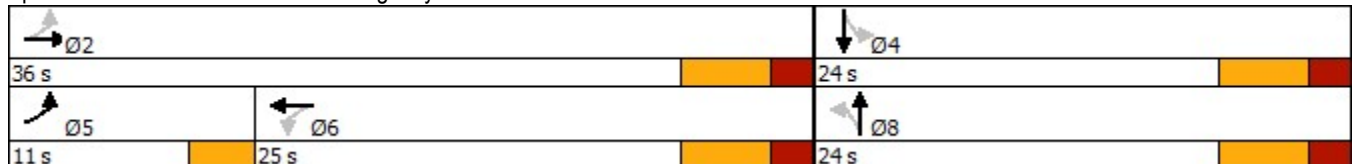
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	375	4	9	509	85	9	34	19	121	16	127
Future Volume (vph)	117	375	4	9	509	85	9	34	19	121	16	127
Satd. Flow (prot)	1770	3534	0	1770	3447	0	0	1760	0	1770	1582	0
Flt Permitted	0.334			0.510				0.921		0.713		
Satd. Flow (perm)	619	3534	0	941	3447	0	0	1631	0	1316	1582	0
Satd. Flow (RTOR)		2			33			21			138	
Lane Group Flow (vph)	127	412	0	10	645	0	0	68	0	132	155	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Total Split (s)	11.0	36.0		25.0	25.0		24.0	24.0		24.0	24.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0			6.0		6.0	6.0	
Act Effect Green (s)	29.0	27.8		19.8	19.8			10.0		10.1	10.1	
Actuated g/C Ratio	0.65	0.62		0.44	0.44			0.22		0.22	0.22	
v/c Ratio	0.21	0.19		0.02	0.42			0.18		0.44	0.33	
Control Delay	5.9	6.3		13.0	13.8			13.2		22.0	7.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	5.9	6.3		13.0	13.8			13.2		22.0	7.0	
LOS	A	A		B	B			B		C	A	
Approach Delay		6.2			13.8			13.2			13.9	
Approach LOS		A			B			B			B	
Queue Length 50th (m)	3.9	8.6		0.6	23.3			3.3		9.9	1.2	
Queue Length 95th (m)	11.9	18.6		3.5	43.1			12.0		25.1	13.0	
Internal Link Dist (m)		518.2			383.0			43.2			572.0	
Turn Bay Length (m)	50.0			15.0						25.0		
Base Capacity (vph)	618	2458		483	1787			709		562	755	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.21	0.17		0.02	0.36			0.10		0.23	0.21	

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 44.9
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.44
 Intersection Signal Delay: 11.2
 Intersection Capacity Utilization 50.6%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 2: Access #3/Regency Park Drive & Washmill Lake Drive



Appendix C - Intersection Performance Analysis
 1: Regency Park Drive/Parkland Drive & Lacewood Drive

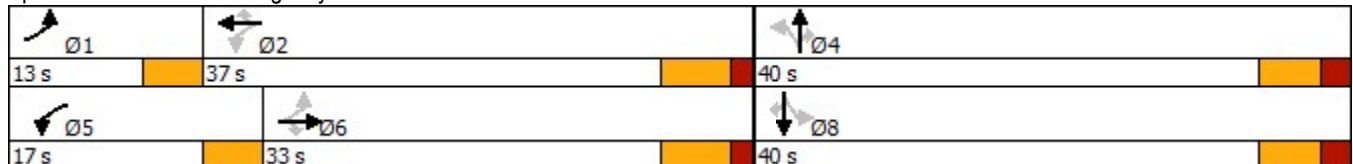
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	522	347	261	486	133	279	119	259	119	144	136
Future Volume (vph)	184	522	347	261	486	133	279	119	259	119	144	136
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.456			0.303			0.657			0.674		
Satd. Flow (perm)	835	3539	1497	558	3539	1497	1206	1863	1536	1236	1863	1536
Satd. Flow (RTOR)			135			88			262			113
Lane Group Flow (vph)	200	567	377	284	528	145	303	129	282	129	157	148
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4		4	8		8
Total Split (s)	13.0	33.0	33.0	17.0	37.0	37.0	40.0	40.0	40.0	40.0	40.0	40.0
Total Lost Time (s)	4.0	6.3	6.3	4.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Act Effct Green (s)	30.5	19.3	19.3	36.6	22.4	22.4	23.1	23.1	23.1	23.1	23.1	23.1
Actuated g/C Ratio	0.43	0.27	0.27	0.51	0.31	0.31	0.32	0.32	0.32	0.32	0.32	0.32
v/c Ratio	0.43	0.59	0.75	0.59	0.48	0.28	0.78	0.22	0.42	0.32	0.26	0.26
Control Delay	14.1	26.7	26.8	16.3	22.2	10.8	38.0	19.5	5.6	21.8	19.9	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	26.7	26.8	16.3	22.2	10.8	38.0	19.5	5.6	21.8	19.9	7.7
LOS	B	C	C	B	C	B	D	B	A	C	B	A
Approach Delay		24.5			18.7			21.9			16.3	
Approach LOS		C			B			C			B	
Queue Length 50th (m)	14.3	37.7	32.0	21.4	31.8	5.8	38.4	13.2	1.9	13.6	16.2	3.4
Queue Length 95th (m)	32.0	62.1	72.7	45.6	53.4	20.6	76.3	28.2	18.5	30.3	33.5	16.6
Internal Link Dist (m)		125.4			242.6			314.2			320.2	
Turn Bay Length (m)	55.0		7.0	50.0		7.0	35.0		7.0	35.0		7.0
Base Capacity (vph)	487	1390	670	525	1598	724	598	923	893	612	923	818
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.41	0.56	0.54	0.33	0.20	0.51	0.14	0.32	0.21	0.17	0.18

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 71.7
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 21.1
 Intersection Capacity Utilization 75.8%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 1: Regency Park Drive/Parkland Drive & Lacewood Drive



Appendix C - Intersection Performance Analysis
 2: Access #3/Regency Park Drive & Washmill Lake Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	862	7	18	703	213	6	19	17	187	21	161
Future Volume (vph)	199	862	7	18	703	213	6	19	17	187	21	161
Satd. Flow (prot)	1770	3534	0	1770	3377	0	0	1730	0	1770	1573	0
Flt Permitted	0.158			0.303				0.939		0.727		
Satd. Flow (perm)	293	3534	0	560	3377	0	0	1634	0	1332	1573	0
Satd. Flow (RTOR)		2			68			18			175	
Lane Group Flow (vph)	216	945	0	20	996	0	0	46	0	203	198	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Total Split (s)	12.0	46.0		34.0	34.0		24.0	24.0		24.0	24.0	
Total Lost Time (s)	3.0	6.0		6.0	6.0			6.0		6.0	6.0	
Act Effect Green (s)	37.2	34.1		22.2	22.2			13.6		13.6	13.6	
Actuated g/C Ratio	0.62	0.57		0.37	0.37			0.23		0.23	0.23	
v/c Ratio	0.55	0.47		0.10	0.77			0.12		0.67	0.40	
Control Delay	12.3	8.9		14.6	20.4			14.8		34.3	8.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	12.3	8.9		14.6	20.4			14.8		34.3	8.0	
LOS	B	A		B	C			B		C	A	
Approach Delay		9.5			20.3			14.8			21.3	
Approach LOS		A			C			B			C	
Queue Length 50th (m)	9.7	31.1		1.5	49.6			2.6		22.2	2.2	
Queue Length 95th (m)	25.8	49.5		6.0	76.3			10.3		45.6	17.3	
Internal Link Dist (m)		518.2			383.0			43.2			572.0	
Turn Bay Length (m)	50.0			15.0						25.0		
Base Capacity (vph)	409	2424		269	1656			516		411	606	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.53	0.39		0.07	0.60			0.09		0.49	0.33	

Intersection Summary

Cycle Length: 70
 Actuated Cycle Length: 60.1
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 15.6
 Intersection Capacity Utilization 68.0%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 2: Access #3/Regency Park Drive & Washmill Lake Drive

