450 Rice Road, Welland Transportation Impact Assessment

Paradigm Transportation Solutions Limited

October 2024
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Project Summary

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450 Rice Road, Welland
Transportation Impact Assessment

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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study (TIS) for a proposed residential development at 450 Rice Road in Welland, Niagara Region.

The study aims to assess current traffic and the additional traffic generated by the proposed development, analyze the traffic impact on the adjacent roadway network and provide the municipality and owner with any improvements required to mitigate the identified effects of the site-generated traffic.

Conclusions

This study evaluates the impacts of background traffic growth and projects the impacts of the development with the construction of 139 townhouse units. Access to the site is proposed via a new driveway connection to Rice Road, located 195 metres north of the Rice Road and Quaker Road intersection.

Full-build out of the development is projected to generate approximately 67 new vehicle trips during the weekday AM peak hour and 79 new vehicle trips during the weekday PM peak hour. A left-turn lane warrant analysis was conducted at the proposed development driveway to Rice Road and determined that a southbound left-turn lane is not warranted.

The traffic analysis conducted as part of this assessment indicates that development volumes will result in minor increases in the surrounding study area intersection volumes under peak conditions, which should not be perceptible.

Deficiencies currently exist at the intersection of Rice Road and Highway 20. Operations at this intersection are projected to degrade further as a result of the general growth in traffic to the area, independent of the development. Niagara Region has completed a Municipal Class Environmental Assessment Study to identify improvements to Merritt Road and Rice Road due to proposed developments in the Town of Pelham, the City of Thorold and the City of Welland. As part of the Class EA, to provide additional capacity improvements for the overall area, Merritt Road between Cataract Road and Highway 406 is recommended to be extended. Through this extension, traffic volumes along Rice Road are projected to decrease by approximately 25%. However, until this occurs, an interim improvement option would be to optimize the signal timings.

The all-way stop-controlled intersection of Rice Road and Quaker Road is also projected to experience increased demand due to the general traffic growth projected for the area. A traffic signal warrant analysis was conducted for this intersection to determine if projected traffic conditions would satisfy the warrants. However, the warrant criteria for signalization are not satisfied. To determine the extent of the queues created by the all-way stop configuration, a SimTraffic simulation was completed for the 2033 Total Horizon.

Reviewing these results indicates that during the respective peak hours, a queue length of 51 metres is expected for the intersection's southbound approach. The proposed Driveway to Rice Road is approximately 195 metres north of the Rice Road and Quaker Road intersection; vehicle blockage is not projected to occur.

Concerning the northbound approach, a queue length of 74 metres is projected during the weekday PM peak hour, which would block the Niagara Catholic School Board’s north Driveway. It is noted, however, that the school board has two additional driveways, one to Quaker Road and an additional driveway to Rice Road, which the queue lengths will not impact. As the property has multiple access points, access to/from the property is still available during peak congestion at Rice Road and Quaker Road intersection. Driver courtesy will also be expected to allow space in the queue for vehicles to/from the school board’s north Driveway.

Given that the queue lengths will not impact adjacent intersections/major driveways, the increased delay is considered tolerable until the intersection is widened and upgraded to traffic control signals.

Recommendations

Based on the findings of this study, the following recommendations are identified:

- The Region optimizes the traffic signal timings at the intersection of Rice Road with Highway 20 and Woodlawn Road as an interim solution until the preferred improvements as per the Merritt Road/Rice Road Class EA are implemented.

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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study (TIS) for a proposed residential development at 450 Rice Road in Welland, Niagara Region. **Figure 1.1** details the location of the subject development.

The study aims to assess current traffic and the additional traffic generated by the proposed development, analyze the traffic impact on the adjacent roadway network and provide the municipality and owner with any improvements required to mitigate the identified effects of the site-generated traffic.

More specifically, the scope of this study is to:

- Forecast traffic from the proposed development;
- Assign the projected volumes to the surrounding road network based on the existing traffic patterns at the driveway connections;
- Assess total future traffic within the study area. The following horizons have been considered: Five (2033) Years after Full-Build-OUt.
- Identify operational concerns and any mitigation measures that may be required to improve operations and

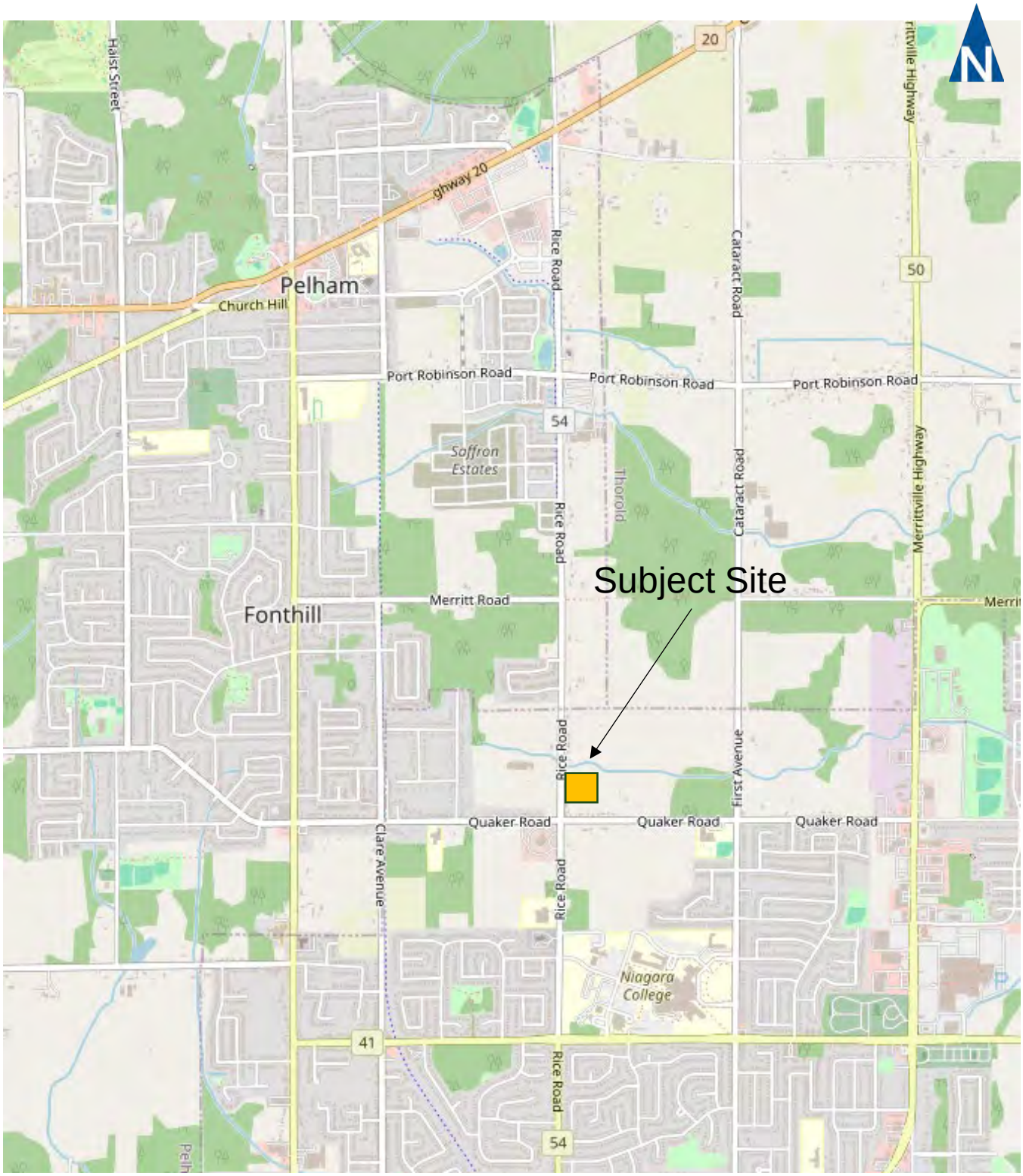
This report adhered to the terms of reference Paradigm and Niagara Region developed. **Appendix A** contains the pre-study consultation material.

1.2 Study Area

The study area intersections assessed in this study include:

- Rice Road at Quaker Road (all-way stop)
- Rice Road at Highway 20 (signalized)
- Rice Road at Woodlawn Road (signalized)
- One driveway connection

Figure 1.1 illustrates the study area location.



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Location of Subject Site

450 Rice Road, Welland - TIA
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Figure 1.1

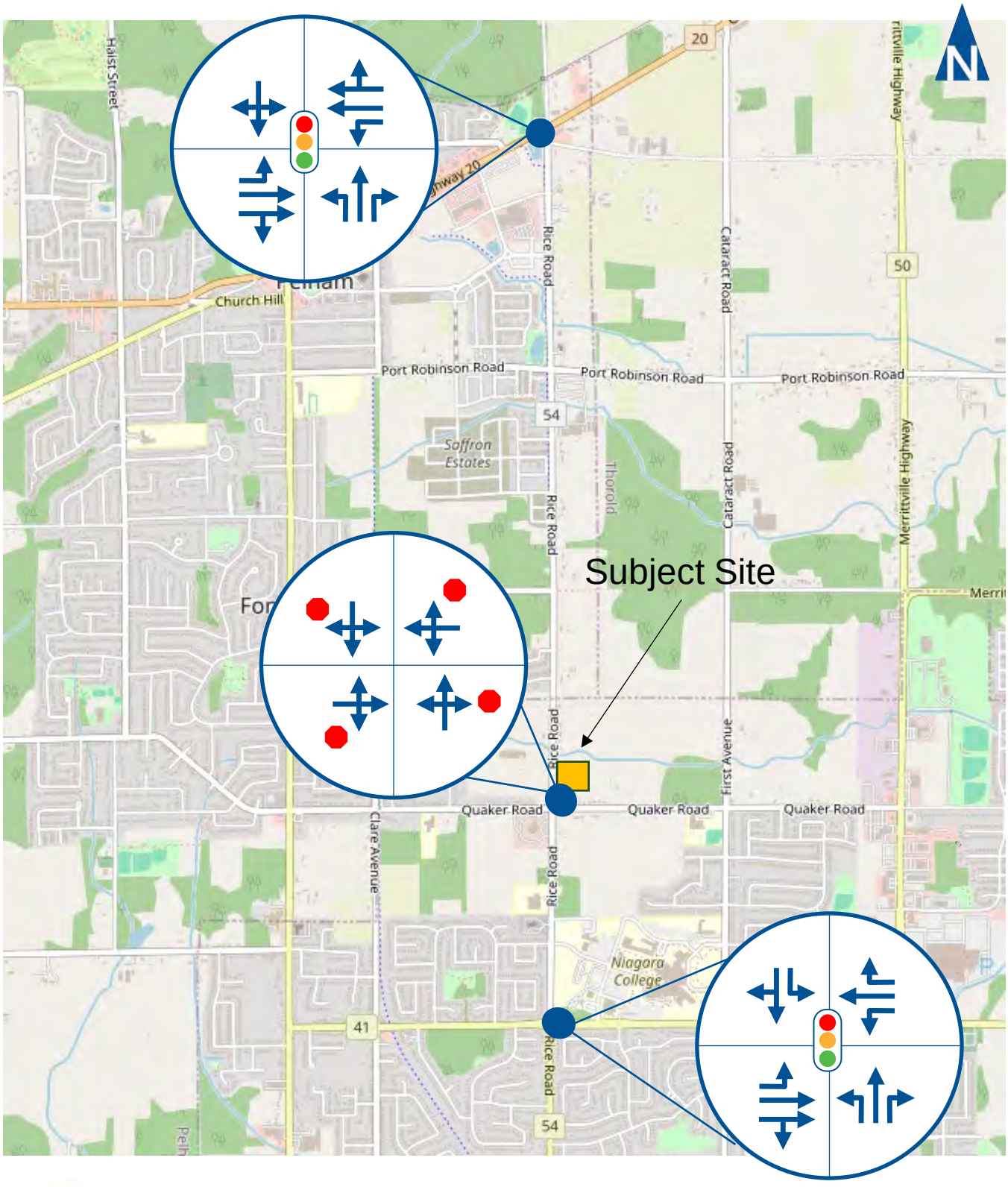
2 Existing Conditions

2.1 Roadway Characteristics

The roadways of interest within the study area include:

- **Rice Road (Regional Road 54)** is a two-lane, 50 km/h arterial roadway under the jurisdiction of Niagara Region. No sidewalks or cycling lanes are provided on either side of the roadway adjacent to the proposed development.
- **Quaker Road** is a two-lane, 50 km/h arterial roadway under the jurisdiction of the City of Welland. No sidewalks or cycling lanes are provided on either side of the roadway within the study area.
- **Woodlawn Road (Regional Road 41)** is a two-lane road west of Rice Road and a four-lane road east of Rice Road. The speed limit is 50 km/h and is an arterial road under the jurisdiction of the Niagara Region. Sidewalks are located on the south side of the road throughout the study area, while a sidewalk on the north side is located for the portion east of Rice Road. No cycling lanes are provided on either side of the roadway within the study area.
- **Highway 20** is a five-lane road west of Rice Road and a four-lane road east of Rice Road. The speed limit is 50 km/h and is an arterial road under the jurisdiction of the Niagara Region. Sidewalks are located on the north and south sides of the road for the section of Highway 20 west of Rice Road. No cycling lanes are provided on either side of the roadway within the study area.

Figure 2.1 illustrates the study area's existing land configuration and traffic control.



Existing Lane Configuration and Traffic Control

450 Rice Road, Welland - TIA
240535

Figure 2.1

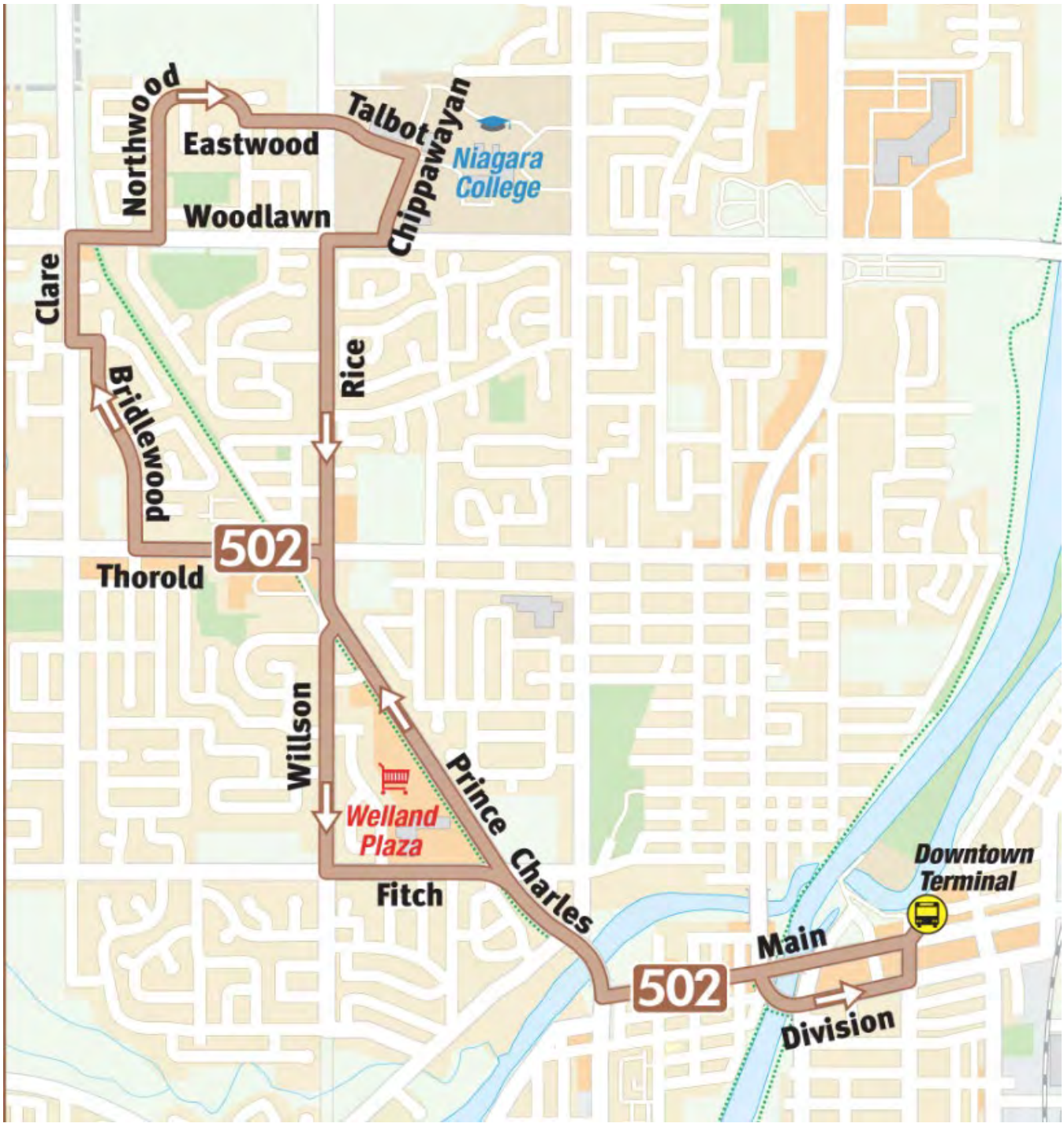
2.2 Existing Transit Service

Transit service in Welland is provided by Niagara Region Transit (NRT). NRT is the result of an effort from the Niagara Region and the 12 local municipalities to connect all of Niagara by combining the existing Niagara Region Transit, Niagara Falls Transit, St. Catharines Transit, Welland Transit and Fort Erie Transit systems into one transit operator that began on January 1, 2023.

NRT operates local transit routes within the city and regional services between various municipalities. The following routes, which provide connections with proximity to the subject site, are as follows:

- **502 Rice Road** operates along Rice Road between Talbot Trail and Fitch Street. Headways are approximately 30 minutes. Service is provided Monday to Friday, approximately 6:00 AM to 11:00 PM.

Figure 2.2 illustrates the existing public transit network within the study area. The closest bus stops are approximately 750 metres south of the proposed development at the intersection of Rice Road and Talbot Trail.



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Existing Transit Network

450 Rice Road, Welland - TIA
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Figure 2.2

2.3 Traffic Volumes

Turning movement counts (TMC) quantify vehicle movement through the area to assess intersection operation. Existing traffic data at an intersection or road section forms the foundation for analysis. The counts are usually taken during peak periods at an intersection to complete the level of service analysis. **Appendix B** contains the traffic data utilized in this report.

2.3.1 Traffic Data

The Region provided existing traffic counts from August 2023 at the intersections of Rice Road with Highway 20 and Woodlawn Road. With respect to the intersection of Rice Road and Quaker Road, Paradigm completed traffic counts in September 2024. **Table 2.1** provides a summary of traffic count locations and dates**.**

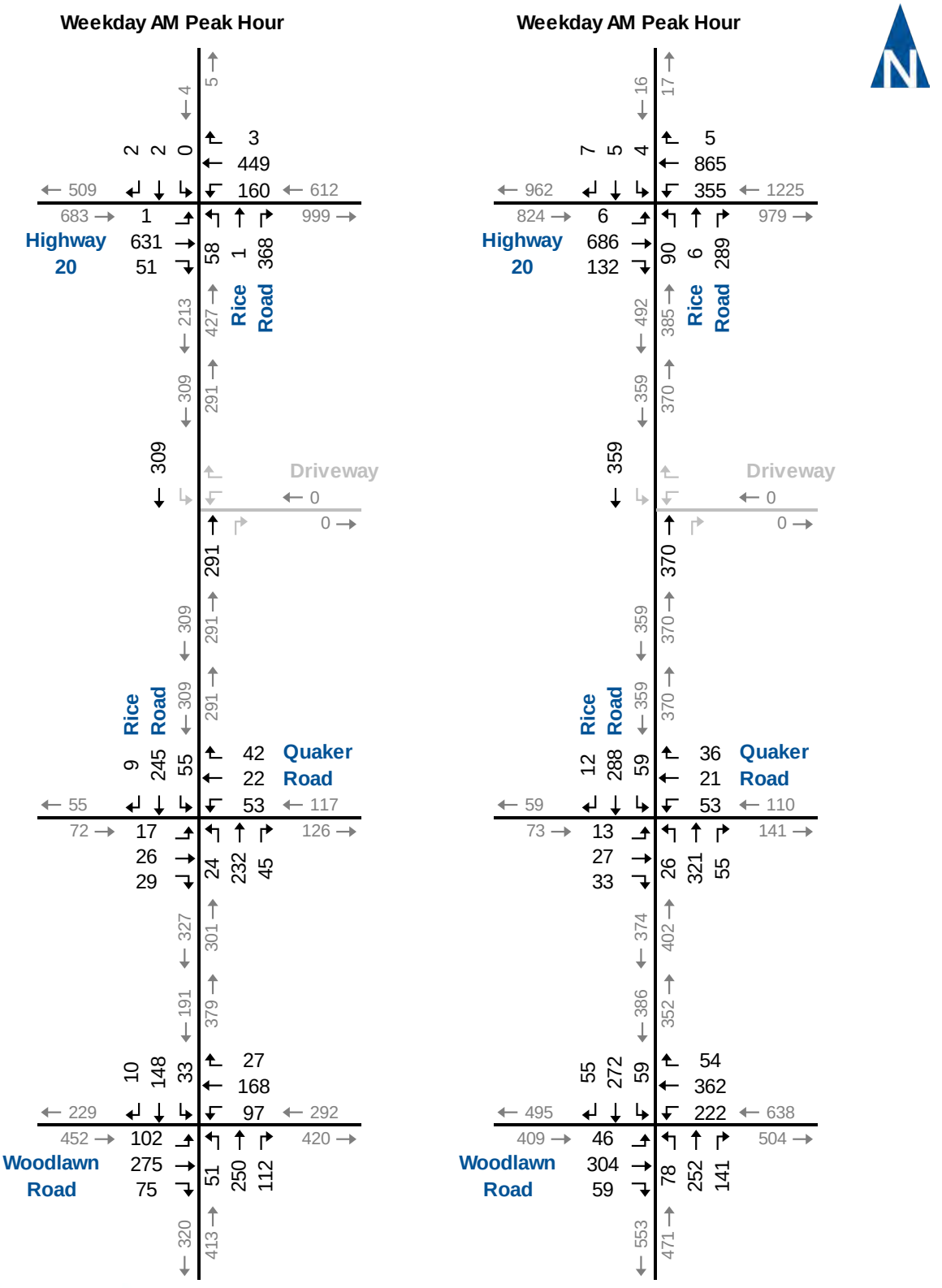
TABLE 2.1: TRAFFIC COUNT SUMMARY

Intersection	Count Date
Rice Road at Quaker Road	September 10, 2024
Rice Road at Highway 20	August 9, 2023
Rice Road at Woodlawn Road	August 9, 2023

2.3.2 Volume Adjustments and Balancing

As several major intersections exist between the study area intersections, volume balancing has not been accounted for between the various intersections.

Figure 2.3 illustrates the adjusted base year traffic volumes during the weekday AM and PM peak hours.



Base Year Traffic Volumes

450 Rice Road, Welland - TIA
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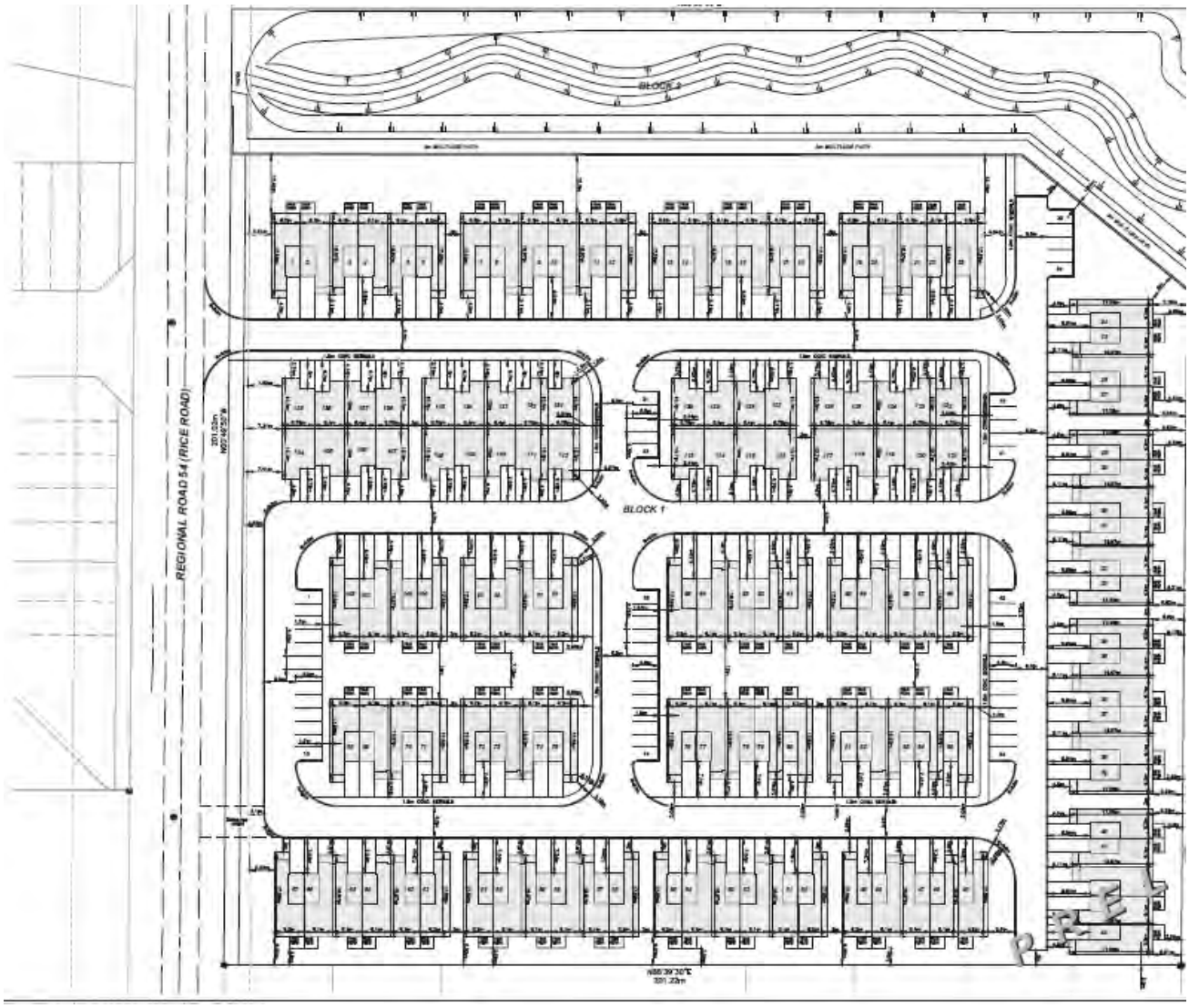
Figure 2.3

3 Development Proposal Review

3.1 Programme Elements

The 1.26-hectare site will be developed into a residential development with 139 townhouse units. Vehicular access is proposed via a new driveway connection to Rice Road, located approximately 195 metres north of the Rice Road and Quaker Road intersection (curb return to curb return). The proposed development is anticipated to be fully built by 2028.

Figure 3.1 illustrates the site plan.



Site Plan

3.2 Development Trip Generation

Trip generation information is used to forecast the anticipated level of traffic activity because of the development. Trip generation for each land use type was summed to establish total site trip generation for the respective peak hours.

The rate at which any development generates traffic depends upon several factors, such as size, location, and concentration of surrounding developments. To estimate the traffic volume generated by the development components, traffic projections were based on trip generation data published in the Institute for Transportation Engineer's (ITE) Trip Generation Manual, 11th Edition[1]. The following land uses (LUC) have been used:

- **LUC 215 – Single Family Attached** – Single-family attached housing includes any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space. The database for this land use includes duplexes (defined as a single structure with two distinct dwelling units, typically joined side-by-side and each with at least one outside entrance) and townhouses/rowhouses (defined as a single structure with three or more distinct dwelling units, joined side-by-side in a row and each with an outside entrance)

The estimated total trip generation for the proposed development is displayed in **Table 3.1**, which indicates that 67 and 79 new vehicle trips are forecast to be generated during the AM and PM peak hours.

TABLE 3.1: ESTIMATED TRIP GENERATION

Use	Units	Trips	Weekday AM Peak				Weekday PM Peak			
			Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
LUC 215 - Single-Family Attached Housing	139	Total	Eq.	17	50	67	Eq.	47	32	79
		Eq.	T = 0.52(X) - 5.70				T = 0.60(X) - 3.93			

[1] Trip Generation Eleventh Edition, Institute of Transportation Engineers, Washington D.C., 2021

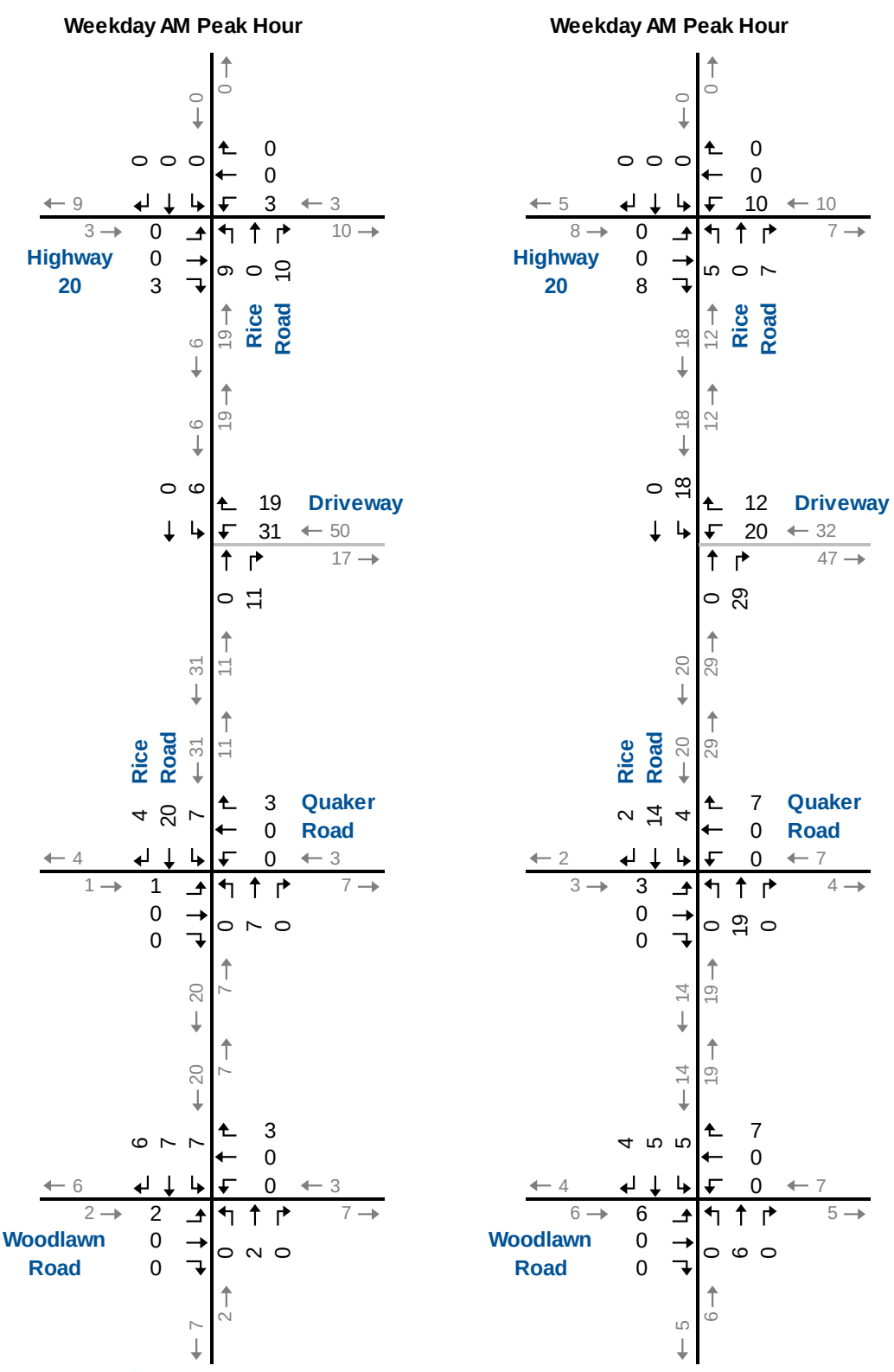
3.3 Development Trip Distribution

The directional distribution of traffic approaching and departing the development is a function of several variables: population densities, existing travel patterns, and the efficiency of the roadways leading to the site. Trip distribution for the proposed development was estimated based on a review of the existing trip patterns within the study area. **Table 3.2** summarizes the trip distribution used in this study. **Appendix C** includes the calculations.

TABLE 3.2: TRIP DISTRIBUTION

Direction (To/From)	Travel Route	Percent Assigned To Route
East	Highway 20 Quaker Road Woodlawn Road	21% 14% 15%
West	Highway 20 Quaker Road Woodlawn Road	17% 7% 12%
South	Rice Road	14%
Total		**100%**

The trips projected from the proposed development have been assigned to the roadway network based on the trip distribution noted above. **Figure 3.2** illustrates the trip assignment.



Site Trip Generation

4 Future Conditions

The following horizon years have been utilized to analyze future traffic conditions:

- 2033: Five Years after Full-Build Out

4.1 Future Traffic Growth

Traffic growth on area roadways is a function of the expected land development, economic activity, and demographic changes. A frequently used procedure estimates an annual percentage increase and applies that increase to the study area traffic volumes. An alternative approach is to identify estimated traffic generated by specific planned significant developments that would be expected to affect the project study area roadways. For this assessment, an annual percentage has been utilized.

4.2.1 General Growth Rate

Niagara Region has completed a Municipal Class Environmental Assessment Study to identify improvements to Merritt Road and Rice Road as a result of proposed developments in the Town of Pelham, the City of Thorold and the City of Welland. Through the Class EA, growth rates along Rice Road and Quaker Road have been developed based on travel demand forecasting model output from the Region's EMME model[2]. Utilizing this information, the following growth rates have been assumed:

- Quaker Road – 3% Eastbound, 1.9% Westbound
- Rice Road – 3% Northbound, 1.5% Southbound

As the Class EA did not provide any growth projections for Woodlawn Road or Highway 20, a growth rate of 2% per annum has been utilized for these roadways.

[2] Schedule 'C' Municipal Class Environmental Assessment for Merritt Road (Regional Road 37) and Rice Road (Regional Road 54) in the Town of Pelham, the City of Thorold and the City of Welland, Transportation Assessment Report, February 2024

4.2.2 Background Developments

The non-site traffic increase (background traffic) represents generalized traffic growth. The background traffic projections for the 2033 horizon are illustrated in **Figure 4.1**.

4.2.3 Total Projections

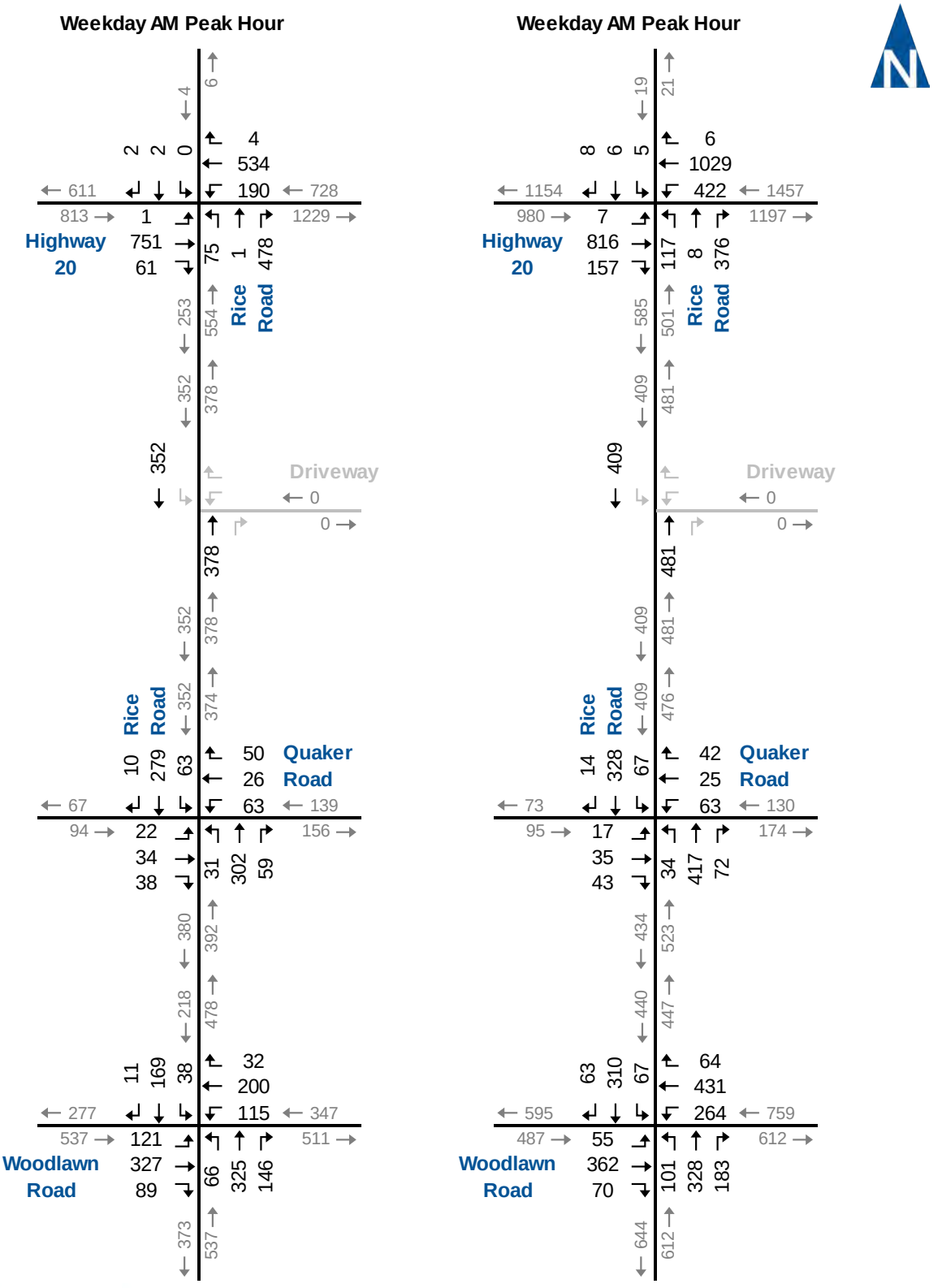
The projected site-generated traffic volumes were added to the background projections to develop the total traffic volume. The total traffic projections for the 2033 horizon are illustrated in **Figure 4.2**.

4.2 Roadway Improvements

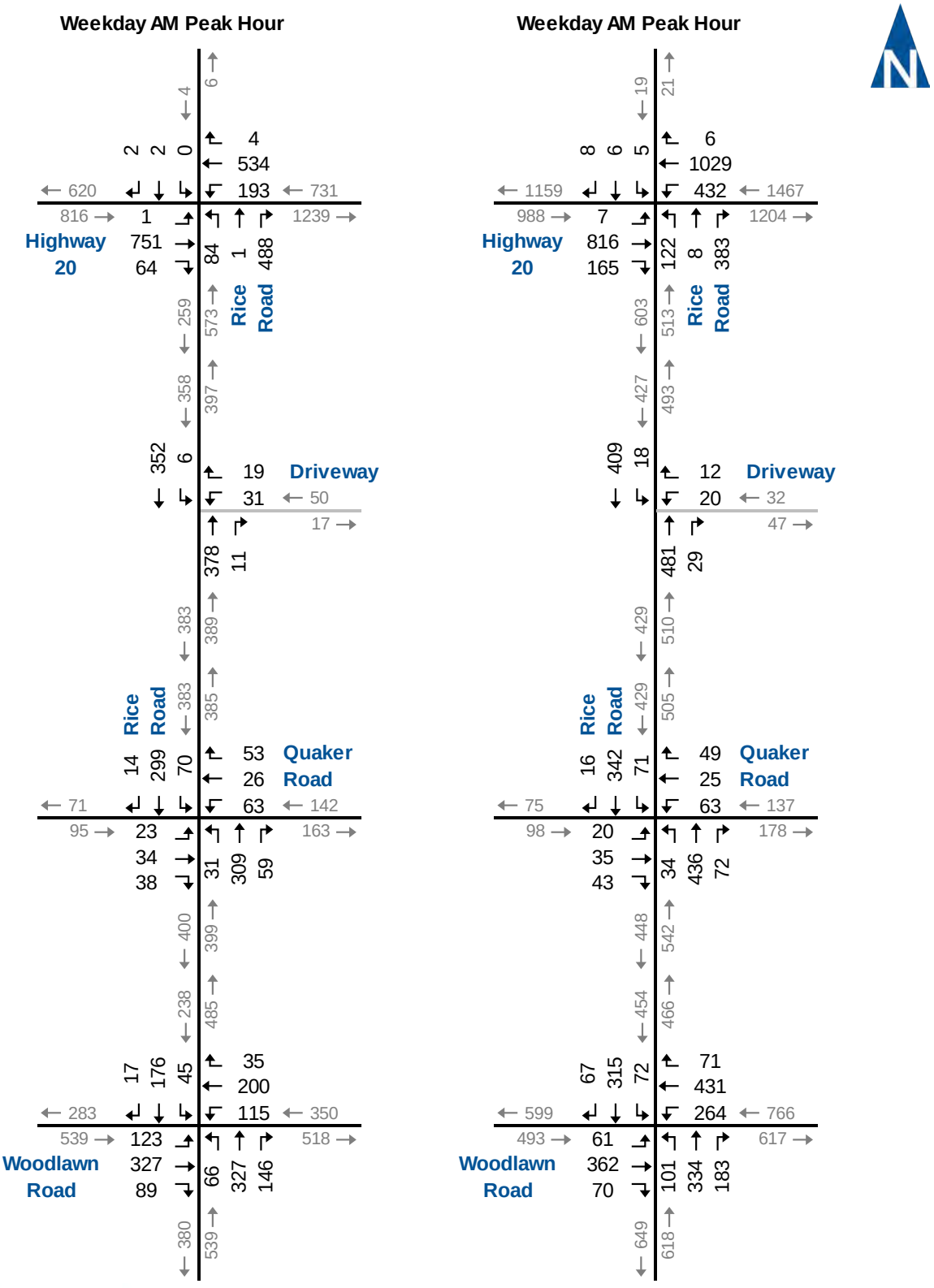
As part of the Class EA completed for Rice Road, the following improvements have been identified for the study area:

- Rice Road Corridor
  - Five Lane Cross-Section
- Rice Road at Quaker Road
  - Signalization of Intersection
  - Separate Left-Turn lanes for all approaches
  - Separate Right-Turn Lane for north and south approaches

However, given that the timing of improvements for implementation is currently unknown, no roadway improvements have been considered as part of the analysis for future conditions.



2033 Background Traffic Volumes



2033 Total Traffic Volumes

450 Rice Road, Welland - TIA
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Figure 4.2

5 Operational Assessment

5.1 Level of Service Criteria

Level of service (LOS) is used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that indexes the operational qualities of a roadway segment or an intersection with designations ranging from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

For signalized intersections, the analysis considered the operation of each lane or lane group entering the intersection and the level of service for the overall conditions at the intersection. At signalized intersections, intersections with movements operating with a v/c ratio of 0.84 or less are classified as within capacity, a v/c ratio of 0.85-1.00 as approaching capacity and a v/c ratio over 1.00 as exceeding capacity.

For unsignalized intersections, the analysis assumes that traffic on the mainline is not affected by the traffic on the side streets. The level of service is only determined for left turns from the main street and all movements from the minor street. At unsignalized intersections, an overall LOS between A-C is classified as tolerable delays; an overall LOS D-E is classified as an increased delay and an overall LOS F is classified as Significant Delays.

The evaluation criteria for analyzing intersections are based on the 2010 Highway Capacity Manual (HCM)[3].

[3] Transportation Research Board, Highway Capacity Manual, Washing, D.C. 2003.

5.2 Intersection Capacity Analysis

Intersection capacity analyses were conducted at all intersections in the study area. Analyses were conducted for the Base Conditions and five years after build-out (2033). Optimization of signal timings has occurred between the various horizon years.

Tables 5.1 through **5.4** summarize the capacity analyses for the study area intersections for all horizon years. The capacity analysis results are included in **Appendix D**. The following sub-sections outline the critical movements of the study area intersections.

5.2.1 Rice Road at Highway 20 (Signalized)

2024 Base Year Operations	Approaching Capacity	
2033 Background Operations:	Approaching Capacity	
2033 Total Operations	Approaching Capacity	

At Rice Road and Highway 20, the eastbound shared through/right turn movement and westbound left turn movement is operating at LOS D with a v/c ratio of 0.88 during the weekday PM peak hour.

Under the 2033 Background horizon, an additional delay is projected; however, no significant change in LOS is projected. It is noted that the v/c ratio for the eastbound shared through/right turn movement and westbound left turn movement is projected to increase to 0.95/0.94 during the weekday PM peak hour.

In terms of development traffic implications, similar levels of operation are generally expected under the 2033 Total conditions with only minor increases in delay resulting from site-generated traffic volumes.

Critical Movements (V/C over 0.85)

- Eastbound Shared Through/Right (2024 Base)
- Westbound Left (2024 Base)

TABLE 5.1: RICE ROAD AT HIGHWAY 20 OPERATIONS

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				Overall
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Rice Road at Highway 20	TCS	2024 Base Year	LOS	C	D	D	D	C	B	B	B	B	B	B	B	B	B	B	B	C
				Delay	22	36	36	35	21	16	16	17	17	15	20	19	15	15	15	15	25
				V/C	0.00	0.83	0.83		0.63	0.36	0.36		0.13	0.00	0.36		0.00	0.00	0.00		
				Q	1	85	85		30	40	40		16	1	26		2	2	2		
		TCS	2033 Background	LOS	C	D	D	D	C	B	B	B	B	B	C	C	B	B	B	B	C
				Delay	21	40	40	40	30	15	15	19	19	17	29	27	17	17	17	17	29
				V/C	0.00	0.90	0.90		0.77	0.40	0.40		0.19	0.00	0.63		0.00	0.00	0.00		
				Q	1	113	113		52	46	46		21	1	69		3	3	3		
		TCS	2033 Total	LOS	C	D	D	D	C	B	B	B	B	B	C	C	B	B	B	B	C
				Delay	21	40	40	40	31	15	15	19	20	17	30	28	17	17	17	17	29
				V/C	0.00	0.90	0.90		0.78	0.40	0.40		0.21	0.00	0.65		0.00	0.00	0.00		
				Q	1	114	114		54	46	46		23	1	79		3	3	3		
PM Peak Hour	1 - Rice Road at Highway 20	TCS	2024 Base Year	LOS	C	D	D	D	D	B	B	B	C	C	C	C	C	C	C	C	C
				Delay	20	36	36	36	39	11	11	19	27	22	26	26	23	23	23	23	26
				V/C	0.04	0.88	0.88		0.88	0.50	0.50		0.30	0.01	0.25		0.03	0.03	0.03		
				Q	4	111	111		93	59	59		29	5	22		7	7	7		
		TCS	2033 Background	LOS	B	D	D	D	D	A	A	C	D	C	C	C	C	C	C	C	C
				Delay	19	44	44	44	49	9	9	20	37	28	33	34	28	28	28	28	31
				V/C	0.06	0.95	0.95		0.94	0.53	0.53		0.49	0.02	0.33		0.04	0.04	0.04		
				Q	4	141	141		121	66	66		39	5	29		8	8	8		
		TCS	2033 Total	LOS	B	D	D	D	D	A	A	C	D	C	C	C	C	C	C	C	C
				Delay	20	46	46	46	53	9	9	22	38	28	33	34	28	28	28	28	32
				V/C	0.06	0.96	0.96		0.95	0.53	0.53		0.52	0.02	0.34		0.05	0.05	0.05		
				Q	4	142	142		126	66	66		41	5	30		8	8	8		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout

5.2.2 Rice Road at Quaker Road (AWS)

2024 Base Year Operations	Tolerable Delays	
2033 Background Operations:	Increased Delays	
2033 Total Operations	Increased Delays	

At the intersection of Rice Road and Quaker Road, individual movements operate at LOS C or better during the weekday AM and PM peak hours.

Under the 2033 Background horizon, increased delay is projected for the northbound approach, which is projected to operate at LOS D during the weekday PM peak hour.

Regarding development traffic implications, increased delay is projected for the northbound approach, which is projected to operate at LOS E, and the southbound approach, which is projected to operate at LOS D during the weekday PM peak hour.

Critical Movements (LOS D)

- Northbound Movement (2033 Background)
- Southbound Movement (2033 Total)

TABLE 5.2: RICE ROAD AT QUAKER ROAD OPERATIONS

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																Overall
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	2 - Rice Road at Quaker Road	AWS	2024 Base Year	LOS	A	A	A	**A**	A	A	A	**A**	B	B	B	**B**	B	B	B	**B**	
				Delay	10	10	10	**10**	10	10	10	**10**	12	12	12	**12**	13	13	13	**13**	
				V/C	0.13	0.13	0.13		0.20	0.20	0.20		0.45	0.45	0.45		0.47	0.47	0.47		
		AWS	2033 Background	LOS	B	B	B	**B**	B	B	B	**B**	C	C	C	**C**	C	C	C	**C**	
				Delay	11	11	11	**11**	11	11	11	**11**	17	17	17	**17**	16	16	16	**16**	
				V/C	0.18	0.18	0.18		0.26	0.26	0.26		0.63	0.63	0.63		0.58	0.58	0.58		
		AWS	2033 Total	LOS	B	B	B	**B**	B	B	B	**B**	C	C	C	**C**	C	C	C	**C**	
				Delay	11	11	11	**11**	12	12	12	**12**	18	18	18	**18**	18	18	18	**18**	
				V/C	0.19	0.19	0.19		0.27	0.27	0.27		0.65	0.65	0.65		0.64	0.64	0.64		
PM Peak Hour	2 - Rice Road at Quaker Road	AWS	2024 Base Year	LOS	B	B	B	**B**	B	B	B	**B**	C	C	C	**C**	B	B	B	**B**	
				Delay	10	10	10	**10**	11	11	11	**11**	16	16	16	**16**	15	15	15	**15**	
				V/C	0.14	0.14	0.14		0.20	0.20	0.20		0.61	0.61	0.61		0.57	0.57	0.57		
		AWS	2033 Background	LOS	B	B	B	**B**	B	B	B	**B**	D	D	D	**D**	C	C	C	**C**	
				Delay	12	12	12	**12**	12	12	12	**12**	34	34	34	**34**	22	22	22	**22**	
				V/C	0.20	0.20	0.20		0.27	0.27	0.27		0.87	0.87	0.87		0.72	0.72	0.72		
		AWS	2033 Total	LOS	B	B	B	**B**	B	B	B	**B**	E	E	E	**E**	D	D	D	**D**	
				Delay	12	12	12	**12**	13	13	13	**13**	43	43	43	**43**	26	26	26	**26**	
				V/C	0.22	0.22	0.22		0.29	0.29	0.29		0.92	0.92	0.92		0.77	0.77	0.77		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout

5.2.3 Rice Road at Woodlawn Road (Signalized)

2024 Base Year Operations	Within Capacity	
2033 Background Operations:	Approaching Capacity	
2033 Total Operations	Approaching Capacity	

At Rice Road and Woodlawn Road, individual movements are currently operating at LOS D or better with a v/c ratio no greater than 0.72 during the weekday AM and PM peak hours.

Under the 2033 Background horizon, an additional delay is projected; however, no significant change in LOS is projected. It is noted that the v/c ratio for the westbound left turn movement is projected to increase to 0.89 during the weekday PM peak hour.

In terms of development traffic implications, similar levels of operation are generally expected under the 2033 Total conditions with only minor increases in delay resulting from site-generated traffic volumes.

Critical Movements (V/C over 0.85)

- Westbound Left (2033 Background)

TABLE 5.3: RICE ROAD AT WOODLAWN ROAD OPERATIONS

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																Overall
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	3 - Rice Road at Woodlawn Road	TCS	2024 Base Year	LOS	D	C	C	**C**	C	C	B	**C**	A	B	B	**B**	B	B	B	**B**	**C**
				Delay	35	33	33	**33**	22	22	19	**22**	10	12	10	**11**	15	17	17	**17**	**22**
				V/C	0.59	0.61	0.61		0.37	0.34	0.02		0.11	0.31	0.10		0.10	0.29	0.29		
				Q	33	41	41		21	37	0		11	50	10		12	43	43		
		TCS	2033 Background	LOS	D	C	C	**C**	C	C	B	**C**	B	B	B	**B**	B	C	C	**C**	**C**
				Delay	37	33	33	**34**	22	21	19	**21**	11	15	12	**13**	18	21	21	**20**	**23**
				V/C	0.64	0.66	0.66	**0.00**	0.46	0.38	0.03		0.14	0.41	0.15		0.13	0.37	0.37		
				Q	40	50	50		25	44	0		14	68	14		14	49	49		
		TCS	2033 Total	LOS	D	C	C	**C**	C	C	B	**C**	B	B	B	**B**	B	C	C	**C**	**C**
				Delay	37	33	33	**34**	22	21	19	**21**	11	15	12	**13**	18	21	21	**21**	**23**
				V/C	0.65	0.66	0.66		0.46	0.38	0.03		0.14	0.42	0.15		0.16	0.40	0.40		
				Q	40	50	50		25	44	1		14	68	14		16	52	52		
PM Peak Hour	3 - Rice Road at Woodlawn Road	TCS	2024 Base Year	LOS	C	D	D	**D**	C	C	B	**C**	B	B	B	**B**	B	C	C	**C**	**C**
				Delay	33	37	37	**37**	29	26	19	**27**	13	14	12	**13**	20	28	28	**27**	**26**
				V/C	0.34	0.68	0.68		0.72	0.64	0.05		0.21	0.32	0.12		0.18	0.63	0.63		
				Q	19	48	48		49	86	5		15	49	10		19	91	91		
		TCS	2033 Background	LOS	C	D	D	**D**	D	C	B	**C**	B	B	B	**B**	C	C	C	**C**	**C**
				Delay	34	40	40	**39**	47	29	19	**34**	14	17	14	**15**	21	34	34	**32**	**30**
				V/C	0.41	0.76	0.76		0.89	0.74	0.06		0.31	0.42	0.19		0.23	0.74	0.74		
				Q	22	57	57		66	107	7		19	65	15		21	117	117		
		TCS	2033 Total	LOS	C	D	D	**D**	D	C	B	**C**	B	B	B	**B**	C	C	C	**C**	**C**
				Delay	34	40	40	**39**	47	29	19	**34**	14	17	14	**15**	22	35	35	**33**	**30**
				V/C	0.45	0.76	0.76		0.89	0.74	0.06		0.32	0.43	0.19		0.24	0.76	0.76		
				Q	24	57	57		66	107	8		19	67	15		23	121	121		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout

5.2.4 Rice Road at Driveway

2033 Total Operations	Tolerable Delays	

Individual movements at Rice Road and the Driveway are forecast to operate at LOS C or better during the weekday peak hours for 2033, Total horizon. Delays from the site driveway are not expected to exceed 18 seconds.

TABLE 5.4: RICE ROAD AT DRIVEWAY OPERATIONS

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																Overall
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak	4 - Rice Road at Driveway	TWSC	2024 Base Year	LOS Delay V/C Q					B 15 0.13 4		B 15 0.13 4	**B** **15**		A 0 0.25 0	A 0 0.25 0	**A** **0**	A 0 0.01 0	A 0 0.01 0		**A** **0**	
PM Peak	4 - Rice Road at Driveway	TWSC	2024 Base Year	LOS Delay V/C Q					C 18 0.11 3		C 18 0.11 3	**C** **18**		A 0 0.33 0	A 0 0.33 0	**A** **0**	A 1 0.02 1	A 1 0.02 1		**A** **1**	

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout

6 Mitigation

As summarized in the analysis tables in the previous chapter, the signalized intersections within the study area are currently projected to experience operational deficiencies independent of the development.

The analysis also identified that the development would have minimal impact on the study area's traffic conditions.

6.1 Intersection Improvements

The following section discusses the potential remedial measures that could be considered to accommodate better the forecast traffic volumes at the study area intersections.

6.1.1 Rice Road at Highway 20

With future growth in general traffic, the signalized intersection of Rice Road and Highway 20 will experience increased demand. Improvements to the signal timing could be provided as an interim solution. Ultimately, the future extension of Merrit Road between Rice Road and Cataract Road will be required to provide increased capacity through other alternative routes. Based on the Merritt Road/Rice Road Class EA estimates, volumes along Rice Road could be reduced by approximately 25%.

6.1.2 Rice Road at Quaker Road

With future growth in general traffic, the all-way stop-controlled intersection of Rice Road and Quaker Road will experience increased demand.

A traffic signal warrant analysis was conducted for this intersection to determine if projected traffic conditions would satisfy the warrants. The weekday afternoon peak hour turning movement volume forecast was considered, and Traffic Signal Justification 7 from “Ontario Traffic Manual for Traffic Signals” was applied. This method estimates average hourly volumes for turning movement volumes based on a peak hour forecast.

To apply this analysis method, the average hourly volumes are compared for the Minimum Vehicular Volume and Delay to cross-traffic criteria for traffic signal justification. The Ontario Traffic Manual (OTM) Book 12 dictates that minimum vehicular volume (1A and 1B) or the delay in crossing traffic warrant (2A and 2B) be met to 120% for traffic control signals to be warranted for existing intersections with forecast

traffic volumes. **Table 6.1** summarizes the traffic signal warrant. **Appendix E** provides the warrant analysis worksheets for reference.

TABLE 6.1: RICE AT QUAKER SIGNAL WARRANT SUMMARY

Horizon Year	Minimjum Vehicular Volume		Delay to Cross Traffic		120% Warranted
	All Approaches (1A)	Minor Street Approaches (1B)	Major Street Approaches (2A)	Traffic Major Street (2B)	
2033 Background	73%	242%	16%	295%	No
2033 Total	77%	258%	16%	317%	No

The signal warrant analysis indicates that traffic control signals are not warranted at the intersection under 2033 Background or Total Horizon.

A SimTraffic simulation has been completed for the queue created at the Rice Road and Quaker Road intersection to determine whether the queues would block an adjacent intersection or a major driveway connection.

SimTraffic was utilized rather than Synchro in this assessment as microscopic models, such as Sim Traffic, individually track each vehicle in the traffic system through the model and collect comprehensive operational measures of effectiveness for every vehicle during each 0.1 seconds of the simulation. The analysis consisted of ten (10) iterations of sixty (60) minute simulations to forecast the delay per vehicle in seconds. **Appendix F** provides the SimTraffic results.

Reviewing these results indicates that during the respective peak hours, a queue length of 51 metres is expected for the intersection's southbound approach. The proposed Driveway to Rice Road is approximately 195 metres north of the Rice Road and Quaker Road intersection; vehicle blockage is not projected to occur.

Concerning the northbound approach, a queue length of 74 metres is projected during the weekday PM peak hour, which would block the Niagara Catholic School Board’s north Driveway. It is noted, however, that the school board has two additional driveways, one to Quaker Road and an additional driveway to Rice Road, which the queue lengths will not impact. As the property has multiple access points, access to/from the property is still available during peak congestion at the intersection of Rice Road and Quaker Road. Driver courtesy will also be expected to allow space in the queue for vehicles to/from the school board’s north Driveway.

6.2 Auxiliary Turn Lane Requirements

A review of potential auxiliary turn lanes along Rice Road at the proposed development driveway connection has been assessed.

6.2.1 Left-Turn Lane

The proposed new unsignalized intersections with Rice Road were assessed to determine if the future traffic volumes warrant the installation of a left-turn lane along Rice Road. The warrants for left-turn lanes follow the Ministry of Transportation's (MTO) Design Supplement to the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* (GDGCR)[4] requirements, which provides guidance on the assessment of and/or need for auxiliary left-turn lanes at unsignalized intersections. The warrant analysis to determine if a left-turn lane is needed is based on the following criteria:

- Design speed of the road (posted speed + 10 km/h[5]);
- Advancing Volume;
- Opposing Volume; and
- Percent of advancing vehicles performing a left-turn maneuver.

The percentages of left-turning vehicles in the approaching volume were rounded to the nearest five percent, as warrant nomographs are only provided for five percent increments. **Table 6.2** summarizes the results of the left-turn lane warrant analysis. The results indicate an auxiliary left-turn lane is not warranted along Rice Road at the site driveway under the 2033 Total horizon. **Appendix G** provides the left-turn lane nomographs.

[4] Transportation Association of Canada, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads – Appendix 9A*, Ministry of Transportation of Ontario, 2023.

[5] Niagara Region, Schedule 'C' Municipal Class Environmental Assessment for Merritt Road (Regional Road 37) and Rice Road (Regional Road 54), Table 8-3, March 2024

TABLE 6.2: LEFT-TURN LANE WARRANT SUMMARY

	Rice Road at Driveway	
Approach Direction	Southbound	
Design Speed	60 km/h	
Horizon	2033 Total	
Peak Hour	AM	PM
Advancing Volume	358	427
Opposing Volumes	389	510
Left Turning Traffic	6	18
% of Left Turning Traffic	1.7%	4.2%
Figure Used*	9A-7 (5%)	9A-7 (5%)
Warranted	**No**	**No**
Storage Length Required	-	-

Based on MTO Design Supplement for TAC Geometric Design Guide for Canadian Road - 2023

6.2.2 Deceleration Right-Turn Lane

Right turn lanes are exclusive vehicle lanes allowing a right turn movement to occur outside the through lane. Deceleration lanes are advantageous on higher-speed roads because the driver of a vehicle leaving the highway has no choice but to slow down on the through-traffic lane if a deceleration lane is not provided. The failure to brake by the following drivers, because of a lack of alertness may result in rear-end collisions.

The Federal Highway Administration (FHWA) studied the safety impact of exclusive right turn lanes, and based on their review, collisions can be expected to decrease from 4% to 27%, depending on the circumstances.[6] The proposed new driveway to Rice Road were assessed to determine if the forecasted traffic volumes warrant installing a northbound right-turn lane along Rice Road.
TAC *GDGCR*[7] details the requirements for auxiliary right-turn lanes and recommends a right-turn taper and/or a right-turn lane at unsignalized intersections when "*the volume of decelerating or accelerating vehicles compared with the through traffic volume causes undue hazard*."

MTO guidelines (Geometric Design Standards for Ontario Highways)[8] note that right-turn lanes or tapers may be considered at channelized intersections where right-turn volumes exceed 60 vehicles per hour (vph) and where right-turning vehicles create a hazard or reduce capacity at the intersection. Although this guideline is noted for channelized intersections and the reference pertains to best practices at the time (1976), it provides a benchmark guideline for the volume of right-turning vehicles that may benefit from a right-turn lane.

The northbound right-turning volumes at the proposed site driveway connection to Rice Road are less than 30 vehicles per peak hour under the 2033 Total horizon, equivalent to approximately one vehicle every two minutes over a peak hour. This turning movement is considered insignificant, accounting for less than 5% of the approaching volumes. As a result, the northbound right-turn movements are anticipated not to cause undue hazard, and an auxiliary right-turn lane is not recommended along Rice Road at the proposed site driveway to the development.

---

6 Federal Highway Administration, Safety Effectiveness of Intersection Left-and Right-Turn Lanes.
7 Transportation Association of Canada, *Geometric Design Guide for Canadian Roads*, 2017, p99.
8 Geometric Design Standards for Ontario Highways, Ministry of Transportation, Surveys & Design Office, Chapter E7.2.

7 Conclusions and Recommendations

7.1 Conclusions

This study evaluates the impacts of background traffic growth and projects the impacts of the development with the construction of 139 townhouse units. Access to the site is proposed via a new driveway connection to Rice Road, located 195 metres north of the Rice Road and Quaker Road intersection.

Full-build out of the development is projected to generate approximately 67 new vehicle trips during the weekday AM peak hour and 79 new vehicle trips during the weekday PM peak hour. A left-turn lane warrant analysis was conducted at the proposed development driveway to Rice Road and determined that a southbound left-turn lane is not warranted.

The traffic analysis conducted as part of this assessment indicates that development volumes will result in minor increases in the surrounding study area intersection volumes under peak conditions, which should not be perceptible.

Deficiencies currently exist at the intersection of Rice Road and Highway 20. Operations at this intersection are projected to degrade further as a result of the general growth in traffic to the area, independent of the development. Niagara Region has completed a Municipal Class Environmental Assessment Study to identify improvements to Merritt Road and Rice Road due to proposed developments in the Town of Pelham, the City of Thorold and the City of Welland. As part of the Class EA, to provide additional capacity improvements for the overall area, Merritt Road between Cataract Road and Highway 406 is recommended to be extended. Through this extension, traffic volumes along Rice Road are projected to decrease by approximately 25%. However, until this occurs, an interim improvement option would be to optimize the signal timings.

The all-way stop-controlled intersection of Rice Road and Quaker Road is also projected to experience increased demand as a result of the general traffic growth project for the area. A traffic signal warrant analysis was conducted for this intersection to determine if projected traffic conditions would satisfy the warrants. However, the warrant criteria for signalization are not satisfied. To determine the extent of the queues created by the all-way stop configuration, a SimTraffic simulation was completed for the 2033 Total Horizon.

Reviewing these results indicates that during the respective peak hours, a queue length of 51 metres is expected for the intersection's

southbound approach. The proposed Driveway to Rice Road is approximately 195 metres north of the Rice Road and Quaker Road intersection; vehicle blockage is not projected to occur.

Concerning the northbound approach, a queue length of 74 metres is projected during the weekday PM peak hour, which would block the Niagara Catholic School Board's north Driveway. It is noted, however, that the school board has two additional driveways, one to Quaker Road and an additional driveway to Rice Road, which the queue lengths will not impact. As the property has multiple access points, access to/from the property is still available during peak congestion at Rice Road and Quaker Road intersection. Driver courtesy will also be expected to allow space in the queue for vehicles to/from the school board's north Driveway.

Given that the queue lengths will not impact adjacent intersections/major driveways, the increased delay is considered tolerable until the intersection is widened and upgraded to traffic control signals.

7.2 Recommendations

Based on the findings of this study, the following recommendations are identified:

- The Region optimizes the traffic signal timings at the intersection of Rice Road with Highway 20 and Woodlawn Road as an interim solution until the preferred improvements as per the Class EA are implemented.

Appendix A

Terms of Reference

From:	Dunsmore, Susan
To:	Adam Makarewicz
Cc:	Wilson, Josh; McGowan, Jake
Subject:	RE: 240535: 450 Rice Road, Welland - TIA Scope of Work
Date:	September 16, 2024 7:22:57 AM
Attachments:	image002.png image003.png image004.png image005.png image006.png image007.png

Good Morning

Transportation planning staff have reviewed the scope provided and have provided their comments in red below. For regional traffic data please use the following link: https://www.niagararegion.ca/living/roads/permits/traffic-data-requests.aspx. If the TIS requires improvements to Regional Roads or intersections the TIS is to include functional drawings for the improvements.

If you require anything further please contact either Josh Wilson or myself at your convenience.

Thank you

Susan M. Dunsmore, P.Eng.
ACTING DIRECTOR, INFRASTRUCTURE PLANNING &DEVELOPMENT ENGINEERING
Niagara Region, 1815 Sir Isaac Brock Way, Thorold, ON, L2V 4T7

P : (905) 980 - 6000 ext. 3661
W : www.niagararegion.ca
E : susan.dunsmore@niagararegion.ca

From: Adam Makarewicz <amakarewicz@ptsl.com>
Sent: Friday, September 6, 2024 10:39 AM
To: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Subject: 240535: 450 Rice Road, Welland - TIA Scope of Work

CAUTION EXTERNAL EMAIL: This email originated from outside of the Niagara Region email system. Use caution when clicking links or opening attachments unless you recognize the sender and know the content is safe.

Hi Susan

We've been retained to complete a traffic study for a proposed residential development on the east side of Rice Road and north of Quaker Road; the municipal address is 450 Rice

Road in Welland, Ontario.

The applicant proposes an Official Plan Amendment to develop the property with 139 residential units (low-density) and 193 parking spaces. Vehicle access to the site is proposed through a new driveway connection to Rice Road, located at the northern limit of the property.

It is understood that the Niagara Region has completed a Schedule C Municipal Class Environmental Assessment, including a detailed transportation assessment of Merritt Road (Regional Road 37) and Rice Road (Regional Road 54) in Pelham, Thorold, and Welland. Based on the completed EA, the preferred design is to widen Rice Road north of Quaker Road from a two-lane cross-section to a five-lane cross-section. Based on the pre-consultation that has occurred for this development application, the Region has requested a Transportation Impact Assessment for the short-term condition where the road remains as a two-lane cross-section to determine what facilities/improvements will be required in the interim.

Based on this, would the following scope of work be acceptable?

We've been retained to complete a traffic study for a proposed residential development on the east side of Rice Road and north of Quaker Road; the municipal address is 450 Rice Road in Welland, Ontario.

The applicant proposes an Official Plan Amendment to develop the property with 139 residential units (low-density) and 193 parking spaces. Vehicle access to the site is proposed through a new driveway connection to Rice Road, located at the northern limit of the property.

It is understood that the Niagara Region has completed a Schedule C Municipal Class Environmental Assessment, including a detailed transportation assessment of Merritt Road (Regional Road 37) and Rice Road (Regional Road 54) in Pelham, Thorold, and Welland. Based on the completed EA, the preferred design is to widen Rice Road north of Quaker Road from a two-lane cross-section to a five-lane cross-section. Based on the pre-consultation that has occurred for this development application, the Region has requested a Transportation Impact Assessment for the short-term condition where the road remains as a two-lane cross-section to determine what facilities/improvements will be required in the interim.

For further updates on the Environmental Assessment and the improvements along Rice Road, please refer to the EA webpage at:

https://niagararegion.ca/projects/regional-road-37/

Based on this, would the following scope of work be acceptable?

Scope of Work

- Study Area
    - Rice Road at Quaker Road
    - Proposed Development Driveway
    - Rice Road at Highway 20 – TMC available August 2023

Rice Road at Woodlawn Road – TMC available August 2023

- Peak Hours
  - Weekday AM
  - Weekday PM

- Traffic Data
  - New Counts will be completed in September 2024.

- Horizon Years
  - Existing Year (2024)
  - At Full Buildout, a rough estimate of the buildout year should be identified in the TIS analysis because the study horizon is based on development' buildout year.
  - Five Years After Full Build-Out

- Analysis
  - Synchro 11
  - HCM 2000

- Background Traffic
  - Generalized growth rate will be based on the growth rates contained in the Merritt Road/Rice Road EA (2024-02-15)
    - Quaker Road – 3% EB, 1.9% WB
    - Rice Road – 3% NB, 1.5% SB

- Site Traffic Estimates
  - ITE Trip Generation (11th Edition)

- Site Traffic Distribution
  - Existing travel patterns based on Rice Road and Quaker Road count.

- Mitigation Assessment
  - Left-turn lane Warrants at Rice Road and Proposed Driveway

Thanks,

Adam J. Makarewicz
Senior Project Manager, Associate

paradigm TRANSPORTATION SOLUTIONS LIMITED

Great Place To Work. Certified NOV 2023 - NOV 2024 CANADA

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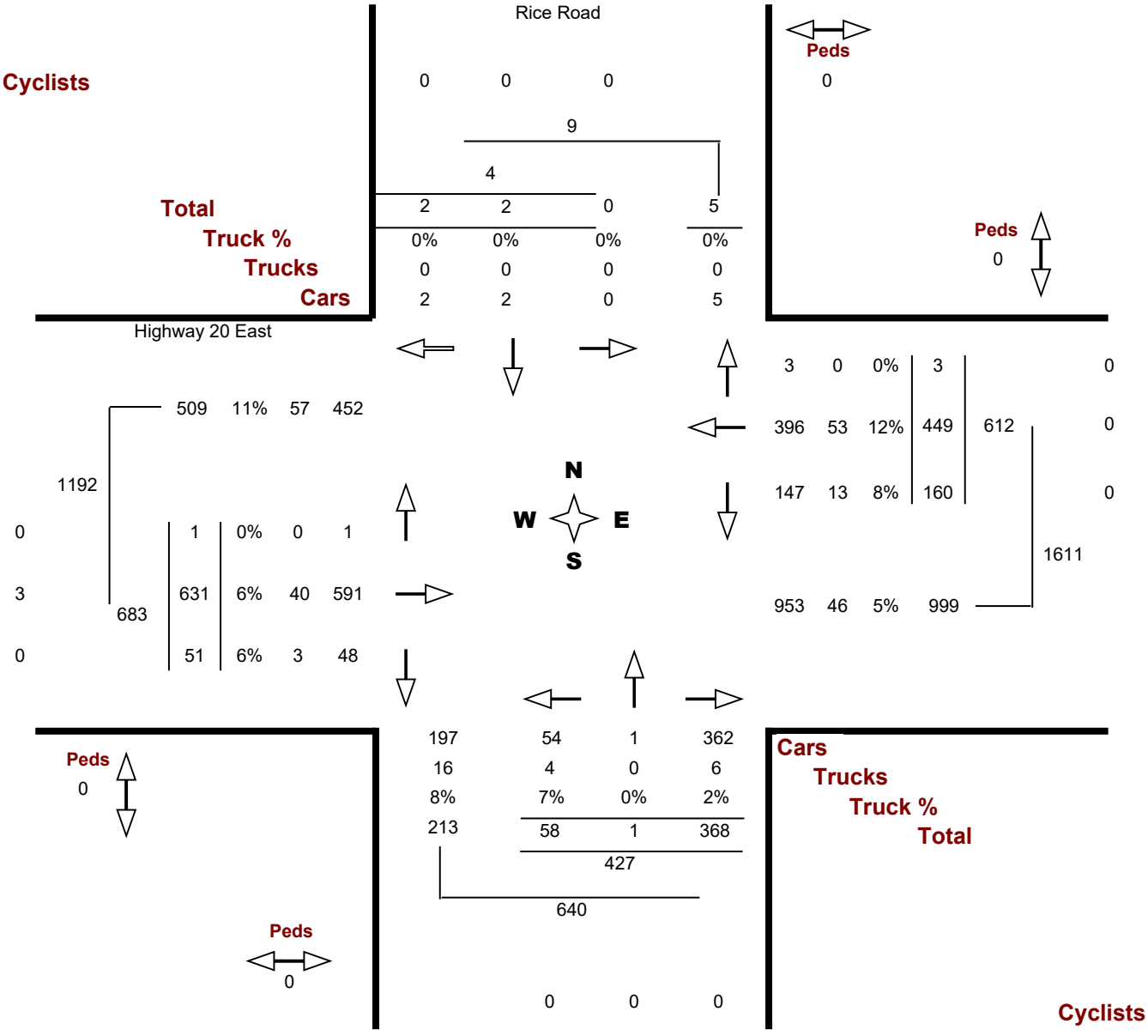
Appendix B

Existing Traffic Data

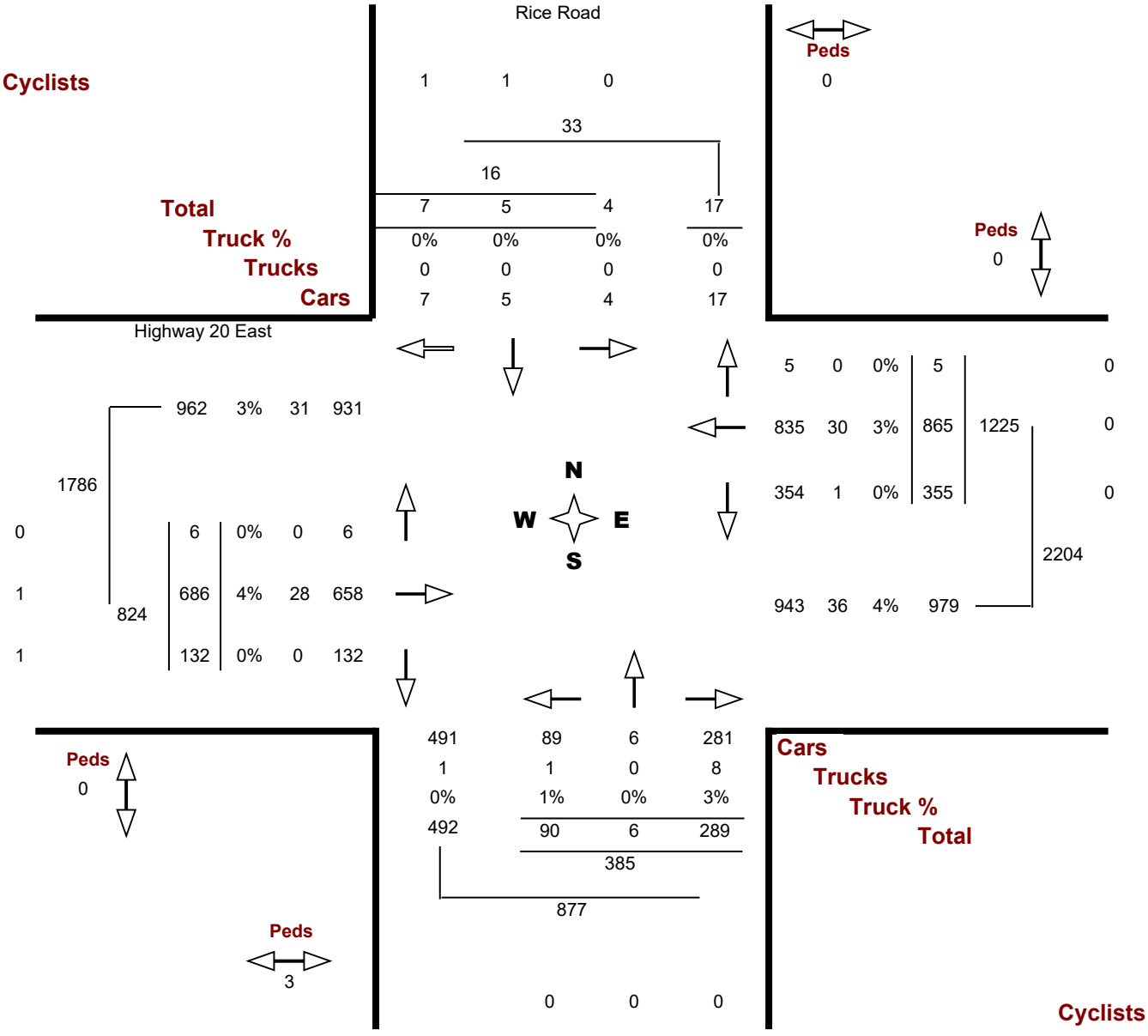
Turning Movements Report - AM Period

Location.....	Highway 20 East @ Rice Road	**GeoID.....**	00389
Municipality.	PELHAM	**Count Date.**	Wednesday, 09 August, 2023
Traffic Cont.	Traffic signal	**Count Time.**	07:00 AM — 09:00 AM
Major Dir.....	East west	**Peak Hour..**	08:00 AM — 09:00 AM



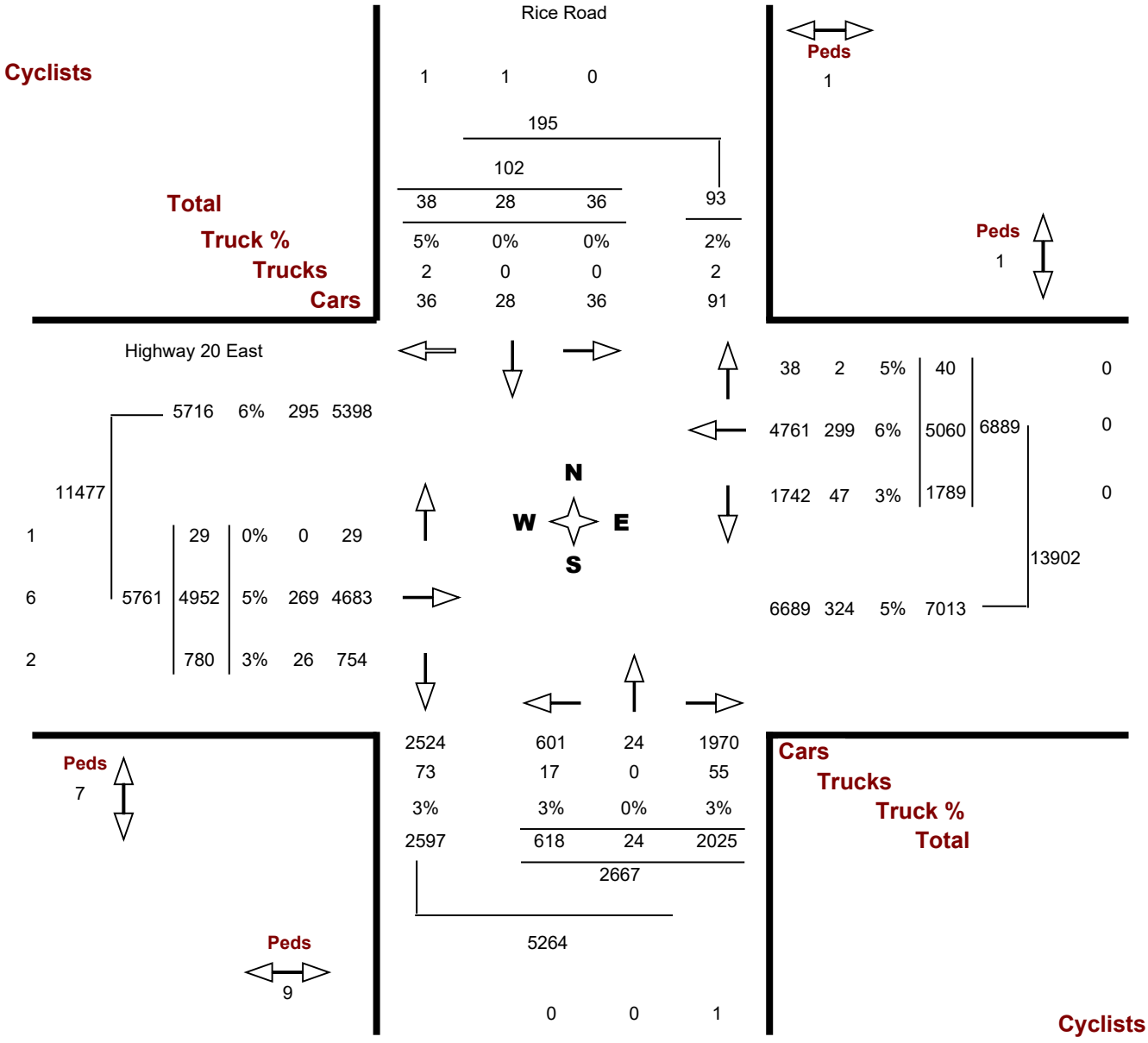
Turning Movements Report - PM Period

Location.....	Highway 20 East @ Rice Road	**GeoID.....**	00389
Municipality.	PELHAM	**Count Date.**	Wednesday, 09 August, 2023
Traffic Cont.	Traffic signal	**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	East west	**Peak Hour..**	04:00 PM — 05:00 PM



Turning Movement Count Report
Full Study

Location..... Highway 20 East @ Rice Road
Municipality..... PELHAM
GeoID..... 00389
Count Date..... Wednesday, 09 August, 2023



Turning Movement Count - Details Report (15 min)

Location..... Highway 20 East @ Rice Road

Municipality..... PELHAM

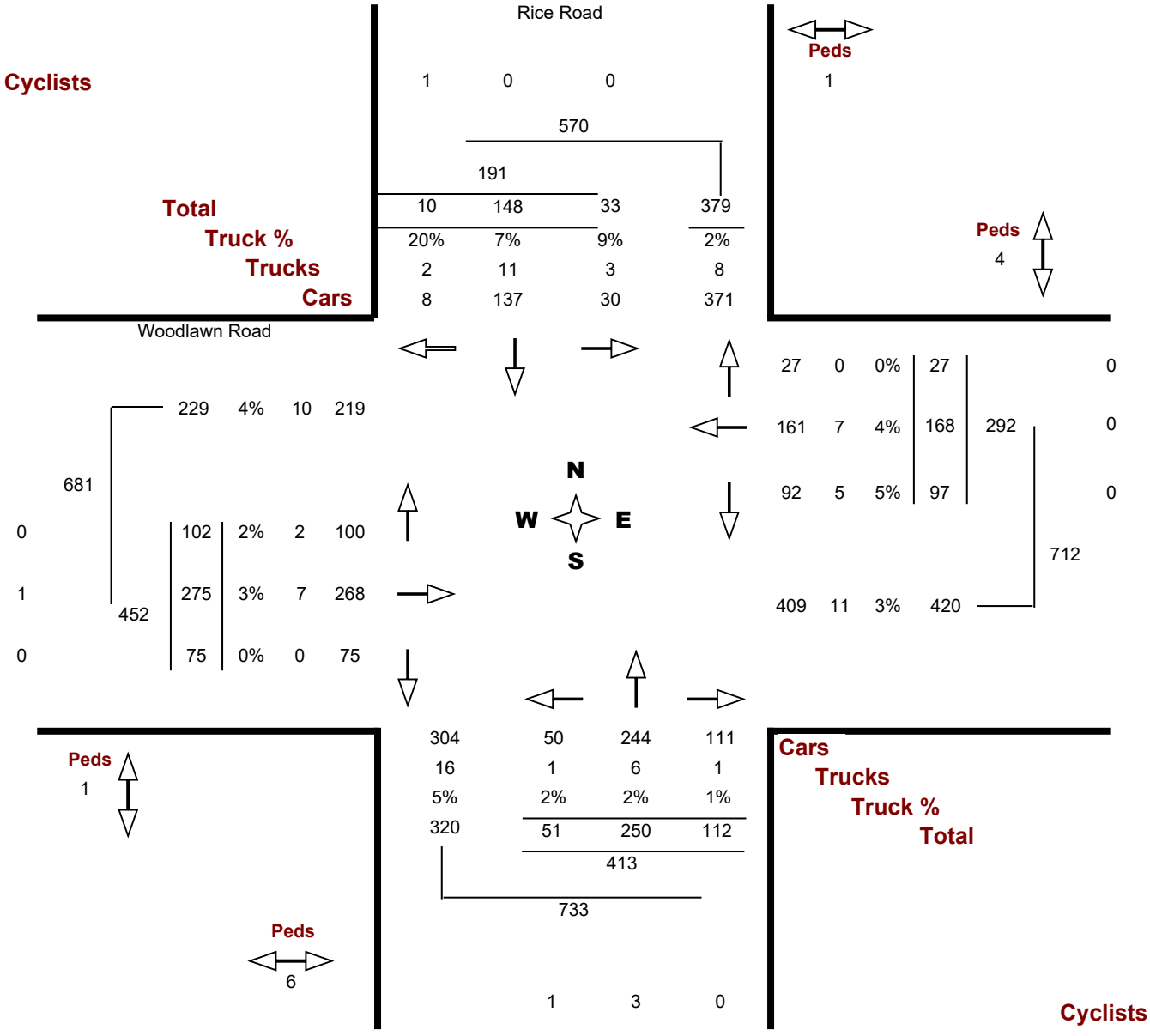
Count Date..... Wednesday, August 09, 2023

		Rice Road										Highway 20 East									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00	07:15	0	0	0	0	0	4	0	56	0	60	30	55	0	0	85	0	88	10	0	98
07:15	07:30	0	0	0	0	0	3	0	72	0	75	30	71	1	0	102	0	115	13	0	128
07:30	07:45	0	0	0	0	0	5	2	72	0	79	31	94	0	0	125	0	153	5	0	158
07:45	08:00	0	0	1	0	1	10	0	87	0	97	39	113	3	0	155	1	131	12	0	144
Hourly Total		0	0	1	0	1	22	2	287	0	311	130	333	4	0	467	1	487	40	0	528
08:00	08:15	0	0	0	0	0	9	0	105	0	114	38	81	0	0	119	0	148	7	0	155
08:15	08:30	0	0	2	0	2	10	0	81	0	91	39	116	1	0	156	0	166	11	0	177
08:30	08:45	0	1	0	0	1	17	0	98	0	115	50	130	1	0	181	0	178	16	0	194
08:45	09:00	0	1	0	0	1	22	1	84	0	107	33	122	1	0	156	1	139	17	0	157
Hourly Total		0	2	2	0	4	58	1	368	0	427	160	449	3	0	612	1	631	51	0	683
11:00	11:15	0	0	1	0	1	18	2	48	0	68	42	145	3	0	190	1	135	18	0	154
11:15	11:30	0	1	2	0	3	17	0	49	0	66	31	119	0	0	150	0	144	22	0	166
11:30	11:45	1	1	1	0	3	25	0	49	0	74	54	173	0	0	227	3	161	20	0	184
11:45	12:00	0	0	2	0	2	25	0	67	0	92	49	155	1	0	205	1	174	32	0	207
Hourly Total		1	2	6	0	9	85	2	213	0	300	176	592	4	0	772	5	614	92	0	711
12:00	12:15	1	0	0	0	1	18	0	52	0	70	49	161	1	0	211	1	150	26	0	177
12:15	12:30	4	0	2	0	6	20	3	51	0	74	36	158	4	0	198	2	154	30	0	186
12:30	12:45	1	0	3	0	4	23	0	43	0	66	53	157	1	0	211	1	169	31	0	201
12:45	13:00	3	0	1	0	4	35	3	54	0	92	45	170	0	0	215	1	152	30	0	183
Hourly Total		9	0	6	0	15	96	6	200	0	302	183	646	6	0	835	5	625	117	0	747
13:00	13:15	0	1	0	0	1	16	1	57	0	74	46	135	2	0	183	1	167	35	0	203
13:15	13:30	2	2	2	0	6	20	0	53	0	73	48	157	4	0	209	0	176	25	0	201
13:30	13:45	0	1	2	0	3	25	1	52	0	78	39	169	0	0	208	3	155	25	0	183
13:45	14:00	4	3	0	0	7	28	1	41	0	70	61	138	1	0	200	1	154	32	0	187
Hourly Total		6	7	4	0	17	89	3	203	0	295	194	599	7	0	800	5	652	117	0	774
15:00	15:15	2	2	2	0	6	14	0	63	0	77	50	176	2	0	228	1	153	22	0	176
15:15	15:30	1	1	2	0	4	19	0	46	0	65	62	180	1	0	243	1	132	28	0	161
15:30	15:45	4	3	2	0	9	24	1	65	0	90	63	192	0	0	255	1	153	28	0	182
15:45	16:00	1	0	1	0	2	20	2	55	0	77	67	214	3	0	284	0	163	32	0	195
Hourly Total		8	6	7	0	21	77	3	229	0	309	242	762	6	0	1010	3	601	110	0	714
16:00	16:15	1	3	1	0	5	20	1	95	0	116	71	203	3	0	277	1	193	36	0	230

		Rice Road										Highway 20 East									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15	16:30	2	0	1	0	3	22	2	68	0	92	91	217	2	0	310	1	180	32	0	213
16:30	16:45	1	1	1	0	3	22	1	62	0	85	91	231	0	0	322	2	153	32	0	187
16:45	17:00	0	1	4	0	5	26	2	64	0	92	102	214	0	0	316	2	160	32	0	194
Hourly Total		4	5	7	0	16	90	6	289	0	385	355	865	5	0	1225	6	686	132	0	824
17:00	17:15	2	2	0	0	4	27	0	64	0	91	90	214	2	0	306	1	166	27	0	194
17:15	17:30	3	1	3	0	7	26	0	61	0	87	95	187	2	0	284	1	176	29	0	206
17:30	17:45	1	1	1	0	3	15	1	66	0	82	90	232	1	0	323	1	175	35	0	211
17:45	18:00	2	2	1	0	5	33	0	45	0	78	74	181	0	0	255	0	139	30	0	169
Hourly Total		8	6	5	0	19	101	1	236	0	338	349	814	5	0	1168	3	656	121	0	780
Grand Total		36	28	38	0	102	618	24	2025	0	2667	1789	5060	40	0	6889	29	4952	780	0	5761
Truck %		0%	0%	5%	0%	2%	3%	0%	3%	0%	3%	3%	6%	5%	0%	5%	0%	5%	3%	0%	5%

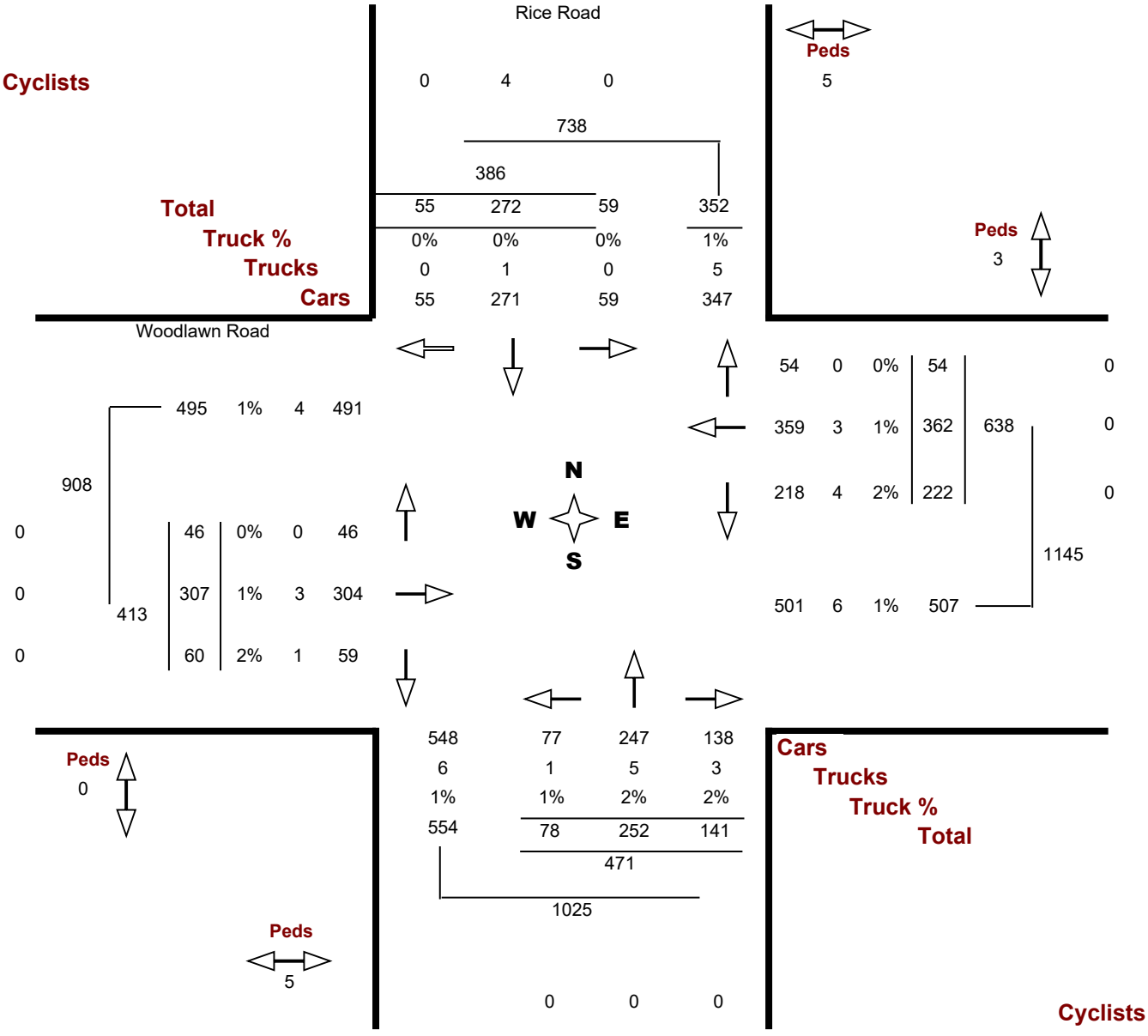
Turning Movements Report - AM Period

Location.....	Rice Road @ Woodlawn Road	**GeoID.....**	00265
Municipality.	WELLAND	**Count Date.**	Wednesday, 09 August, 2023
Traffic Cont.	Traffic signal	**Count Time.**	07:00 AM — 09:00 AM
Major Dir.....	East west	**Peak Hour..**	08:00 AM — 09:00 AM



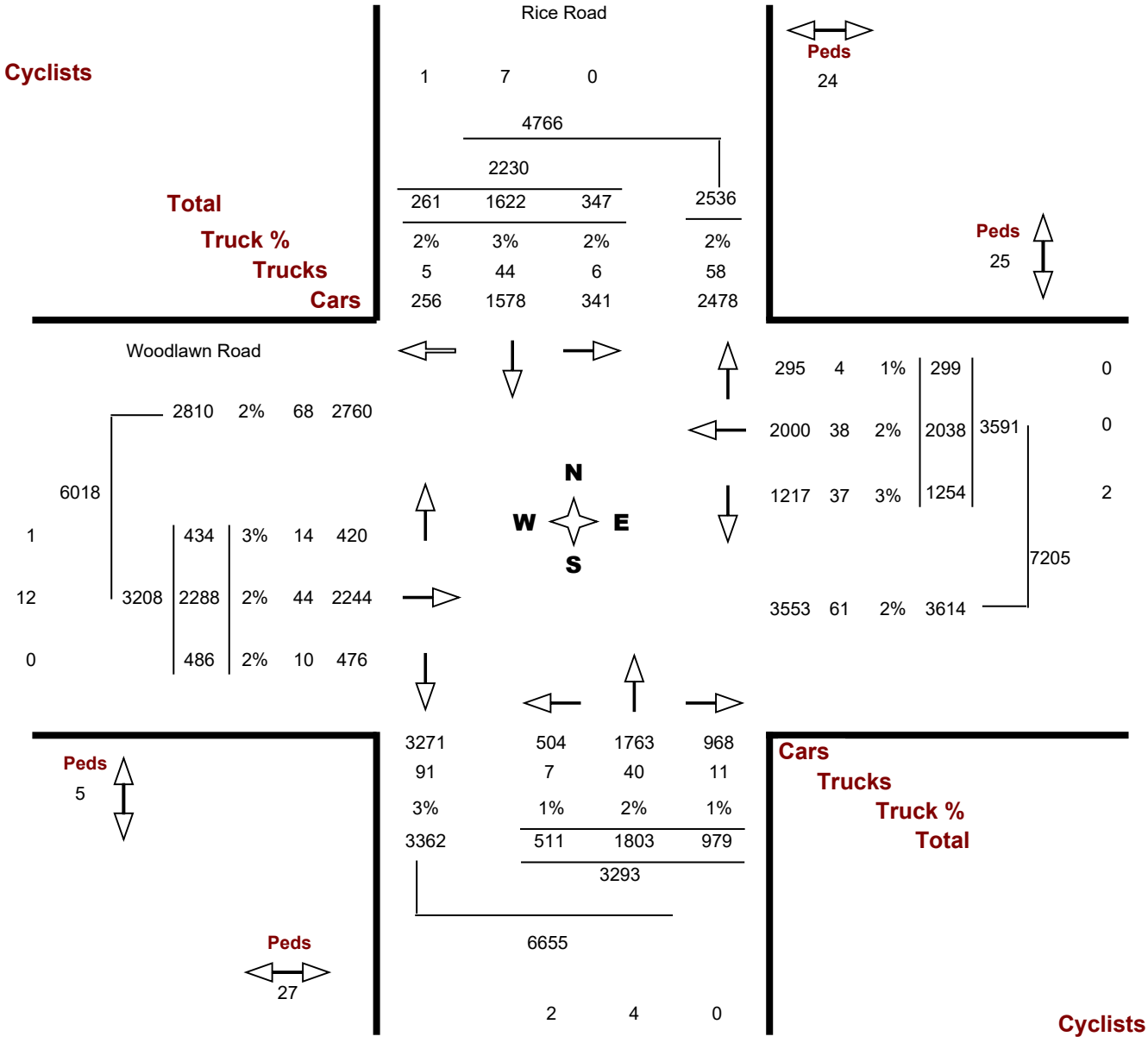
Turning Movements Report - PM Period

Location.....	Rice Road @ Woodlawn Road	**GeoID.....**	00265
Municipality.	WELLAND	**Count Date.**	Wednesday, 09 August, 2023
Traffic Cont.	Traffic signal	**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	East west	**Peak Hour..**	04:00 PM — 05:00 PM



Turning Movement Count Report
Full Study

Location..... Rice Road @ Woodlawn Road
Municipality..... WELLAND
GeoID..... 00265
Count Date..... Wednesday, 09 August, 2023



Turning Movement Count - Details Report (15 min)

Location..... Rice Road @ Woodlawn Road

Municipality..... WELLAND

Count Date..... Wednesday, August 09, 2023

		Rice Road										Woodlawn Road									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00	07:15	4	15	2	0	21	7	32	17	0	56	15	14	3	0	32	12	38	6	0	56
07:15	07:30	4	18	1	0	23	8	31	23	0	62	12	28	1	0	41	7	56	6	0	69
07:30	07:45	6	34	1	0	41	15	60	24	0	99	16	25	4	0	45	10	68	15	0	93
07:45	08:00	8	27	5	0	40	11	53	21	0	85	14	35	4	0	53	15	75	14	0	104
Hourly Total		22	94	9	0	125	41	176	85	0	302	57	102	12	0	171	44	237	41	0	322
08:00	08:15	9	42	2	0	53	11	66	18	0	95	19	37	5	0	61	34	66	18	0	118
08:15	08:30	6	30	5	0	41	11	53	34	0	98	25	51	7	0	83	24	65	21	0	110
08:30	08:45	12	35	3	0	50	15	69	34	0	118	26	43	6	0	75	17	60	14	0	91
08:45	09:00	6	41	0	0	47	14	62	26	0	102	27	37	9	0	73	27	84	22	0	133
Hourly Total		33	148	10	0	191	51	250	112	0	413	97	168	27	0	292	102	275	75	0	452
11:00	11:15	8	51	8	0	67	14	40	31	0	85	31	63	8	0	102	14	55	12	0	81
11:15	11:30	15	46	10	0	71	9	47	26	0	82	28	54	8	0	90	10	79	17	0	106
11:30	11:45	17	47	5	0	69	19	47	38	0	104	33	52	12	0	97	11	67	15	0	93
11:45	12:00	10	50	8	0	68	18	58	30	0	106	48	55	10	0	113	9	77	13	0	99
Hourly Total		50	194	31	0	275	60	192	125	0	377	140	224	38	0	402	44	278	57	0	379
12:00	12:15	9	36	13	0	58	14	54	37	0	105	34	69	8	0	111	15	97	12	0	124
12:15	12:30	13	53	10	0	76	12	55	26	0	93	46	57	13	0	116	9	74	14	0	97
12:30	12:45	7	51	5	0	63	19	64	32	0	115	42	47	14	0	103	21	88	17	0	126
12:45	13:00	14	54	10	0	78	18	65	38	0	121	51	64	7	0	122	14	77	16	0	107
Hourly Total		43	194	38	0	275	63	238	133	0	434	173	237	42	0	452	59	336	59	0	454
13:00	13:15	12	55	15	0	82	22	50	31	0	103	50	63	13	0	126	14	70	19	0	103
13:15	13:30	9	62	10	0	81	13	67	40	0	120	42	59	6	0	107	13	64	13	0	90
13:30	13:45	10	57	8	0	75	13	56	38	0	107	38	64	7	0	109	22	72	8	0	102
13:45	14:00	10	57	6	0	73	15	56	25	0	96	27	69	8	0	104	13	69	29	0	111
Hourly Total		41	231	39	0	311	63	229	134	0	426	157	255	34	0	446	62	275	69	0	406
15:00	15:15	12	51	4	0	67	20	51	41	0	112	51	82	12	0	145	10	74	8	0	92
15:15	15:30	15	62	10	0	87	23	62	33	0	118	49	83	9	0	141	17	84	13	0	114
15:30	15:45	18	60	6	0	84	18	51	34	0	103	56	67	10	0	133	8	71	11	0	90
15:45	16:00	10	46	8	0	64	21	64	40	0	125	56	107	8	0	171	9	62	10	0	81
Hourly Total		55	219	28	0	302	82	228	148	0	458	212	339	39	0	590	44	291	42	0	377
16:00	16:15	15	67	14	0	96	21	61	41	0	123	54	70	15	0	139	9	65	16	0	90

		Rice Road										Woodlawn Road									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15	16:30	17	65	15	0	97	20	61	33	0	114	63	99	15	0	177	14	85	13	0	112
16:30	16:45	13	77	14	0	104	16	59	36	0	111	64	92	12	0	168	8	74	19	0	101
16:45	17:00	14	63	12	0	89	21	71	31	0	123	41	101	12	0	154	15	83	12	0	110
Hourly Total		59	272	55	0	386	78	252	141	0	471	222	362	54	0	638	46	307	60	0	413
17:00	17:15	13	69	12	0	94	27	79	34	0	140	39	86	5	0	130	5	59	16	0	80
17:15	17:30	13	65	17	0	95	17	59	21	0	97	58	99	13	0	170	9	75	27	0	111
17:30	17:45	9	57	9	0	75	21	53	22	0	96	48	72	16	0	136	10	83	17	0	110
17:45	18:00	9	79	13	0	101	8	47	24	0	79	51	94	19	0	164	9	72	23	0	104
Hourly Total		44	270	51	0	365	73	238	101	0	412	196	351	53	0	600	33	289	83	0	405
Grand Total		347	1622	261	0	2230	511	1803	979	0	3293	1254	2038	299	0	3591	434	2288	486	0	3208
Truck %		2%	3%	2%	0%	2%	1%	2%	1%	0%	2%	3%	2%	1%	0%	2%	3%	2%	2%	0%	2%

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Rice Road & Quaker Road
Site Code: 240535
Start Date: 09/10/2024

Turning Movement Data

Start Time	Quaker Road Eastbound						Quaker Road Westbound						Rice Road Northbound						Rice Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	6	2	0	0	8	3	2	1	0	0	6	3	19	6	0	0	28	5	23	0	0	0	28	70
7:15 AM	1	3	6	0	0	10	5	3	3	0	0	11	6	47	10	0	0	63	5	24	1	0	0	30	114
7:30 AM	4	4	5	0	0	13	8	3	5	0	0	16	7	53	7	0	0	67	11	31	4	0	0	46	142
7:45 AM	6	5	0	0	0	11	3	6	7	0	0	16	7	53	10	0	0	70	12	49	5	0	0	66	163
Hourly Total	11	18	13	0	0	42	19	14	16	0	0	49	23	172	33	0	0	228	33	127	10	0	0	170	489
8:00 AM	8	17	16	0	0	41	9	14	10	0	0	33	14	66	10	0	0	90	15	56	2	0	0	73	237
8:15 AM	4	7	7	0	0	18	14	5	12	0	0	31	5	57	10	0	0	72	8	75	1	0	1	84	205
8:30 AM	2	1	1	0	0	4	12	0	7	0	0	19	3	53	11	0	0	67	16	58	2	0	0	76	166
8:45 AM	3	1	5	0	0	9	18	3	13	0	0	34	2	56	14	0	0	72	16	56	4	0	1	76	191
Hourly Total	17	26	29	0	0	72	53	22	42	0	0	117	24	232	45	0	0	301	55	245	9	0	2	309	799
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	1	1	1	0	0	3	7	2	17	0	0	26	2	45	10	0	0	57	13	41	2	0	0	56	142
11:15 AM	1	2	1	0	0	4	10	1	12	0	0	23	5	57	15	0	0	77	17	47	0	0	0	64	168
11:30 AM	1	3	2	0	0	6	11	2	20	0	0	33	4	52	16	0	0	72	12	43	2	0	0	57	168
11:45 AM	2	3	3	0	0	8	12	2	20	0	0	34	9	51	7	0	0	67	14	31	1	0	0	46	155
Hourly Total	5	9	7	0	0	21	40	7	69	0	0	116	20	205	48	0	0	273	56	162	5	0	0	223	633
12:00 PM	0	6	5	0	0	11	11	1	21	0	0	33	2	47	8	0	0	57	16	39	1	0	0	56	157
12:15 PM	1	2	2	0	0	5	12	2	13	0	0	27	8	61	13	0	0	82	19	61	2	0	0	82	196
12:30 PM	0	2	4	0	0	6	6	1	17	0	0	24	4	59	20	0	0	83	15	46	0	0	0	61	174
12:45 PM	0	1	6	0	0	7	16	5	8	0	0	29	3	45	13	0	0	61	12	56	3	0	0	71	168
Hourly Total	1	11	17	0	0	29	45	9	59	0	0	113	17	212	54	0	0	283	62	202	6	0	0	270	695
1:00 PM	2	2	2	0	0	6	8	5	15	0	0	28	0	46	9	0	0	55	19	50	0	0	0	69	158
1:15 PM	2	3	1	0	0	6	13	2	20	0	0	35	1	48	9	0	0	58	16	51	1	0	0	68	167
1:30 PM	0	4	3	0	0	7	7	3	17	0	0	27	8	38	9	0	0	55	12	47	0	0	1	59	148
1:45 PM	3	3	0	0	0	6	14	2	13	0	0	29	3	37	10	0	0	50	18	49	1	0	0	68	153
Hourly Total	7	12	6	0	0	25	42	12	65	0	0	119	12	169	37	0	0	218	65	197	2	0	1	264	626
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	3	1	4	0	0	8	19	3	16	0	0	38	4	63	12	0	0	79	16	46	0	0	0	62	187
3:15 PM	1	1	4	0	0	6	17	4	12	0	0	33	5	79	19	0	0	103	21	69	3	0	0	93	235
3:30 PM	1	3	5	0	0	9	15	5	17	0	0	37	5	90	31	0	1	126	18	57	2	0	0	77	249
3:45 PM	1	5	2	0	0	8	4	5	24	0	0	33	12	80	18	0	0	110	12	57	3	0	0	72	223
Hourly Total	6	10	15	0	0	31	55	17	69	0	0	141	26	312	80	0	1	418	67	229	8	0	0	304	894
4:00 PM	6	3	11	0	0	20	14	8	6	0	0	28	7	69	16	0	0	92	15	64	2	0	0	81	221
4:15 PM	4	7	6	0	0	17	15	5	7	0	0	27	6	80	15	0	0	101	20	77	0	0	0	97	242
4:30 PM	2	8	4	0	0	14	17	8	5	0	0	30	7	93	21	0	0	121	8	66	6	0	0	80	245

4:45 PM	5	6	14	0	0	25	10	4	5	0	0	19	8	81	9	0	0	98	19	67	4	0	0	90	232
Hourly Total	17	24	35	0	0	76	56	25	23	0	0	104	28	323	61	0	0	412	62	274	12	0	0	348	940
5:00 PM	2	6	9	0	0	17	11	4	19	0	0	34	5	67	10	0	0	82	12	78	2	0	0	92	225
5:15 PM	0	2	8	0	0	10	5	3	16	0	0	24	2	52	9	0	0	63	8	71	5	0	0	84	181
5:30 PM	1	3	3	0	0	7	12	2	11	0	0	25	2	78	7	0	0	87	8	61	2	0	0	71	190
5:45 PM	1	0	0	0	0	1	4	2	14	0	1	20	0	47	8	0	0	55	13	35	1	0	0	49	125
Hourly Total	4	11	20	0	0	35	32	11	60	0	1	103	9	244	34	0	0	287	41	245	10	0	0	296	721
6:00 PM	0	5	2	0	0	7	8	3	10	0	0	21	1	42	8	0	0	51	14	50	3	0	0	67	146
6:15 PM	0	0	0	0	0	0	11	1	12	0	0	24	2	47	12	0	0	61	16	45	0	0	0	61	146
6:30 PM	1	1	0	0	0	2	3	1	13	0	0	17	1	41	4	0	0	46	10	38	1	0	0	49	114
6:45 PM	1	1	2	0	0	4	3	1	7	0	0	11	1	45	8	0	0	54	10	34	2	0	0	46	115
Hourly Total	2	7	4	0	0	13	25	6	42	0	0	73	5	175	32	0	0	212	50	167	6	0	0	223	521
Grand Total	70	128	146	0	0	344	367	123	445	0	1	935	164	2044	424	0	1	2632	491	1848	68	0	3	2407	6318
Approach %	20.3	37.2	42.4	0.0	-	-	39.3	13.2	47.6	0.0	-	-	6.2	77.7	16.1	0.0	-	-	20.4	76.8	2.8	0.0	-	-	-
Total %	1.1	2.0	2.3	0.0	-	5.4	5.8	1.9	7.0	0.0	-	14.8	2.6	32.4	6.7	0.0	-	41.7	7.8	29.2	1.1	0.0	-	38.1	-
Motorcycles	0	0	0	0	-	0	4	0	0	0	-	4	0	5	2	0	-	7	2	10	0	0	-	12	23
% Motorcycles	0.0	0.0	0.0	-	-	0.0	1.1	0.0	0.0	-	-	0.4	0.0	0.2	0.5	-	-	0.3	0.4	0.5	0.0	-	-	0.5	0.4
Cars & Light Goods	66	120	116	0	-	302	358	121	438	0	-	917	130	2007	408	0	-	2545	478	1798	64	0	-	2340	6104
% Cars & Light Goods	94.3	93.8	79.5	-	-	87.8	97.5	98.4	98.4	-	-	98.1	79.3	98.2	96.2	-	-	96.7	97.4	97.3	94.1	-	-	97.2	96.6
Buses	1	3	3	0	-	7	1	1	3	0	-	5	5	11	9	0	-	25	8	17	3	0	-	28	65
% Buses	1.4	2.3	2.1	-	-	2.0	0.3	0.8	0.7	-	-	0.5	3.0	0.5	2.1	-	-	0.9	1.6	0.9	4.4	-	-	1.2	1.0
Single-Unit Trucks	3	0	24	0	-	27	4	1	4	0	-	9	29	15	4	0	-	48	2	18	1	0	-	21	105
% Single-Unit Trucks	4.3	0.0	16.4	-	-	7.8	1.1	0.8	0.9	-	-	1.0	17.7	0.7	0.9	-	-	1.8	0.4	1.0	1.5	-	-	0.9	1.7
Articulated Trucks	0	0	3	0	-	3	0	0	0	0	-	0	0	6	0	0	-	6	1	5	0	0	-	6	15
% Articulated Trucks	0.0	0.0	2.1	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.2	0.3	0.0	-	-	0.2	0.2
Bicycles on Road	0	5	0	0	-	5	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	6
% Bicycles on Road	0.0	3.9	0.0	-	-	1.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.2	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	33.3	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	66.7	-	-

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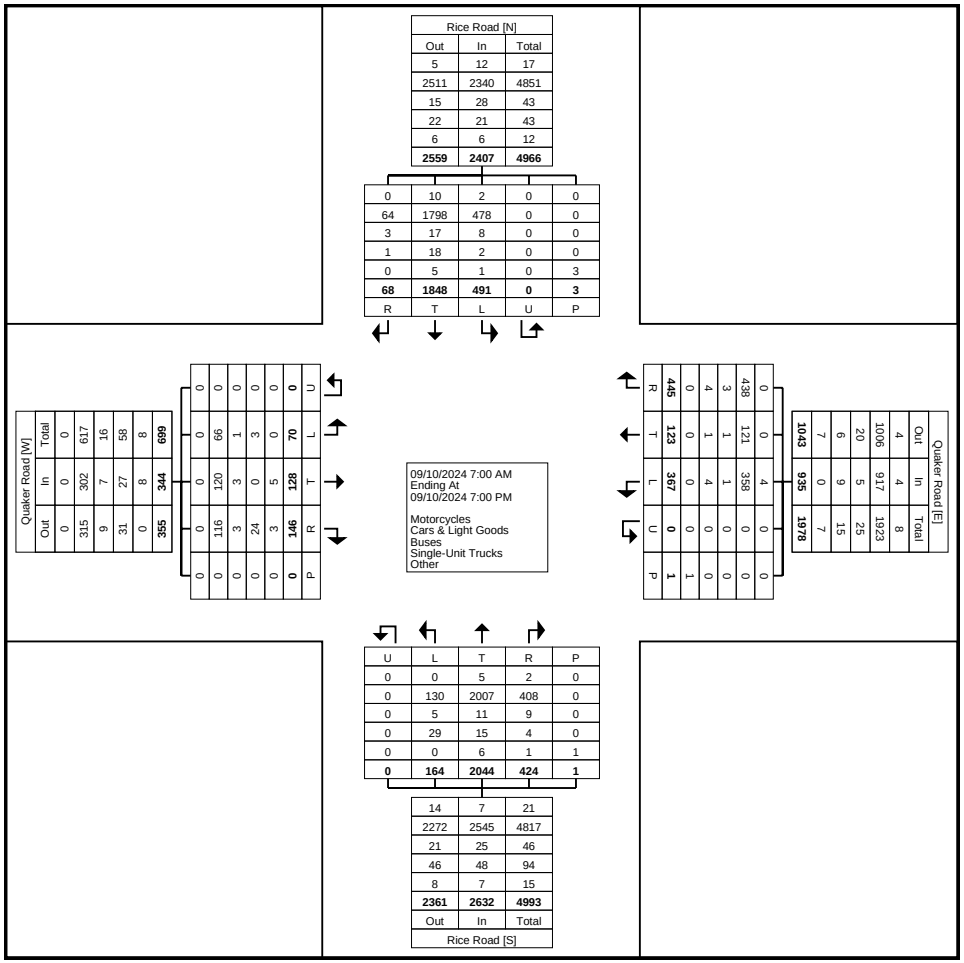
Site Code: 240535
Start Date: 09/10/2024
Page No: 3



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Rice Road & Quaker Road
Site Code: 240535
Start Date: 09/10/2024

Turning Movement Peak Hour Data (8:00 AM)

Start Time	Quaker Road Eastbound						Quaker Road Westbound						Rice Road Northbound						Rice Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	8	17	16	0	0	41	9	14	10	0	0	33	14	66	10	0	0	90	15	56	2	0	0	73	237
8:15 AM	4	7	7	0	0	18	14	5	12	0	0	31	5	57	10	0	0	72	8	75	1	0	1	84	205
8:30 AM	2	1	1	0	0	4	12	0	7	0	0	19	3	53	11	0	0	67	16	58	2	0	0	76	166
8:45 AM	3	1	5	0	0	9	18	3	13	0	0	34	2	56	14	0	0	72	16	56	4	0	1	76	191
Total	17	26	29	0	0	72	53	22	42	0	0	117	24	232	45	0	0	301	55	245	9	0	2	309	799
Approach %	23.6	36.1	40.3	0.0	-	-	45.3	18.8	35.9	0.0	-	-	8.0	77.1	15.0	0.0	-	-	17.8	79.3	2.9	0.0	-	-	-
Total %	2.1	3.3	3.6	0.0	-	9.0	6.6	2.8	5.3	0.0	-	14.6	3.0	29.0	5.6	0.0	-	37.7	6.9	30.7	1.1	0.0	-	38.7	-
PHF	0.531	0.382	0.453	0.000	-	0.439	0.736	0.393	0.808	0.000	-	0.860	0.429	0.879	0.804	0.000	-	0.836	0.859	0.817	0.563	0.000	-	0.920	0.843
Motorcycles	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	1	0	0	0	-	1	2
% Motorcycles	0.0	0.0	0.0	-	-	0.0	1.9	0.0	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	1.8	0.0	0.0	-	-	0.3	0.3
Cars & Light Goods	17	24	24	0	-	65	52	21	41	0	-	114	21	229	43	0	-	293	51	235	7	0	-	293	765
% Cars & Light Goods	100.0	92.3	82.8	-	-	90.3	98.1	95.5	97.6	-	-	97.4	87.5	98.7	95.6	-	-	97.3	92.7	95.9	77.8	-	-	94.8	95.7
Buses	0	2	3	0	-	5	0	1	0	0	-	1	1	3	2	0	-	6	3	6	2	0	-	11	23
% Buses	0.0	7.7	10.3	-	-	6.9	0.0	4.5	0.0	-	-	0.9	4.2	1.3	4.4	-	-	2.0	5.5	2.4	22.2	-	-	3.6	2.9
Single-Unit Trucks	0	0	2	0	-	2	0	0	1	0	-	1	2	0	0	0	-	2	0	4	0	0	-	4	9
% Single-Unit Trucks	0.0	0.0	6.9	-	-	2.8	0.0	0.0	2.4	-	-	0.9	8.3	0.0	0.0	-	-	0.7	0.0	1.6	0.0	-	-	1.3	1.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

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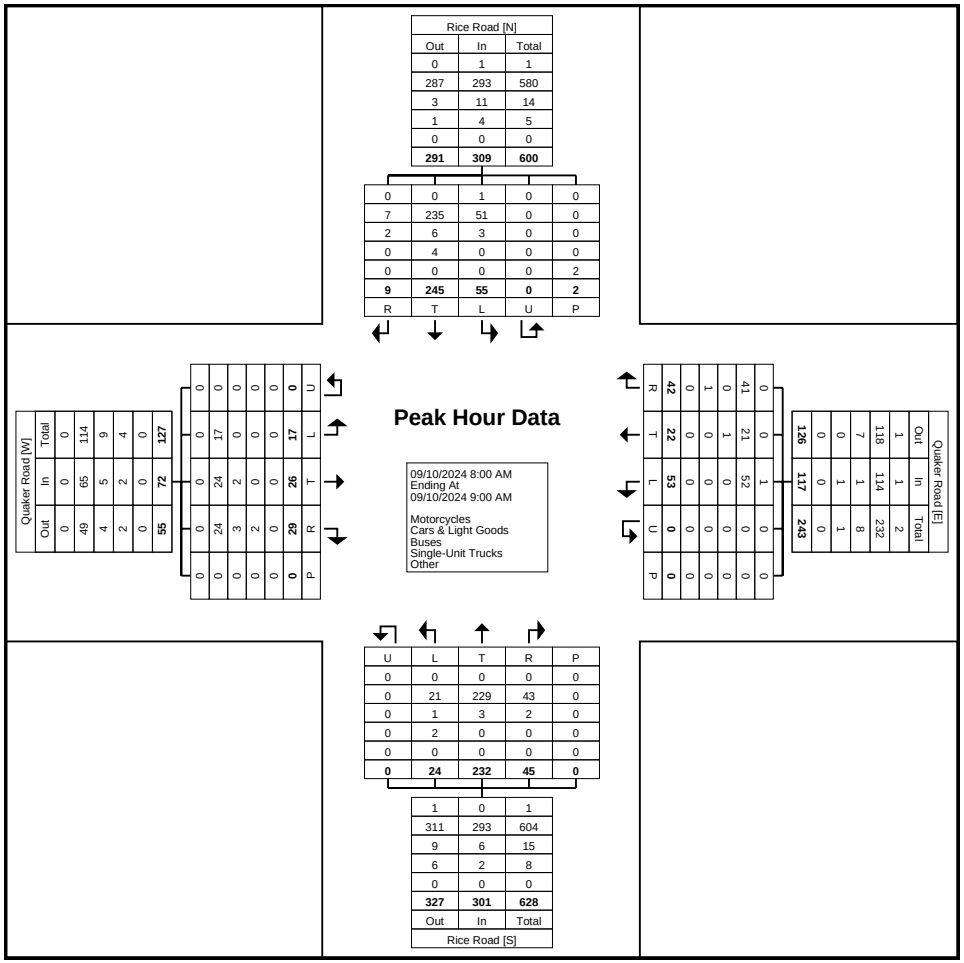

Turning Movement Peak Hour Data Plot (8:00 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Rice Road & Quaker Road
Site Code: 240535
Start Date: 09/10/2024

Turning Movement Peak Hour Data (12:15 PM)

Start Time	Quaker Road Eastbound						Quaker Road Westbound						Rice Road Northbound						Rice Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:15 PM	1	2	2	0	0	5	12	2	13	0	0	27	8	61	13	0	0	82	19	61	2	0	0	82	196
12:30 PM	0	2	4	0	0	6	6	1	17	0	0	24	4	59	20	0	0	83	15	46	0	0	0	61	174
12:45 PM	0	1	6	0	0	7	16	5	8	0	0	29	3	45	13	0	0	61	12	56	3	0	0	71	168
1:00 PM	2	2	2	0	0	6	8	5	15	0	0	28	0	46	9	0	0	55	19	50	0	0	0	69	158
Total	3	7	14	0	0	24	42	13	53	0	0	108	15	211	55	0	0	281	65	213	5	0	0	283	696
Approach %	12.5	29.2	58.3	0.0	-	-	38.9	12.0	49.1	0.0	-	-	5.3	75.1	19.6	0.0	-	-	23.0	75.3	1.8	0.0	-	-	-
Total %	0.4	1.0	2.0	0.0	-	3.4	6.0	1.9	7.6	0.0	-	15.5	2.2	30.3	7.9	0.0	-	40.4	9.3	30.6	0.7	0.0	-	40.7	-
PHF	0.375	0.875	0.583	0.000	-	0.857	0.656	0.650	0.779	0.000	-	0.931	0.469	0.865	0.688	0.000	-	0.846	0.855	0.873	0.417	0.000	-	0.863	0.888
Motorcycles	0	0	0	0	-	0	1	0	0	0	-	1	0	1	0	0	-	1	0	1	0	0	-	1	3
% Motorcycles	0.0	0.0	0.0	-	-	0.0	2.4	0.0	0.0	-	-	0.9	0.0	0.5	0.0	-	-	0.4	0.0	0.5	0.0	-	-	0.4	0.4
Cars & Light Goods	3	7	9	0	-	19	41	13	51	0	-	105	10	204	52	0	-	266	65	211	5	0	-	281	671
% Cars & Light Goods	100.0	100.0	64.3	-	-	79.2	97.6	100.0	96.2	-	-	97.2	66.7	96.7	94.5	-	-	94.7	100.0	99.1	100.0	-	-	99.3	96.4
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.1
Single-Unit Trucks	0	0	5	0	-	5	0	0	2	0	-	2	5	5	3	0	-	13	0	1	0	0	-	1	21
% Single-Unit Trucks	0.0	0.0	35.7	-	-	20.8	0.0	0.0	3.8	-	-	1.9	33.3	2.4	5.5	-	-	4.6	0.0	0.5	0.0	-	-	0.4	3.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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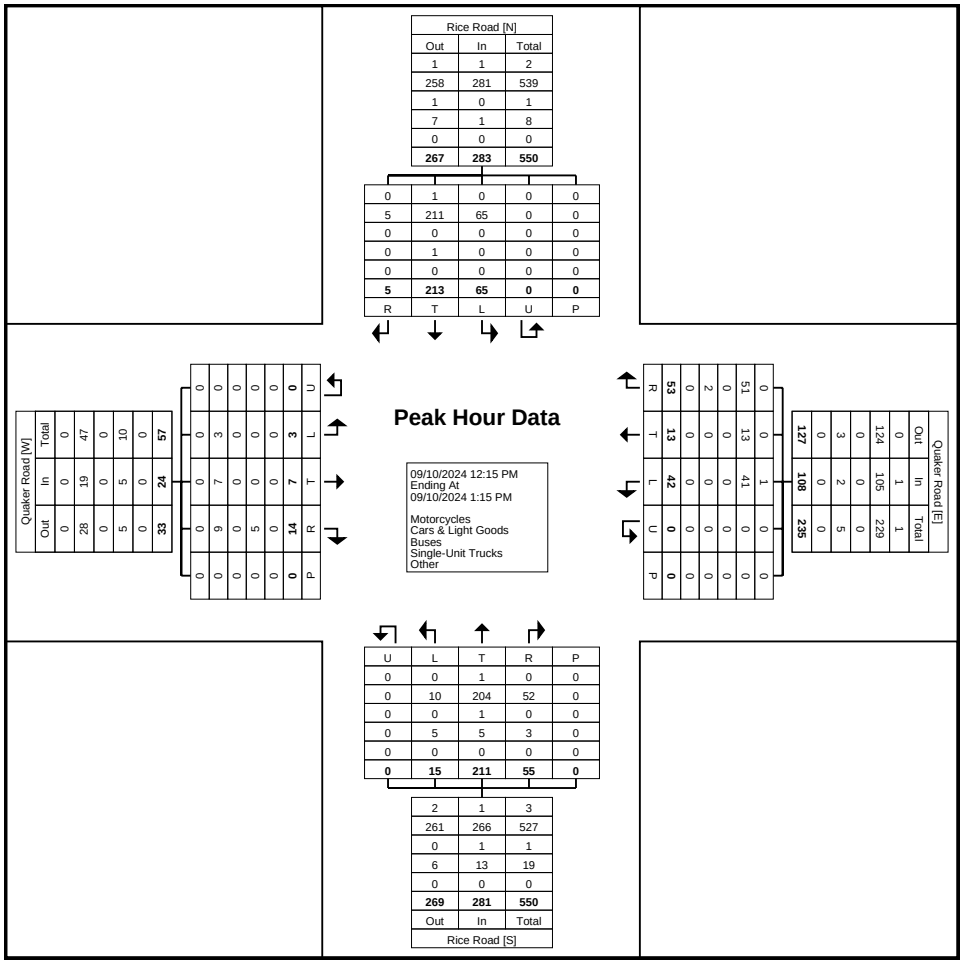

Turning Movement Peak Hour Data Plot (12:15 PM)

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5A-150 Pinebush Rd

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Count Name: Rice Road & Quaker Road
Site Code: 240535
Start Date: 09/10/2024

Turning Movement Peak Hour Data (4:15 PM)

Start Time	Quaker Road Eastbound						Quaker Road Westbound						Rice Road Northbound						Rice Road Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:15 PM	4	7	6	0	0	17	15	5	7	0	0	27	6	80	15	0	0	101	20	77	0	0	0	97	242
4:30 PM	2	8	4	0	0	14	17	8	5	0	0	30	7	93	21	0	0	121	8	66	6	0	0	80	245
4:45 PM	5	6	14	0	0	25	10	4	5	0	0	19	8	81	9	0	0	98	19	67	4	0	0	90	232
5:00 PM	2	6	9	0	0	17	11	4	19	0	0	34	5	67	10	0	0	82	12	78	2	0	0	92	225
Total	13	27	33	0	0	73	53	21	36	0	0	110	26	321	55	0	0	402	59	288	12	0	0	359	944
Approach %	17.8	37.0	45.2	0.0	-	-	48.2	19.1	32.7	0.0	-	-	6.5	79.9	13.7	0.0	-	-	16.4	80.2	3.3	0.0	-	-	-
Total %	1.4	2.9	3.5	0.0	-	7.7	5.6	2.2	3.8	0.0	-	11.7	2.8	34.0	5.8	0.0	-	42.6	6.3	30.5	1.3	0.0	-	38.0	-
PHF	0.650	0.844	0.589	0.000	-	0.730	0.779	0.656	0.474	0.000	-	0.809	0.813	0.863	0.655	0.000	-	0.831	0.738	0.923	0.500	0.000	-	0.925	0.963
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	1	1	0	-	2	1	4	0	0	-	5	7
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	1.8	-	-	0.5	1.7	1.4	0.0	-	-	1.4	0.7
Cars & Light Goods	13	22	28	0	-	63	53	21	36	0	-	110	23	318	53	0	-	394	56	280	12	0	-	348	915
% Cars & Light Goods	100.0	81.5	84.8	-	-	86.3	100.0	100.0	100.0	-	-	100.0	88.5	99.1	96.4	-	-	98.0	94.9	97.2	100.0	-	-	96.9	96.9
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1	4	0	0	-	5	6
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	1.7	1.4	0.0	-	-	1.4	0.6
Single-Unit Trucks	0	0	5	0	-	5	0	0	0	0	-	0	3	1	0	0	-	4	1	0	0	0	-	1	10
% Single-Unit Trucks	0.0	0.0	15.2	-	-	6.8	0.0	0.0	0.0	-	-	0.0	11.5	0.3	0.0	-	-	1.0	1.7	0.0	0.0	-	-	0.3	1.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	5	0	0	-	5	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	6
% Bicycles on Road	0.0	18.5	0.0	-	-	6.8	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.8	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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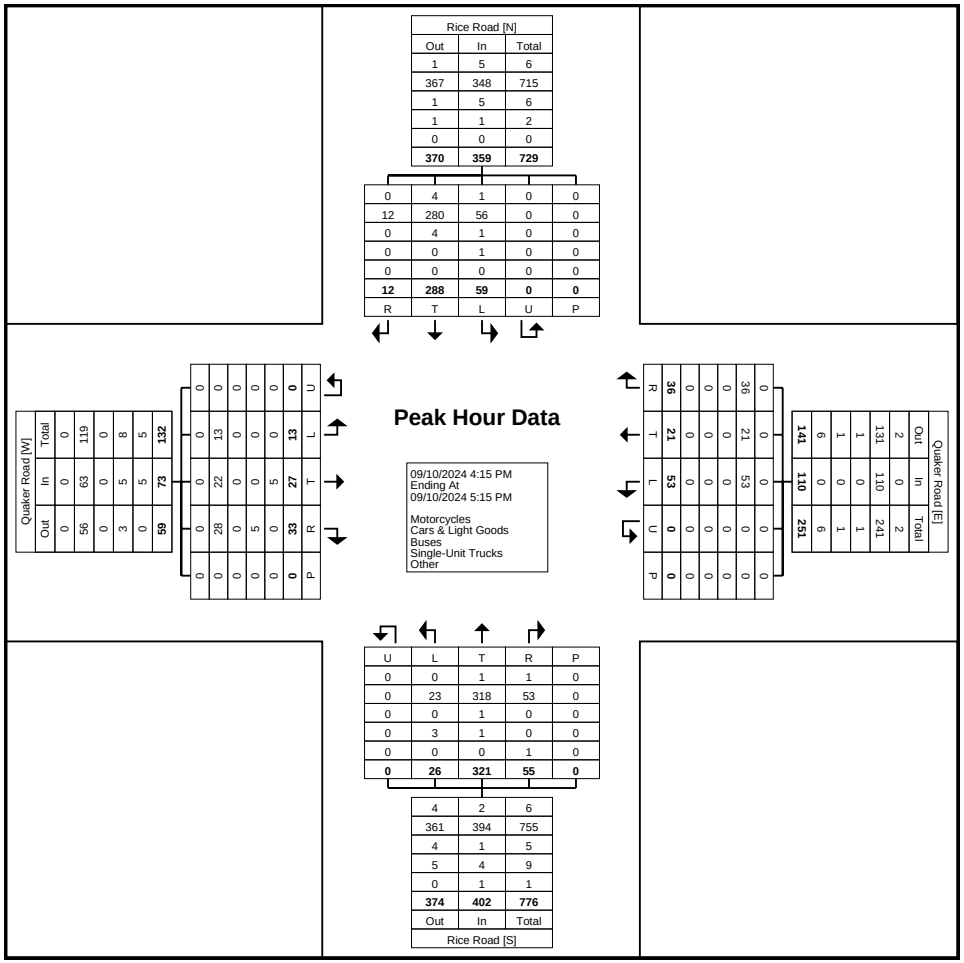


Turning Movement Peak Hour Data Plot (4:15 PM)

Appendix C

Distribution Calculations

Rice at Quaker	Two-Way Link Volumes			
	AM Peak Hour	PM Peak Hour	Total	%
North	600	729	1329	38.1%
South	628	776	1404	40.3%
East	243	251	494	14.2%
West	127	132	259	7.4%
Total	1598	1888	3486	100.0%

Rice at Highway 20	Two-Way Link Volumes				Intersection Distribution
	AM Peak Hour	PM Peak Hour	Total	%	38.1%
North	9	33	42	0.61%	0.2%
East	1611	2204	3815	55.82%	21.3%
West	1192	1786	2978	43.57%	16.6%
Total	2812	4023	6835	100.00%	38.1%

Rice at Woodlawn	Two-Way Link Volumes				Intersection Distribution
	AM Peak Hour	PM Peak Hour	Total	%	40.3%
East	712	1142	1854	35.68%	14.4%
West	681	904	1585	30.50%	12.3%
South	733	1024	1757	33.81%	13.6%
Total	1393	2046	5196	100.00%	40.3%

Appendix D

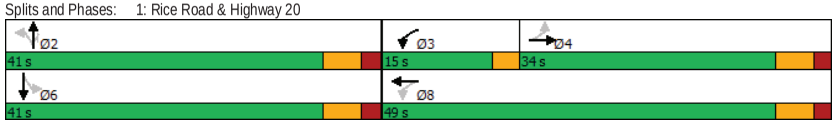
Operational Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	631	51	160	449	3	58	1	368	0	2	2
Future Volume (vph)	1	631	51	160	449	3	58	1	368	0	2	2
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Storage Length (m)	60.0		0.0	100.0		0.0	65.0		65.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.989			0.999				0.850		0.932	
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1568	3148	0	1452	3012	0	1466	1776	1248	0	1519	0
Flt Permitted	0.473			0.182			0.755					
Satd. Flow (perm)	781	3148	0	278	3012	0	1165	1776	1248	0	1519	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			1				368		2	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		302.4			531.3			2985.6			100.9	
Travel Time (s)		21.8			38.3			215.0			7.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	8%	12%	0%	7%	0%	2%	0%	0%	0%
Adj. Flow (vph)	1	686	55	174	488	3	63	1	400	0	2	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	741	0	174	491	0	63	1	400	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.31	1.20	1.09	1.35	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		4		3	8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.2	24.2		13.0	24.1		24.4	24.4	24.4	30.0	30.0	
Total Split (s)	34.0	34.0		15.0	49.0		41.0	41.0	41.0	41.0	41.0	
Total Split (%)	37.8%	37.8%		16.7%	54.4%		45.6%	45.6%	45.6%	45.6%	45.6%	
Maximum Green (s)	27.8	27.8		12.0	42.9		34.6	34.6	34.6	34.6	34.6	
Yellow Time (s)	4.2	4.2		3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.3	2.3	2.3	2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	24.0	24.0		41.3	38.1		34.7	34.7	34.7		34.7	
Actuated g/C Ratio	0.28	0.28		0.48	0.45		0.41	0.41	0.41		0.41	
v/c Ratio	0.00	0.83		0.61	0.36		0.13	0.00	0.55		0.01	
Control Delay	22.0	37.5		22.3	16.2		18.5	17.0	6.4		14.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	22.0	37.5		22.3	16.2		18.5	17.0	6.4		14.2	
LOS	C	D		C	B		B	B	A		B	
Approach Delay		37.5			17.8			8.0			14.3	
Approach LOS		D			B			A			B	
Queue Length 50th (m)	0.1	62.1		16.7	28.1		7.0	0.1	3.4		0.2	
Queue Length 95th (m)	1.3	84.7		29.5	39.8		16.2	1.1	26.4		2.4	
Internal Link Dist (m)		278.4			507.3			2961.6			76.9	
Turn Bay Length (m)	60.0			100.0			65.0		65.0			
Base Capacity (vph)	255	1034		299	1518		473	721	725		618	
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	0.00	0.72		0.58	0.32		0.13	0.00	0.55		0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 85.4			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 23.2		Intersection LOS: C	
Intersection Capacity Utilization 73.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Rice Road & Highway 20



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	631	51	160	449	3	58	1	368	0	2	2
Future Volume (vph)	1	631	51	160	449	3	58	1	368	0	2	2
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Total Lost time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85		0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1568	3148		1452	3012		1466	1776	1248		1520	
Flt Permitted	0.47	1.00		0.18	1.00		0.76	1.00	1.00		1.00	
Satd. Flow (perm)	781	3148		278	3012		1165	1776	1248		1520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	686	55	174	488	3	63	1	400	0	2	2
RTOR Reduction (vph)	0	7	0	0	1	0	0	0	218	0	1	0
Lane Group Flow (vph)	1	734	0	174	490	0	63	1	182	0	3	0
Heavy Vehicles (%)	0%	6%	6%	8%	12%	0%	7%	0%	2%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	24.0	24.0		38.2	38.2		34.7	34.7	34.7		34.7	
Effective Green, g (s)	24.0	24.0		38.2	38.2		34.7	34.7	34.7		34.7	
Actuated g/C Ratio	0.28	0.28		0.45	0.45		0.41	0.41	0.41		0.41	
Clearance Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	219	884		276	1347		473	721	507		617	
v/s Ratio Prot		c0.23		c0.08	0.16			0.00			0.00	
v/s Ratio Perm	0.00			0.20			0.05		c0.15			
v/c Ratio	0.00	0.83		0.63	0.36		0.13	0.00	0.36		0.00	
Uniform Delay, d1	22.1	28.8		16.4	15.6		15.9	15.1	17.6		15.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	6.7		4.6	0.2		0.6	0.0	2.0		0.0	
Delay (s)	22.1	35.5		21.1	15.7		16.5	15.1	19.6		15.1	
Level of Service	C	D		C	B		B	B	B		B	
Approach Delay (s)		35.4			17.1			19.2			15.1	
Approach LOS		D			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	15.6	
Intersection Capacity Utilization	73.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	26	29	53	22	42	24	232	45	55	245	9
Future Volume (vph)	17	26	29	53	22	42	24	232	45	55	245	9
Ideal Flow (vphpl)	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.945			0.951			0.980			0.996	
Flt Protected		0.989			0.978			0.996			0.991	
Satd. Flow (prot)	0	1381	0	0	1478	0	0	1555	0	0	1531	0
Flt Permitted		0.989			0.978			0.996			0.991	
Satd. Flow (perm)	0	1381	0	0	1478	0	0	1555	0	0	1531	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		556.9			693.9			1030.4			235.8	
Travel Time (s)		40.1			50.0			74.2			17.0	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	17%	2%	5%	2%	12%	1%	4%	7%	4%	22%
Adj. Flow (vph)	18	28	32	58	24	46	26	252	49	60	266	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	78	0	0	128	0	0	327	0	0	336	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	26	29	53	22	42	24	232	45	55	245	9
Future Volume (vph)	17	26	29	53	22	42	24	232	45	55	245	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	28	32	58	24	46	26	252	49	60	266	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	78	128	327	336
Volume Left (vph)	18	58	26	60
Volume Right (vph)	32	46	49	10
Hadj (s)	-0.02	-0.08	-0.03	0.10
Departure Headway (s)	5.8	5.6	4.9	5.1
Degree Utilization, x	0.13	0.20	0.45	0.47
Capacity (veh/h)	536	564	698	682
Control Delay (s)	9.6	10.0	11.9	12.5
Approach Delay (s)	9.6	10.0	11.9	12.5
Approach LOS	A	B	B	B

Intersection Summary			
Delay	11.7		
Level of Service	B		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

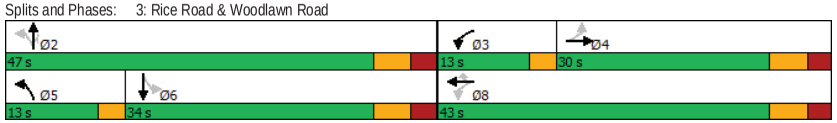
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	275	75	97	168	27	51	250	112	33	148	10
Future Volume (vph)	102	275	75	97	168	27	51	250	112	33	148	10
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Storage Length (m)	25.0		30.0	55.0		0.0	20.0		25.0	30.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		0.99		0.98	1.00		0.98	1.00	1.00	
Frt		0.968				0.850			0.850		0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1538	3167	0	1538	1741	1261	1494	1708	1273	1439	1407	0
Flt Permitted	0.642			0.391			0.595			0.592		
Satd. Flow (perm)	1037	3167	0	628	1741	1232	934	1708	1251	893	1407	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37				85			122		4	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		589.4			876.0			706.2			1030.4	
Travel Time (s)		42.4			63.1			50.8			74.2	
Confl. Peds. (#/hr)	1		6	6		1	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	0%	2%	2%	1%	5%	4%	0%	9%	7%	20%
Adj. Flow (vph)	111	299	82	105	183	29	55	272	122	36	161	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	381	0	105	183	29	55	272	122	36	172	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.35	1.20	1.09	1.35	1.20	1.31	1.31
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.8	24.8		13.0	24.8	24.8	13.0	25.0	25.0	25.0	25.0	
Total Split (s)	30.0	30.0		13.0	43.0	43.0	13.0	47.0	47.0	34.0	34.0	
Total Split (%)	33.3%	33.3%		14.4%	47.8%	47.8%	14.4%	52.2%	52.2%	37.8%	37.8%	
Maximum Green (s)	23.2	23.2		10.0	36.2	36.2	10.0	40.0	40.0	27.0	27.0	
Yellow Time (s)	4.1	4.1		3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.7	2.7		0.0	2.7	2.7	0.0	2.9	2.9	2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0	0		0	0	0	0	
Act Effct Green (s)	14.6	14.6		28.4	24.5	24.5	44.6	40.6	40.6	33.3	33.3	
Actuated g/C Ratio	0.18	0.18		0.36	0.31	0.31	0.56	0.51	0.51	0.42	0.42	
v/c Ratio	0.58	0.62		0.31	0.34	0.07	0.09	0.31	0.17	0.10	0.29	
Control Delay	42.9	31.6		18.6	21.7	0.3	10.8	14.5	3.5	21.4	21.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	42.9	31.6		18.6	21.7	0.3	10.8	14.5	3.5	21.4	21.7	
LOS	D	C		B	C	A	B	B	A	C	C	
Approach Delay		34.1			18.7			11.1			21.6	
Approach LOS		C			B			B			C	
Queue Length 50th (m)	16.8	27.5		11.0	21.7	0.0	3.9	25.1	0.0	4.0	20.3	
Queue Length 95th (m)	33.3	41.4		21.3	37.3	0.0	11.3	50.4	9.5	12.4	42.7	
Internal Link Dist (m)		565.4			852.0			682.2			1006.4	
Turn Bay Length (m)	25.0			55.0			20.0		25.0	30.0		
Base Capacity (vph)	308	968		342	807	617	598	875	701	375	593	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.36	0.39		0.31	0.23	0.05	0.09	0.31	0.17	0.10	0.29	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 79.1			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 22.0		Intersection LOS: C	
Intersection Capacity Utilization 63.9%		ICU Level of Service B	

Analysis Period (min) 15

Splits and Phases: 3: Rice Road & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	275	75	97	168	27	51	250	112	33	148	10
Future Volume (vph)	102	275	75	97	168	27	51	250	112	33	148	10
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Total Lost time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1535	3168		1534	1741	1233	1492	1708	1251	1434	1408	
Flt Permitted	0.64	1.00		0.39	1.00	1.00	0.59	1.00	1.00	0.59	1.00	
Satd. Flow (perm)	1037	3168		632	1741	1233	935	1708	1251	893	1408	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	299	82	105	183	29	55	272	122	36	161	11
RTOR Reduction (vph)	0	30	0	0	0	20	0	0	59	0	2	0
Lane Group Flow (vph)	111	351	0	105	183	9	55	272	63	36	170	0
Confl. Peds. (#/hr)	1		6	6		1	1		4	4		1
Heavy Vehicles (%)	2%	3%	0%	2%	2%	1%	5%	4%	0%	9%	7%	20%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	14.6	14.6		25.2	25.2	25.2	41.9	41.9	41.9	33.3	33.3	
Effective Green, g (s)	14.6	14.6		25.2	25.2	25.2	41.9	41.9	41.9	33.3	33.3	
Actuated g/C Ratio	0.18	0.18		0.31	0.31	0.31	0.52	0.52	0.52	0.41	0.41	
Clearance Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	187	571		281	542	384	522	884	647	367	579	
v/s Ratio Prot		c0.11		c0.04	0.11		0.01	c0.16			0.12	
v/s Ratio Perm	0.11			0.08		0.01	0.05		0.05	0.04		
v/c Ratio	0.59	0.61		0.37	0.34	0.02	0.11	0.31	0.10	0.10	0.29	
Uniform Delay, d1	30.4	30.6		20.7	21.4	19.3	9.8	11.2	9.9	14.6	15.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.0	2.0		0.8	0.4	0.0	0.1	0.9	0.3	0.5	1.3	
Delay (s)	35.4	32.5		21.6	21.8	19.3	9.9	12.1	10.2	15.1	17.2	
Level of Service	D	C		C	C	B	A	B	B	B	B	
Approach Delay (s)		33.2			21.5			11.3			16.8	
Approach LOS		C			C			B			B	

Intersection Summary					
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.41				
Actuated Cycle Length (s)	80.9	Sum of lost time (s)		19.8	
Intersection Capacity Utilization	63.9%	ICU Level of Service		B	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	686	132	355	865	5	90	6	289	4	5	7
Future Volume (vph)	6	686	132	355	865	5	90	6	289	4	5	7
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Storage Length (m)	60.0		0.0	100.0		0.0	65.0		65.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00										
Frt		0.976			0.999				0.850		0.936	
Flt Protected	0.950			0.950			0.950				0.988	
Satd. Flow (prot)	1568	3172	0	1568	3273	0	1553	1776	1236	0	1507	0
Flt Permitted	0.303			0.136			0.746				0.962	
Satd. Flow (perm)	500	3172	0	225	3273	0	1219	1776	1236	0	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			1				314		8	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		302.4			531.3			2985.6			100.9	
Travel Time (s)		21.8			38.3			215.0			7.3	
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	1%	0%	3%	0%	0%	0%
Adj. Flow (vph)	7	746	143	386	940	5	98	7	314	4	5	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	889	0	386	945	0	98	7	314	0	17	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.31	1.20	1.09	1.35	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.2	24.2		13.0	24.1		24.4	24.4	24.4	24.4	24.4	
Total Split (s)	35.1	35.1		26.0	61.1		28.9	28.9	28.9	28.9	28.9	
Total Split (%)	39.0%	39.0%		28.9%	67.9%		32.1%	32.1%	32.1%	32.1%	32.1%	
Maximum Green (s)	28.9	28.9		23.0	55.0		22.5	22.5	22.5	22.5	22.5	
Yellow Time (s)	4.2	4.2		3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.3	2.3	2.3	2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	26.2	26.2		51.7	48.6		22.7	22.7	22.7		22.7	
Actuated g/C Ratio	0.31	0.31		0.62	0.58		0.27	0.27	0.27		0.27	
v/c Ratio	0.04	0.88		0.87	0.50		0.30	0.01	0.56		0.04	
Control Delay	22.2	38.5		39.2	11.2		29.9	25.7	7.8		19.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	22.2	38.5		39.2	11.2		29.9	25.7	7.8		19.1	
LOS	C	D		D	B		C	C	A		B	
Approach Delay		38.3			19.3			13.2			19.1	
Approach LOS		D			B			B			B	
Queue Length 50th (m)	0.9	75.6		46.2	45.0		14.3	0.9	0.0		1.2	
Queue Length 95th (m)	4.2	#111.2		#92.5	59.1		29.1	4.5	22.2		6.5	
Internal Link Dist (m)		278.4			507.3			2961.6			76.9	
Turn Bay Length (m)	60.0			100.0			65.0		65.0			
Base Capacity (vph)	174	1120		510	2167		330	481	563		403	
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	0.04	0.79		0.76	0.44		0.30	0.01	0.56		0.04	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 83.9			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 24.8		Intersection LOS: C	
Intersection Capacity Utilization 73.7%		ICU Level of Service D	

Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rice Road & Highway 20

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	686	132	355	865	5	90	6	289	4	5	7
Future Volume (vph)	6	686	132	355	865	5	90	6	289	4	5	7
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Total Lost time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1568	3172		1568	3274		1553	1776	1236		1509	
Flt Permitted	0.30	1.00		0.14	1.00		0.75	1.00	1.00		0.96	
Satd. Flow (perm)	500	3172		225	3274		1220	1776	1236		1468	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	746	143	386	940	5	98	7	314	4	5	8
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	229	0	6	0
Lane Group Flow (vph)	7	871	0	386	945	0	98	7	85	0	11	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	26.3	26.3		48.6	48.6		22.7	22.7	22.7		22.7	
Effective Green, g (s)	26.3	26.3		48.6	48.6		22.7	22.7	22.7		22.7	
Actuated g/C Ratio	0.31	0.31		0.58	0.58		0.27	0.27	0.27		0.27	
Clearance Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	156	995		438	1898		330	481	334		397	
v/s Ratio Prot		0.27		c0.20	0.29			0.00				
v/s Ratio Perm	0.01			c0.31			c0.08		0.07		0.01	
v/c Ratio	0.04	0.88		0.88	0.50		0.30	0.01	0.25		0.03	
Uniform Delay, d1	20.0	27.2		20.8	10.4		24.2	22.4	23.9		22.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	8.7		18.3	0.2		2.3	0.1	1.8		0.1	
Delay (s)	20.1	35.9		39.2	10.6		26.5	22.4	25.8		22.6	
Level of Service	C	D		D	B		C	C	C		C	
Approach Delay (s)		35.8			18.9			25.9			22.6	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	83.8	Sum of lost time (s)	15.6
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	27	33	53	21	36	26	321	55	59	288	12
Future Volume (vph)	13	27	33	53	21	36	26	321	55	59	288	12
Ideal Flow (vphpl)	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.938			0.956			0.981			0.995	
Flt Protected		0.991			0.976			0.997			0.992	
Satd. Flow (prot)	0	1336	0	0	1521	0	0	1562	0	0	1559	0
Flt Permitted		0.991			0.976			0.997			0.992	
Satd. Flow (perm)	0	1336	0	0	1521	0	0	1562	0	0	1559	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		556.9			693.9			1030.4			235.8	
Travel Time (s)		40.1			50.0			74.2			17.0	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	18%	15%	0%	0%	0%	11%	1%	4%	5%	3%	0%
Adj. Flow (vph)	14	29	36	58	23	39	28	349	60	64	313	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	79	0	0	120	0	0	437	0	0	390	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	61.4%	ICU Level of Service B	
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	13	27	33	53	21	36	26	321	55	59	288	12
Future Volume (vph)	13	27	33	53	21	36	26	321	55	59	288	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	29	36	58	23	39	28	349	60	64	313	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	79	120	437	390
Volume Left (vph)	14	58	28	64
Volume Right (vph)	36	39	60	13
Hadj (s)	-0.01	-0.10	-0.03	0.07
Departure Headway (s)	6.3	6.1	5.1	5.2
Degree Utilization, x	0.14	0.20	0.61	0.57
Capacity (veh/h)	477	509	683	664
Control Delay (s)	10.3	10.6	15.8	14.8
Approach Delay (s)	10.3	10.6	15.8	14.8
Approach LOS	B	B	C	B

Intersection Summary				
Delay		14.4		
Level of Service		B		
Intersection Capacity Utilization		61.4%	ICU Level of Service	B
Analysis Period (min)		15		

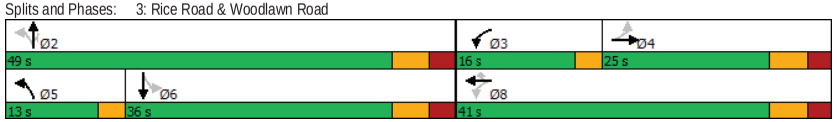
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	304	59	222	362	54	78	252	141	59	272	55
Future Volume (vph)	46	304	59	222	362	54	78	252	141	59	272	55
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Storage Length (m)	25.0		30.0	55.0		0.0	20.0		25.0	30.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99		0.97			0.98	1.00		
Frt		0.976				0.850			0.850		0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1568	3239	0	1538	1758	1273	1553	1741	1248	1568	1497	0
Flt Permitted	0.530			0.357			0.399			0.591		
Satd. Flow (perm)	869	3239	0	574	1758	1232	652	1741	1228	973	1497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				85			153		12	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		589.4			876.0			706.2			1030.4	
Travel Time (s)		42.4			63.1			50.8			74.2	
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	2%	1%	0%	1%	2%	2%	0%	0%	0%
Adj. Flow (vph)	50	330	64	241	393	59	85	274	153	64	296	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	394	0	241	393	59	85	274	153	64	356	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.35	1.20	1.09	1.35	1.20	1.31	1.31
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.8	24.8		13.0	24.8	24.8	13.0	25.0	25.0	25.0	25.0	
Total Split (s)	25.0	25.0		16.0	41.0	41.0	13.0	49.0	49.0	36.0	36.0	
Total Split (%)	27.8%	27.8%		17.8%	45.6%	45.6%	14.4%	54.4%	54.4%	40.0%	40.0%	
Maximum Green (s)	18.2	18.2		13.0	34.2	34.2	10.0	42.0	42.0	29.0	29.0	
Yellow Time (s)	4.1	4.1		3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.7	2.7		0.0	2.7	2.7	0.0	2.9	2.9	2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0	0		0	0	0	0	
Act Effct Green (s)	14.8	14.8		33.9	30.1	30.1	46.1	42.1	42.1	31.9	31.9	
Actuated g/C Ratio	0.17	0.17		0.39	0.35	0.35	0.54	0.49	0.49	0.37	0.37	
v/c Ratio	0.34	0.69		0.66	0.64	0.12	0.19	0.32	0.23	0.18	0.63	
Control Delay	38.0	38.2		28.3	28.7	2.7	11.9	15.4	3.3	23.3	30.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	38.0	38.2		28.3	28.7	2.7	11.9	15.4	3.3	23.3	30.1	
LOS	D	D		C	C	A	B	B	A	C	C	
Approach Delay		38.2			26.3			11.2			29.1	
Approach LOS		D			C			B			C	
Queue Length 50th (m)	7.8	32.4		29.2	56.0	0.0	7.0	28.2	0.0	7.9	52.0	
Queue Length 95th (m)	18.8	47.7		48.6	86.1	4.6	15.4	48.6	10.3	18.7	#90.5	
Internal Link Dist (m)		565.4			852.0			682.2			1006.4	
Turn Bay Length (m)	25.0			55.0			20.0		25.0	30.0		
Base Capacity (vph)	184	704		372	700	541	454	852	679	360	562	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.56		0.65	0.56	0.11	0.19	0.32	0.23	0.18	0.63	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 86			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 25.7		Intersection LOS: C	
Intersection Capacity Utilization 77.7%		ICU Level of Service D	

Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Rice Road & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	304	59	222	362	54	78	252	141	59	272	55
Future Volume (vph)	46	304	59	222	362	54	78	252	141	59	272	55
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Total Lost time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1558	3238		1535	1758	1233	1553	1741	1228	1564	1496	
Flt Permitted	0.53	1.00		0.36	1.00	1.00	0.40	1.00	1.00	0.59	1.00	
Satd. Flow (perm)	869	3238		577	1758	1233	652	1741	1228	973	1496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	330	64	241	393	59	85	274	153	64	296	60
RTOR Reduction (vph)	0	18	0	0	0	39	0	0	77	0	8	0
Lane Group Flow (vph)	50	376	0	241	393	20	85	274	76	64	348	0
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Heavy Vehicles (%)	0%	1%	2%	2%	1%	0%	1%	2%	2%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	14.8	14.8		30.1	30.1	30.1	42.8	42.8	42.8	31.9	31.9	
Effective Green, g (s)	14.8	14.8		30.1	30.1	30.1	42.8	42.8	42.8	31.9	31.9	
Actuated g/C Ratio	0.17	0.17		0.35	0.35	0.35	0.49	0.49	0.49	0.37	0.37	
Clearance Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	148	552		336	610	428	403	859	606	358	550	
v/s Ratio Prot		0.12		c0.10	0.22		0.02	c0.16			c0.23	
v/s Ratio Perm	0.06			c0.15		0.02	0.08		0.06	0.07		
v/c Ratio	0.34	0.68		0.72	0.64	0.05	0.21	0.32	0.12	0.18	0.63	
Uniform Delay, d1	31.6	33.7		22.2	23.8	18.8	12.3	13.2	11.8	18.5	22.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	3.4		7.1	2.3	0.0	0.3	1.0	0.4	1.1	5.5	
Delay (s)	33.0	37.2		29.3	26.1	18.8	12.6	14.2	12.3	19.6	28.1	
Level of Service	C	D		C	C	B	B	B	B	B	C	
Approach Delay (s)		36.7			26.6			13.3			26.8	
Approach LOS		D			C			B			C	

Intersection Summary				
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	19.8	
Intersection Capacity Utilization	77.7%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	751	61	190	534	4	75	1	478	0	2	2
Future Volume (vph)	1	751	61	190	534	4	75	1	478	0	2	2
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Storage Length (m)	60.0		0.0	100.0		0.0	65.0		65.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.989			0.999				0.850		0.932	
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1568	3148	0	1452	3012	0	1466	1776	1248	0	1519	0
Flt Permitted	0.432			0.133			0.755					
Satd. Flow (perm)	713	3148	0	203	3012	0	1165	1776	1248	0	1519	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			1				363		2	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		302.4			531.3			2985.6			100.9	
Travel Time (s)		21.8			38.3			215.0			7.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	8%	12%	0%	7%	0%	2%	0%	0%	0%
Adj. Flow (vph)	1	816	66	207	580	4	82	1	520	0	2	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	882	0	207	584	0	82	1	520	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.31	1.20	1.09	1.35	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		4		3	8			2			6	

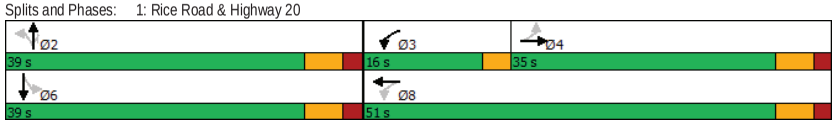
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.2	24.2		13.0	24.1		24.4	24.4	24.4	30.0	30.0	
Total Split (s)	35.0	35.0		16.0	51.0		39.0	39.0	39.0	39.0	39.0	
Total Split (%)	38.9%	38.9%		17.8%	56.7%		43.3%	43.3%	43.3%	43.3%	43.3%	
Maximum Green (s)	28.8	28.8		13.0	44.9		32.6	32.6	32.6	32.6	32.6	
Yellow Time (s)	4.2	4.2		3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.3	2.3	2.3	2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	27.1	27.1		45.3	42.2		32.7	32.7	32.7		32.7	
Actuated g/C Ratio	0.31	0.31		0.52	0.48		0.37	0.37	0.37		0.37	
v/c Ratio	0.00	0.90		0.75	0.40		0.19	0.00	0.75		0.01	
Control Delay	21.0	41.9		34.2	15.3		21.1	18.0	15.5		15.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	21.0	41.9		34.2	15.3		21.1	18.0	15.5		15.2	
LOS	C	D		C	B		C	B	B		B	
Approach Delay		41.9			20.2			16.3			15.3	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	0.1	78.1		19.7	33.1		10.1	0.1	22.5		0.3	
Queue Length 95th (m)	1.2	#113.2		#52.1	45.7		20.9	1.2	69.4		2.5	
Internal Link Dist (m)		278.4			507.3			2961.6			76.9	
Turn Bay Length (m)	60.0			100.0			65.0		65.0			
Base Capacity (vph)	235	1046		291	1551		435	663	693		568	
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	0.00	0.84		0.71	0.38		0.19	0.00	0.75		0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 87.4			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 27.6		Intersection LOS: C	
Intersection Capacity Utilization 86.0%		ICU Level of Service E	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Rice Road & Highway 20



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	751	61	190	534	4	75	1	478	0	2	2
Future Volume (vph)	1	751	61	190	534	4	75	1	478	0	2	2
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Total Lost time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85		0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1568	3148		1452	3012		1466	1776	1248		1520	
Flt Permitted	0.43	1.00		0.13	1.00		0.76	1.00	1.00		1.00	
Satd. Flow (perm)	713	3148		203	3012		1165	1776	1248		1520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	816	66	207	580	4	82	1	520	0	2	2
RTOR Reduction (vph)	0	7	0	0	1	0	0	0	227	0	1	0
Lane Group Flow (vph)	1	875	0	207	583	0	82	1	293	0	3	0
Heavy Vehicles (%)	0%	6%	6%	8%	12%	0%	7%	0%	2%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	27.1	27.1		42.2	42.2		32.7	32.7	32.7		32.7	
Effective Green, g (s)	27.1	27.1		42.2	42.2		32.7	32.7	32.7		32.7	
Actuated g/C Ratio	0.31	0.31		0.48	0.48		0.37	0.37	0.37		0.37	
Clearance Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	221	976		269	1454		435	664	466		568	
v/s Ratio Prot		c0.28		c0.11	0.19			0.00			0.00	
v/s Ratio Perm	0.00			0.27			0.07		c0.23			
v/c Ratio	0.00	0.90		0.77	0.40		0.19	0.00	0.63		0.00	
Uniform Delay, d1	20.8	28.8		17.1	14.5		18.4	17.1	22.4		17.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	10.7		12.4	0.2		1.0	0.0	6.3		0.0	
Delay (s)	20.8	39.5		29.5	14.7		19.4	17.1	28.7		17.2	
Level of Service	C	D		C	B		B	B	C		B	
Approach Delay (s)		39.5			18.6			27.4			17.2	
Approach LOS		D			B			C			B	

Intersection Summary				
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	15.6	
Intersection Capacity Utilization	86.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	34	38	63	26	50	31	302	59	63	279	10
Future Volume (vph)	22	34	38	63	26	50	31	302	59	63	279	10
Ideal Flow (vphpl)	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.946			0.951			0.980			0.996	
Flt Protected		0.988			0.978			0.996			0.991	
Satd. Flow (prot)	0	1382	0	0	1478	0	0	1555	0	0	1531	0
Flt Permitted		0.988			0.978			0.996			0.991	
Satd. Flow (perm)	0	1382	0	0	1478	0	0	1555	0	0	1531	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		556.9			693.9			1030.4			235.8	
Travel Time (s)		40.1			50.0			74.2			17.0	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	17%	2%	5%	2%	12%	1%	4%	7%	4%	22%
Adj. Flow (vph)	24	37	41	68	28	54	34	328	64	68	303	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	102	0	0	150	0	0	426	0	0	382	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	61.5%	ICU Level of Service B		
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	22	34	38	63	26	50	31	302	59	63	279	10
Future Volume (vph)	22	34	38	63	26	50	31	302	59	63	279	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	37	41	68	28	54	34	328	64	68	303	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	102	150	426	382
Volume Left (vph)	24	68	34	68
Volume Right (vph)	41	54	64	11
Hadj (s)	-0.02	-0.08	-0.03	0.10
Departure Headway (s)	6.4	6.2	5.3	5.5
Degree Utilization, x	0.18	0.26	0.63	0.58
Capacity (veh/h)	466	500	649	628
Control Delay (s)	10.8	11.4	16.7	15.8
Approach Delay (s)	10.8	11.4	16.7	15.8
Approach LOS	B	B	C	C

Intersection Summary				
Delay	15.1			
Level of Service	C			
Intersection Capacity Utilization	61.5%	ICU Level of Service	B	
Analysis Period (min)	15			

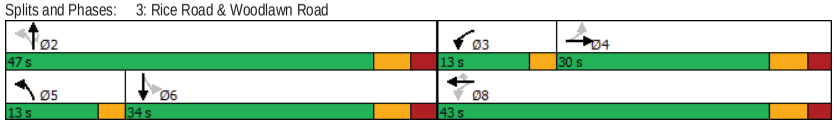
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	327	89	115	200	32	66	325	146	38	169	11
Future Volume (vph)	121	327	89	115	200	32	66	325	146	38	169	11
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Storage Length (m)	25.0		30.0	55.0		0.0	20.0		25.0	30.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		0.99		0.98	1.00		0.98	1.00	1.00	
Frt		0.968				0.850			0.850		0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1538	3167	0	1538	1741	1261	1494	1708	1273	1439	1409	0
Flt Permitted	0.622			0.338			0.578			0.550		
Satd. Flow (perm)	1005	3167	0	543	1741	1232	907	1708	1251	830	1409	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37				85			134		4	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		589.4			876.0			706.2			1030.4	
Travel Time (s)		42.4			63.1			50.8			74.2	
Confl. Peds. (#/hr)	1		6	6		1	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	0%	2%	2%	1%	5%	4%	0%	9%	7%	20%
Adj. Flow (vph)	132	355	97	125	217	35	72	353	159	41	184	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	132	452	0	125	217	35	72	353	159	41	196	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.35	1.20	1.09	1.35	1.20	1.31	1.31
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.8	24.8		13.0	24.8	24.8	13.0	25.0	25.0	25.0	25.0	
Total Split (s)	30.0	30.0		13.0	43.0	43.0	13.0	47.0	47.0	34.0	34.0	
Total Split (%)	33.3%	33.3%		14.4%	47.8%	47.8%	14.4%	52.2%	52.2%	37.8%	37.8%	
Maximum Green (s)	23.2	23.2		10.0	36.2	36.2	10.0	40.0	40.0	27.0	27.0	
Yellow Time (s)	4.1	4.1		3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.7	2.7		0.0	2.7	2.7	0.0	2.9	2.9	2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0	0		0	0	0	0	
Act Effct Green (s)	16.8	16.8		30.6	26.7	26.7	44.6	40.5	40.5	30.6	30.6	
Actuated g/C Ratio	0.21	0.21		0.38	0.33	0.33	0.55	0.50	0.50	0.38	0.38	
v/c Ratio	0.64	0.66		0.38	0.38	0.08	0.13	0.41	0.23	0.13	0.37	
Control Delay	44.9	32.4		19.6	21.9	0.3	11.8	16.7	4.9	23.5	24.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	44.9	32.4		19.6	21.9	0.3	11.8	16.7	4.9	23.5	24.8	
LOS	D	C		B	C	A	B	B	A	C	C	
Approach Delay		35.2			19.2			12.9			24.6	
Approach LOS		D			B			B			C	
Queue Length 50th (m)	20.5	34.1		13.3	26.4	0.0	5.5	36.5	2.1	4.8	24.6	
Queue Length 95th (m)	39.6	49.7		24.7	43.8	0.2	14.2	67.8	13.8	13.9	49.2	
Internal Link Dist (m)		565.4			852.0			682.2			1006.4	
Turn Bay Length (m)	25.0			55.0			20.0		25.0	30.0		
Base Capacity (vph)	290	942		328	786	602	570	852	691	312	533	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.46	0.48		0.38	0.28	0.06	0.13	0.41	0.23	0.13	0.37	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 81.2			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 23.1		Intersection LOS: C	
Intersection Capacity Utilization 68.9%		ICU Level of Service C	

Analysis Period (min) 15

Splits and Phases: 3: Rice Road & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	327	89	115	200	32	66	325	146	38	169	11
Future Volume (vph)	121	327	89	115	200	32	66	325	146	38	169	11
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Total Lost time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1535	3168		1535	1741	1233	1492	1708	1251	1434	1409	
Flt Permitted	0.62	1.00		0.34	1.00	1.00	0.58	1.00	1.00	0.55	1.00	
Satd. Flow (perm)	1006	3168		545	1741	1233	908	1708	1251	830	1409	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	355	97	125	217	35	72	353	159	41	184	12
RTOR Reduction (vph)	0	29	0	0	0	23	0	0	67	0	3	0
Lane Group Flow (vph)	132	423	0	125	217	12	72	353	92	41	193	0
Confl. Peds. (#/hr)	1		6	6		1	1		4	4		1
Heavy Vehicles (%)	2%	3%	0%	2%	2%	1%	5%	4%	0%	9%	7%	20%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	16.8	16.8		27.4	27.4	27.4	41.2	41.2	41.2	30.6	30.6	
Effective Green, g (s)	16.8	16.8		27.4	27.4	27.4	41.2	41.2	41.2	30.6	30.6	
Actuated g/C Ratio	0.20	0.20		0.33	0.33	0.33	0.50	0.50	0.50	0.37	0.37	
Clearance Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	205	645		272	578	410	507	854	625	308	523	
v/s Ratio Prot		c0.13		c0.04	0.12		0.01	c0.21			0.14	
v/s Ratio Perm	0.13			0.11		0.01	0.06		0.07	0.05		
v/c Ratio	0.64	0.66		0.46	0.38	0.03	0.14	0.41	0.15	0.13	0.37	
Uniform Delay, d1	30.1	30.1		20.3	21.0	18.5	10.9	13.0	11.1	17.1	18.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.8	2.4		1.2	0.4	0.0	0.1	1.5	0.5	0.9	2.0	
Delay (s)	36.8	32.5		21.5	21.4	18.6	11.0	14.5	11.6	18.0	20.9	
Level of Service	D	C		C	C	B	B	B	B	B	C	
Approach Delay (s)		33.5			21.2			13.3			20.4	
Approach LOS		C			C			B			C	

Intersection Summary					
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.50				
Actuated Cycle Length (s)	82.4	Sum of lost time (s)	19.8		
Intersection Capacity Utilization	68.9%	ICU Level of Service	C		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	816	157	422	1029	6	117	8	376	5	6	8
Future Volume (vph)	7	816	157	422	1029	6	117	8	376	5	6	8
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Storage Length (m)	60.0		0.0	100.0		0.0	65.0		65.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00										
Frt		0.976			0.999				0.850		0.942	
Flt Protected	0.950			0.950			0.950				0.988	
Satd. Flow (prot)	1568	3172	0	1568	3273	0	1553	1776	1236	0	1517	0
Flt Permitted	0.253			0.119			0.744				0.954	
Satd. Flow (perm)	418	3172	0	196	3273	0	1216	1776	1236	0	1465	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			1				409		9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		302.4			531.3			2985.6			100.9	
Travel Time (s)		21.8			38.3			215.0			7.3	
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	1%	0%	3%	0%	0%	0%
Adj. Flow (vph)	8	887	171	459	1118	7	127	9	409	5	7	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1058	0	459	1125	0	127	9	409	0	21	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.31	1.20	1.09	1.35	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.2	24.2		13.0	24.1		24.4	24.4	24.4	24.4	24.4	
Total Split (s)	37.0	37.0		28.0	65.0		25.0	25.0	25.0	25.0	25.0	
Total Split (%)	41.1%	41.1%		31.1%	72.2%		27.8%	27.8%	27.8%	27.8%	27.8%	
Maximum Green (s)	30.8	30.8		25.0	58.9		18.6	18.6	18.6	18.6	18.6	
Yellow Time (s)	4.2	4.2		3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.3	2.3	2.3	2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	30.3	30.3		59.9	56.7		18.6	18.6	18.6		18.6	
Actuated g/C Ratio	0.34	0.34		0.68	0.65		0.21	0.21	0.21		0.21	
v/c Ratio	0.06	0.95		0.92	0.53		0.49	0.02	0.70		0.07	
Control Delay	21.4	46.5		47.8	9.4		39.0	28.9	10.7		21.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	21.4	46.5		47.8	9.4		39.0	28.9	10.7		21.5	
LOS	C	D		D	A		D	C	B		C	
Approach Delay		46.3			20.6			17.6			21.5	
Approach LOS		D			C			B			C	
Queue Length 50th (m)	1.0	95.9		62.4	50.3		20.6	1.3	0.0		1.8	
Queue Length 95th (m)	4.2	#140.6		#120.9	65.5		39.0	5.4	29.4		8.0	
Internal Link Dist (m)		278.4			507.3			2961.6			76.9	
Turn Bay Length (m)	60.0			100.0			65.0		65.0			
Base Capacity (vph)	146	1130		524	2197		257	376	583		317	
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	0.05	0.94		0.88	0.51		0.49	0.02	0.70		0.07	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 87.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 28.6		Intersection LOS: C	
Intersection Capacity Utilization 84.4%		ICU Level of Service E	

Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rice Road & Highway 20

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	816	157	422	1029	6	117	8	376	5	6	8
Future Volume (vph)	7	816	157	422	1029	6	117	8	376	5	6	8
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Total Lost time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1568	3172		1568	3274		1553	1776	1236		1518	
Flt Permitted	0.25	1.00		0.12	1.00		0.74	1.00	1.00		0.95	
Satd. Flow (perm)	418	3172		197	3274		1216	1776	1236		1464	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	887	171	459	1118	7	127	9	409	5	7	9
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	322	0	7	0
Lane Group Flow (vph)	8	1040	0	459	1125	0	127	9	87	0	14	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	30.4	30.4		56.8	56.8		18.6	18.6	18.6		18.6	
Effective Green, g (s)	30.4	30.4		56.8	56.8		18.6	18.6	18.6		18.6	
Actuated g/C Ratio	0.35	0.35		0.65	0.65		0.21	0.21	0.21		0.21	
Clearance Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	144	1097		490	2115		257	375	261		309	
v/s Ratio Prot		0.33		c0.25	0.34			0.01				
v/s Ratio Perm	0.02			c0.36			c0.10		0.07		0.01	
v/c Ratio	0.06	0.95		0.94	0.53		0.49	0.02	0.33		0.04	
Uniform Delay, d1	19.2	28.0		23.7	8.4		30.5	27.5	29.4		27.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	16.1		25.5	0.3		6.6	0.1	3.4		0.3	
Delay (s)	19.3	44.1		49.2	8.6		37.2	27.6	32.8		27.9	
Level of Service	B	D		D	A		D	C	C		C	
Approach Delay (s)		43.9			20.4			33.7			27.9	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	15.6
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	35	43	63	25	42	34	417	72	67	328	14
Future Volume (vph)	17	35	43	63	25	42	34	417	72	67	328	14
Ideal Flow (vphpl)	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.938			0.956			0.981			0.995	
Flt Protected		0.991			0.976			0.997			0.992	
Satd. Flow (prot)	0	1335	0	0	1521	0	0	1562	0	0	1559	0
Flt Permitted		0.991			0.976			0.997			0.992	
Satd. Flow (perm)	0	1335	0	0	1521	0	0	1562	0	0	1559	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		556.9			693.9			1030.4			235.8	
Travel Time (s)		40.1			50.0			74.2			17.0	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	18%	15%	0%	0%	0%	11%	1%	4%	5%	3%	0%
Adj. Flow (vph)	18	38	47	68	27	46	37	453	78	73	357	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	103	0	0	141	0	0	568	0	0	445	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	68.2%	ICU Level of Service C	
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	35	43	63	25	42	34	417	72	67	328	14
Future Volume (vph)	17	35	43	63	25	42	34	417	72	67	328	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	38	47	68	27	46	37	453	78	73	357	15

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	103	141	568	445
Volume Left (vph)	18	68	37	73
Volume Right (vph)	47	46	78	15
Hadj (s)	-0.01	-0.10	-0.03	0.07
Departure Headway (s)	7.1	6.9	5.5	5.8
Degree Utilization, x	0.20	0.27	0.87	0.72
Capacity (veh/h)	454	475	643	598
Control Delay (s)	11.9	12.4	34.2	22.0
Approach Delay (s)	11.9	12.4	34.2	22.0
Approach LOS	B	B	D	C

Intersection Summary					
Delay	25.6				
Level of Service	D				
Intersection Capacity Utilization	68.2%	ICU Level of Service		C	
Analysis Period (min)	15				

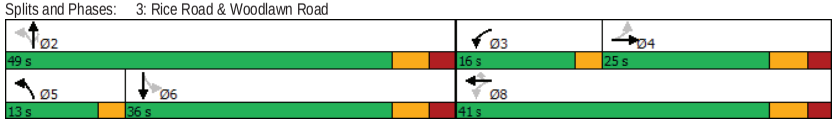
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	362	70	264	431	64	101	328	183	67	310	63
Future Volume (vph)	55	362	70	264	431	64	101	328	183	67	310	63
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Storage Length (m)	25.0		30.0	55.0		0.0	20.0		25.0	30.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99		0.97			0.98	1.00		
Frt		0.976				0.850			0.850		0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1568	3239	0	1538	1758	1273	1553	1741	1248	1568	1497	0
Flt Permitted	0.495			0.290			0.336			0.548		
Satd. Flow (perm)	812	3239	0	467	1758	1232	549	1741	1228	902	1497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				85			172		12	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		589.4			876.0			706.2			1030.4	
Travel Time (s)		42.4			63.1			50.8			74.2	
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	2%	1%	0%	1%	2%	2%	0%	0%	0%
Adj. Flow (vph)	60	393	76	287	468	70	110	357	199	73	337	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	469	0	287	468	70	110	357	199	73	405	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.35	1.20	1.09	1.35	1.20	1.31	1.31
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.8	24.8		13.0	24.8	24.8	13.0	25.0	25.0	25.0	25.0	
Total Split (s)	25.0	25.0		16.0	41.0	41.0	13.0	49.0	49.0	36.0	36.0	
Total Split (%)	27.8%	27.8%		17.8%	45.6%	45.6%	14.4%	54.4%	54.4%	40.0%	40.0%	
Maximum Green (s)	18.2	18.2		13.0	34.2	34.2	10.0	42.0	42.0	29.0	29.0	
Yellow Time (s)	4.1	4.1		3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.7	2.7		0.0	2.7	2.7	0.0	2.9	2.9	2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0	0		0	0	0	0	
Act Effct Green (s)	16.2	16.2		35.8	32.0	32.0	46.1	42.0	42.0	31.8	31.8	
Actuated g/C Ratio	0.18	0.18		0.41	0.36	0.36	0.52	0.48	0.48	0.36	0.36	
v/c Ratio	0.40	0.76		0.83	0.73	0.14	0.27	0.43	0.29	0.22	0.74	
Control Delay	40.3	41.2		41.4	31.9	4.0	13.2	17.5	4.6	24.7	35.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	40.3	41.2		41.4	31.9	4.0	13.2	17.5	4.6	24.7	35.7	
LOS	D	D		D	C	A	B	B	A	C	D	
Approach Delay		41.1			32.9			12.9			34.0	
Approach LOS		D			C			B			C	
Queue Length 50th (m)	9.5	40.0		36.1	70.6	0.0	9.8	41.2	2.5	9.6	64.7	
Queue Length 95th (m)	22.0	57.3		#66.2	107.1	6.5	19.1	65.3	14.6	21.3	#116.6	
Internal Link Dist (m)		565.4			852.0			682.2			1006.4	
Turn Bay Length (m)	25.0			55.0			20.0		25.0	30.0		
Base Capacity (vph)	168	688		348	685	531	402	832	677	326	548	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.36	0.68		0.82	0.68	0.13	0.27	0.43	0.29	0.22	0.74	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 87.9			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 84.7%		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.

Splits and Phases: 3: Rice Road & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	362	70	264	431	64	101	328	183	67	310	63
Future Volume (vph)	55	362	70	264	431	64	101	328	183	67	310	63
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Total Lost time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1558	3238		1536	1758	1232	1553	1741	1228	1564	1496	
Flt Permitted	0.49	1.00		0.29	1.00	1.00	0.34	1.00	1.00	0.55	1.00	
Satd. Flow (perm)	811	3238		468	1758	1232	550	1741	1228	902	1496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	393	76	287	468	70	110	357	199	73	337	68
RTOR Reduction (vph)	0	18	0	0	0	45	0	0	89	0	8	0
Lane Group Flow (vph)	60	451	0	287	468	25	110	357	110	73	397	0
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Heavy Vehicles (%)	0%	1%	2%	2%	1%	0%	1%	2%	2%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	16.2	16.2		32.0	32.0	32.0	42.7	42.7	42.7	31.8	31.8	
Effective Green, g (s)	16.2	16.2		32.0	32.0	32.0	42.7	42.7	42.7	31.8	31.8	
Actuated g/C Ratio	0.18	0.18		0.36	0.36	0.36	0.48	0.48	0.48	0.36	0.36	
Clearance Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	148	592		323	635	445	354	840	592	324	537	
v/s Ratio Prot		0.14		c0.13	0.27		0.03	c0.21			c0.27	
v/s Ratio Perm	0.07			c0.19		0.02	0.12		0.09	0.08		
v/c Ratio	0.41	0.76		0.89	0.74	0.06	0.31	0.42	0.19	0.23	0.74	
Uniform Delay, d1	31.9	34.3		22.8	24.6	18.4	13.8	14.9	13.0	19.8	24.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	5.8		24.2	4.5	0.1	0.5	1.6	0.7	1.6	8.9	
Delay (s)	33.7	40.1		47.0	29.0	18.5	14.3	16.5	13.7	21.4	33.6	
Level of Service	C	D		D	C	B	B	B	B	C	C	
Approach Delay (s)		39.4			34.4			15.3			31.7	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	19.8
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	751	64	193	534	4	84	1	488	0	2	2
Future Volume (vph)	1	751	64	193	534	4	84	1	488	0	2	2
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Storage Length (m)	60.0		0.0	100.0		0.0	65.0		65.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.999				0.850		0.932	
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1568	3145	0	1452	3012	0	1466	1776	1248	0	1519	0
Flt Permitted	0.432			0.132			0.755					
Satd. Flow (perm)	713	3145	0	202	3012	0	1165	1776	1248	0	1519	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			1				363		2	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		302.4			531.3			2985.6			100.9	
Travel Time (s)		21.8			38.3			215.0			7.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	8%	12%	0%	7%	0%	2%	0%	0%	0%
Adj. Flow (vph)	1	816	70	210	580	4	91	1	530	0	2	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	886	0	210	584	0	91	1	530	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.31	1.20	1.09	1.35	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		4		3	8			2			6	

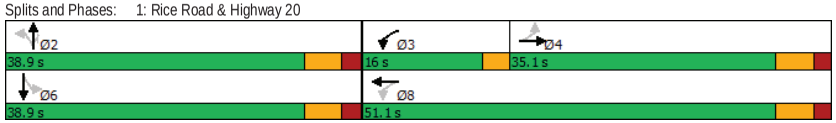
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.2	24.2		13.0	24.1		24.4	24.4	24.4	30.0	30.0	
Total Split (s)	35.1	35.1		16.0	51.1		38.9	38.9	38.9	38.9	38.9	
Total Split (%)	39.0%	39.0%		17.8%	56.8%		43.2%	43.2%	43.2%	43.2%	43.2%	
Maximum Green (s)	28.9	28.9		13.0	45.0		32.5	32.5	32.5	32.5	32.5	
Yellow Time (s)	4.2	4.2		3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.3	2.3	2.3	2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	27.2	27.2		45.4	42.3		32.6	32.6	32.6		32.6	
Actuated g/C Ratio	0.31	0.31		0.52	0.48		0.37	0.37	0.37		0.37	
v/c Ratio	0.00	0.90		0.76	0.40		0.21	0.00	0.77		0.01	
Control Delay	21.0	42.0		35.2	15.2		21.4	18.0	16.6		15.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	21.0	42.0		35.2	15.2		21.4	18.0	16.6		15.2	
LOS	C	D		D	B		C	B	B		B	
Approach Delay		42.0			20.5			17.3			15.3	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	0.1	78.5		20.4	33.0		11.3	0.1	24.8		0.3	
Queue Length 95th (m)	1.2	#113.8		#53.7	45.6		22.9	1.2	#79.0		2.5	
Internal Link Dist (m)		278.4			507.3			2961.6			76.9	
Turn Bay Length (m)	60.0			100.0			65.0		65.0			
Base Capacity (vph)	235	1048		291	1553		433	661	692		566	
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	0.00	0.85		0.72	0.38		0.21	0.00	0.77		0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 87.4			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 27.9		Intersection LOS: C	
Intersection Capacity Utilization 86.9%		ICU Level of Service E	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Rice Road & Highway 20



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	751	64	193	534	4	84	1	488	0	2	2
Future Volume (vph)	1	751	64	193	534	4	84	1	488	0	2	2
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Total Lost time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85		0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1568	3146		1452	3012		1466	1776	1248		1520	
Flt Permitted	0.43	1.00		0.13	1.00		0.76	1.00	1.00		1.00	
Satd. Flow (perm)	713	3146		202	3012		1165	1776	1248		1520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	816	70	210	580	4	91	1	530	0	2	2
RTOR Reduction (vph)	0	7	0	0	1	0	0	0	228	0	1	0
Lane Group Flow (vph)	1	879	0	210	583	0	91	1	302	0	3	0
Heavy Vehicles (%)	0%	6%	6%	8%	12%	0%	7%	0%	2%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	27.2	27.2		42.3	42.3		32.6	32.6	32.6		32.6	
Effective Green, g (s)	27.2	27.2		42.3	42.3		32.6	32.6	32.6		32.6	
Actuated g/C Ratio	0.31	0.31		0.48	0.48		0.37	0.37	0.37		0.37	
Clearance Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	221	979		269	1457		434	662	465		566	
v/s Ratio Prot		c0.28		c0.11	0.19			0.00			0.00	
v/s Ratio Perm	0.00			0.27			0.08		c0.24			
v/c Ratio	0.00	0.90		0.78	0.40		0.21	0.00	0.65		0.00	
Uniform Delay, d1	20.8	28.8		17.5	14.4		18.6	17.2	22.7		17.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	10.8		13.6	0.2		1.1	0.0	6.9		0.0	
Delay (s)	20.8	39.6		31.1	14.6		19.7	17.2	29.6		17.2	
Level of Service	C	D		C	B		B	B	C		B	
Approach Delay (s)		39.5			19.0			28.1			17.2	
Approach LOS		D			B			C			B	

Intersection Summary				
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	15.6	
Intersection Capacity Utilization	86.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	34	38	63	26	53	31	309	59	70	299	14
Future Volume (vph)	23	34	38	63	26	53	31	309	59	70	299	14
Ideal Flow (vphpl)	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.946			0.949			0.980			0.995	
Flt Protected		0.988			0.978			0.996			0.991	
Satd. Flow (prot)	0	1383	0	0	1475	0	0	1555	0	0	1528	0
Flt Permitted		0.988			0.978			0.996			0.991	
Satd. Flow (perm)	0	1383	0	0	1475	0	0	1555	0	0	1528	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		556.9			693.9			1030.4			235.8	
Travel Time (s)		40.1			50.0			74.2			17.0	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	17%	2%	5%	2%	12%	1%	4%	7%	4%	22%
Adj. Flow (vph)	25	37	41	68	28	58	34	336	64	76	325	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	103	0	0	154	0	0	434	0	0	416	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	65.9%	ICU Level of Service C	
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	34	38	63	26	53	31	309	59	70	299	14
Future Volume (vph)	23	34	38	63	26	53	31	309	59	70	299	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	37	41	68	28	58	34	336	64	76	325	15

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	103	154	434	416
Volume Left (vph)	25	68	34	76
Volume Right (vph)	41	58	64	15
Hadj (s)	-0.02	-0.09	-0.03	0.10
Departure Headway (s)	6.6	6.3	5.4	5.5
Degree Utilization, x	0.19	0.27	0.65	0.64
Capacity (veh/h)	451	477	638	624
Control Delay (s)	11.1	11.7	17.9	17.9
Approach Delay (s)	11.1	11.7	17.9	17.9
Approach LOS	B	B	C	C

Intersection Summary					
Delay		16.4			
Level of Service		C			
Intersection Capacity Utilization		65.9%	ICU Level of Service		C
Analysis Period (min)		15			

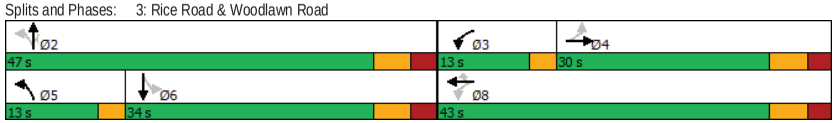
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	327	89	115	200	35	66	327	146	45	176	17
Future Volume (vph)	123	327	89	115	200	35	66	327	146	45	176	17
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Storage Length (m)	25.0		30.0	55.0		0.0	20.0		25.0	30.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		0.99		0.98	1.00		0.98	1.00	1.00	
Frt		0.968				0.850			0.850		0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1538	3167	0	1538	1741	1261	1494	1708	1273	1439	1399	0
Flt Permitted	0.622			0.338			0.571			0.549		
Satd. Flow (perm)	1005	3167	0	543	1741	1232	896	1708	1251	829	1399	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37				85			133		5	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		589.4			876.0			706.2			1030.4	
Travel Time (s)		42.4			63.1			50.8			74.2	
Confl. Peds. (#/hr)	1		6	6		1	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	0%	2%	2%	1%	5%	4%	0%	9%	7%	20%
Adj. Flow (vph)	134	355	97	125	217	38	72	355	159	49	191	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	452	0	125	217	38	72	355	159	49	209	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.35	1.20	1.09	1.35	1.20	1.31	1.31
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.8	24.8		13.0	24.8	24.8	13.0	25.0	25.0	25.0	25.0	
Total Split (s)	30.0	30.0		13.0	43.0	43.0	13.0	47.0	47.0	34.0	34.0	
Total Split (%)	33.3%	33.3%		14.4%	47.8%	47.8%	14.4%	52.2%	52.2%	37.8%	37.8%	
Maximum Green (s)	23.2	23.2		10.0	36.2	36.2	10.0	40.0	40.0	27.0	27.0	
Yellow Time (s)	4.1	4.1		3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.7	2.7		0.0	2.7	2.7	0.0	2.9	2.9	2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0	0		0	0	0	0	
Act Effct Green (s)	16.8	16.8		30.6	26.8	26.8	44.6	40.5	40.5	30.6	30.6	
Actuated g/C Ratio	0.21	0.21		0.38	0.33	0.33	0.55	0.50	0.50	0.38	0.38	
v/c Ratio	0.64	0.66		0.38	0.38	0.08	0.13	0.42	0.23	0.16	0.40	
Control Delay	45.3	32.4		19.6	21.9	0.6	11.8	16.8	5.0	24.0	25.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	45.3	32.4		19.6	21.9	0.6	11.8	16.8	5.0	24.0	25.3	
LOS	D	C		B	C	A	B	B	A	C	C	
Approach Delay		35.3			19.0			13.0			25.0	
Approach LOS		D			B			B			C	
Queue Length 50th (m)	20.9	34.1		13.3	26.4	0.0	5.5	36.8	2.2	5.8	26.5	
Queue Length 95th (m)	40.1	49.7		24.7	43.8	0.8	14.2	68.4	14.0	16.1	52.3	
Internal Link Dist (m)		565.4			852.0			682.2			1006.4	
Turn Bay Length (m)	25.0			55.0			20.0		25.0	30.0		
Base Capacity (vph)	290	941		328	785	602	565	851	690	312	529	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.46	0.48		0.38	0.28	0.06	0.13	0.42	0.23	0.16	0.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 81.3			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 23.2		Intersection LOS: C	
Intersection Capacity Utilization 69.0%		ICU Level of Service C	

Analysis Period (min) 15

Splits and Phases: 3: Rice Road & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	327	89	115	200	35	66	327	146	45	176	17
Future Volume (vph)	123	327	89	115	200	35	66	327	146	45	176	17
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Total Lost time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1535	3168		1535	1741	1233	1492	1708	1251	1434	1399	
Flt Permitted	0.62	1.00		0.34	1.00	1.00	0.57	1.00	1.00	0.55	1.00	
Satd. Flow (perm)	1006	3168		545	1741	1233	897	1708	1251	828	1399	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	355	97	125	217	38	72	355	159	49	191	18
RTOR Reduction (vph)	0	29	0	0	0	25	0	0	67	0	3	0
Lane Group Flow (vph)	134	423	0	125	217	13	72	355	93	49	206	0
Confl. Peds. (#/hr)	1		6	6		1	1		4	4		1
Heavy Vehicles (%)	2%	3%	0%	2%	2%	1%	5%	4%	0%	9%	7%	20%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	16.8	16.8		27.4	27.4	27.4	41.2	41.2	41.2	30.6	30.6	
Effective Green, g (s)	16.8	16.8		27.4	27.4	27.4	41.2	41.2	41.2	30.6	30.6	
Actuated g/C Ratio	0.20	0.20		0.33	0.33	0.33	0.50	0.50	0.50	0.37	0.37	
Clearance Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	205	645		272	578	410	503	854	625	307	519	
v/s Ratio Prot		c0.13		c0.04	0.12		0.01	c0.21			0.15	
v/s Ratio Perm	0.13			0.11		0.01	0.06		0.07	0.06		
v/c Ratio	0.65	0.66		0.46	0.38	0.03	0.14	0.42	0.15	0.16	0.40	
Uniform Delay, d1	30.1	30.1		20.3	21.0	18.5	10.9	13.0	11.1	17.3	19.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.3	2.4		1.2	0.4	0.0	0.1	1.5	0.5	1.1	2.3	
Delay (s)	37.4	32.5		21.5	21.4	18.6	11.0	14.5	11.6	18.4	21.4	
Level of Service	D	C		C	C	B	B	B	B	B	C	
Approach Delay (s)		33.7			21.1			13.3			20.8	
Approach LOS		C			C			B			C	

Intersection Summary				
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	82.4	Sum of lost time (s)	19.8	
Intersection Capacity Utilization	69.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	31	19	378	11	6	352
Future Volume (vph)	31	19	378	11	6	352
Ideal Flow (vphpl)	1630	1630	1535	1535	1375	1375
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.948		0.996			
Flt Protected	0.970					0.999
Satd. Flow (prot)	1469	0	1499	0	0	1347
Flt Permitted	0.970					0.999
Satd. Flow (perm)	1469	0	1499	0	0	1347
Link Speed (k/h)	50		50			50
Link Distance (m)	169.9		235.8			2985.6
Travel Time (s)	12.2		17.0			215.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	21	411	12	7	383
Shared Lane Traffic (%)						
Lane Group Flow (vph)	55	0	423	0	0	390
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.22	1.22	1.31	1.31	1.50	1.50
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	31	19	378	11	6	352
Future Volume (Veh/h)	31	19	378	11	6	352
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	21	411	12	7	383
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	814	417			423	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	814	417			423	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	97			99	
cM capacity (veh/h)	345	636			1136	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	55	423	390
Volume Left	34	0	7
Volume Right	21	12	0
cSH	418	1700	1136
Volume to Capacity	0.13	0.25	0.01
Queue Length 95th (m)	3.6	0.0	0.1
Control Delay (s)	14.9	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	14.9	0.0	0.2
Approach LOS	B		

Intersection Summary				
Average Delay		1.0		
Intersection Capacity Utilization		42.3%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	816	165	432	1029	6	122	8	383	5	6	8
Future Volume (vph)	7	816	165	432	1029	6	122	8	383	5	6	8
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Storage Length (m)	60.0		0.0	100.0		0.0	65.0		65.0	0.0		0.0
Storage Lanes	1		0	1		0	1		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00										
Frt		0.975			0.999				0.850		0.942	
Flt Protected	0.950			0.950			0.950				0.988	
Satd. Flow (prot)	1568	3169	0	1568	3273	0	1553	1776	1236	0	1517	0
Flt Permitted	0.253			0.119			0.744				0.953	
Satd. Flow (perm)	418	3169	0	196	3273	0	1216	1776	1236	0	1463	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			1				416		9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		302.4			531.3			2985.6			100.9	
Travel Time (s)		21.8			38.3			215.0			7.3	
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	1%	0%	3%	0%	0%	0%
Adj. Flow (vph)	8	887	179	470	1118	7	133	9	416	5	7	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1066	0	470	1125	0	133	9	416	0	21	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.31	1.20	1.09	1.35	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.2	24.2		13.0	24.1		24.4	24.4	24.4	24.4	24.4	
Total Split (s)	37.0	37.0		28.0	65.0		25.0	25.0	25.0	25.0	25.0	
Total Split (%)	41.1%	41.1%		31.1%	72.2%		27.8%	27.8%	27.8%	27.8%	27.8%	
Maximum Green (s)	30.8	30.8		25.0	58.9		18.6	18.6	18.6	18.6	18.6	
Yellow Time (s)	4.2	4.2		3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.3	2.3	2.3	2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	30.6	30.6		60.6	57.5		18.6	18.6	18.6		18.6	
Actuated g/C Ratio	0.35	0.35		0.68	0.65		0.21	0.21	0.21		0.21	
v/c Ratio	0.06	0.96		0.94	0.53		0.52	0.02	0.71		0.07	
Control Delay	21.3	47.8		50.4	9.4		40.0	28.9	10.9		21.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	21.3	47.8		50.4	9.4		40.0	28.9	10.9		21.5	
LOS	C	D		D	A		D	C	B		C	
Approach Delay		47.6			21.5			18.1			21.5	
Approach LOS		D			C			B			C	
Queue Length 50th (m)	1.0	97.1		65.1	50.3		21.7	1.3	0.0		1.8	
Queue Length 95th (m)	4.2	#142.4		#125.6	65.5		40.8	5.4	29.7		8.0	
Internal Link Dist (m)		278.4			507.3			2961.6			76.9	
Turn Bay Length (m)	60.0			100.0			65.0		65.0			
Base Capacity (vph)	145	1120		521	2179		255	373	588		314	
Starvation Cap Reductn	0	0		0	0		0	0	0		0	
Spillback Cap Reductn	0	0		0	0		0	0	0		0	
Storage Cap Reductn	0	0		0	0		0	0	0		0	
Reduced v/c Ratio	0.06	0.95		0.90	0.52		0.52	0.02	0.71		0.07	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 88.6			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 85.6%		ICU Level of Service E	

Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rice Road & Highway 20

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	816	165	432	1029	6	122	8	383	5	6	8
Future Volume (vph)	7	816	165	432	1029	6	122	8	383	5	6	8
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1535	1651	1776	1498	1630	1630	1630
Total Lost time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1568	3169		1568	3274		1553	1776	1236		1518	
Flt Permitted	0.25	1.00		0.12	1.00		0.74	1.00	1.00		0.95	
Satd. Flow (perm)	418	3169		196	3274		1216	1776	1236		1464	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	887	179	470	1118	7	133	9	416	5	7	9
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	329	0	7	0
Lane Group Flow (vph)	8	1048	0	470	1125	0	133	9	87	0	14	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	1%	0%	3%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	30.6	30.6		57.4	57.4		18.6	18.6	18.6		18.6	
Effective Green, g (s)	30.6	30.6		57.4	57.4		18.6	18.6	18.6		18.6	
Actuated g/C Ratio	0.35	0.35		0.65	0.65		0.21	0.21	0.21		0.21	
Clearance Time (s)	6.2	6.2		3.0	6.1		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	144	1095		494	2123		255	373	259		307	
v/s Ratio Prot		0.33		c0.25	0.34			0.01				
v/s Ratio Perm	0.02			c0.36			c0.11		0.07		0.01	
v/c Ratio	0.06	0.96		0.95	0.53		0.52	0.02	0.34		0.05	
Uniform Delay, d1	19.3	28.3		24.2	8.3		31.0	27.7	29.7		27.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	17.6		28.5	0.2		7.4	0.1	3.5		0.3	
Delay (s)	19.5	45.9		52.7	8.6		38.4	27.9	33.2		28.1	
Level of Service	B	D		D	A		D	C	C		C	
Approach Delay (s)		45.7			21.6			34.4			28.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	15.6
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	35	43	63	25	49	34	436	72	71	342	16
Future Volume (vph)	20	35	43	63	25	49	34	436	72	71	342	16
Ideal Flow (vphpl)	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.941			0.952			0.982			0.995	
Flt Protected		0.990			0.978			0.997			0.992	
Satd. Flow (prot)	0	1344	0	0	1518	0	0	1564	0	0	1559	0
Flt Permitted		0.990			0.978			0.997			0.992	
Satd. Flow (perm)	0	1344	0	0	1518	0	0	1564	0	0	1559	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		556.9			693.9			1030.4			235.8	
Travel Time (s)		40.1			50.0			74.2			17.0	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	18%	15%	0%	0%	0%	11%	1%	4%	5%	3%	0%
Adj. Flow (vph)	22	38	47	68	27	53	37	474	78	77	372	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	107	0	0	148	0	0	589	0	0	466	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	35	43	63	25	49	34	436	72	71	342	16
Future Volume (vph)	20	35	43	63	25	49	34	436	72	71	342	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	38	47	68	27	53	37	474	78	77	372	17

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	107	148	589	466
Volume Left (vph)	22	68	37	77
Volume Right (vph)	47	53	78	17
Hadj (s)	0.00	-0.12	-0.03	0.07
Departure Headway (s)	7.3	7.1	5.7	5.9
Degree Utilization, x	0.22	0.29	0.92	0.77
Capacity (veh/h)	447	469	625	589
Control Delay (s)	12.4	12.9	43.1	25.8
Approach Delay (s)	12.4	12.9	43.1	25.8
Approach LOS	B	B	E	D

Intersection Summary					
Delay		31.0			
Level of Service		D			
Intersection Capacity Utilization		71.8%	ICU Level of Service		C
Analysis Period (min)		15			

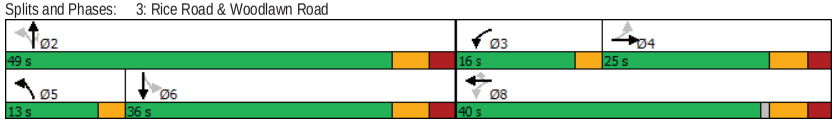
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	362	70	264	431	71	101	334	183	72	315	67
Future Volume (vph)	61	362	70	264	431	71	101	334	183	72	315	67
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Storage Length (m)	25.0		30.0	55.0		0.0	20.0		25.0	30.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99		0.97			0.98	1.00		
Frt		0.976				0.850			0.850		0.974	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1568	3239	0	1538	1758	1273	1553	1741	1248	1568	1495	0
Flt Permitted	0.495			0.290			0.325			0.545		
Satd. Flow (perm)	812	3239	0	467	1758	1232	531	1741	1228	897	1495	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				85			170		13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		589.4			876.0			706.2			1030.4	
Travel Time (s)		42.4			63.1			50.8			74.2	
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	2%	2%	1%	0%	1%	2%	2%	0%	0%	0%
Adj. Flow (vph)	66	393	76	287	468	77	110	363	199	78	342	73
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	469	0	287	468	77	110	363	199	78	415	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.20	1.09	1.31	1.20	1.09	1.35	1.20	1.09	1.35	1.20	1.31	1.31
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		10.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	24.8	24.8		13.0	24.8	24.8	13.0	25.0	25.0	25.0	25.0	
Total Split (s)	25.0	25.0		16.0	40.0	40.0	13.0	49.0	49.0	36.0	36.0	
Total Split (%)	27.8%	27.8%		17.8%	44.4%	44.4%	14.4%	54.4%	54.4%	40.0%	40.0%	
Maximum Green (s)	18.2	18.2		13.0	33.2	33.2	10.0	42.0	42.0	29.0	29.0	
Yellow Time (s)	4.1	4.1		3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.7	2.7		0.0	2.7	2.7	0.0	2.9	2.9	2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0	7.0		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0	0		0	0	0	0	
Act Effct Green (s)	16.2	16.2		35.8	32.0	32.0	46.1	42.0	42.0	31.8	31.8	
Actuated g/C Ratio	0.18	0.18		0.41	0.36	0.36	0.52	0.48	0.48	0.36	0.36	
v/c Ratio	0.44	0.76		0.83	0.73	0.15	0.28	0.44	0.29	0.24	0.76	
Control Delay	41.9	41.2		41.4	31.9	4.6	13.3	17.6	4.7	25.0	36.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	41.9	41.2		41.4	31.9	4.6	13.3	17.6	4.7	25.0	36.7	
LOS	D	D		D	C	A	B	B	A	C	D	
Approach Delay		41.3			32.7			13.1			34.9	
Approach LOS		D			C			B			C	
Queue Length 50th (m)	10.5	40.0		36.1	70.6	0.0	9.8	42.0	2.7	10.3	66.8	
Queue Length 95th (m)	23.9	57.3		#66.2	107.1	7.7	19.1	66.5	14.9	22.6	#120.8	
Internal Link Dist (m)		565.4			852.0			682.2			1006.4	
Turn Bay Length (m)	25.0			55.0			20.0		25.0	30.0		
Base Capacity (vph)	168	688		348	685	531	394	832	676	324	548	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.39	0.68		0.82	0.68	0.15	0.28	0.44	0.29	0.24	0.76	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 87.9			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 29.7		Intersection LOS: C	
Intersection Capacity Utilization 85.3%		ICU Level of Service E	

Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Rice Road & Woodlawn Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	362	70	264	431	71	101	334	183	72	315	67
Future Volume (vph)	61	362	70	264	431	71	101	334	183	72	315	67
Ideal Flow (vphpl)	1651	1776	1535	1651	1776	1498	1651	1776	1498	1651	1535	1535
Total Lost time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1558	3238		1536	1758	1232	1553	1741	1228	1564	1494	
Flt Permitted	0.49	1.00		0.29	1.00	1.00	0.33	1.00	1.00	0.54	1.00	
Satd. Flow (perm)	811	3238		468	1758	1232	532	1741	1228	897	1494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	66	393	76	287	468	77	110	363	199	78	342	73
RTOR Reduction (vph)	0	18	0	0	0	49	0	0	88	0	8	0
Lane Group Flow (vph)	66	451	0	287	468	28	110	363	111	78	407	0
Confl. Peds. (#/hr)	5		5	5		5			3	3		
Heavy Vehicles (%)	0%	1%	2%	2%	1%	0%	1%	2%	2%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	16.2	16.2		32.0	32.0	32.0	42.7	42.7	42.7	31.8	31.8	
Effective Green, g (s)	16.2	16.2		32.0	32.0	32.0	42.7	42.7	42.7	31.8	31.8	
Actuated g/C Ratio	0.18	0.18		0.36	0.36	0.36	0.48	0.48	0.48	0.36	0.36	
Clearance Time (s)	6.8	6.8		3.0	6.8	6.8	3.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	148	592		323	635	445	347	840	592	322	536	
v/s Ratio Prot		0.14		c0.13	0.27		0.03	c0.21			c0.27	
v/s Ratio Perm	0.08			c0.19		0.02	0.12		0.09	0.09		
v/c Ratio	0.45	0.76		0.89	0.74	0.06	0.32	0.43	0.19	0.24	0.76	
Uniform Delay, d1	32.2	34.3		22.8	24.6	18.5	13.8	15.0	13.0	19.9	25.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	5.8		24.2	4.5	0.1	0.5	1.6	0.7	1.8	9.7	
Delay (s)	34.3	40.1		47.0	29.0	18.5	14.4	16.6	13.7	21.7	34.7	
Level of Service	C	D		D	C	B	B	B	B	C	C	
Approach Delay (s)		39.4			34.3			15.4			32.6	
Approach LOS		D			C			B			C	

Intersection Summary					
HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	19.8		
Intersection Capacity Utilization	85.3%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	20	12	481	29	18	409
Future Volume (vph)	20	12	481	29	18	409
Ideal Flow (vphpl)	1630	1630	1535	1535	1375	1375
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.950		0.992			
Flt Protected	0.970					0.998
Satd. Flow (prot)	1473	0	1493	0	0	1345
Flt Permitted	0.970					0.998
Satd. Flow (perm)	1473	0	1493	0	0	1345
Link Speed (k/h)	50		50			50
Link Distance (m)	169.9		235.8			2985.6
Travel Time (s)	12.2		17.0			215.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	13	523	32	20	445
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	555	0	0	465
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.22	1.22	1.31	1.31	1.50	1.50
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	12	481	29	18	409
Future Volume (Veh/h)	20	12	481	29	18	409
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	13	523	32	20	445
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	1024	539			555	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1024	539			555	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	98			98	
cM capacity (veh/h)	256	542			1015	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	35	555	465
Volume Left	22	0	20
Volume Right	13	32	0
cSH	318	1700	1015
Volume to Capacity	0.11	0.33	0.02
Queue Length 95th (m)	2.9	0.0	0.5
Control Delay (s)	17.7	0.0	0.6
Lane LOS	C		A
Approach Delay (s)	17.7	0.0	0.6
Approach LOS	C		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix E

Traffic Control Signal Warrant

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2033 Background
Region/City/Township: Welland

Major Street: Rice Road
Minor Street: Quaker Road

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

	Major Street						Minor Street						
	Rice Road						Quaker Road						
	Eastbound			Westbound			Northbound			Southbound			Peds Crossing
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	22	34	38	63	26	50	31	302	59	63	279	10	
PM Peak Hour	17	35	43	63	25	42	34	417	72	37	328	14	
Average Hourly Volume	10	17	20	32	13	23	16	180	33	25	152	6	0

Warrant	AHV
1A - All	526
1B - Minor	412
2A - Major	115
2B - Cross	221

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	526
					% Fulfilled	73.1%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	412
					% Fulfilled	242.1%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	115
					% Fulfilled	15.9%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	221
					% Fulfilled	294.7%

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2033 Total
Region/City/Township: Welland

Major Street: Rice Road
Minor Street: Quaker Road

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

	Major Street						Minor Street						
	Rice Road						Quaker Road						
	Eastbound			Westbound			Northbound			Southbound			Peds Crossing
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
AM Peak Hour	23	34	38	63	26	53	31	309	59	70	299	14	
PM Peak Hour	20	35	43	63	25	49	34	436	72	71	342	16	
Average Hourly Volume	11	17	20	32	13	26	16	186	33	35	160	8	0

Warrant	AHV
1A - All	556
1B - Minor	438
2A - Major	118
2B - Cross	238

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	556
					% Fulfilled	77.3%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	120	170	120	170	438
					% Fulfilled	257.8%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	118
					% Fulfilled	16.4%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	238
					% Fulfilled	317.0%

Appendix F

SimTraffic Simulation Results

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	3504	3602	3561	3471	3549	3551	3667
Vehs Exited	3512	3634	3540	3491	3568	3535	3700
Starting Vehs	181	189	179	186	183	173	209
Ending Vehs	173	157	200	166	164	189	176
Travel Distance (km)	6963	7079	6941	6853	6896	6898	7295
Travel Time (hr)	178.6	181.4	179.2	175.3	177.1	175.1	189.0
Total Delay (hr)	35.1	35.5	35.8	33.7	34.7	33.0	38.2
Total Stops	3663	3745	3778	3685	3688	3551	3867
Fuel Used (l)	521.2	533.2	519.5	508.3	513.2	514.8	546.8

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	3666	3514	3664	3576
Vehs Exited	3660	3483	3657	3580
Starting Vehs	179	174	189	183
Ending Vehs	185	205	196	181
Travel Distance (km)	7297	6824	7102	7015
Travel Time (hr)	189.3	174.4	181.6	180.1
Total Delay (hr)	38.6	33.8	35.1	35.4
Total Stops	3950	3623	3682	3722
Fuel Used (l)	545.4	506.1	529.0	523.8

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	3504	3602	3561	3471	3549	3551	3667
Vehs Exited	3512	3634	3540	3491	3568	3535	3700
Starting Vehs	181	189	179	186	183	173	209
Ending Vehs	173	157	200	166	164	189	176
Travel Distance (km)	6963	7079	6941	6853	6896	6898	7295
Travel Time (hr)	178.6	181.4	179.2	175.3	177.1	175.1	189.0
Total Delay (hr)	35.1	35.5	35.8	33.7	34.7	33.0	38.2
Total Stops	3663	3745	3778	3685	3688	3551	3867
Fuel Used (l)	521.2	533.2	519.5	508.3	513.2	514.8	546.8

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	3666	3514	3664	3576
Vehs Exited	3660	3483	3657	3580
Starting Vehs	179	174	189	183
Ending Vehs	185	205	196	181
Travel Distance (km)	7297	6824	7102	7015
Travel Time (hr)	189.3	174.4	181.6	180.1
Total Delay (hr)	38.6	33.8	35.1	35.4
Total Stops	3950	3623	3682	3722
Fuel Used (l)	545.4	506.1	529.0	523.8

Intersection: 2: Rice Road & Quaker Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	22.4	25.2	47.9	54.7
Average Queue (m)	11.8	13.2	26.3	27.0
95th Queue (m)	19.2	20.8	41.4	44.4
Link Distance (m)	546.7	683.6	1007.6	217.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	4765	4748	4765	4699	4729	4848	4699
Vehs Exited	4815	4840	4776	4776	4706	4782	4731
Starting Vehs	262	289	239	304	231	233	232
Ending Vehs	212	197	228	227	254	299	200
Travel Distance (km)	9311	9458	9176	9237	9314	9364	9183
Travel Time (hr)	253.0	253.5	243.5	247.1	250.4	256.8	245.4
Total Delay (hr)	61.4	58.4	54.9	56.9	58.2	63.7	56.5
Total Stops	5268	5275	4973	5057	5146	5455	5040
Fuel Used (l)	706.1	722.2	690.5	701.2	702.7	712.1	692.0

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	4775	4708	4752	4749
Vehs Exited	4742	4722	4764	4766
Starting Vehs	240	244	256	253
Ending Vehs	273	230	244	237
Travel Distance (km)	9429	9336	9410	9322
Travel Time (hr)	256.8	249.0	255.0	251.0
Total Delay (hr)	62.4	56.7	61.4	59.1
Total Stops	5361	5143	5253	5199
Fuel Used (l)	721.3	703.2	711.2	706.3

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

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

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	4765	4748	4765	4699	4729	4848	4699
Vehs Exited	4815	4840	4776	4776	4706	4782	4731
Starting Vehs	262	289	239	304	231	233	232
Ending Vehs	212	197	228	227	254	299	200
Travel Distance (km)	9311	9458	9176	9237	9314	9364	9183
Travel Time (hr)	253.0	253.5	243.5	247.1	250.4	256.8	245.4
Total Delay (hr)	61.4	58.4	54.9	56.9	58.2	63.7	56.5
Total Stops	5268	5275	4973	5057	5146	5455	5040
Fuel Used (l)	706.1	722.2	690.5	701.2	702.7	712.1	692.0

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	4775	4708	4752	4749
Vehs Exited	4742	4722	4764	4766
Starting Vehs	240	244	256	253
Ending Vehs	273	230	244	237
Travel Distance (km)	9429	9336	9410	9322
Travel Time (hr)	256.8	249.0	255.0	251.0
Total Delay (hr)	62.4	56.7	61.4	59.1
Total Stops	5361	5143	5253	5199
Fuel Used (l)	721.3	703.2	711.2	706.3

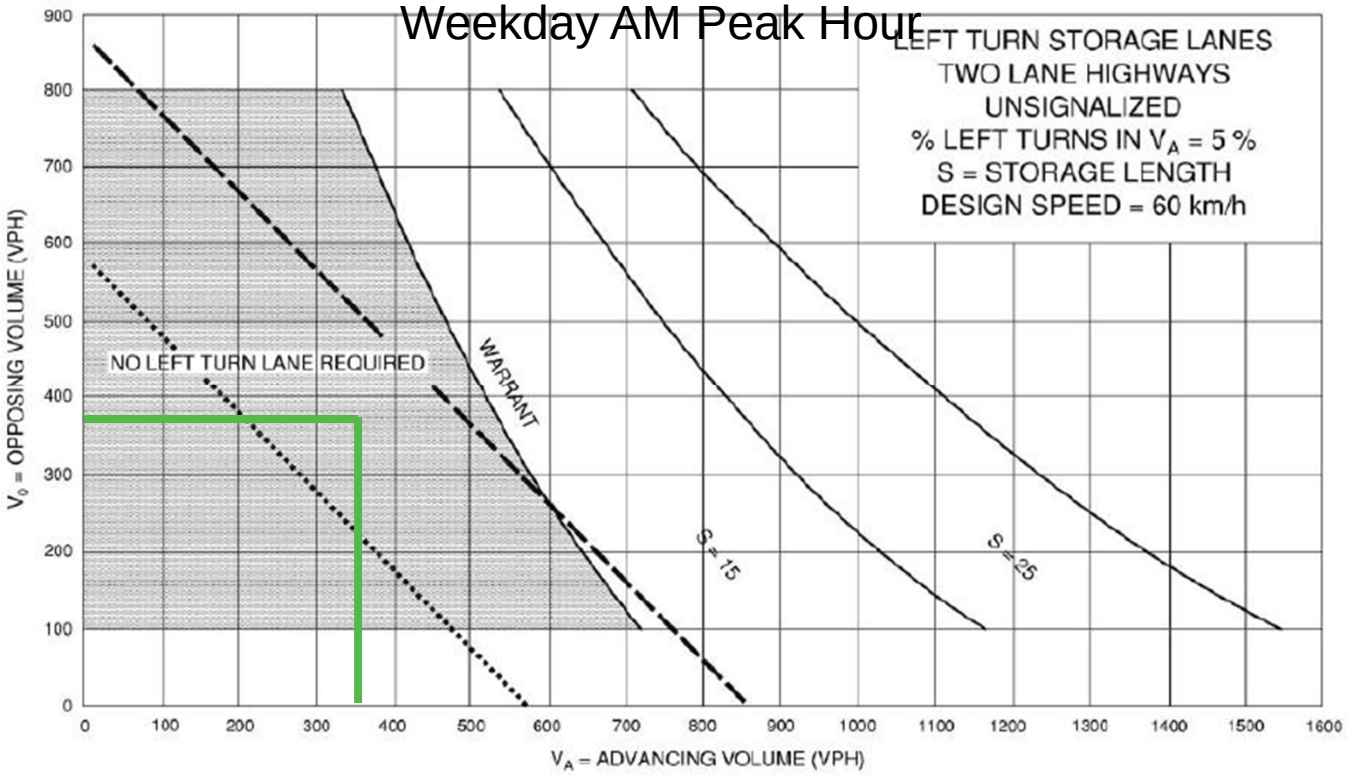
Intersection: 2: Rice Road & Quaker Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	27.0	23.9	84.9	61.5
Average Queue (m)	12.9	12.3	41.9	29.9
95th Queue (m)	22.1	19.6	73.5	50.6
Link Distance (m)	546.7	683.6	1007.6	217.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

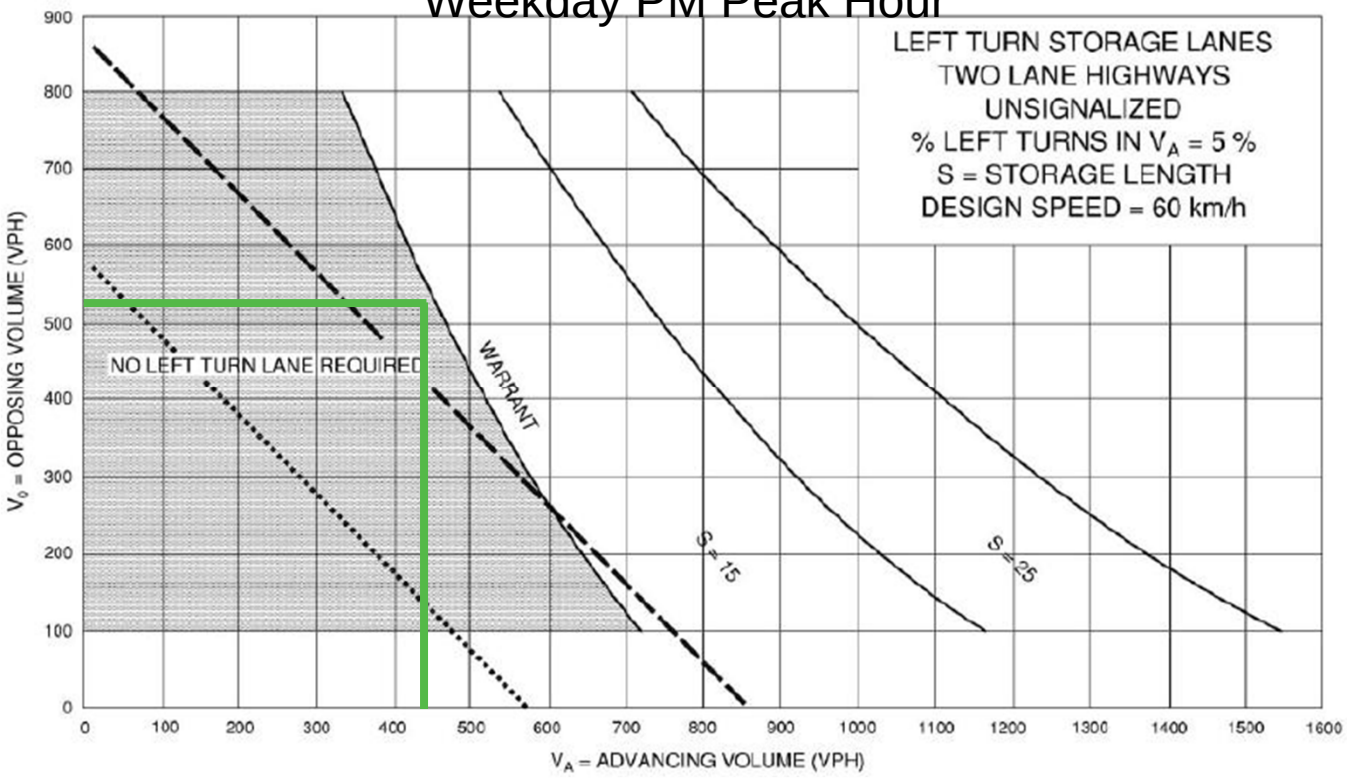
Appendix G

Left-Turn Lane Warrant

Weekday AM Peak Hour



Weekday PM Peak Hour



paradigm TRANSPORTATION SOLUTIONS LIMITED

Rice Road at Driveway
Left Turn Lane Warrants