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# Transportation Impact Study

## Wyse Road, Dartmouth

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a report by  
Fathom Studio

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Project  
Wyse Road,  
Multi-Unit Development

Prepared for  
HRM Planning & Development  
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## APPENDICIES

- Appendix A: Traffic Counts**
- Appendix B: Trip Generation**
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Count

2017

Timings

2017

Timings



# 1. INTRODUCTION

Transportation Impact Studies are prepared to ensure developments are consistent with the objectives and policies of the Municipal Planning Strategies / Municipal Development Plans and the Regional Plan

This Transportation Impact Study follows HRM’s Guidelines for the Preparation of Transportation Impact Studies, 8<sup>th</sup> Edition and general traffic and transportation engineering principles for such studies. It is intended to address the transportation impacts that may be expected on the road and active transportation networks resulting from the:

- Removal of the former Scotia Bank building located in the northeast corner of the Wyse Road and Nantucket Avenue; and,
- Addition of a new multi-unit residential / commercial / office development as described in the table below.

Table 1-1:  
Project Summary

<b>Proposed Development</b>	Dunphy Wyse Road Development
<b>Owner</b>	Alex Dunphy
<b>Location</b>	Northeast corner of: Wyse Road and Nantucket Avenue
<b>Building Details</b>	125 Residential Units 9,000 ft <sup>2</sup> Commercial / Retail Space 8,000 ft <sup>2</sup> Office Space
<b>Parking</b>	~ 105 Car Spaces



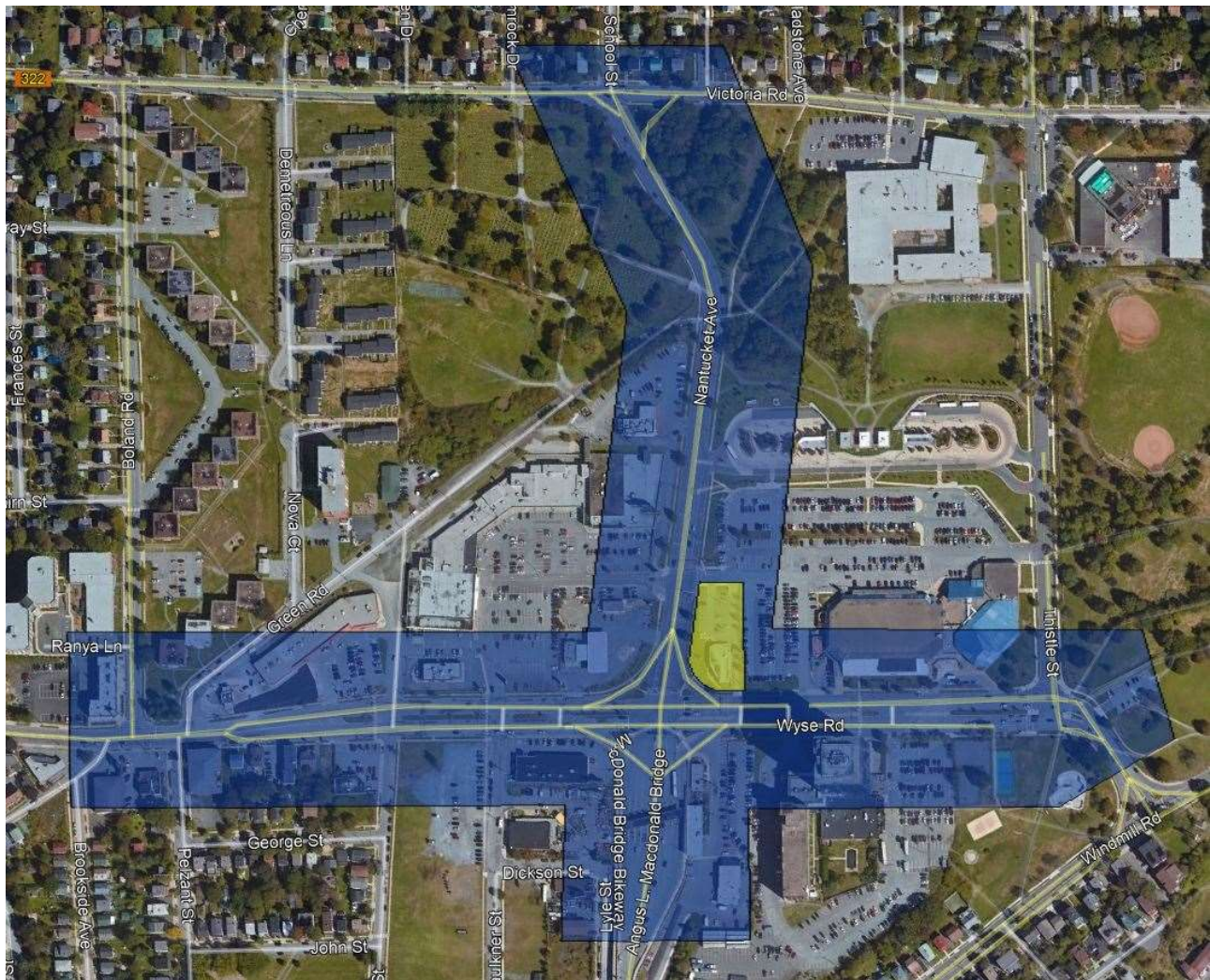
Figure 1-1:  
Building Rendering

# 2. EXISTING CONDITIONS

## 2.1 Study Area

The study area is located in the northeast quadrant of the Wyse Road and Nantucket Avenue intersection, immediately northeast of the Macdonald Bridge in Dartmouth, Nova Scotia. The yellow area represents the new building development site and the blue represents the primary study area considered in this study for analysis purposes.

Figure 2-1: Study Area





## 2.2 Roadways and Intersections

The following sections provide a brief summary of each of the key roadways in the study area that are relevant to this study.

### Wyse Road

A major roadway that runs parallel to the Halifax Harbour between Windmill Road and Albro Lake Road. In the vicinity of the development, Wyse is a divided multi-lane urban roadway that provides access to various commercial driveways and accommodates significant transit traffic. It provides direct access to the Macdonald Bridge's vehicle, bicycle and pedestrian lanes through the signalized Nantucket Avenue intersection. Sidewalks are present on both sides of the road and numerous midblock and intersection crosswalks are present in the area. Westbound Wyse Road at Nantucket includes two dedicated left turn lanes and a transit-only left turn lane to the Macdonald Bridge and a shared through right turn lane. The eastbound approach includes a double right turn lane to the Macdonald Bridge via a channelized right, two through lanes (shared with the right turn upstream of the intersection) and a dedicated left turn.



### Nantucket Avenue

Nantucket is a 4 / 5 lane urban roadway that transitions to the Macdonald Bridge approach and departure lanes on the south side of the Wyse Road intersection. It includes two southbound approach lanes to Wyse Road (through only and shared through / right – left turns are restricted) and three northbound lanes away from the Bridge. The northbound curb lane is restricted to bus traffic only through the Wyse Road intersection and becomes a dedicated left turn lane into the Sportsplex parking lot. There are sidewalks on both sides of the roadway and a signalized pedestrian actuated traffic signal is located immediately on the uphill (north) side of the Sportsplex / Dartmouth Shopping Center accesses. Nantucket also serves the west entrance and exit movements to and from the Dartmouth Bridge Transit Terminal, located just north of the Sportsplex.



## Victoria Road

Victoria Road is the next major roadway north of the development and services traffic between Downtown Dartmouth at its east end and the Circumferential Highway (Hwy 111) at its west end, including its continuation further to the west as Windmill Road. It's intersection with Nantucket Drive is signalized and is a primary route between the Macdonald Bridge and Woodland Avenue / Highway 118. Near Nantucket, Victoria Road includes a westbound dedicated left and shared through/right lane and an eastbound shared through/left with a dedicated right turn channelization and associated approach flare towards the Macdonald Bridge.



## Thistle Street

Thistle is a two-lane connector roadway between Wyse Road, through Victoria Road and into residential areas to the north of Victoria. It is a common commuter route using Maple Drive as a connection between Thistle and Ochterloney Street. It services the east entry and exit driveways to the Dartmouth Bridge Transit Terminal and includes an access to the Sportplex parking lot. Traffic signals are present at both Victoria Road and Wyse Road.



## Macdonald Bridge

The Macdonald Bridge is one of the two bridges crossing the Halifax Harbour. The bridge has three lanes with a center reversing lane and is serviced by 5 approach and departure lanes (10 total) as well as bicycle (west side) and pedestrian (east side) lanes on either side of the Bridge. Toll collection includes MacPass technologies and coin collection on all lanes and one attendant is present in each direction for cash transactions.



## 2.3 Active Transportation (AT)

The core downtown areas of both Halifax and Dartmouth have documented high cyclist and pedestrian activity (and other travel modes). This study area is no exception with many local AT origins and destinations surrounding the site and the development has direct access to numerous AT and transit corridors. These include the Dartmouth Bridge Transit Terminal, Dartmouth High and Bicentennial Schools, Dartmouth Common, the recently expanded and renovated Zatzman Sportsplex, Downtown Dartmouth, the Dartmouth waterfront, and various commercial and retail businesses. The development also has direct access to the dedicated bicycle and pedestrian walking lanes that cross the Macdonald Bridge connecting Dartmouth and Halifax.

The majority of routes and intersection crossings are already in place for this development and access points for the development naturally connect to existing sidewalk infrastructure along Nantucket Avenue and Wyse Road.

## 2.4 Vehicle Traffic

Recent and historical traffic counts were provided from HRM for all intersections in the study area. Most counts were completed during 2017 and 2018 and counts were supplemented by transit data, site observations, and general data associated with counts across the Macdonald and MacKay bridges. The baseline counts used in this analysis are provided in Appendix A of this report and the tables in Section 4 of this report show the volumes present on each movement of the intersections under each analysis scenario.



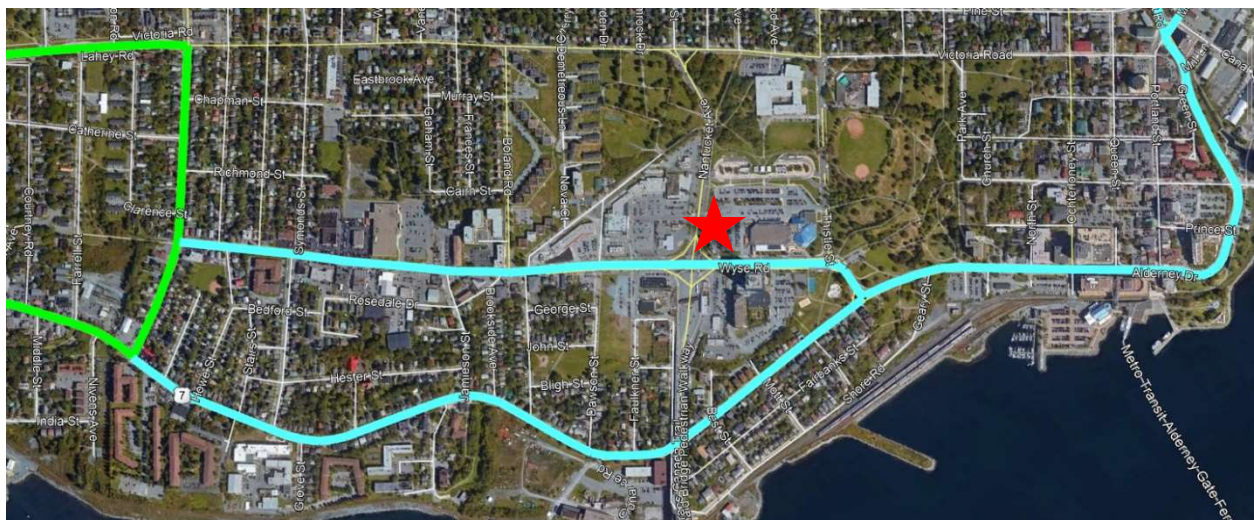
## 2.5 Transit

The proposed development is located immediately southwest of the Dartmouth Bridge Transit Terminal with less than 200 meters between the development and main transit terminal building. The development therefore has direct access to some of the best transit service available in the region with immediate access to over 20 different routes at the terminal and on connecting roadways. Additional routes are available at the Alderney Gate Terminal include the Alderney Ferry to Halifax which is located about 800 meters to the southeast.



## 2.6 Truck Routes

Halifax's By-Law T-400 "Respecting the Establishment of Truck Routes for Certain Trucking Motor Vehicles within the HRM" identifies Wyse Road and Windmill Road as Daytime routes (shown in blue) between the hours of 7 AM and 9 PM. Adjoining "Full Time" truck routes (shown in green) include Albion Lake Road and portions of Victoria Road and Windmill Road to the northwest and the Circumferential Highway via Alderney Drive, Prince Albert or Portland Street. These routes provide direct access to the new development, though limited delivery requirements are expected at this site.



# 3. FUTURE CONDITIONS

## 3.1 Context

### 3.1.1 Analysis Time Horizon

Based on recommended HRM guidelines, the base year for this study has been established as 2019 and such studies frequently addresses a 5-year time horizon (2024) which includes background traffic growth, new traffic related to the Wyse Road development and any other significant transportation impacts anticipated during that period. Given the relatively low volume of traffic generated by the development relative to the total traffic on the road network, this study addresses the 2019 base year and the 2024 horizon year with the development in place.

### 3.1.2 Background Traffic

Background traffic growth rates for traffic impact studies throughout HRM vary though are often in the 0.5 - 1% range. Actual growth is frequently less than this in many areas and even negative in some cases. Much of the natural traffic growth throughout the road network has been influence by the regional planning initiatives implemented over the past decade. Some of this work has resulted in more development closer to the downtown cores of Halifax and Dartmouth. Simultaneously, it has promoted increased transit and active transportation use which in turn has helped limit traffic growth rates for personal vehicles.

To determine reasonable growth rates in past studies for the Dartmouth area, HRM was consulted regarding transportation modeling work that was carried out as part of the regional planning analysis, and those consultations recommended that an average annual growth rate of 0.5% was appropriate for this general project area. Typically, the background traffic growth rates account for the addition of development throughout the area that contributing to traffic near the development as well as the general impact of trip reductions related to shifts to transit and active transportation modes.

The other important consideration regarding background traffic growth for the purposes of this study is the impact of the Macdonald Bridge, particularly during the peak hours of traffic. The intersection of Wyse Road with Nantucket and the Macdonald Bridge generally operates at, or near capacity during both the AM and PM peak hours. As intersection utilization nears capacity, traffic growth rates typically reduce in favour of the peak period extending over a longer period of time. Given the various factors and inputs, this study has assumed a 0.5% background traffic growth rate over the 5-year horizon to 2024 and to adjust past studies to the 2019 base year.



### 3.1.3 Analysis Period

Roadways adjacent to the development are highly commuter oriented, particularly given the proximity of the Macdonald Bridge which is a major commuter corridor to between downtown Dartmouth and Halifax. Therefore, the weekday AM and PM peak hours are considered to be the critical periods for the analysis.

## 3.2 The Development

The proposed development is composed primarily of residential units, a relatively small segment of office space, and some ground floor commercial / retail space. To determine a reasonable estimate of trips destined to and from the development during the AM and PM peak hours, the Institute of Transportation Engineers (ITE) Trip Generation Guide (10<sup>th</sup> Edition) was used. The residential portions of the development were represented by “Multifamily Residential Units (high-rise)”. The office space assumed the “General Office Building” land use and generated reasonable numbers given the location of the development and access to transit and active transportation infrastructure. The retail component of the space is challenging to define, but it is generally assumed that the nature and the location of the development will not lend itself to a retail use that generates an excessively high volume of new traffic. Frequently, retail space in such developments provide service to local area residents and generate little additional vehicle traffic. For the purposes of this study, the Shopping Center land use was selected as the most reasonable (and conservative) representation of trips to be generated from this development.

The proposed development will require removal of the existing building and construction of the new mixed-use development. As there has been little activity at the existing building in recent years and when operational, the single story building generated relative low traffic volumes, no traffic has been eliminated from the network to account for removal of the building.

### 3.2.1 Trip Generation

The addition of new traffic related to the development is summarized in the table below and a more detailed summary of the trip generation rates, and background calculations are provided in Appendix B of this report. Internal capture rates were estimated using the National Cooperative Highway Research Program (NCHRP) methodologies and no pass-by trips were assumed for the development (i.e. all trips were assigned as new trips to the development).

**Table 3-1: Trip Generation Summary**

	ITE Land Use Type	AM Peak			PM Peak		
		Enter	Exit	Total	Enter	Exit	Total
Multifamily (High Rise)	ITE 222	12	36	48	31	20	51
Office	ITE 710	8	1	9	1	8	9
Misc. Retail	ITE 820	5	3	8	16	18	34
Internal Capture Trips	(NCHRP)	0	0	0	-9	-9	-18
<b>TOTAL</b>		<b>25</b>	<b>40</b>	<b>65</b>	<b>39</b>	<b>37</b>	<b>76</b>

Given the proximity to Bridge transit hub and access to the robust active transportation network, it is expected that the development will generate traffic at rates significantly less than those estimated for “typical” mixed use developments. In the case of this development, trip reduction is expected to impact both origin related traffic (i.e. residents traveling from the development to work) as well as destination-based trips (i.e. people traveling to the office or retail portions of the development). In addition, the development is at a location that should incentivize the use of alternate modes of travel given the congestion frequently experienced on the Macdonald Bridge. Nonetheless, no additional trip reduction factors were assumed for the purposes of this study.

## **3.3 Trip Distribution and Assignment**

It is assumed that traffic will distribute itself through the network in a similar manner to the existing traffic. The new building will have a mix of inbound peak traffic and outbound peak traffic (i.e. primarily inbound office traffic and outbound residential traffic in the AM peak).

### **3.3.1 Driveway Location**

The location for the development’s driveway access to the underground parking structure has been discussed extensively and various options have been proposed. The original and preferred location from a traffic operations and safety perspective was to locate the driveway at the northeast corner of the development connecting to the main circulation aisle through the Sportsplex parking lot. This location corresponded with one of the existing driveways to the former Scotiabank surface parking lot, though HRM informed the developer that any access off the Sportsplex parking lot would not be permitted.

This resulted in the evaluation of alternative access locations which identified one option off Nantucket Avenue and one option off Wyse Road. Both alternative access points would require some level of turn restrictions to function effectively which is discussed in greater detail in the conclusions section of this report. A preliminary analysis of the Wyse Road and Nantucket Avenue driveway options shows that there is very little difference on the impacts to network traffic operations between the two options. Therefore, for the purposes of this study, we have analyzed the network using the Nantucket Road intersection only and further assumed that this intersection would function as a right-in, right-out only access.

Regardless of the access driveway, adjacent intersections can experience some level of congestion related to access to the Macdonald Bridge. It is therefore anticipated that entry and exit movements from the development may vary day-to-day depending on the level of congestion on the adjacent roadways. It is also anticipated that congestion may result in some drivers electing to use alternate routes to get between the development and their intended external origin or destination. The trip assignment assumptions and results are reflected in the spreadsheets and tables included in Appendix C of this report.



# 4. ANALYSIS

## 4.1 Transportation Modelling

A microscopic traffic model was prepared using the Synchro/SimTraffic platform for the AM and PM peak hours of analysis. Detailed output for each of the scenarios is provided in Appendix D of the report. The analysis included the following models for each of the AM and PM peaks:

- 2019 existing conditions;
- 2024 conditions with background traffic only; and,
- 2024 with background and development traffic.

The trip assignment process suggested that traffic entering and exiting the development on Nantucket Avenue will have to use circuitous routes in some cases to get to or from the driveway. For example, a driver approaching the site from the northwest (say from Dartmouth Crossing), will likely use Boland Street to Wyse Road then turn left onto Nantucket to enter the driveway because a left turn is not permitted from Nantucket to the driveway. This study assumes that all drivers remain on the main road network and use the most convenient route between the driveway and their external origin or destination, though it is possible some drivers may elect to use various shortcut or U-turn options to shorten their routes.

In general, intersections in the study area operate at a reasonably good level of service with limited delays and queues, while the intersection of Wyse Road with the Macdonald Bridge and Nantucket can experience frequent congestion during the peak hours. The individual intersections most impacted by the development are discussed in greater detail in the following sections and detailed results for all intersections for each analysis scenario are provided in Appendix D of this report.













## 4.2 Development Driveway













The development's driveway was assumed to operate as a right-in, right-out only access. The traffic signals at the Wyse Road intersection immediately to the south combined with the limited eastbound left turn volumes from Wyse to Nantucket and three-lane cross section adjacent to the driveway result in significant gaps in traffic allowing the driveway movements to operate at a high level of service. Modeling results show that in the worst case, the driveway intersection operates with a volume to capacity ratio of 0.25 or less, delays less than 10 seconds and minimal queuing. Detailed results are provided for the 2024 Development scenarios only (driveway is not present in existing and background traffic only scenarios) in Appendix D of this report for intersection #18: Nantucket and Driveway.

## 4.3 Nantucket Ave/Sportsplex/Mall Driveway

This is the first intersection immediately north of the site and accommodates all traffic exiting the site if the development's driveway is located on Nantucket Street. Conversely, all traffic entering the site will come from the south and will not travel through this intersection. The Nantucket driveway option therefore represents the worst-case scenario for traffic operations as volumes at this intersection would be lower if the driveway were located on Wyse Road. This intersection includes pedestrian actuated traffic signals on the north side of the intersection. The majority of green time remains attributed to through movements on Nantucket Avenue to service volumes coming off the Macdonald Bridge. This intersection is located at an adequate distance from the proposed driveway to meet the minimum 30 meter separation distance suggested by HRM by-laws.

The Synchro modeling results suggest that the AM peak experiences maximum volume to capacity ratio's of about 0.50 (50% capacity) today and 0.51 under 2024 development conditions with an overall intersection capacity utilization of about 53%. There is little change in operational results between existing and future development conditions during AM or PM peak hours. The two figures below present the volumes, volume to capacity ratio's and average vehicle delays for each movement at the intersection during the AM and PM peak hours.

AM Peak		Mall Driveway			Sportsplex			Nantucket NB			Nantucket SB		
													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
2019 Existing	Vol		5		3	4	39	24	280	44	20	939	59
	V/C		0.01			0.12		0.16		0.04		0.50	
	Delay		0.0			14.2		5.7		1.7		8.1	
2024 Back-ground	Vol		5		3	4	40	25	287	45	21	963	60
	V/C		0.01			0.12		0.17		0.05		0.51	
	Delay		0.0			14.2		5.7		1.7		8.2	
2024 Development	Vol		5		3	4	40	25	326	47	21	963	60
	V/C		0.01			0.12		0.19		0.05		0.51	
	Delay		0.0			14.2		5.8		1.7		8.2	

PM Peak		Mall Driveway			Sportplex			Nantucket NB			Nantucket SB		
													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
2019 Existing	Vol		7		5	0	39	5	750	20	20	456	75
	V/C		0.01			0.12		0.36		0.02		0.28	
	Delay		0.0			12.6		6.9		2.1		5.9	
2024 Back-ground	Vol		7		5	0	40	5	769	21	21	468	77
	V/C		0.01			0.12		0.36		0.02		0.28	
	Delay		0.0			12.6		6.9		2.1		5.9	
2024 Development	Vol		7		5	0	40	5	806	22	21	468	77
	V/C		0.01			0.12		0.39		0.02		0.29	
	Delay		0.0			12.6		7.2		2.1		5.9	



























In general, this intersection operates at a high level of performance throughout all scenarios and given the robust nature of the adjacent road network, no specific improvements are required at this intersection to accommodate the development. Modelling results suggest that there may be some benefits achieved for operations on Nantucket with improved coordination between the signals at the Sportsplex Driveway and signals at Wyse Road with Nantucket.

## 4.4 Nantucket Ave. / Victoria Rd. / School St.

The second signalized intersection to the north of the site has very limited impact from development-based traffic which composes about 2% of the overall traffic at the intersection in the 2024 development scenario. The heaviest movements during the AM peak hour are the eastbound right turn and westbound left turn from Victoria to Nantucket and the modelling results suggest an overall intersection capacity utilization of about 73% with volume to capacity ratios remaining less than 0.60 on all movements.

PM peak traffic is impacted by the heavier volume of northbound traffic on Nantucket making a left turn onto Victoria Road resulting in a movement v/c ratio of around 0.95 and some substantial queuing. That said, the queuing is not unreasonable given the heavy volume of traffic crossing the Macdonald Bridge during peak hour operations and there is available capacity on other movements at the intersection that could allow a more even distribution of capacity utilization if desired. Opposing traffic on School Road is relatively low so the northbound left turn movement generally operates with limited delay. Overall capacity utilization is around 77% at this intersection.

AM Peak		Victoria Road			Victoria Road			Nantucket Avenue			School Street		
													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
2019 Existing	Vol	10	80	510	330	300	27	165	45	109	20	180	10
	V/C	0.11		0.53	0.57	0.39		0.45	0.25		0.36		
	Delay	19.3		14.3	15.5	11.0		19.7	6.2		16.0		
2024 Back-ground	Vol	10	82	523	338	308	28	169	46	112	21	185	10
	V/C	0.11		0.54	0.58	0.40		0.47	0.26		0.37		
	Delay	19.3		14.5	15.5	11.0		19.7	6.2		16.0		
2024 Development	Vol	10	82	523	338	308	28	198	48	120	22	185	10
	V/C	0.11		0.54	0.58	0.40		0.55	0.27		0.37		
	Delay	19.3		14.5	15.5	11.0		21.8	6.1		16.0		

PM Peak		Victoria Road			Victoria Road			Nantucket Avenue			School Street		
													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
2019 Existing	Vol	20	209	368	134	199	50	577	65	169	20	48	10
	V/C	0.46		0.58	0.49	0.48		0.87	0.26		0.09		
	Delay	32.9		21.9	24.0	19.2		28.6	3.0		6.1		
2024 Back-ground	Vol	21	214	377	137	204	51	592	67	173	21	49	10
	V/C	0.46		0.58	0.49	0.48		0.87	0.26		0.09		
	Delay	32.9		21.9	24.0	19.2		28.6	3.0		6.1		
2024 Develop-ment	Vol	21	214	377	137	204	51	621	68	179	23	49	10
	V/C	0.48		0.59	0.51	0.50		0.95	0.27		0.10		
	Delay	32.9		22.2	24.8	19.5		39.2	3.0		6.2		

























## 4.5 Wyse Rd / Macdonald Bridge / Nantucket

This intersection is one of the highest volume intersections in HRM and is characterized by eastbound double right, westbound double left, southbound double through lanes on the approaches. Operations vary significantly day-to-day depending on the peak traffic characteristics that are often dependent on driver choices on the approaching road network. The AM peak hour frequently experiences some congestion as vehicles enter onto the Macdonald Bridge from all three approaches.

























Queues frequently extend across the Macdonald Bridge from the Halifax side of the Harbour which contributes to congestion at this intersection. Exacerbating the challenges are the left turn bus movements from the westbound dedicated bus lane on Wyse Road onto the Macdonald Bridge which frequently blocks the eastbound right turn movements onto the Bridge from Wyse Road.

For all these reasons, this is a difficult intersection to accurately model. The modelling result suggest that in the absence of backups on the Macdonald Bridge (from the Halifax side) that limit the efficiency of the intersection, the intersection operates with an overall capacity utilization of about 82% in the AM and PM peaks. During these periods, movements to the Bridge frequently operate with a V/C ratio over 0.9 and substantial queuing can occur. Often, one or two of the three approach legs run at capacity and observations in the area suggest that some drivers will seek alternate routes to less congested approaches.



AM Peak		Wyse (EB)			Wyse (WB)			Macdonald Brdg			Nantucket		
													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
													
2019 Existing	Vol	66	100	665	803	83	28	143	254	485	0	903	8
	V/C	0.26	0.27	0.74	0.90	0.13		0.70	0.12	0.51	0.83		
	Delay	33.5	32.7	33.4	47.8	10.0		37.8	16.5	3.8	37.0		
2024 Back-ground	Vol	68	103	682	823	85	29	147	260	497	0	926	8
	V/C	0.26	0.28	0.76	0.92	0.13		0.72	0.12	0.52	0.85		
	Delay	33.6	32.9	34.2	49.8	10.0		39.8	16.5	3.9	38.6		
2024 Development	Vol	76	103	698	823	85	35	147	271	497		926	8
	V/C	0.29	0.28	0.78	0.92	0.14		0.72	0.13	0.52	0.85		
	Delay	34.3	32.8	35.0	49.9	10.0		40.0	16.6	3.9	38.8		










Various signal timing adjustments can be made during the AM peak hours to distribute capacity and queuing through the intersection, though all have very limited impact on the overall operations at the intersection. Given the nature of the intersection as the entrance to the Macdonald Bridge, it is expected that there will always be some level of congestion for movements approaching the bridge. As the development based volumes are so low, there is virtually no change to performance measures with the development traffic added.










PM Peak		Wyse (EB)			Wyse (WB)			Macdonald Bridge			Nantucket		
													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
													
2019 Existing	Vol	60	128	375	447	142	50	283	654	1011		543	22
	V/C	0.29	0.41	0.39	0.66	0.26		0.70	0.26	0.85	0.48		
	Delay	34.4	34.9	22.5	36.4	14.4		26.6	13.6	13.0	25.0		
2024 Back-ground	Vol	62	131	384	458	146	51	290	671	1037		557	23
	V/C	0.29	0.41	0.39	0.66	0.26		0.70	0.26	0.85	0.48		
	Delay	39.0	41.7	13.9	47.0	19.7		20.1	10.7	16.2	20.8		
2024 Development	Vol	74	131	400	458	146	64	290	687	1037		557	23
	V/C	0.36	0.41	0.41	0.67	0.28		0.75	0.28	0.87	0.50		
	Delay	36.0	34.8	22.8	36.9	14.2		29.7	14.0	15.3	25.5		

PM peak operations at this intersection are slightly better than during the AM peak hour as level of service through the intersection is heavily dictated by the ability to get vehicles through the Macdonald Bridge toll plaza and then through the signals at Wyse Road. The available capacity of the signals typically causes queueing to extend across the bridge toward the Halifax side and limits the amount of traffic downstream of the intersection. With respect to the impacts of the development, the new traffic composes well less the 1% of the total traffic through the intersection and therefore does not generate any specific recommendations for improvements at this intersection.

## 4.6 Wyse Road and Thistle Street

This is the first intersection east of the proposed development and like other intersections in the study area, development traffic has minimal impact on the intersection's operations. Development traffic composes about 1% of total traffic through the intersection during the peak hours. V/C ratios and overall intersection capacity utilization remain below 50% during the AM peak hour with limited delay and queuing. During the PM peak the heavier eastbound left to Thistle competes with the westbound through movement on Wyse resulting in v/c ratios of about 0.9, though the traffic signals help keep delays and queue lengths at reasonable levels.

AM Peak		Wyse (EB)		Wyse (WB)		Thistle	
							
		EBL	EBT	WBT	WBR	SBL	SBR
							
2019 Existing	Vol	88	497	565	41	57	349
	V/C	0.56	0.50	0.61		0.07	0.43
	Delay	27.1	15.2	16.4		8.0	6.5
2024 Background	Vol	90	510	579	42	58	358
	V/C	0.57	0.50	0.61		0.07	0.44
	Delay	28.0	15.2	16.3		8.2	7.1
2024 Development	Vol	90	510	583	42	65	361
	V/C	0.58	0.50	0.62		0.08	0.45
	Delay	28.3	15.2	16.4		8.2	7.2

PM Peak		Wyse (EB)		Wyse (WB)		Thistle	
							
		EBL	EBT	WBT	WBR	SBL	SBR
							
2019 Existing	Vol	362	687	671	62	70	172
	V/C	0.89	0.39	0.79		0.14	0.30
	Delay	37.0	8.6	25.6		16.2	4.6
2024 Background	Vol	371	704	688	64	72	176
	V/C	0.89	0.39	0.79		0.14	0.30
	Delay	37.0	8.6	25.6		16.2	4.6
2024 Development	Vol	371	704	694	64	79	182
	V/C	0.92	0.40	0.81		0.16	0.32
	Delay	41.6	8.6	26.7		16.5	4.6



## 4.7 Development Driveway Location

The originally proposed driveway location from the Sportsplex parking lot was not permitted. Therefore, alternative driveway options on Nantucket Avenue and Wyse Road were evaluated and summarized in a March 2020 letter that addressed the adjacent roadway environment, and operational and safety implications of each driveway option. The letter is attached in Appendix E for reference with the key findings summarized in the points below:

- Both driveway options are feasible and meet the 30-meter minimum required separation from the nearest street line of the Wyse/Nantucket/Macdonald Bridge intersection;
- Driveway volumes are low which minimize the driveway's impacts on adjacent traffic;
- Due to the proximity of the intersection and the adjacent lanes / operations, both driveway options should be configured as right-in, right-out driveways. Comments provided by HRM suggest that supplementary measures may be required to limit the possibility of making left turn movements. Further discussion should take place as the project moves into detailed design stages and options could include directional islands and the extension of medians;
- Both driveway options introduce some level of route restrictions between the development and external origins / destinations. The specific route challenges associated with each driveway option are detailed in the attached letter, though it is difficult to predict exactly how drivers will respond to various traffic conditions. Suffice to say that the surrounding road network is robust and there are a wide variety of alternative routing options that remain relatively short and convenient;
- Comments from Halifax Transit suggest that the Nantucket driveway option appears to minimize the potential impacts to transit operations and is therefore preferred;
- Comments from HRM have indicated that detailed design work is proceeding on uni-directional protected bicycle lanes on Wyse Road, between Boland Road and Thistle St. with construction expected to begin in 2020.

Based on the various analyses and feedback comments, it appears that there is a collective preference to pursue the Nantucket Road driveway option. Under this scenario, the preferred driveway location should maximize the distance away from the Wyse Road intersection while not compromising spacing to the Sportsplex driveway or the ability to achieve appropriate grading to the development's parking structure. At the current time, the preferred location appears to be approximately at the midpoint between Wyse Road and the Sportsplex driveway. This results in about 40 meters between the driveway and each of the adjacent intersections.

Given the complex environment and interests of various HRM departments, further refinement of the driveway location and operational characteristics should be discussed as part of the detailed design process and subsequent to this transportation impact study.

# 5. CONCLUSIONS

This report has analyzed the impacts of the removal of an existing building and the addition of a new multi-unit residential development with office and retail space. The analysis shows that the development contributes a very small amount of traffic to the adjacent roadways and intersections relative to the overall traffic on the road network. Furthermore, the results show very little change to key performance parameters such as delays, queue length or volume to capacity ratios between conditions before and after the development is in place.

The surrounding road network is characterized by high volumes of commuter-based traffic, most notably related to volumes onto and off the Macdonald Bridge between Dartmouth and Halifax. This commuter traffic is quite consistent during the weekdays, though the intensity of traffic on the three directional approaches to the Bridge can vary significantly. In general, the development fits very well into the surrounding environment being directly located on several core transportation routes and having direct access to robust transit and active transportation networks. It is expected that residents of this development are highly likely to utilize both the transit and AT networks which in turn help to reduce additional vehicle traffic on the roadways.

The analysis suggests that there are no improvements required to the external road network to accommodate the proposed development. Analysis and HRM feedback suggests that the preferred location of the site's parkade driveway is off Nantucket Avenue approximately 40 meters north of Wyse Road. Refinement of the driveway's location and geometrics should be undertaken in conjunction with HRM as the project moves into the detailed design stages.

We trust that this report satisfies the Halifax requirements for the preparation of Transportation Impact Studies. Should there be any questions or comments regarding the content of the study, please do not hesitate to contact the undersigned.

Sincerely,

Original Signed

**Roger N. Boychuk, P.Eng.**  
Senior Transportation Engineer

Fathom Studio (*formerly Ekistics Planning & Design and Form:Media*)  
1 Starr Lane, Dartmouth, NS B2Y 4V7

c: (902) 233 1152  
[www.fathomstudio.ca](http://www.fathomstudio.ca)





fathom

# APPENDIX A

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## Traffic Counts



# MANUAL TRAFFIC COUNTS

INTERSECTION:

NANTUCKET AVENUE AT DARTMOUTH SPORTSPLEX

WEATHER  
RECORDER

CLOUDY  
KS

DAY DATE MONTH YEAR  
TUES 7 NOV 2017

STREET: TIME:		NANTUCKET AVENUE			NANTUCKET AVENUE			MALL			DARTMOUTH SPORTSPLEX			TOTAL
		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
07:00:00 AM	07:15:00 AM	3	202	11	0	51	5	0	0	0	0	0	7	
07:15:00 AM	07:30:00 AM	8	225	13	0	60	8	0	0	0	1	1	12	
07:30:00 AM	07:45:00 AM	4	255	16	0	70	13	0	0	0	0	2	13	
07:45:00 AM	08:00:00 AM	5	248	18	0	87	6	0	0	2	2	1	7	

TOTAL	20	930	58	0	268	32	0	0	2	3	4	39	1356
PEAK	1008			300			2			46			FACTOR
15 MIN PEAK	1100			372			8			60			
PEAK HOUR FACTOR	0.92			0.81			0.25			0.77			
TWO WAY TOTALS	1315			1235			64			98			
													1.01
													1370

DAY DATE MONTH YEAR  
TUES 7 NOV 2017

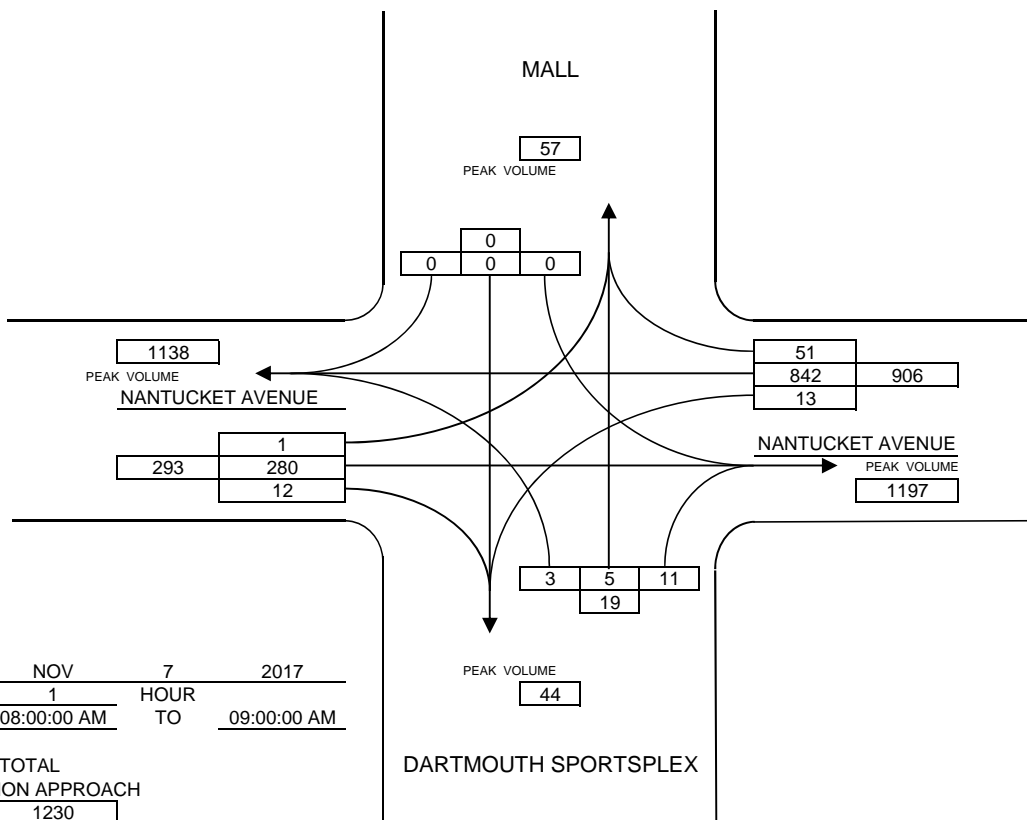
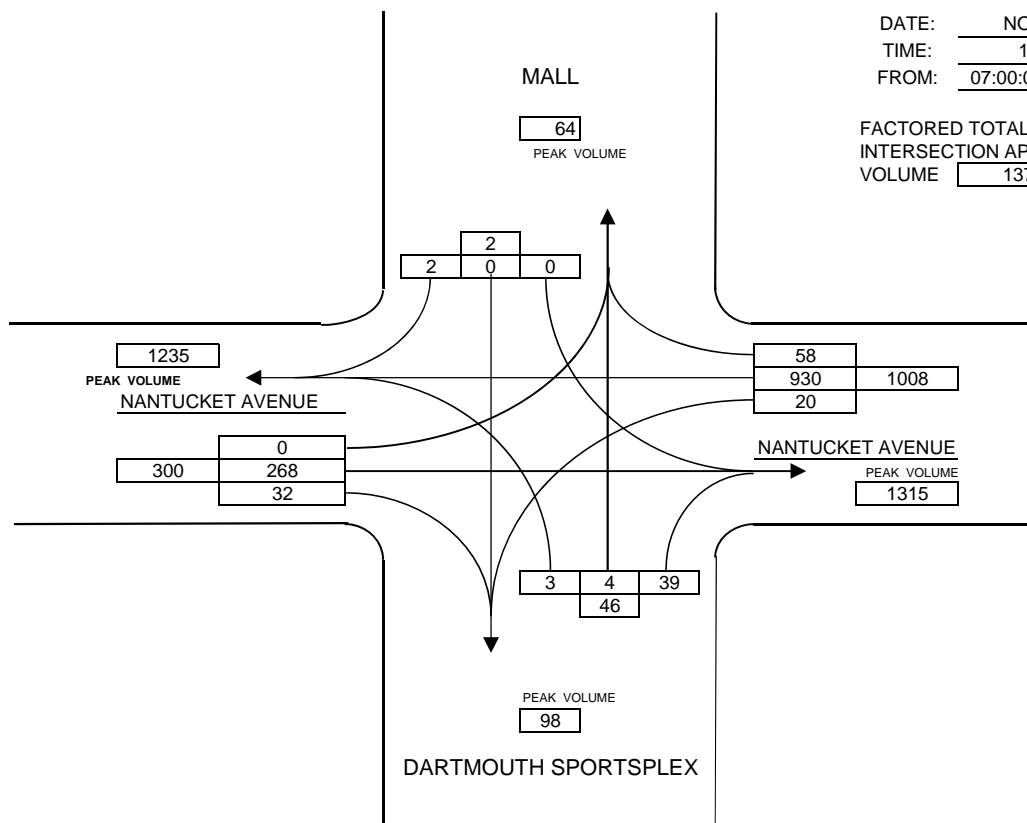
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
08:00:00 AM	08:15:00 AM	2	197	13	0	65	4	0	0	0	1	1	1	284
08:15:00 AM	08:30:00 AM	4	223	12	1	79	2	0	0	0	0	2	5	328
08:30:00 AM	08:45:00 AM	2	204	14	0	71	3	0	0	0	1	0	3	298
08:45:00 AM	09:00:00 AM	5	218	12	0	65	3	0	0	0	1	2	2	308

TOTAL	13	842	51	1	280	12	0	0	0	3	5	11	1218
PEAK	906			293			0			19			FACTOR
15 MIN PEAK	956			328			0			28			
PEAK HOUR FACTOR	0.95			0.89			0			0.68			
TWO WAY TOTALS	1197			1138			57			44			
													1.01
													1230

# VEHICULAR GRAPHIC SUMMARY SHEET

## NANTUCKET AVENUE AT DARTMOUTH SPORTSPLEX

INTERSECTION :



# MANUAL TRAFFIC COUNTS

INTERSECTION:

NANTUCKET AVENUE AT DARTMOUTH SPORTSPLEX

WEATHER  
RECORDER

CLOUDY  
KS

DAY DATE MONTH YEAR  
TUES 7 NOV 2017

STREET: TIME:		NANTUCKET AVENUE			NANTUCKET AVENUE			MALL			DARTMOUTH SPORTSPLEX			TOTAL
		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
04:00:00 PM	04:15:00 PM	0	92	19	0	183	3	0	0	3	0	0	8	308
04:15:00 PM	04:30:00 PM	1	98	9	0	197	1	0	0	3	0	0	8	317
04:30:00 PM	04:45:00 PM	0	103	16	0	201	2	0	0	4	1	0	13	340
04:45:00 PM	05:00:00 PM	0	108	22	1	200	2	0	0	2	0	0	12	347

TOTAL	1	401	66	1	781	8	0	0	12	1	0	41	1312
PEAK	468			790			12			42			FACTOR
15 MIN PEAK	520			812			16			56			
PEAK HOUR FACTOR	0.9			0.97			0.75			0.75			
TWO WAY TOTALS	1290			1204			79			51			
													1.01
													1325

DAY DATE MONTH YEAR  
TUES 7 NOV 2017

TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
05:00:00 PM	05:15:00 PM	0	104	15	1	215	2	0	0	3	2	0	11	353
05:15:00 PM	05:30:00 PM	1	118	23	0	183	1	0	0	1	0	0	8	335
05:30:00 PM	05:45:00 PM	0	120	19	0	194	4	0	0	2	2	0	3	344
05:45:00 PM	06:00:00 PM	0	109	17	0	199	4	0	0	1	1	0	2	333

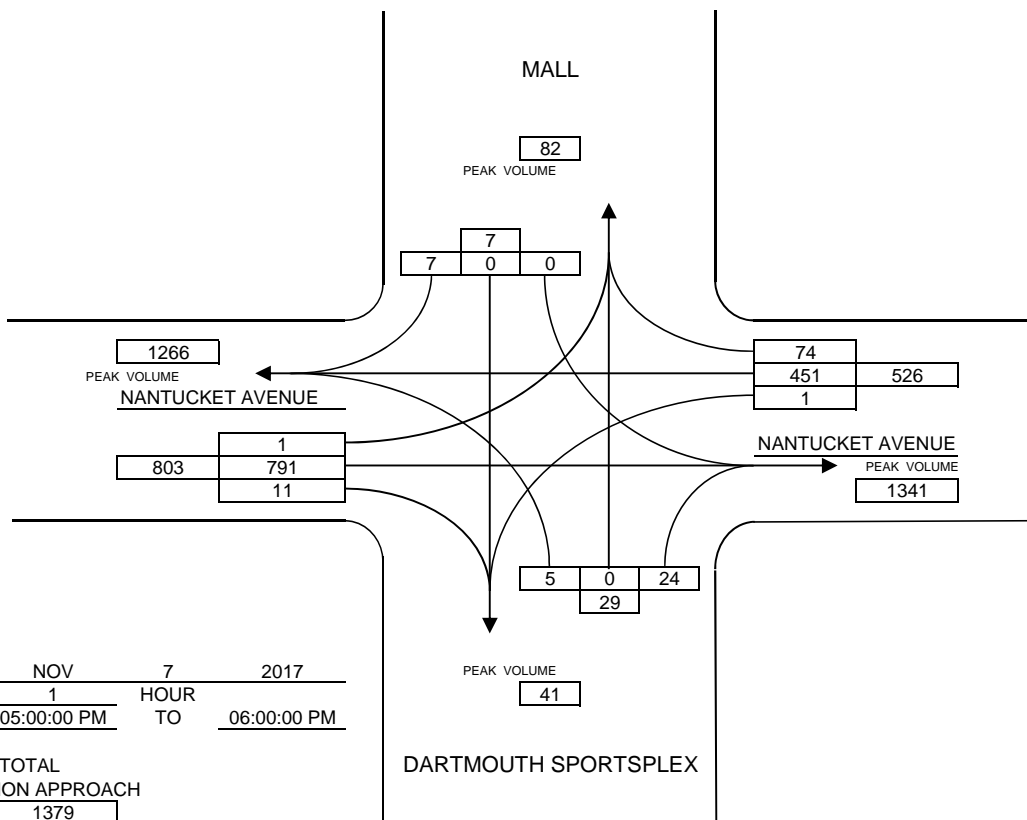
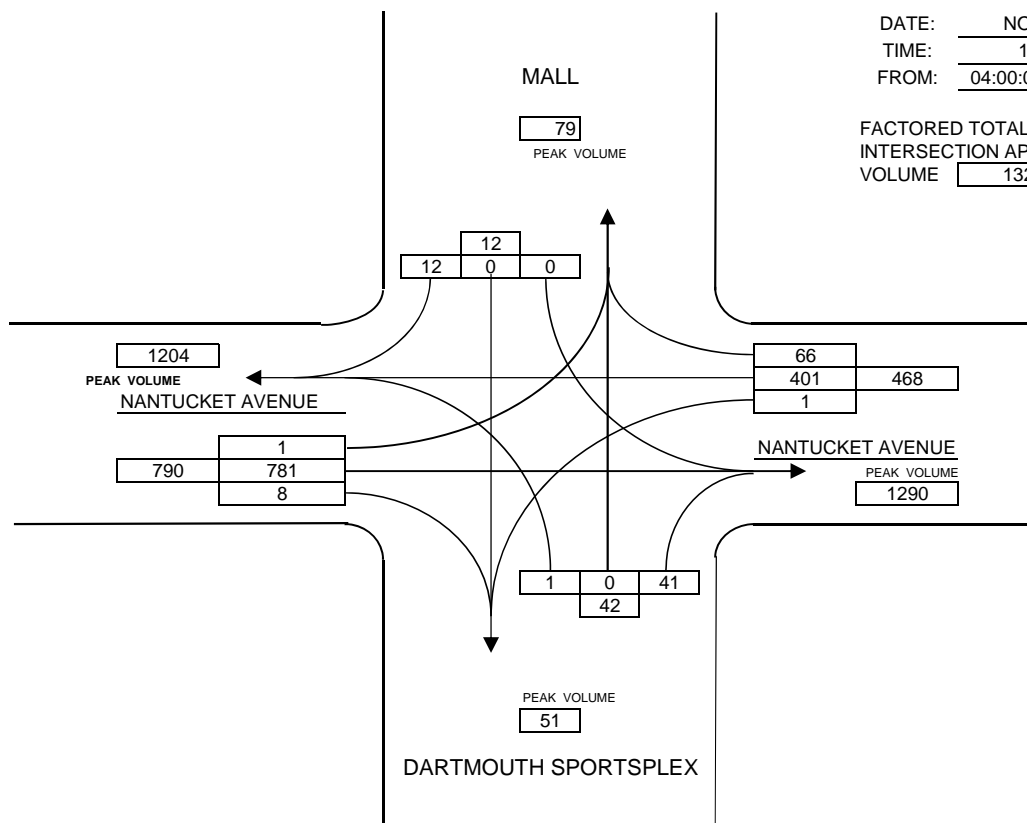
TOTAL	1	451	74	1	791	11	0	0	7	5	0	24	1365	
PEAK	526			803			7			29			FACTOR	
15 MIN PEAK	568			872			12			52				
PEAK HOUR FACTOR	0.93			0.92			0.58			0.56				
TWO WAY TOTALS	1341			1266			82			41				
														1.01
														1379



# VEHICULAR GRAPHIC SUMMARY SHEET

## NANTUCKET AVENUE AT DARTMOUTH SPORTSPLEX

INTERSECTION :



# MANUAL TRAFFIC COUNTS

INTERSECTION:

THISTLE STREET AT VICTORIA ROAD

WEATHER  
RECORDER

CLEAR  
SS

DAY DATE MONTH YEAR  
TUESDAY 17 OCT 2017

STREET: TIME: 15 MIN INTERVALS		THISTLE STREET FROM THE EAST			THISTLE STREET FROM THE WEST			VICTORIA STREET FROM THE NORTH			VICTORIA STREET FROM THE SOUTH			TOTAL
		L	S	R	L	S	R	L	S	R	L	S	R	
07:00:00 AM	07:15:00 AM	0	59	69	2	20	2	12	18	12	19	92	0	305
07:15:00 AM	07:30:00 AM	0	73	64	8	25	1	13	10	12	17	89	0	312
07:30:00 AM	07:45:00 AM	1	66	56	8	22	1	12	12	14	25	107	1	325
07:45:00 AM	08:00:00 AM	2	79	60	12	26	1	15	18	13	23	85	0	334

TOTAL	3	277	249	30	93	5	52	58	51	84	373	1	1276	
PEAK	529			128			161			458			FACTOR	
15 MIN PEAK	564			156			184			532				
PEAK HOUR FACTOR	0.94			0.82			0.88			0.86				
TWO WAY TOTALS	675			540			813			524				
														1.01
														1289

DAY DATE MONTH YEAR  
TUESDAY 17 OCT 2017

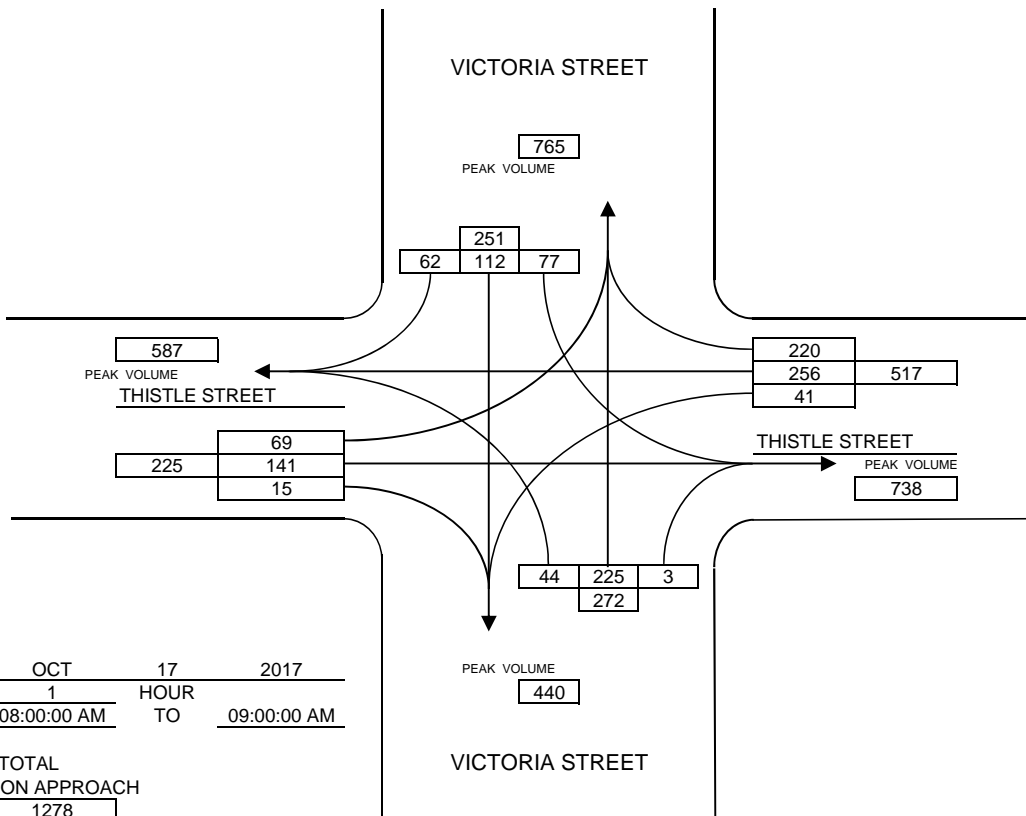
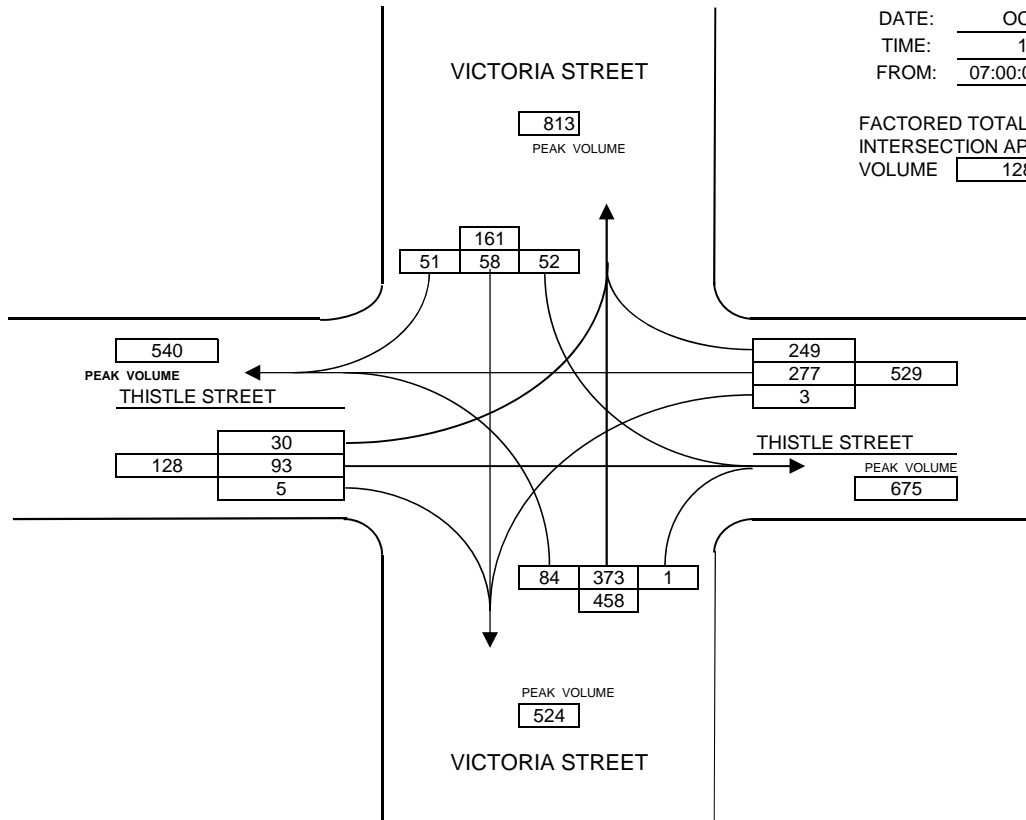
TIME: 15 MIN INTERVALS		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
		L	S	R	L	S	R	L	S	R	L	S	R	
08:00:00 AM	08:15:00 AM	2	48	48	22	18	3	19	28	15	12	74	1	290
08:15:00 AM	08:30:00 AM	3	72	58	23	23	5	19	29	19	10	62	1	324
08:30:00 AM	08:45:00 AM	15	75	55	13	58	5	17	24	14	2	43	1	322
08:45:00 AM	09:00:00 AM	21	61	59	11	42	2	22	31	14	20	46	0	329

TOTAL	41	256	220	69	141	15	77	112	62	44	225	3	1265	
PEAK	517			225			251			272			FACTOR	
15 MIN PEAK	580			304			268			348				
PEAK HOUR FACTOR	0.89			0.74			0.94			0.78				
TWO WAY TOTALS	738			587			765			440				
														1.01
														1278

# VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION :

THISTLE STREET AT VICTORIA ROAD



DATE: OCT 17 2017  
TIME: 1 HOUR  
FROM: 08:00:00 AM TO 09:00:00 AM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1278



# MANUAL TRAFFIC COUNTS

INTERSECTION:

THISTLE STREET AT VICTORIA ROAD

WEATHER  
RECORDER

CLEAR  
SS

DAY DATE MONTH YEAR  
TUESDAY 17 OCT 2017

STREET: TIME: 15 MIN INTERVALS		THISTLE STREET FROM THE EAST			THISTLE STREET FROM THE WEST			VICTORIA STREET FROM THE NORTH			VICTORIA STREET FROM THE SOUTH			TOTAL
		L	S	R	L	S	R	L	S	R	L	S	R	
04:00:00 PM	04:15:00 PM	1	21	21	11	124	4	50	19	8	5	47	2	313
04:15:00 PM	04:30:00 PM	3	38	40	9	143	3	69	39	8	6	58	3	419
04:30:00 PM	04:45:00 PM	0	24	25	10	111	6	59	25	11	12	77	3	363
04:45:00 PM	05:00:00 PM	1	32	35	7	117	2	66	24	21	14	45	0	364

TOTAL	5	115	121	37	495	15	244	107	48	37	227	8	1459
PEAK	241			547			399			272			FACTOR
15 MIN PEAK	324			620			464			368			
PEAK HOUR FACTOR	0.74			0.88			0.86			0.74			
TWO WAY TOTALS	988			747			784			399			
1.01													
1474													

DAY DATE MONTH YEAR  
TUESDAY 17 OCT 2017

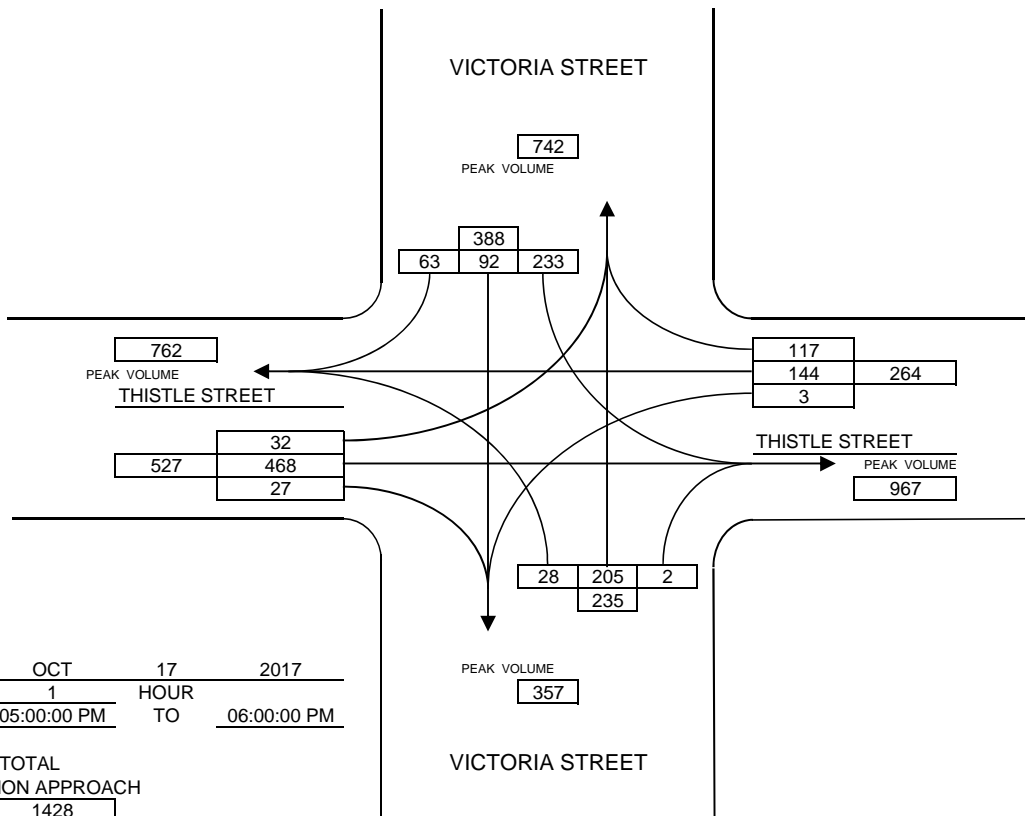
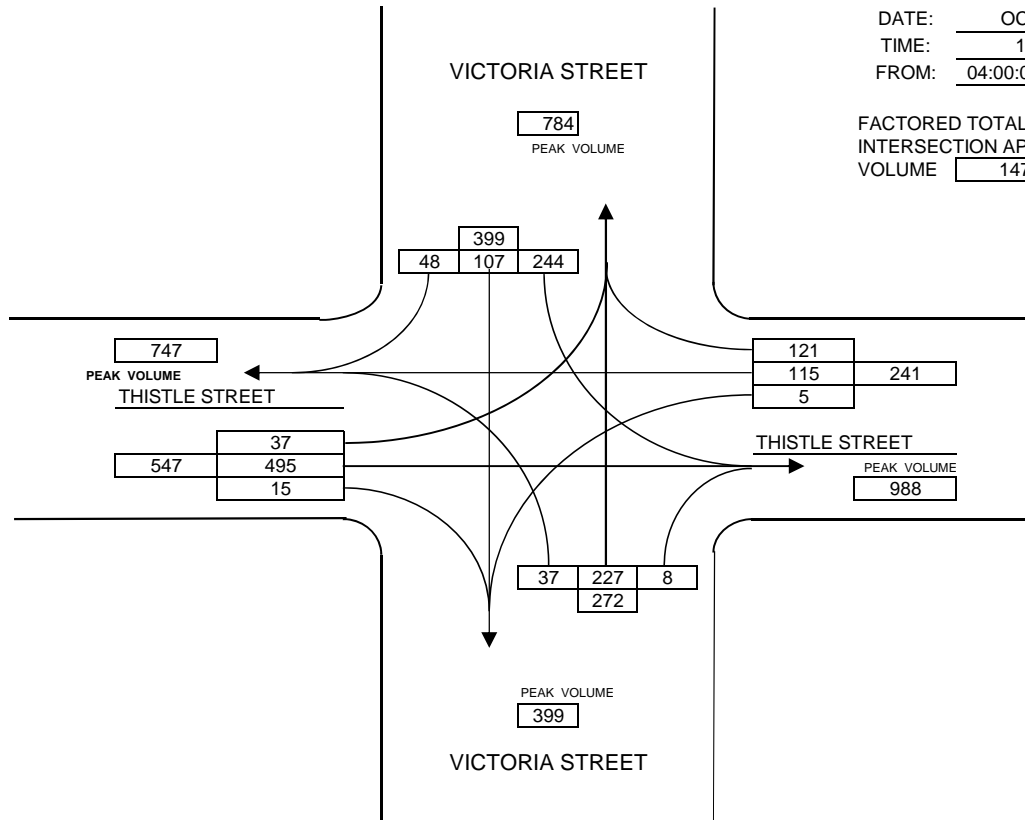
TIME: 15 MIN INTERVALS		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
		L	S	R	L	S	R	L	S	R	L	S	R	
05:00:00 PM	05:15:00 PM	0	38	26	8	116	4	64	34	17	11	78	1	397
05:15:00 PM	05:30:00 PM	2	45	25	8	123	9	56	9	9	7	45	0	338
05:30:00 PM	05:45:00 PM	1	32	28	7	112	7	56	29	18	6	36	1	333
05:45:00 PM	06:00:00 PM	0	29	38	9	117	7	57	20	19	4	46	0	346

TOTAL	3	144	117	32	468	27	233	92	63	28	205	2	1414	
PEAK	264			527			388			235			FACTOR	
15 MIN PEAK	288			560			460			360				
PEAK HOUR FACTOR	0.92			0.94			0.84			0.65				
TWO WAY TOTALS	967			762			742			357				
														1.01
														1428

# VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION :

THISTLE STREET AT VICTORIA ROAD





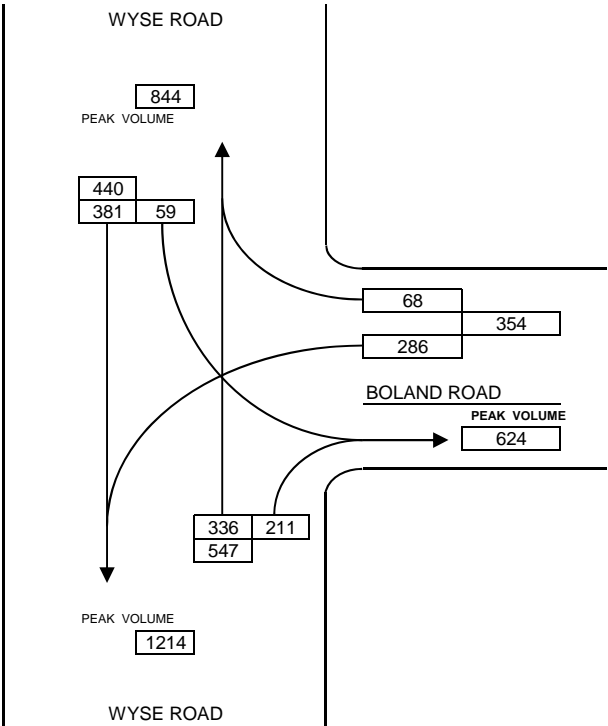
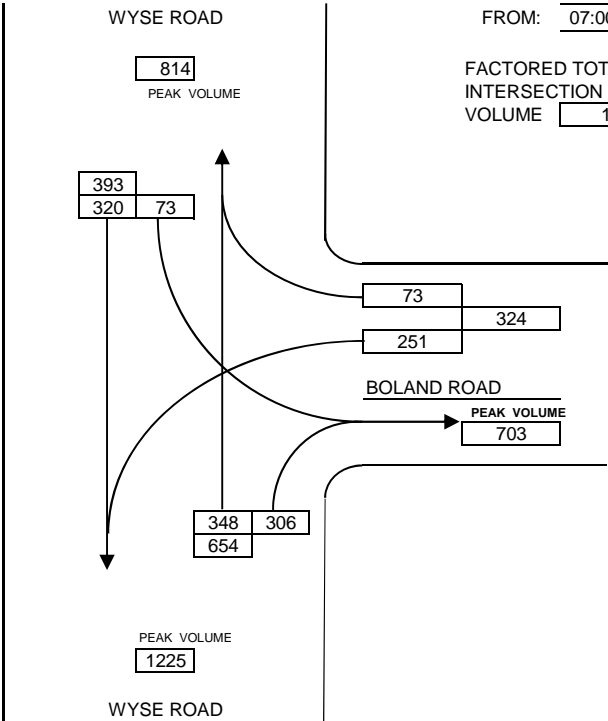


VEHICULAR GRAPHIC SUMMARY SHEET  
BOLAND ROAD AT WYSE ROAD

INTERSECTION :

DATE: SEPT 7 2016  
TIME: 1 HOUR  
FROM: 07:00:00 AM TO 08:00:00 AM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1371



DATE: SEPT 7 2016  
TIME: 1 HOUR  
FROM: 08:00:00 AM TO 09:00:00 AM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1341

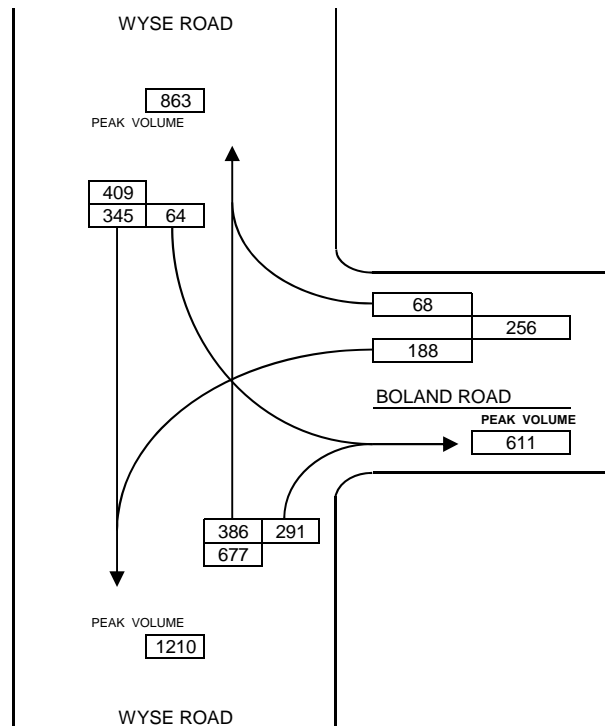
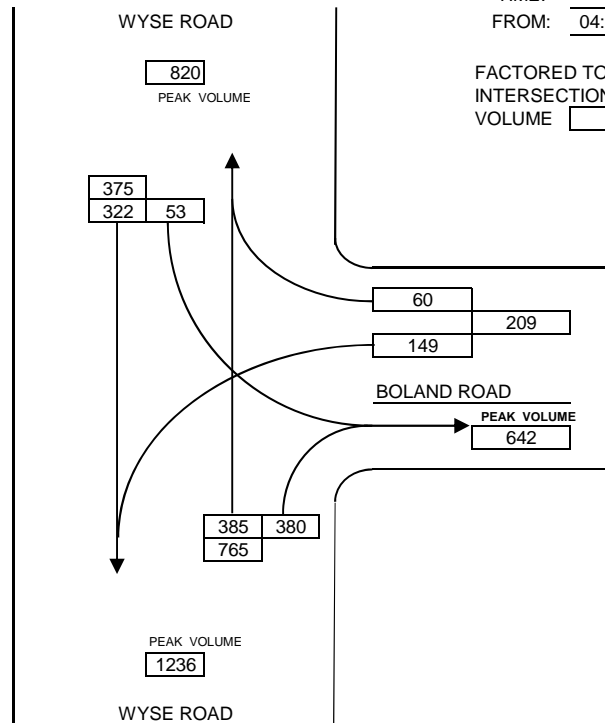


# **VEHICULAR GRAPHIC SUMMARY SHEET** **BOLAND ROAD AT WYSE ROAD**

INTERSECTION :

DATE: SEPT 7 2016  
 TIME: 1 HOUR  
 FROM: 04:00:00 PM TO 05:00:00 PM

FACTORED TOTAL  
 INTERSECTION APPROACH  
 VOLUME 1349



DATE: SEPT 7 2016  
 TIME: 1 HOUR  
 FROM: 05:00:00 PM TO 06:00:00 PM

FACTORED TOTAL  
 INTERSECTION APPROACH  
 VOLUME 1342

Halifax Regional Municipality (Dartmouth, NS)  
PO Box 1749

Halifax, Nova Scotia, Canada B3J 3A5  
(902) 490-4866

Count Name: NANTUCKET AVENUE AT WYSE  
ROAD  
Site Code: 17RQ330  
Start Date: 11/23/2017  
Page No: 1

## Turning Movement Data

Start Time	Wyse Road Southbound Southbound						Nantucket Ave Westbound Westbound						Wyse Road Northbound Northbound						Macdonald Bridge Eastbound Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:00 AM	175	15	7	0	0	197	2	212	0	0	3	214	2	13	196	0	1	211	100	52	34	0	3	186	808
7:15 AM	201	21	18	0	2	240	3	196	0	0	2	199	6	19	197	0	5	222	120	66	45	0	7	231	892
7:30 AM	140	16	19	0	0	175	2	243	0	0	2	245	6	23	212	0	1	241	120	56	36	0	6	212	873
7:45 AM	177	28	15	0	0	220	2	225	0	0	0	227	6	16	221	0	2	243	125	53	25	0	6	203	893
Hourly Total	693	80	59	0	2	832	9	876	0	0	7	885	20	71	826	0	9	917	465	227	140	0	22	832	3466
8:00 AM	147	20	14	0	1	181	1	239	0	0	6	240	10	25	173	0	0	208	118	79	37	0	6	234	863
8:15 AM	143	34	12	0	1	189	10	194	0	0	6	204	10	27	176	0	4	213	142	61	31	0	5	234	840
8:30 AM	130	40	19	0	1	189	7	192	0	0	2	199	9	24	161	0	4	194	138	82	41	0	5	261	843
8:45 AM	127	40	21	0	2	188	5	155	1	0	2	161	10	32	124	0	1	166	131	56	43	0	2	230	745
Hourly Total	547	134	66	0	5	747	23	780	1	0	16	804	39	108	634	0	9	781	529	278	152	0	18	959	3291
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	80	40	11	0	0	131	8	74	0	0	7	82	15	21	72	0	6	108	119	93	48	0	0	260	581
11:15 AM	74	23	17	0	0	114	19	78	0	0	5	97	10	21	88	0	4	119	100	94	50	0	1	244	574
11:30 AM	76	32	13	0	0	121	10	83	0	0	5	93	15	26	118	0	3	159	128	98	61	0	1	287	660
11:45 AM	70	33	17	0	0	120	21	88	0	0	2	109	19	42	87	0	1	148	96	99	72	0	5	267	644
Hourly Total	300	128	58	0	0	486	58	323	0	0	19	381	59	110	365	0	14	534	443	384	231	0	7	1058	2459
12:00 PM	68	40	14	0	0	122	12	99	1	0	9	112	15	35	92	0	2	142	109	93	79	0	3	281	657
12:15 PM	86	30	14	0	0	130	12	72	0	0	3	84	6	50	113	0	4	169	100	114	69	0	5	283	666
12:30 PM	74	55	19	0	0	148	23	85	0	0	13	108	10	34	93	0	4	137	119	80	51	0	2	250	643
12:45 PM	79	42	17	0	0	138	15	97	0	0	2	112	13	48	93	0	5	154	147	91	66	0	7	304	708
Hourly Total	307	167	64	0	0	538	62	353	1	0	27	416	44	167	391	0	15	602	475	378	265	0	17	1118	2674
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	90	39	17	0	0	146	3	122	0	0	2	125	11	37	106	0	5	154	205	164	82	0	2	451	876
4:15 PM	71	33	10	0	1	114	8	153	0	0	3	161	6	37	128	0	4	171	233	148	63	0	12	444	890
4:30 PM	87	46	16	0	0	149	3	145	1	0	5	149	11	47	106	0	6	164	231	116	71	0	9	418	880
4:45 PM	93	38	12	0	2	143	9	145	0	0	6	154	4	41	95	0	6	140	238	181	72	0	3	491	928
Hourly Total	341	156	55	0	3	552	23	565	1	0	16	589	32	162	435	0	21	629	907	609	288	0	26	1804	3574
5:00 PM	100	31	15	0	0	146	6	128	0	0	1	134	7	50	115	0	1	172	244	147	64	0	1	455	907
5:15 PM	88	27	22	0	0	137	5	143	0	0	3	148	5	32	122	0	5	159	253	173	77	0	0	503	947
5:30 PM	94	32	7	0	0	133	2	127	0	0	1	129	10	19	115	0	0	144	276	153	70	0	0	499	905
5:45 PM	69	31	22	0	0	122	5	146	0	0	3	151	5	25	126	0	3	156	206	146	74	0	0	426	855
Hourly Total	351	121	66	0	0	538	18	544	0	0	8	562	27	126	478	0	9	631	979	619	285	0	1	1883	3614
Grand Total	2539	786	368	0	10	3693	193	3441	3	0	93	3637	221	744	3129	0	77	4094	3798	2495	1361	0	91	7654	19078
Approach %	68.8	21.3	10.0	0.0	-	-	5.3	94.6	0.1	0.0	-	-	5.4	18.2	76.4	0.0	-	-	49.6	32.6	17.8	0.0	-	-	-
Total %	13.3	4.1	1.9	0.0	-	19.4	1.0	18.0	0.0	0.0	-	19.1	1.2	3.9	16.4	0.0	-	21.5	19.9	13.1	7.1	0.0	-	40.1	-
All Vehicles (no classification)	2539	786	368	0	-	3693	193	3441	3	0	-	3637	221	744	3129	0	-	4094	3798	2495	1361	0	-	7654	19078
% All Vehicles (no classification)	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0
Bicycles on Crosswalk	-	-	-	-	3	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	5	-	-



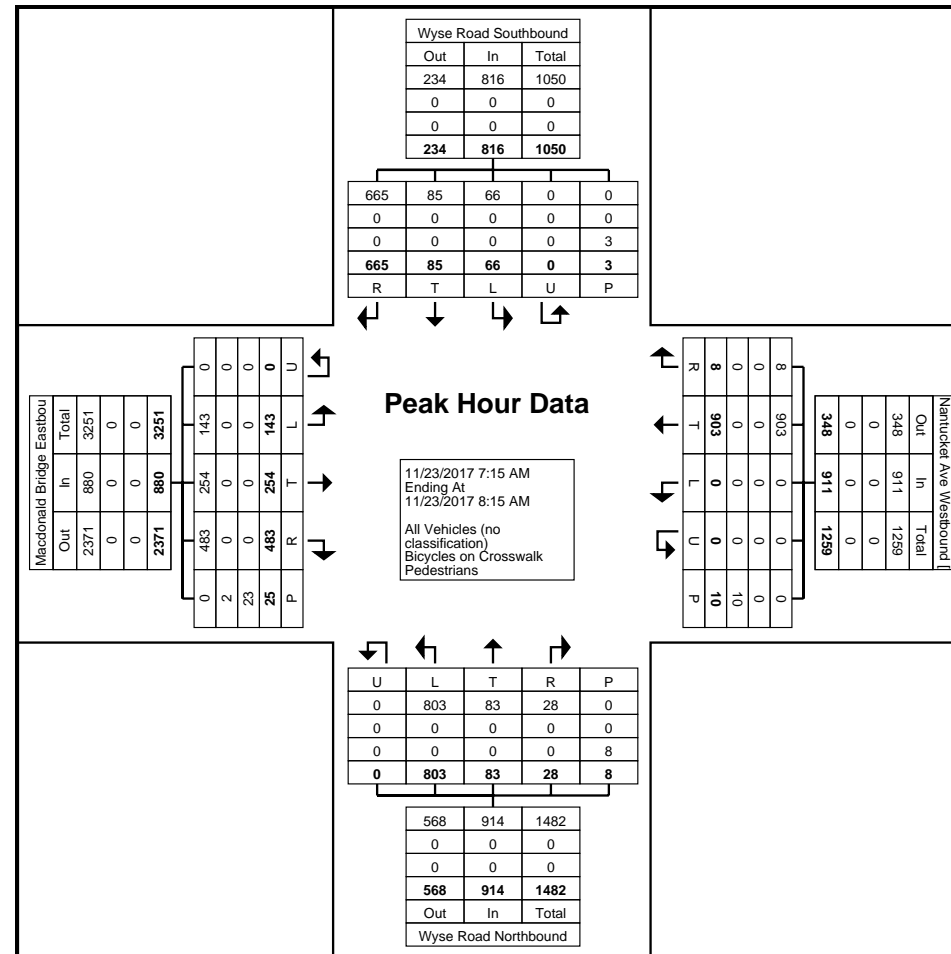
Halifax Regional Municipality (Dartmouth, NS)  
PO Box 1749

Halifax, Nova Scotia, Canada B3J 3A5  
(902) 490-4866

Count Name: NANTUCKET AVENUE AT WYSE  
ROAD  
Site Code: 17RQ330  
Start Date: 11/23/2017  
Page No: 4

### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Wyse Road Southbound Southbound						Nantucket Ave Westbound Westbound						Wyse Road Northbound Northbound						Macdonald Bridge Eastbound Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	201	21	18	0	2	240	3	196	0	0	2	199	6	19	197	0	5	222	120	66	45	0	7	231	892
7:30 AM	140	16	19	0	0	175	2	243	0	0	2	245	6	23	212	0	1	241	120	56	36	0	6	212	873
7:45 AM	177	28	15	0	0	220	2	225	0	0	0	227	6	16	221	0	2	243	125	53	25	0	6	203	893
8:00 AM	147	20	14	0	1	181	1	239	0	0	6	240	10	25	173	0	0	208	118	79	37	0	6	234	863
Total	665	85	66	0	3	816	8	903	0	0	10	911	28	83	803	0	8	914	483	254	143	0	25	880	3521
Approach %	81.5	10.4	8.1	0.0	-	-	0.9	99.1	0.0	0.0	-	-	3.1	9.1	87.9	0.0	-	-	54.9	28.9	16.3	0.0	-	-	-
Total %	18.9	2.4	1.9	0.0	-	23.2	0.2	25.6	0.0	0.0	-	25.9	0.8	2.4	22.8	0.0	-	26.0	13.7	7.2	4.1	0.0	-	25.0	-
PHF	0.827	0.759	0.868	0.000	-	0.850	0.667	0.929	0.000	0.000	-	0.930	0.700	0.830	0.908	0.000	-	0.940	0.966	0.804	0.794	0.000	-	0.940	0.986
All Vehicles (no classification)	665	85	66	0	-	816	8	903	0	0	-	911	28	83	803	0	-	914	483	254	143	0	-	880	3521
% All Vehicles (no classification)	100.0	100.0	100.0	-	-	100.0	100.0	100.0	-	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	8.0	-	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	10	-	-	-	-	-	8	-	-	-	-	-	23	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	92.0	-	-



Turning Movement Peak Hour Data Plot (7:15 AM)

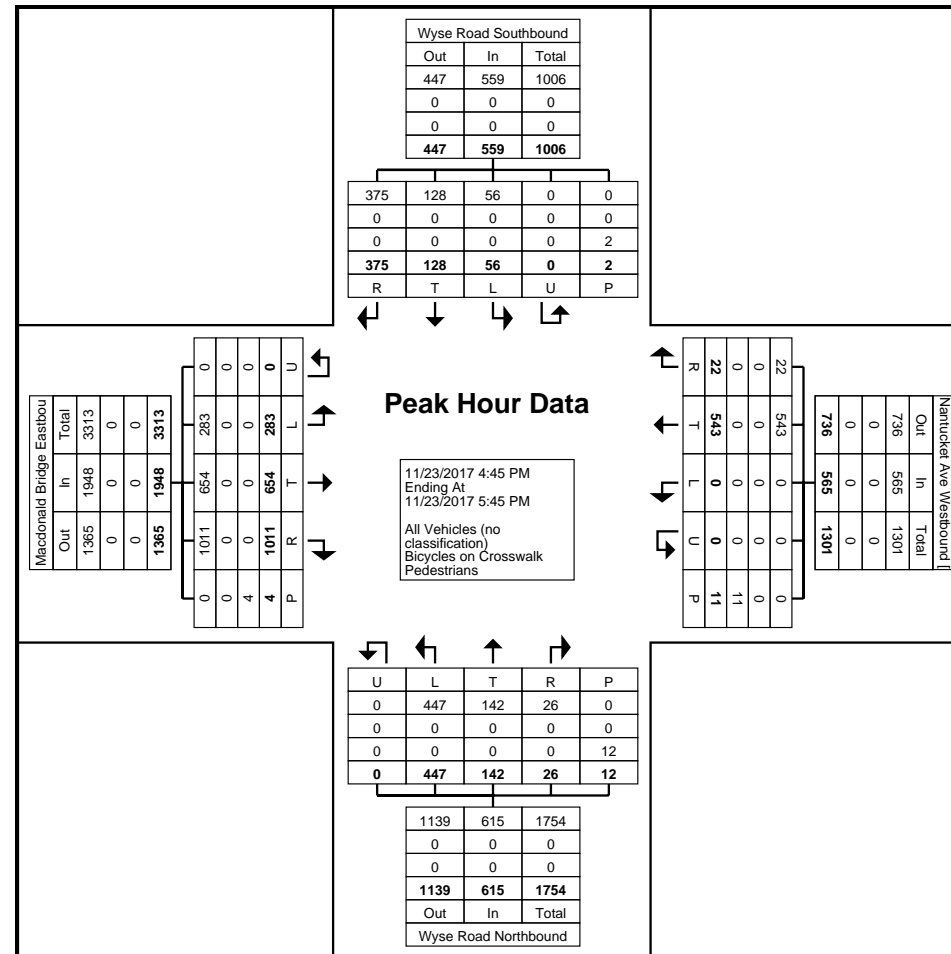
Halifax Regional Municipality (Dartmouth, NS)  
PO Box 1749

Halifax, Nova Scotia, Canada B3J 3A5  
(902) 490-4866

Count Name: NANTUCKET AVENUE AT WYSE  
ROAD  
Site Code: 17RQ330  
Start Date: 11/23/2017  
Page No: 10

### Turning Movement Peak Hour Data (4:45 PM)

Start Time	Wyse Road Southbound Southbound						Nantucket Ave Westbound Westbound						Wyse Road Northbound Northbound						Macdonald Bridge Eastbound Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:45 PM	93	38	12	0	2	143	9	145	0	0	6	154	4	41	95	0	6	140	238	181	72	0	3	491	928
5:00 PM	100	31	15	0	0	146	6	128	0	0	1	134	7	50	115	0	1	172	244	147	64	0	1	455	907
5:15 PM	88	27	22	0	0	137	5	143	0	0	3	148	5	32	122	0	5	159	253	173	77	0	0	503	947
5:30 PM	94	32	7	0	0	133	2	127	0	0	1	129	10	19	115	0	0	144	276	153	70	0	0	499	905
Total	375	128	56	0	2	559	22	543	0	0	11	565	26	142	447	0	12	615	1011	654	283	0	4	1948	3687
Approach %	67.1	22.9	10.0	0.0	-	-	3.9	96.1	0.0	0.0	-	-	4.2	23.1	72.7	0.0	-	-	51.9	33.6	14.5	0.0	-	-	-
Total %	10.2	3.5	1.5	0.0	-	15.2	0.6	14.7	0.0	0.0	-	15.3	0.7	3.9	12.1	0.0	-	16.7	27.4	17.7	7.7	0.0	-	52.8	-
PHF	0.938	0.842	0.636	0.000	-	0.957	0.611	0.936	0.000	0.000	-	0.917	0.650	0.710	0.916	0.000	-	0.894	0.916	0.903	0.919	0.000	-	0.968	0.973
All Vehicles (no classification)	375	128	56	0	-	559	22	543	0	0	-	565	26	142	447	0	-	615	1011	654	283	0	-	1948	3687
% All Vehicles (no classification)	100.0	100.0	100.0	-	-	100.0	100.0	100.0	-	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	11	-	-	-	-	-	12	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Turning Movement Peak Hour Data Plot (4:45 PM)



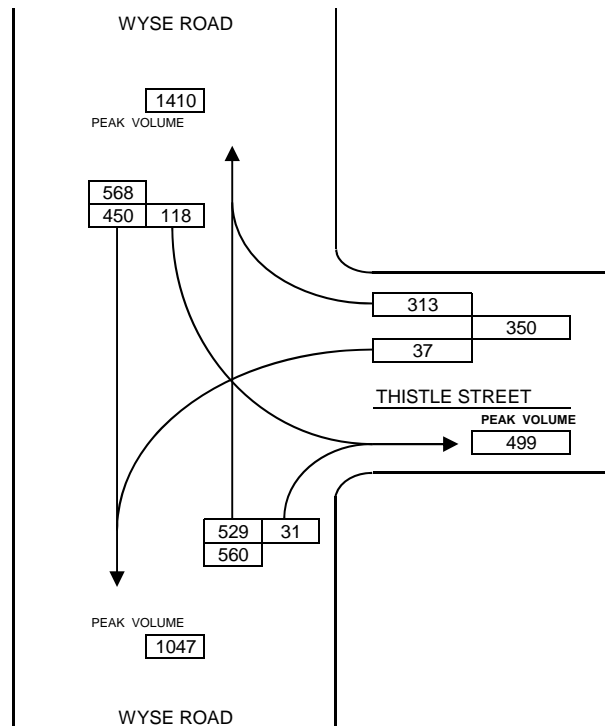
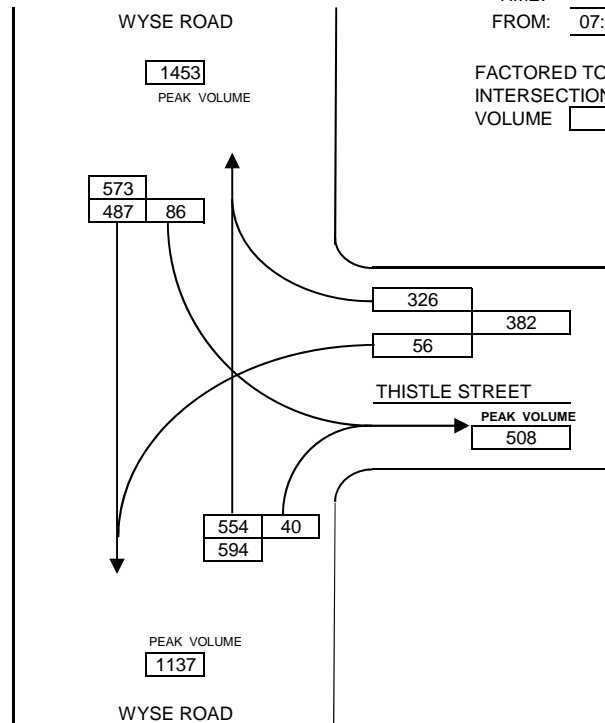


INTERSECTION :

**VEHICULAR GRAPHIC SUMMARY SHEET**  
**THISTLE STREET AT WYSE ROAD**

DATE: AUG 24 2017  
TIME: 1 HOUR  
FROM: 07:00:00 AM TO 08:00:00 AM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1580



DATE: AUG 24 2017  
TIME: 1 HOUR  
FROM: 08:00:00 AM TO 09:00:00 AM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1508

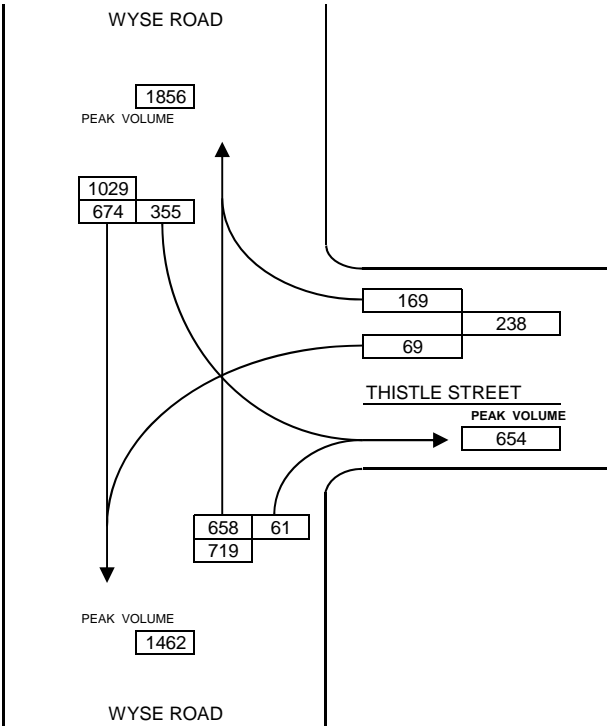
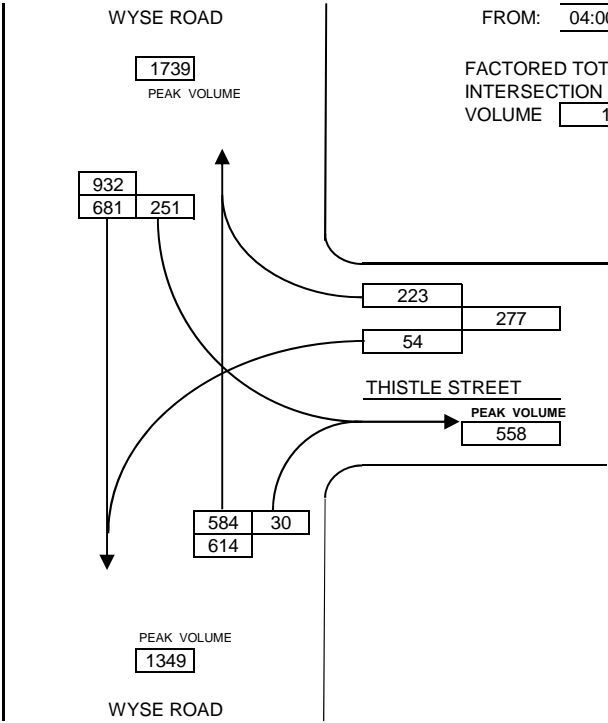


INTERSECTION :

VEHICULAR GRAPHIC SUMMARY SHEET  
THISTLE STREET AT WYSE ROAD

DATE: AUG 24 2017  
TIME: 1 HOUR  
FROM: 04:00:00 PM TO 05:00:00 PM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1859



DATE: AUG 24 2017  
TIME: 1 HOUR  
FROM: 05:00:00 PM TO 06:00:00 PM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 2026



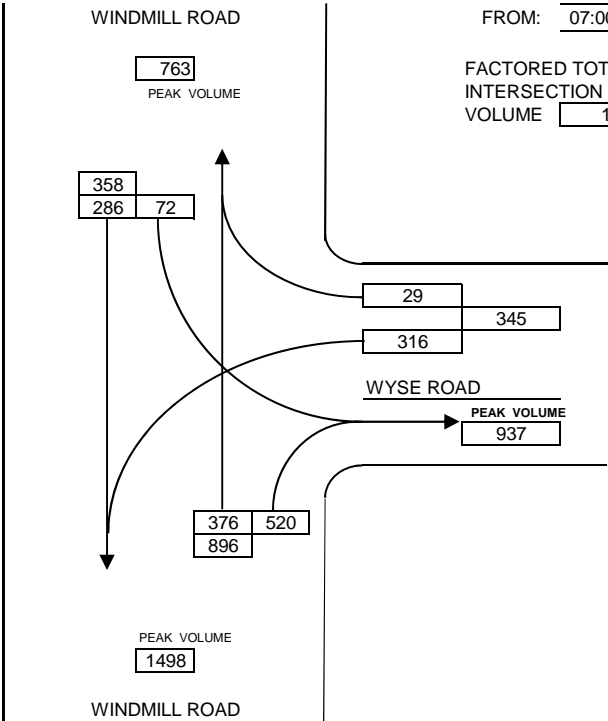


VEHICULAR GRAPHIC SUMMARY SHEET  
WINDMILL ROAD AT WYSE ROAD

INTERSECTION :

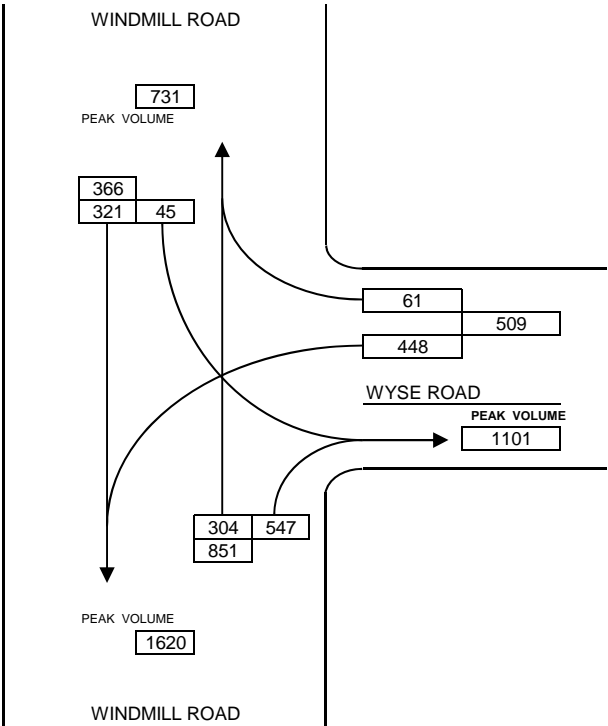
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TIME: 1 HOUR  
FROM: 07:00:00 AM TO 08:00:00 AM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1551



DATE: NOV 2 2017  
TIME: 1 HOUR  
FROM: 08:00:00 AM TO 09:00:00 AM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1674



KS

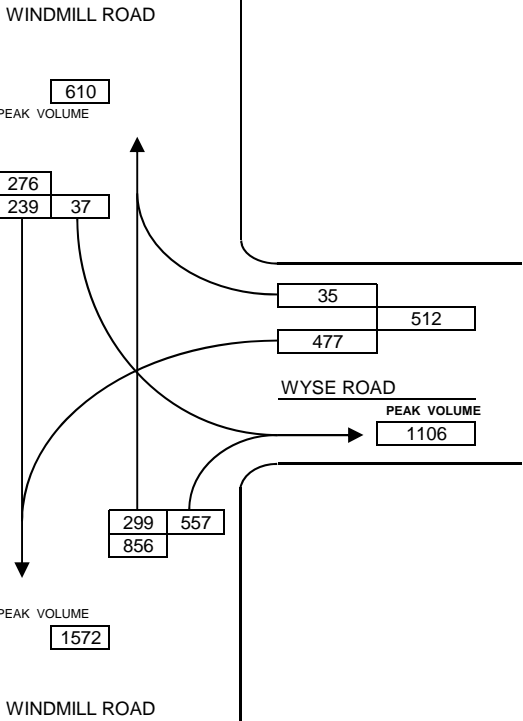
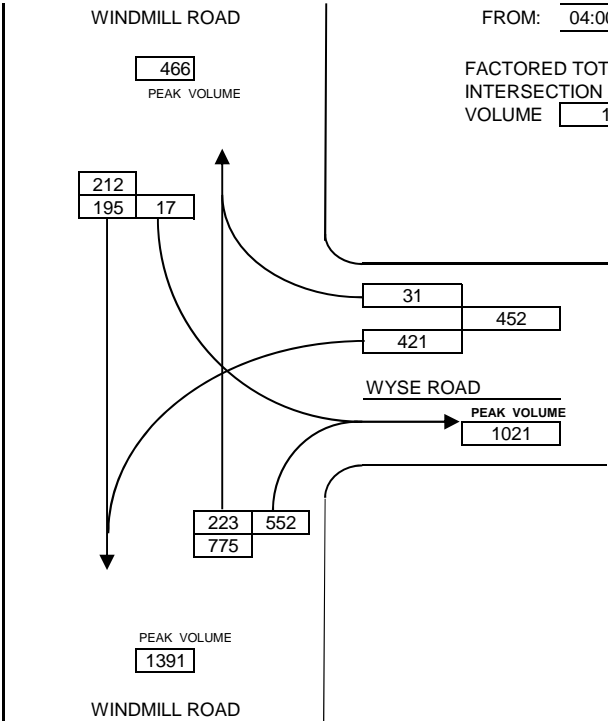
1595

VEHICULAR GRAPHIC SUMMARY SHEET  
WINDMILL ROAD AT WYSE ROAD

INTERSECTION :

DATE: NOV 2 2017  
TIME: 1 HOUR  
FROM: 04:00:00 PM TO 05:00:00 PM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1396



DATE: NOV 2 2017  
TIME: 1 HOUR  
FROM: 05:00:00 PM TO 06:00:00 PM

FACTORED TOTAL  
INTERSECTION APPROACH  
VOLUME 1595

fathom

# APPENDIX B

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## Trip Generation



## Trip Generation Summary

Alternative: Alternative 1

Phase:

Open Date: 2019-11-10

Project: Wyse Road Development

Analysis Date: 2019-11-10

ITE	Land Use	Weekday Average Daily Trips				Weekday AM Peak Hour of Adjacent Street Traffic				Weekday PM Peak Hour of Adjacent Street Traffic			
		*	Enter	Exit	Total	*	Enter	Exit	Total	*	Enter	Exit	Total
222	Multifamily (High Rise)		352	352	704		12	36	48		31	20	51
	125 Dwelling Units												
710	Office		39	39	78		8	1	9		1	8	9
	8 1000 Sq. Ft. GFA												
820	Retail		170	170	340		5	3	8		16	18	34
	9 1000 Sq. Ft. GLA												
Unadjusted Volume			561	561	1122		25	40	65		48	46	94
Internal Capture Trips			0	0	0		0	0	0		9	9	18
Pass-By Trips			0	0	0		0	0	0		4	4	8
Volume Added to Adjacent Streets			561	561	1122		25	40	65		35	33	68

Total Weekday Average Daily Trips Internal Capture = 0 Percent

Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 19 Percent

\* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 10th Edition

**TRIP GENERATION 10, TRAFFICWARE, LLC**

P. 1

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# APPENDIX C

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## Trip Assignment

## 2024 Background and Development

**Development: Wyse Road Development****Driveway: 1      Development - Nantucket**

Origin #	Route	To		From	
		Distribution %	Trips	Distribution %	Trips
1	NW Victoria to Development - Nantucket	20.00	5	20.00	8
2	N School to Development - Nantucket	5.00	1	5.00	2
3	NE Thistle to Development - Nantucket	5.00	1	5.00	2
4	NE Victoria to Development - Nantucket	5.00	1	5.00	2
5	SE Alderney to Development - Nantucket	10.00	3	10.00	4
6	SE Windmill to Development - Nantucket	5.00	1	5.00	2
7	S Macdonald Bridge to Development - Nantucket	40.00	10	40.00	16
8	W Wyse to Development - Nantucket	10.00	3	10.00	4

**Development: Wyse Road Development****Driveway: 1      Development - Nantucket**

Origin #	Route	To		From	
		Distribution %	Trips	Distribution %	Trips
1	NW Victoria to Development - Nantucket	20.00	8	37.34	14
2	N School to Development - Nantucket	5.00	2	3.25	1
3	NE Thistle to Development - Nantucket	5.00	2	0.00	0
4	NE Victoria to Development - Nantucket	5.00	2	0.00	0
5	SE Alderney to Development - Nantucket	10.00	4	15.33	6
6	SE Windmill to Development - Nantucket	5.00	2	3.99	1
7	S Macdonald Bridge to Development - Nantucket	40.00	16	40.09	15
8	SW Wyse to Development - Nantucket	10.00	4	0.00	0

fathom

# APPENDIX D


















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## Synchro Output



1: Nantucket/School & Victoria  
2024 Background and Development

AM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	80	510	330	300	165	45	20	180
Future Volume (vph)	10	80	510	330	300	165	45	20	180
Lane Group Flow (vph)	0	98	554	359	355	179	167	0	229
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	34.0	34.0	34.0	34.0	34.0	26.0	26.0	26.0	26.0
Total Split (%)	56.7%	56.7%	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5	4.5		4.5
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		29.5	29.5	29.5	29.5	21.5	21.5		21.5
Actuated g/C Ratio		0.49	0.49	0.49	0.49	0.36	0.36		0.36
v/c Ratio		0.11	0.53	0.57	0.39	0.45	0.25		0.36
Control Delay		19.3	13.9	15.1	10.9	19.2	6.2		15.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay		19.3	13.9	15.1	10.9	19.2	6.2		15.8
LOS		B	B	B	B	B	A		B
Approach Delay		14.7			13.0		12.9		15.8
Approach LOS		B			B		B		B
Queue Length 50th (m)		11.7	35.2	27.1	23.1	15.4	3.7		18.5
Queue Length 95th (m)		m16.6	m63.3	50.6	40.4	31.6	14.7		34.3
Internal Link Dist (m)		334.0			285.2		95.9		149.3
Turn Bay Length (m)			10.0	30.0					
Base Capacity (vph)		878	1053	635	909	398	672		644
Starvation Cap Reductn		0	0	0	0	0	0		0
Spillback Cap Reductn		0	0	0	0	0	0		0
Storage Cap Reductn		0	0	0	0	0	0		0
Reduced v/c Ratio		0.11	0.53	0.57	0.39	0.45	0.25		0.36

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 50

Control Type: Pretimed

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 13.9

Intersection LOS: B













Intersection Capacity Utilization 72.3%

ICU Level of Service C

Analysis Period (min) 15













m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Nantucket/School & Victoria

					
Ø2 (R)			Ø4		
26 s			34 s		
					
Ø6 (R)			Ø8		
26 s			34 s		

### 3: Nantucket & Mall/Sportsplex 2024 Background and Development

AM Peak

							
Lane Group	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	5	4	24	280	44	20	939
Future Volume (vph)	5	4	24	280	44	20	939
Lane Group Flow (vph)	5	49	0	330	48	0	1107
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		8		2			6
Permitted Phases	4		2		2	6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	25.0	25.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5
Lead/Lag							
Lead-Lag Optimize?							
Act Effct Green (s)	20.5	20.5		60.5	60.5		60.5
Actuated g/C Ratio	0.23	0.23		0.67	0.67		0.67
v/c Ratio	0.01	0.12		0.16	0.04		0.50
Control Delay	0.0	14.2		5.7	1.7		8.1
Queue Delay	0.0	0.0		0.0	0.0		0.0
Total Delay	0.0	14.2		5.7	1.7		8.1
LOS	A	B		A	A		A
Approach Delay		14.2		5.2			8.1
Approach LOS		B		A			A
Queue Length 50th (m)	0.0	1.7		10.2	0.0		45.0
Queue Length 95th (m)	0.0	m8.3		15.2	3.3		58.6
Internal Link Dist (m)		136.0		20.6			158.1
Turn Bay Length (m)							
Base Capacity (vph)	481	406		2007	1079		2230
Starvation Cap Reductn	0	0		0	0		0
Spillback Cap Reductn	0	0		0	0		0
Storage Cap Reductn	0	0		0	0		0
Reduced v/c Ratio	0.01	0.12		0.16	0.04		0.50

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 50

Control Type: Pretimed

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 7.5

Intersection LOS: A





Intersection Capacity Utilization 52.3%

ICU Level of Service A

Analysis Period (min) 15



















m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Nantucket & Mall/Sportsplex

	Ø2 (R)			Ø4
65 s			25 s	
	Ø6 (R)			Ø8
65 s			25 s	

#### 4: Bridge/Nantucket & Wyse 2024 Background and Development

AM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	66	100	665	803	83	143	254	485	903
Future Volume (vph)	66	100	665	803	83	143	254	485	903
Lane Group Flow (vph)	66	100	665	803	111	143	254	485	911
Turn Type	Perm	NA	pt+ov	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases		4	4 5	3	8	5	2		6
Permitted Phases	4					2		2	
Detector Phase	4	4	4 5	3	8	5	2	2	6
Switch Phase									
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		9.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5		26.0	48.5	10.4	41.5	41.5	31.1
Total Split (%)	25.0%	25.0%		28.9%	53.9%	11.6%	46.1%	46.1%	34.6%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead		Lead			Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes			Yes
Recall Mode	None	None		None	None	None	Max	Max	Max
Act Effct Green (s)	17.7	17.7	28.1	21.0	43.2	37.0	37.0	37.0	26.6
Actuated g/C Ratio	0.20	0.20	0.32	0.24	0.48	0.41	0.41	0.41	0.30
v/c Ratio	0.26	0.27	0.74	0.90	0.13	0.70	0.12	0.51	0.83
Control Delay	33.5	32.7	33.4	47.8	10.0	37.8	16.5	3.8	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.0
Total Delay	33.5	32.7	33.4	47.8	10.0	37.8	16.5	3.8	85.0
LOS	C	C	C	D	B	D	B	A	F
Approach Delay		33.3			43.2		13.0		85.0
Approach LOS		C			D		B		F
Queue Length 50th (m)	10.2	15.5	61.0	70.7	7.9	16.2	10.2	0.0	81.1
Queue Length 95th (m)	22.3	30.0	83.7	#102.1	17.0	#35.9	15.6	18.3	#107.1
Internal Link Dist (m)		363.0			87.0		193.3		29.1
Turn Bay Length (m)									
Base Capacity (vph)	262	375	874	915	897	204	2151	953	1103
Starvation Cap Reductn	0	0	0	0	0	0	0	0	273
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.27	0.76	0.88	0.12	0.70	0.12	0.51	1.10

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 89.2

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 44.1

Intersection LOS: D

Intersection Capacity Utilization 82.6%



















ICU Level of Service E

Analysis Period (min) 15

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

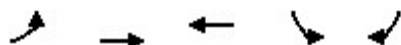
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bridge/Nantucket & Wyse

								
41.5 s			26 s			22.5 s		
								
10.4 s	31.1 s					48.5 s		

# 10: Wyse & Thistle 2024 Background and Development

AM Peak



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	88	497	565	57	349
Future Volume (vph)	88	497	565	57	349
Lane Group Flow (vph)	96	540	659	62	379
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		4	8	6	
Permitted Phases	4				6
Detector Phase	4	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5
Total Split (s)	31.0	31.0	31.0	29.0	29.0
Total Split (%)	51.7%	51.7%	51.7%	48.3%	48.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	Max	Max
Act Effct Green (s)	14.8	14.8	14.8	24.7	24.7
Actuated g/C Ratio	0.30	0.30	0.30	0.51	0.51
v/c Ratio	0.56	0.50	0.61	0.07	0.43
Control Delay	27.1	15.2	16.4	8.0	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	15.2	16.4	8.0	6.5
LOS	C	B	B	A	A
Approach Delay		17.0	16.4	6.7	
Approach LOS		B	B	A	
Queue Length 50th (m)	7.1	20.5	25.3	2.4	8.6
Queue Length 95th (m)	19.2	31.1	37.8	9.6	32.7
Internal Link Dist (m)		153.3	86.2	122.6	
Turn Bay Length (m)					80.0
Base Capacity (vph)	312	1947	1935	900	891
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.31	0.28	0.34	0.07	0.43

## Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 48.6

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 14.2

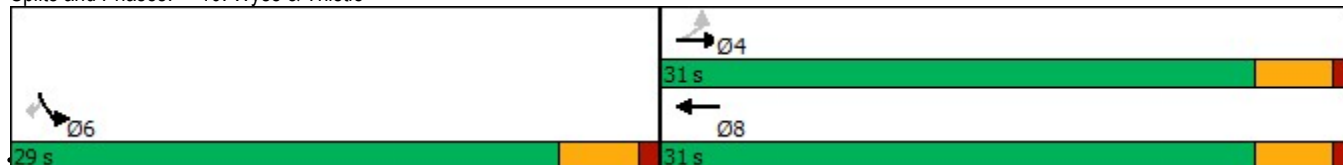
Intersection LOS: B

Intersection Capacity Utilization 46.0%




















ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Wyse & Thistle




















## AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Traffic Volume (veh/h)	0	0	0	0	0	0	0	348	0	0	911	36
Future Volume (Veh/h)	0	0	0	0	0	0	0	348	0	0	911	36
Sign Control	Stop				Stop			Free			Free	
Grade	0%				0%			0%			-5%	
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)	0	0	0	0	0	0	0	378	0	0	990	39
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None								None			
Median storage (veh)												
Upstream signal (m)	53								45			
pX, platoon unblocked	0.87	0.87	0.85	0.87	0.87	0.96	0.85					0.96
vC, conflicting volume	1198	1388	514	873	1407	189	1029					378
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	739	957	78	365	979	84	683					280
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1					4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	100	100	100	100	100	100	100					100
cM capacity (veh/h)	265	223	822	492	216	924	771					1234
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	0	0	189	189	0	660	369					
Volume Left	0	0	0	0	0	0	0					
Volume Right	0	0	0	0	0	0	39					
cSH	1700	1700	1700	1700	1700	1700	1700					
Volume to Capacity	0.04	0.05	0.11	0.11	0.02	0.39	0.22					
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS	A	A										
Approach Delay (s)	0.0	0.0	0.0	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			0.0									
Intersection Capacity Utilization			29.7%	ICU Level of Service				A				
Analysis Period (min)			15									

1: Nantucket/School & Victoria  
2024 Background Traffic Only

AM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	80	510	330	300	165	45	20	180
Future Volume (vph)	10	82	523	338	308	169	46	21	185
Lane Group Flow (vph)	0	100	568	367	365	184	172	0	235
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	34.0	34.0	34.0	34.0	34.0	26.0	26.0	26.0	26.0
Total Split (%)	56.7%	56.7%	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5	4.5		4.5
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		29.5	29.5	29.5	29.5	21.5	21.5		21.5
Actuated g/C Ratio		0.49	0.49	0.49	0.49	0.36	0.36		0.36
v/c Ratio		0.11	0.54	0.58	0.40	0.47	0.26		0.37
Control Delay		19.3	14.5	15.5	11.0	19.7	6.2		16.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay		19.3	14.5	15.5	11.0	19.7	6.2		16.0
LOS		B	B	B	B	B	A		B
Approach Delay		15.2			13.2		13.2		16.0
Approach LOS		B			B		B		B
Queue Length 50th (m)		11.9	37.6	27.9	23.9	16.0	3.7		19.1
Queue Length 95th (m)		m16.6	m64.2	52.3	41.4	32.8	14.9		35.1
Internal Link Dist (m)		334.0			285.2		95.9		149.3
Turn Bay Length (m)			10.0	30.0					
Base Capacity (vph)		878	1048	633	910	393	674		643
Starvation Cap Reductn		0	0	0	0	0	0		0
Spillback Cap Reductn		0	0	0	0	0	0		0
Storage Cap Reductn		0	0	0	0	0	0		0
Reduced v/c Ratio		0.11	0.54	0.58	0.40	0.47	0.26		0.37

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 55

Control Type: Pretimed

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 14.2

Intersection LOS: B













Intersection Capacity Utilization 72.3%

ICU Level of Service C

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.













Splits and Phases: 1: Nantucket/Maple & Victoria

					
Ø2 (R)			Ø4		
26 s			34 s		
					
Ø6 (R)			Ø8		
26 s			34 s		



3: Nantucket & Mall/Sportsplex  
2024 Background Traffic Only

AM Peak

							
Lane Group	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	5	4	24	280	44	20	939
Future Volume (vph)	5	4	25	287	45	21	963
Lane Group Flow (vph)	5	50	0	339	49	0	1135
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		8		2			6
Permitted Phases	4		2		2	6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	25.0	25.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5
Lead/Lag							
Lead-Lag Optimize?							
Act Effct Green (s)	20.5	20.5		60.5	60.5		60.5
Actuated g/C Ratio	0.23	0.23		0.67	0.67		0.67
v/c Ratio	0.01	0.12		0.17	0.05		0.51
Control Delay	0.0	13.9		5.7	1.7		8.2
Queue Delay	0.0	0.0		0.0	0.0		0.0
Total Delay	0.0	13.9		5.7	1.7		8.2
LOS	A	B		A	A		A
Approach Delay		13.9		5.2			8.2
Approach LOS		B		A			A
Queue Length 50th (m)	0.0	0.8		10.5	0.0		46.6
Queue Length 95th (m)	0.0	m8.5		15.6	3.3		60.8
Internal Link Dist (m)		136.0		20.6			158.1
Turn Bay Length (m)							
Base Capacity (vph)	475	407		1993	1080		2230
Starvation Cap Reductn	0	0		0	0		0
Spillback Cap Reductn	0	0		0	0		0
Storage Cap Reductn	0	0		0	0		0
Reduced v/c Ratio	0.01	0.12		0.17	0.05		0.51

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 50

Control Type: Pretimed

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 7.6

Intersection LOS: A





Intersection Capacity Utilization 52.3%

ICU Level of Service A

Analysis Period (min) 15



















m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Nantucket & Mall/Sportsplex

	Ø2 (R)			Ø4
65 s			25 s	
	Ø6 (R)			Ø8
65 s			25 s	

4: Bridge/Nantucket & Wyse  
2024 Background Traffic Only

AM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	66	100	665	803	83	143	254	485	903
Future Volume (vph)	68	103	682	823	85	147	260	497	926
Lane Group Flow (vph)	68	103	682	823	114	147	260	497	934
Turn Type	Perm	NA	pt+ov	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases		4	4 5	3	8	5	2		6
Permitted Phases	4					2		2	
Detector Phase	4	4	4 5	3	8	5	2	2	6
Switch Phase									
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		9.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5		26.0	48.5	10.4	41.5	41.5	31.1
Total Split (%)	25.0%	25.0%		28.9%	53.9%	11.6%	46.1%	46.1%	34.6%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead		Lead			Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes			Yes
Recall Mode	None	None		None	None	None	Max	Max	Max
Act Effct Green (s)	17.9	17.9	28.2	21.2	43.5	37.0	37.0	37.0	26.6
Actuated g/C Ratio	0.20	0.20	0.32	0.24	0.49	0.41	0.41	0.41	0.30
v/c Ratio	0.26	0.28	0.76	0.92	0.13	0.72	0.12	0.52	0.85
Control Delay	33.6	32.9	34.2	49.8	10.0	39.8	16.5	3.9	38.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.6
Total Delay	33.6	32.9	34.2	49.8	10.0	39.8	16.5	3.9	87.2
LOS	C	C	C	D	A	D	B	A	F
Approach Delay		34.0			44.9		13.4		87.2
Approach LOS		C			D		B		F
Queue Length 50th (m)	10.5	16.0	63.0	73.0	8.1	16.7	10.4	0.0	83.8
Queue Length 95th (m)	22.9	30.6	86.4	#106.1	17.4	#38.7	15.8	18.4	#116.9
Internal Link Dist (m)		363.0			87.0		193.3		29.1
Turn Bay Length (m)									
Base Capacity (vph)	261	374	872	912	894	203	2143	958	1099
Starvation Cap Reductn	0	0	0	0	0	0	0	0	270
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.28	0.78	0.90	0.13	0.72	0.12	0.52	1.13

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 89.5

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 45.4

Intersection LOS: D

Intersection Capacity Utilization 82.6%











































ICU Level of Service E

Analysis Period (min) 15

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

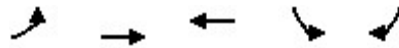
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bridge/Nantucket & Wyse

																				
41.5 s						26 s						22.5 s								
																				
10.4 s						31.1 s						48.5 s								

10: Wyse & Thistle  
2024 Background Traffic Only

AM Peak



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	88	497	565	57	349
Future Volume (vph)	90	510	579	58	358
Lane Group Flow (vph)	98	554	675	63	389
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		4	8	6	
Permitted Phases	4				6
Detector Phase	4	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5
Total Split (s)	31.0	31.0	31.0	29.0	29.0
Total Split (%)	51.7%	51.7%	51.7%	48.3%	48.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	Max	Max
Act Effct Green (s)	15.2	15.2	15.2	24.7	24.7
Actuated g/C Ratio	0.31	0.31	0.31	0.50	0.50
v/c Ratio	0.57	0.50	0.61	0.07	0.44
Control Delay	28.0	15.1	16.3	8.2	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	15.1	16.3	8.2	7.1
LOS	C	B	B	A	A
Approach Delay		17.1	16.3	7.2	
Approach LOS		B	B	A	
Queue Length 50th (m)	7.3	21.1	26.1	2.6	10.2
Queue Length 95th (m)	19.8	31.8	38.8	9.7	35.5
Internal Link Dist (m)		153.3	86.2	122.6	
Turn Bay Length (m)					80.0
Base Capacity (vph)	301	1930	1918	892	881
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.33	0.29	0.35	0.07	0.44

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 49

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 14.3

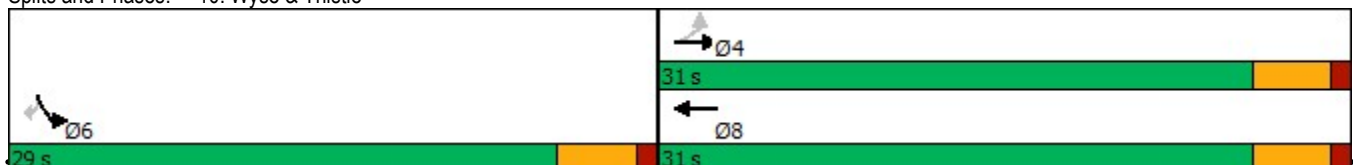
Intersection LOS: B

Intersection Capacity Utilization 46.0%




















ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Wyse & Thistle




















## AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Traffic Volume (veh/h)	0	0	0	0	0	0	0	348	0	0	911	36
Future Volume (Veh/h)	0	0	0	0	0	0	0	357	0	0	934	37
Sign Control	Stop				Stop				Free			
Grade	0%				0%				-5%			
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)	0	0	0	0	0	0	0	388	0	0	1015	40
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None								None			
Median storage (veh)												
Upstream signal (m)	53								45			
pX, platoon unblocked	0.86	0.86	0.84	0.86	0.86	0.96	0.84					0.96
vC, conflicting volume	1229	1423	528	896	1443	194	1055					388
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	755	980	73	369	1003	86	698					287
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1					4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	100	100	100	100	100	100	100					100
cM capacity (veh/h)	257	215	822	486	208	921	756					1225
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	0	0	194	194	0	677	378					
Volume Left	0	0	0	0	0	0	0					
Volume Right	0	0	0	0	0	0	40					
cSH	1700	1700	1700	1700	1700	1700	1700					
Volume to Capacity	0.00	0.00	0.11	0.11	0.00	0.40	0.22					
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS	A	A										
Approach Delay (s)	0.0	0.0	0.0	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay	0.0											
Intersection Capacity Utilization	29.7%											
ICU Level of Service	A											
Analysis Period (min)	15											

1: Nantucket/School & Victoria  
2024 Background and Development

AM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	80	510	330	300	165	45	20	180
Future Volume (vph)	10	82	523	338	308	198	48	22	185
Lane Group Flow (vph)	0	100	568	367	365	215	182	0	236
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	34.0	34.0	34.0	34.0	34.0	26.0	26.0	26.0	26.0
Total Split (%)	56.7%	56.7%	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5	4.5		4.5
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		29.5	29.5	29.5	29.5	21.5	21.5		21.5
Actuated g/C Ratio		0.49	0.49	0.49	0.49	0.36	0.36		0.36
v/c Ratio		0.11	0.54	0.58	0.40	0.55	0.27		0.37
Control Delay		19.3	14.5	15.5	11.0	21.8	6.1		16.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay		19.3	14.5	15.5	11.0	21.8	6.1		16.0
LOS		B	B	B	B	C	A		B
Approach Delay		15.2			13.2		14.6		16.0
Approach LOS		B			B		B		B
Queue Length 50th (m)		11.9	37.6	27.9	23.9	19.3	3.9		19.2
Queue Length 95th (m)		m16.6	m64.2	52.3	41.4	39.1	15.4		35.4
Internal Link Dist (m)		334.0			285.2		95.9		149.3
Turn Bay Length (m)			10.0	30.0					
Base Capacity (vph)		878	1048	633	910	393	679		641
Starvation Cap Reductn		0	0	0	0	0	0		0
Spillback Cap Reductn		0	0	0	0	0	0		0
Storage Cap Reductn		0	0	0	0	0	0		0
Reduced v/c Ratio		0.11	0.54	0.58	0.40	0.55	0.27		0.37

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 55

Control Type: Pretimed

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 14.5

Intersection LOS: B













Intersection Capacity Utilization 72.3%

ICU Level of Service C

Analysis Period (min) 15













m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Nantucket/Maple & Victoria

					
Ø2 (R)			Ø4		
26 s			34 s		
					
Ø6 (R)			Ø8		
26 s			34 s		

### 3: Nantucket & Mall/Sportsplex 2024 Background and Development

AM Peak

							
Lane Group	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	5	4	24	280	44	20	939
Future Volume (vph)	5	4	25	326	47	21	963
Lane Group Flow (vph)	5	50	0	381	51	0	1135
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		8		2			6
Permitted Phases	4		2		2	6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	25.0	25.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5
Lead/Lag							
Lead-Lag Optimize?							
Act Effct Green (s)	20.5	20.5		60.5	60.5		60.5
Actuated g/C Ratio	0.23	0.23		0.67	0.67		0.67
v/c Ratio	0.01	0.12		0.19	0.05		0.51
Control Delay	0.0	13.8		5.8	1.6		8.2
Queue Delay	0.0	0.0		0.0	0.0		0.0
Total Delay	0.0	13.8		5.8	1.6		8.2
LOS	A	B		A	A		A
Approach Delay		13.8		5.3			8.2
Approach LOS		B		A			A
Queue Length 50th (m)	0.0	0.8		12.0	0.0		46.7
Queue Length 95th (m)	0.0	m8.3		17.5	3.4		60.8
Internal Link Dist (m)		136.0		20.6			158.1
Turn Bay Length (m)							
Base Capacity (vph)	475	407		2012	1080		2227
Starvation Cap Reductn	0	0		0	0		0
Spillback Cap Reductn	0	0		0	0		0
Storage Cap Reductn	0	0		0	0		0
Reduced v/c Ratio	0.01	0.12		0.19	0.05		0.51

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 50

Control Type: Pretimed

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 7.6

Intersection LOS: A





Intersection Capacity Utilization 52.3%

ICU Level of Service A

Analysis Period (min) 15



















m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Nantucket & Mall/Sportsplex

	Ø2 (R)			Ø4
65 s			25 s	
	Ø6 (R)			Ø8
65 s			25 s	

#### 4: Bridge/Nantucket & Wyse 2024 Background and Development

AM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	66	100	665	803	83	143	254	485	903
Future Volume (vph)	76	103	698	823	85	147	271	497	926
Lane Group Flow (vph)	76	103	698	823	121	147	271	497	934
Turn Type	Perm	NA	pt+ov	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases		4	4 5	3	8	5	2		6
Permitted Phases	4					2		2	
Detector Phase	4	4	4 5	3	8	5	2	2	6
Switch Phase									
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		9.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5		26.0	48.5	10.4	41.5	41.5	31.1
Total Split (%)	25.0%	25.0%		28.9%	53.9%	11.6%	46.1%	46.1%	34.6%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead		Lead			Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes			Yes
Recall Mode	None	None		None	None	None	Max	Max	Max
Act Effct Green (s)	18.0	18.0	28.4	21.2	43.7	37.0	37.0	37.0	26.6
Actuated g/C Ratio	0.20	0.20	0.32	0.24	0.49	0.41	0.41	0.41	0.30
v/c Ratio	0.29	0.28	0.78	0.92	0.14	0.72	0.13	0.52	0.85
Control Delay	34.3	32.8	35.0	49.9	9.6	40.0	16.6	3.9	38.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.6
Total Delay	34.3	32.8	35.0	49.9	9.6	40.0	16.6	3.9	87.4
LOS	C	C	C	D	A	D	B	A	F
Approach Delay		34.7			44.7		13.4		87.4
Approach LOS		C			D		B		F
Queue Length 50th (m)	11.9	16.0	65.0	73.0	8.3	16.7	10.9	0.0	83.8
Queue Length 95th (m)	24.9	30.6	88.9	#106.1	17.7	#38.7	16.5	18.4	#116.9
Internal Link Dist (m)		363.0			87.0		193.3		29.1
Turn Bay Length (m)									
Base Capacity (vph)	259	373	870	910	889	203	2140	958	1097
Starvation Cap Reductn	0	0	0	0	0	0	0	0	270
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.28	0.80	0.90	0.14	0.72	0.13	0.52	1.13

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 89.7

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 45.4

Intersection LOS: D

Intersection Capacity Utilization 82.6%

























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.

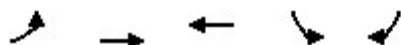
Splits and Phases: 4: Bridge/Nantucket & Wyse

											
41.5 s			26 s			22.5 s					
											
10.4 s			31.1 s			48.5 s					



# 10: Wyse & Thistle 2024 Background and Development

AM Peak



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	88	497	565	57	349
Future Volume (vph)	90	510	583	65	361
Lane Group Flow (vph)	98	554	680	71	392
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		4	8	6	
Permitted Phases	4				6
Detector Phase	4	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5
Total Split (s)	31.0	31.0	31.0	29.0	29.0
Total Split (%)	51.7%	51.7%	51.7%	48.3%	48.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	Max	Max
Act Effct Green (s)	15.2	15.2	15.2	24.7	24.7
Actuated g/C Ratio	0.31	0.31	0.31	0.50	0.50
v/c Ratio	0.58	0.50	0.62	0.08	0.45
Control Delay	28.3	15.1	16.4	8.2	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	15.1	16.4	8.2	7.2
LOS	C	B	B	A	A
Approach Delay		17.1	16.4	7.3	
Approach LOS		B	B	A	
Queue Length 50th (m)	7.3	21.1	26.3	3.0	10.6
Queue Length 95th (m)	19.9	31.8	39.1	10.7	36.1
Internal Link Dist (m)		153.3	86.2	122.6	
Turn Bay Length (m)					80.0
Base Capacity (vph)	298	1928	1916	891	879
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.33	0.29	0.35	0.08	0.45

## Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 49

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 14.3

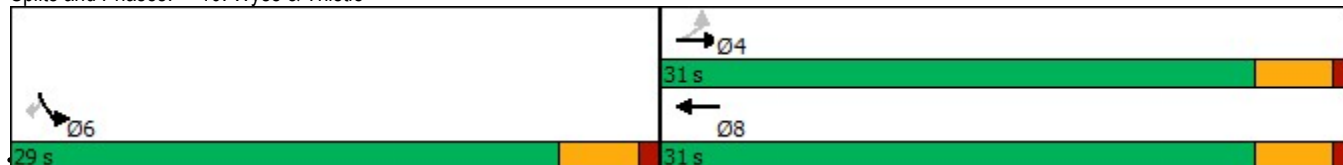
Intersection LOS: B

Intersection Capacity Utilization 46.0%




















ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Wyse & Thistle




















## AM Peak












												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Traffic Volume (veh/h)	0	0	0	0	0	0	0	348	0	0	911	36
Future Volume (Veh/h)	0	0	0	0	0	41	0	357	26	0	934	37
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			-5%		
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)	0	0	0	0	0	45	0	388	28	0	1015	40
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)							53			45		
pX, platoon unblocked	0.86	0.86	0.84	0.86	0.86	0.96	0.84				0.96	
vC, conflicting volume	1274	1451	528	896	1443	194	1055				416	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	808	1013	73	370	1004	87	698				317	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	100	100	100	100	100	95	100				100	
cM capacity (veh/h)	223	205	822	485	207	920	756				1194	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	0	45	194	194	28	677	378					
Volume Left	0	0	0	0	0	0	0					
Volume Right	0	45	0	0	28	0	40					
cSH	1700	920	1700	1700	1700	1700	1700					
Volume to Capacity	0.00	0.05	0.11	0.11	0.02	0.40	0.22					
Queue Length 95th (m)	0.0	1.2	0.0	0.0	0.0	0.0	0.0					
Control Delay (s)	0.0	9.1	0.0	0.0	0.0	0.0	0.0					
Lane LOS	A	A										
Approach Delay (s)	0.0	9.1	0.0	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			29.7%	ICU Level of Service				A				
Analysis Period (min)			15									

1: Nantucket/School & Victoria  
2019 Existing Conditions

PM Peak













									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	20	209	368	134	199	577	65	20	48
Future Volume (vph)	20	209	368	134	199	577	65	20	48
Lane Group Flow (vph)	0	249	400	146	270	627	255	0	85
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.6	22.6	22.6	22.6	22.6	37.4	37.4	37.4	37.4
Total Split (%)	37.7%	37.7%	37.7%	37.7%	37.7%	62.3%	62.3%	62.3%	62.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5	4.5		4.5
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		18.1	18.1	18.1	18.1	32.9	32.9		32.9
Actuated g/C Ratio		0.30	0.30	0.30	0.30	0.55	0.55		0.55
v/c Ratio		0.46	0.58	0.49	0.48	0.87	0.26		0.09
Control Delay		32.9	21.9	24.0	19.2	28.6	3.0		6.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay		32.9	21.9	24.0	19.2	28.6	3.0		6.1
LOS		C	C	C	B	C	A		A
Approach Delay		26.1			20.9		21.2		6.1
Approach LOS		C			C		C		A
Queue Length 50th (m)		32.6	36.2	13.7	23.0	56.5	3.5		3.6
Queue Length 95th (m)		m37.6	m43.9	29.7	42.6	#122.7	12.4		9.0
Internal Link Dist (m)		334.0			285.2		95.9		149.3
Turn Bay Length (m)			10.0	30.0					
Base Capacity (vph)		538	694	297	559	717	994		922
Starvation Cap Reductn		0	0	0	0	0	0		0
Spillback Cap Reductn		0	0	0	0	0	0		0
Storage Cap Reductn		0	0	0	0	0	0		0
Reduced v/c Ratio		0.46	0.58	0.49	0.48	0.87	0.26		0.09
Intersection Summary									
Cycle Length: 60									
Actuated Cycle Length: 60									
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green									
Natural Cycle: 60									
Control Type: Pretimed									
Maximum v/c Ratio: 0.87									
Intersection Signal Delay: 22.1					Intersection LOS: C				
Intersection Capacity Utilization 75.5%					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.									
m Volume for 95th percentile queue is metered by upstream signal.									

Splits and Phases: 1: Nantucket/Maple & Victoria





					
Ø2 (R)			Ø4		
37.4 s			22.6 s		
					
Ø6 (R)			Ø8		
37.4 s			22.6 s		

3: Nantucket & Mall/Sportsplex  
2019 Existing Conditions

PM Peak



















							
Lane Group	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	7	0	5	750	20	20	456
Future Volume (vph)	7	0	5	750	20	20	456
Lane Group Flow (vph)	8	47	0	820	22	0	600
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		8		2			6
Permitted Phases	4		2		2	6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	25.0	25.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5
Lead/Lag							
Lead-Lag Optimize?							
Act Effct Green (s)	20.5	20.5		60.5	60.5		60.5
Actuated g/C Ratio	0.23	0.23		0.67	0.67		0.67
v/c Ratio	0.01	0.12		0.36	0.02		0.28
Control Delay	0.0	12.6		6.9	2.1		5.9
Queue Delay	0.0	0.0		1.1	0.0		0.0
Total Delay	0.0	12.6		8.0	2.1		5.9
LOS	A	B		A	A		A
Approach Delay		12.6		7.9			5.9
Approach LOS		B		A			A
Queue Length 50th (m)	0.0	0.6		29.7	0.0		18.6
Queue Length 95th (m)	0.0	9.5		39.4	2.3		26.0
Internal Link Dist (m)		136.0		20.6			158.1
Turn Bay Length (m)							
Base Capacity (vph)	692	403		2264	1071		2138
Starvation Cap Reductn	0	0		1133	0		0
Spillback Cap Reductn	0	0		0	0		0
Storage Cap Reductn	0	0		0	0		0
Reduced v/c Ratio	0.01	0.12		0.73	0.02		0.28
Intersection Summary							
Cycle Length: 90							
Actuated Cycle Length: 90							
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green							
Natural Cycle: 45							
Control Type: Pretimed							
Maximum v/c Ratio: 0.36							
Intersection Signal Delay: 7.2				Intersection LOS: A			
Intersection Capacity Utilization 41.5%				ICU Level of Service A			
Analysis Period (min) 15							

Splits and Phases: 3: Nantucket & Mall/Sportsplex

 Ø2 (R)	 Ø4
65 s	25 s
 Ø5 (R)	 Ø8
65 s	25 s

#### 4: Bridge/Nantucket & Wyse 2019 Existing Conditions

PM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	60	128	375	447	142	283	654	1011	543
Future Volume (vph)	60	128	375	447	142	283	654	1011	543
Lane Group Flow (vph)	60	128	375	447	192	283	654	1011	565
Turn Type	Perm	NA	pt+ov	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases		4	4 5	3	8	5	2		6
Permitted Phases	4					2		2	
Detector Phase	4	4	4 5	3	8	5	2	2	6
Switch Phase									
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		9.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	22.4	22.4		23.6	46.0	13.6	44.0	44.0	30.4
Total Split (%)	24.9%	24.9%		26.2%	51.1%	15.1%	48.9%	48.9%	33.8%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead		Lead			Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes			Yes
Recall Mode	None	None		None	None	None	Max	Max	Max
Act Effct Green (s)	13.8	13.8	27.5	14.7	33.0	39.7	39.7	39.7	26.0
Actuated g/C Ratio	0.17	0.17	0.34	0.18	0.40	0.49	0.49	0.49	0.32
v/c Ratio	0.29	0.41	0.39	0.66	0.26	0.70	0.26	0.85	0.48
Control Delay	34.4	34.9	22.5	36.4	14.4	26.6	13.6	13.0	25.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Total Delay	34.4	34.9	22.5	36.4	14.4	26.6	13.6	13.0	25.7
LOS	C	C	C	D	B	C	B	B	C
Approach Delay		26.6			29.8		15.2		25.7
Approach LOS		C			C		B		C
Queue Length 50th (m)	8.7	18.8	26.2	34.1	17.3	26.8	21.8	20.0	38.3
Queue Length 95th (m)	20.8	36.9	42.0	51.3	30.9	#63.9	35.6	#152.6	61.6
Internal Link Dist (m)		363.0			87.0		193.3		29.1
Turn Bay Length (m)									
Base Capacity (vph)	266	409	931	892	926	402	2518	1192	1173
Starvation Cap Reductn	0	0	0	0	0	0	0	0	301
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.31	0.40	0.50	0.21	0.70	0.26	0.85	0.65

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.8

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 21.0

Intersection LOS: C

Intersection Capacity Utilization 76.8%



















ICU Level of Service D

Analysis Period (min) 15

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

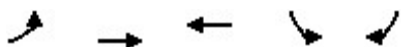
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bridge/Nantucket & Wyse

								
44 s			23.6 s			22.4 s		
								
13.6 s			30.4 s			46 s		

10: Wyse & Thistle  
2019 Existing Conditions

PM Peak



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	362	687	671	70	172
Future Volume (vph)	362	687	671	70	172
Lane Group Flow (vph)	393	747	796	76	187
Turn Type	pm+pt	NA	NA	Prot	Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5
Total Split (s)	15.0	37.5	22.5	22.5	22.5
Total Split (%)	25.0%	62.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	None	None	Max	Max
Act Effct Green (s)	31.8	31.8	16.8	18.0	18.0
Actuated g/C Ratio	0.54	0.54	0.29	0.31	0.31
v/c Ratio	0.89	0.39	0.79	0.14	0.30
Control Delay	37.0	8.6	25.6	16.2	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	37.0	8.6	25.6	16.2	4.6
LOS	D	A	C	B	A
Approach Delay		18.4	25.6	8.0	
Approach LOS		B	C	A	
Queue Length 50th (m)	26.4	23.3	42.4	6.4	0.0
Queue Length 95th (m)	#73.5	33.6	61.3	14.9	12.1
Internal Link Dist (m)		153.3	86.2	122.6	
Turn Bay Length (m)					80.0
Base Capacity (vph)	443	1987	1081	542	614
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	0.38	0.74	0.14	0.30

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 58.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 19.8

Intersection LOS: B

Intersection Capacity Utilization 56.0%

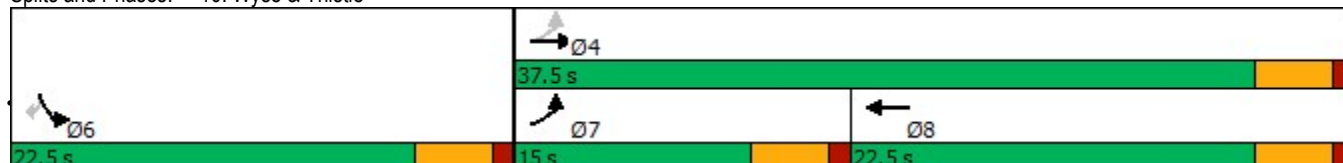
ICU Level of Service B

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.


















Splits and Phases: 10: Wyse & Thistle





1: Nantucket/School & Victoria  
2024 Background Traffic Only

PM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	20	209	368	134	199	577	65	20	48
Future Volume (vph)	21	214	377	137	204	592	67	21	49
Lane Group Flow (vph)	0	249	400	146	270	627	255	0	85
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.6	22.6	22.6	22.6	22.6	37.4	37.4	37.4	37.4
Total Split (%)	37.7%	37.7%	37.7%	37.7%	37.7%	62.3%	62.3%	62.3%	62.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5	4.5		4.5
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		18.1	18.1	18.1	18.1	32.9	32.9		32.9
Actuated g/C Ratio		0.30	0.30	0.30	0.30	0.55	0.55		0.55
v/c Ratio		0.46	0.58	0.49	0.48	0.87	0.26		0.09
Control Delay		32.9	21.9	24.0	19.2	28.6	3.0		6.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay		32.9	21.9	24.0	19.2	28.6	3.0		6.1
LOS		C	C	C	B	C	A		A
Approach Delay		26.1			20.9		21.2		6.1
Approach LOS		C			C		C		A
Queue Length 50th (m)		32.6	36.2	13.7	23.0	56.5	3.5		3.6
Queue Length 95th (m)		m37.6	m43.9	29.7	42.6	#122.7	12.4		9.0
Internal Link Dist (m)		334.0			285.2		95.9		149.3
Turn Bay Length (m)			10.0	30.0					
Base Capacity (vph)		538	694	297	559	717	994		922
Starvation Cap Reductn		0	0	0	0	0	0		0
Spillback Cap Reductn		0	0	0	0	0	0		0
Storage Cap Reductn		0	0	0	0	0	0		0
Reduced v/c Ratio		0.46	0.58	0.49	0.48	0.87	0.26		0.09

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 22.1

Intersection LOS: C

Intersection Capacity Utilization 75.5%

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.

m Volume for 95th percentile queue is metered by upstream signal.













Splits and Phases: 1: Nantucket/Maple & Victoria

	Ø2 (R)		Ø4
37.4 s		22.6 s	
	Ø6 (R)		Ø8
37.4 s		22.6 s	







3: Nantucket & Mall/Sportsplex  
2024 Background Traffic Only

PM Peak



















							
Lane Group	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	7	0	5	750	20	20	456
Future Volume (vph)	7	0	5	769	21	21	468
Lane Group Flow (vph)	8	47	0	820	22	0	600
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		8		2			6
Permitted Phases	4		2		2	6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	25.0	25.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5
Lead/Lag							
Lead-Lag Optimize?							
Act Effct Green (s)	20.5	20.5		60.5	60.5		60.5
Actuated g/C Ratio	0.23	0.23		0.67	0.67		0.67
v/c Ratio	0.01	0.12		0.36	0.02		0.28
Control Delay	0.0	12.6		6.9	2.1		5.9
Queue Delay	0.0	0.0		1.1	0.0		0.0
Total Delay	0.0	12.6		8.0	2.1		5.9
LOS	A	B		A	A		A
Approach Delay		12.6		7.9			5.9
Approach LOS		B		A			A
Queue Length 50th (m)	0.0	0.6		29.7	0.0		18.6
Queue Length 95th (m)	0.0	9.5		39.4	2.3		26.0
Internal Link Dist (m)		136.0		20.6			158.1
Turn Bay Length (m)							
Base Capacity (vph)	692	403		2264	1071		2138
Starvation Cap Reductn	0	0		1133	0		0
Spillback Cap Reductn	0	0		0	0		0
Storage Cap Reductn	0	0		0	0		0
Reduced v/c Ratio	0.01	0.12		0.73	0.02		0.28
Intersection Summary							
Cycle Length: 90							
Actuated Cycle Length: 90							
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green							
Natural Cycle: 45							
Control Type: Pretimed							
Maximum v/c Ratio: 0.36							
Intersection Signal Delay: 7.2				Intersection LOS: A			
Intersection Capacity Utilization 41.5%				ICU Level of Service A			
Analysis Period (min) 15							

Splits and Phases: 3: Nantucket & Mall/Sportsplex

 Ø2 (R)	 Ø4
65 s	25 s
 Ø5 (R)	 Ø8
65 s	25 s

4: Bridge/Nantucket & Wyse  
2024 Background Traffic Only

PM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	60	128	375	447	142	283	654	1011	543
Future Volume (vph)	62	131	384	458	146	290	671	1037	557
Lane Group Flow (vph)	60	128	375	447	192	283	654	1011	565
Turn Type	Perm	NA	pt+ov	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases		4	4 5	3	8	5	2		6
Permitted Phases	4					2		2	
Detector Phase	4	4	4 5	3	8	5	2	2	6
Switch Phase									
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		9.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	22.4	22.4		23.6	46.0	13.6	44.0	44.0	30.4
Total Split (%)	24.9%	24.9%		26.2%	51.1%	15.1%	48.9%	48.9%	33.8%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead		Lead			Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes			Yes
Recall Mode	None	None		None	None	None	Max	Max	Max
Act Effct Green (s)	13.8	13.8	27.5	14.7	33.0	39.7	39.7	39.7	26.0
Actuated g/C Ratio	0.17	0.17	0.34	0.18	0.40	0.49	0.49	0.49	0.32
v/c Ratio	0.29	0.41	0.39	0.66	0.26	0.70	0.26	0.85	0.48
Control Delay	34.4	34.9	22.5	36.4	14.4	26.6	13.6	13.0	25.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Total Delay	34.4	34.9	22.5	36.4	14.4	26.6	13.6	13.0	25.7
LOS	C	C	C	D	B	C	B	B	C
Approach Delay		26.6			29.8		15.2		25.7
Approach LOS		C			C		B		C
Queue Length 50th (m)	8.7	18.8	26.2	34.1	17.3	26.8	21.8	20.0	38.3
Queue Length 95th (m)	20.8	36.9	42.0	51.3	30.9	#63.9	35.6	#152.6	61.6
Internal Link Dist (m)		363.0			87.0		193.3		29.1
Turn Bay Length (m)									
Base Capacity (vph)	266	409	931	892	926	402	2518	1192	1173
Starvation Cap Reductn	0	0	0	0	0	0	0	0	301
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.31	0.40	0.50	0.21	0.70	0.26	0.85	0.65

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.8

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 21.0

Intersection LOS: C

Intersection Capacity Utilization 76.8%



















ICU Level of Service D

Analysis Period (min) 15

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

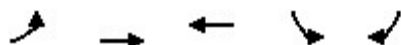
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bridge/Nantucket & Wyse

								
44 s			23.6 s			22.4 s		
								
13.6 s			30.4 s			46 s		

10: Wyse & Thistle  
2024 Background Traffic Only

PM Peak



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	362	687	671	70	172
Future Volume (vph)	371	704	688	72	176
Lane Group Flow (vph)	393	747	796	76	187
Turn Type	pm+pt	NA	NA	Prot	Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5
Total Split (s)	15.0	37.5	22.5	22.5	22.5
Total Split (%)	25.0%	62.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	None	None	Max	Max
Act Effct Green (s)	31.8	31.8	16.8	18.0	18.0
Actuated g/C Ratio	0.54	0.54	0.29	0.31	0.31
v/c Ratio	0.89	0.39	0.79	0.14	0.30
Control Delay	37.0	8.6	25.6	16.2	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	37.0	8.6	25.6	16.2	4.6
LOS	D	A	C	B	A
Approach Delay		18.4	25.6	8.0	
Approach LOS		B	C	A	
Queue Length 50th (m)	26.4	23.3	42.4	6.4	0.0
Queue Length 95th (m)	#73.5	33.6	61.3	14.9	12.1
Internal Link Dist (m)		153.3	86.2	122.6	
Turn Bay Length (m)					80.0
Base Capacity (vph)	443	1987	1081	542	614
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	0.38	0.74	0.14	0.30

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 58.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 19.8

Intersection LOS: B

Intersection Capacity Utilization 56.0%

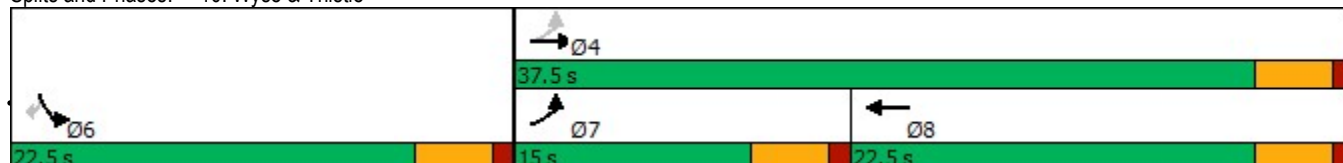
ICU Level of Service B

Analysis Period (min) 15


















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

Queue shown is maximum after two cycles.

Splits and Phases: 10: Wyse & Thistle




















## PM Peak













												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	30	0	0	0	0	764	0	0	448	20
Future Volume (Veh/h)	0	0	31	0	0	0	0	783	0	0	459	21
Sign Control	Stop				Stop				Free			
Grade	0%				0%				-5%			
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)	0	0	33	0	0	0	0	830	0	0	487	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None								None			
Median storage (veh)												
Upstream signal (m)	53								45			
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94	0.91	0.94					0.91
vC, conflicting volume	913	1328	254	1106	1339	415	509					830
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	508	948	85	713	960	170	355					624
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1					4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	100	100	96	100	100	100	100					100
cM capacity (veh/h)	422	244	901	289	240	771	1130					870
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	33	0	415	415	0	325	184					
Volume Left	0	0	0	0	0	0	0					
Volume Right	33	0	0	0	0	0	22					
cSH	901	1700	1700	1700	1700	1700	1700					
Volume to Capacity	0.04	0.05	0.24	0.24	0.02	0.19	0.11					
Queue Length 95th (m)	0.9	0.0	0.0	0.0	0.0	0.0	0.0					
Control Delay (s)	9.1	0.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS	A	A										
Approach Delay (s)	9.1	0.0	0.0	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			0.2									
Intersection Capacity Utilization			24.5%	ICU Level of Service				A				
Analysis Period (min)			15									

1: Nantucket/School & Victoria  
2024 Background and Development

PM Peak













									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	20	209	368	134	199	577	65	20	48
Future Volume (vph)	21	214	377	137	204	621	68	23	49
Lane Group Flow (vph)	0	256	410	149	277	675	269	0	89
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.6	22.6	22.6	22.6	22.6	37.4	37.4	37.4	37.4
Total Split (%)	37.7%	37.7%	37.7%	37.7%	37.7%	62.3%	62.3%	62.3%	62.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5	4.5		4.5
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		18.1	18.1	18.1	18.1	32.9	32.9		32.9
Actuated g/C Ratio		0.30	0.30	0.30	0.30	0.55	0.55		0.55
v/c Ratio		0.48	0.59	0.51	0.50	0.95	0.27		0.10
Control Delay		32.9	22.2	24.8	19.5	39.2	3.0		6.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay		32.9	22.2	24.8	19.5	39.2	3.0		6.2
LOS		C	C	C	B	D	A		A
Approach Delay		26.3			21.3		28.9		6.2
Approach LOS		C			C		C		A
Queue Length 50th (m)		33.5	37.5	14.1	23.8	65.8	3.6		3.8
Queue Length 95th (m)		m37.8	m43.9	30.7	43.9	#136.5	12.8		9.3
Internal Link Dist (m)		334.0			285.2		95.9		149.3
Turn Bay Length (m)			10.0	30.0					
Base Capacity (vph)		537	694	291	559	713	998		909
Starvation Cap Reductn		0	0	0	0	0	0		0
Spillback Cap Reductn		0	0	0	0	0	0		0
Storage Cap Reductn		0	0	0	0	0	0		0
Reduced v/c Ratio		0.48	0.59	0.51	0.50	0.95	0.27		0.10
Intersection Summary									
Cycle Length: 60									
Actuated Cycle Length: 60									
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green									
Natural Cycle: 65									
Control Type: Pretimed									
Maximum v/c Ratio: 0.95									
Intersection Signal Delay: 25.6					Intersection LOS: C				
Intersection Capacity Utilization 75.5%					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.									
m Volume for 95th percentile queue is metered by upstream signal.									

Splits and Phases: 1: Nantucket/Maple & Victoria
















					
Ø2 (R)			Ø4		
37.4 s			22.6 s		
					
Ø6 (R)			Ø8		
37.4 s			22.6 s		

### 3: Nantucket & Mall/Sportsplex 2024 Background and Development

PM Peak



















							
Lane Group	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	7	0	5	750	20	20	456
Future Volume (vph)	7	0	5	806	22	21	468
Lane Group Flow (vph)	8	48	0	881	24	0	616
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		8		2			6
Permitted Phases	4		2		2	6	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	25.0	25.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5
Lead/Lag							
Lead-Lag Optimize?							
Act Effct Green (s)	20.5	20.5		60.5	60.5		60.5
Actuated g/C Ratio	0.23	0.23		0.67	0.67		0.67
v/c Ratio	0.01	0.12		0.39	0.02		0.29
Control Delay	0.0	12.3		7.2	2.0		5.9
Queue Delay	0.0	0.0		1.3	0.0		0.0
Total Delay	0.0	12.3		8.4	2.0		5.9
LOS	A	B		A	A		A
Approach Delay		12.3		8.3			5.9
Approach LOS		B		A			A
Queue Length 50th (m)	0.0	0.3		32.8	0.0		19.2
Queue Length 95th (m)	0.0	9.7		43.1	2.4		26.8
Internal Link Dist (m)		136.0		20.6			158.1
Turn Bay Length (m)							
Base Capacity (vph)	684	404		2267	1071		2128
Starvation Cap Reductn	0	0		1106	0		0
Spillback Cap Reductn	0	0		0	0		0
Storage Cap Reductn	0	0		0	0		0
Reduced v/c Ratio	0.01	0.12		0.76	0.02		0.29
Intersection Summary							
Cycle Length: 90							
Actuated Cycle Length: 90							
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green							
Natural Cycle: 45							
Control Type: Pretimed							
Maximum v/c Ratio: 0.39							
Intersection Signal Delay: 7.4				Intersection LOS: A			
Intersection Capacity Utilization 41.5%				ICU Level of Service A			
Analysis Period (min) 15							

Splits and Phases: 3: Nantucket & Mall/Sportsplex

							
Ø2 (R)						Ø4	
65 s						25 s	
							
Ø5 (R)						Ø8	
65 s						25 s	

#### 4: Bridge/Nantucket & Wyse 2024 Background and Development

PM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	60	128	375	447	142	283	654	1011	543
Future Volume (vph)	74	131	400	458	146	290	687	1037	557
Lane Group Flow (vph)	74	131	400	458	210	290	687	1037	580
Turn Type	Perm	NA	pt+ov	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases		4	4 5	3	8	5	2		6
Permitted Phases	4					2		2	
Detector Phase	4	4	4 5	3	8	5	2	2	6
Switch Phase									
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		9.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	22.4	22.4		23.6	46.0	13.6	44.0	44.0	30.4
Total Split (%)	24.9%	24.9%		26.2%	51.1%	15.1%	48.9%	48.9%	33.8%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead		Lead			Lag
Lead-Lag Optimize?	Yes	Yes		Yes		Yes			Yes
Recall Mode	None	None		None	None	None	Max	Max	Max
Act Effct Green (s)	14.3	14.3	28.0	14.9	33.8	39.7	39.7	39.7	26.0
Actuated g/C Ratio	0.17	0.17	0.34	0.18	0.41	0.48	0.48	0.48	0.32
v/c Ratio	0.36	0.41	0.41	0.67	0.28	0.75	0.28	0.87	0.50
Control Delay	36.0	34.8	22.8	36.9	14.2	29.7	14.0	15.3	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Total Delay	36.0	34.8	22.8	36.9	14.2	29.7	14.0	15.3	26.3
LOS	D	C	C	D	B	C	B	B	C
Approach Delay		27.0			29.8		16.9		26.3
Approach LOS		C			C		B		C
Queue Length 50th (m)	10.9	19.4	28.4	35.5	18.6	28.4	23.8	27.9	40.2
Queue Length 95th (m)	24.6	37.6	44.9	52.7	33.3	#68.9	37.5	#164.3	63.3
Internal Link Dist (m)		363.0			87.0		193.3		29.1
Turn Bay Length (m)									
Base Capacity (vph)	259	406	930	883	914	389	2495	1186	1162
Starvation Cap Reductn	0	0	0	0	0	0	0	0	297
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.32	0.43	0.52	0.23	0.75	0.28	0.87	0.67

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 82.5

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 22.1

Intersection LOS: C

Intersection Capacity Utilization 76.8%



















ICU Level of Service D

Analysis Period (min) 15

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

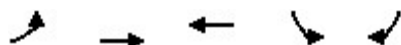
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bridge/Nantucket & Wyse

								
44 s			23.6 s			22.4 s		
								
13.6 s			30.4 s			46 s		

# 10: Wyse & Thistle 2024 Background and Development

PM Peak



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	362	687	671	70	172
Future Volume (vph)	371	704	694	79	182
Lane Group Flow (vph)	403	765	824	86	198
Turn Type	pm+pt	NA	NA	Prot	Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5
Total Split (s)	15.0	37.5	22.5	22.5	22.5
Total Split (%)	25.0%	62.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	None	None	Max	Max
Act Effct Green (s)	32.1	32.1	17.0	18.0	18.0
Actuated g/C Ratio	0.54	0.54	0.29	0.30	0.30
v/c Ratio	0.92	0.40	0.81	0.16	0.32
Control Delay	41.6	8.6	26.7	16.5	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	8.6	26.7	16.5	4.6
LOS	D	A	C	B	A
Approach Delay		20.0	26.7	8.2	
Approach LOS		B	C	A	
Queue Length 50th (m)	28.2	24.0	44.4	7.2	0.0
Queue Length 95th (m)	#77.1	34.6	#65.1	16.4	12.4
Internal Link Dist (m)		153.3	86.2	122.6	
Turn Bay Length (m)					80.0
Base Capacity (vph)	440	1978	1076	540	620
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.92	0.39	0.77	0.16	0.32

## Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 59.1

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 20.9

Intersection LOS: C

Intersection Capacity Utilization 56.0%

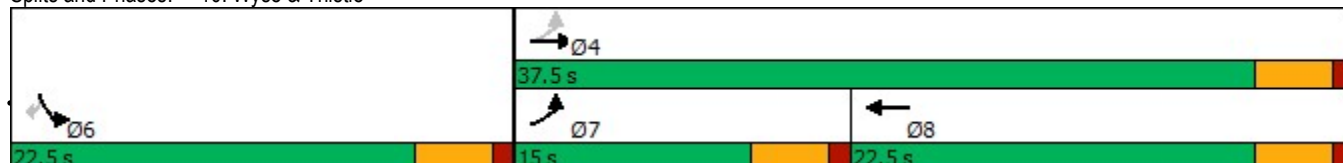
ICU Level of Service B

Analysis Period (min) 15

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


















Queue shown is maximum after two cycles.

Splits and Phases: 10: Wyse & Thistle





## PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	30	0	0	0	0	764	0	0	448	20
Future Volume (Veh/h)	0	0	31	0	0	38	0	783	41	0	459	21
Sign Control	Stop				Stop			Free			Free	
Grade	0%				0%			0%			-5%	
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)	0	0	34	0	0	41	0	851	45	0	499	23
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)							53			45		
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94	0.91	0.94				0.91	
vC, conflicting volume	977	1406	261	1134	1373	426	522				896	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	559	1016	85	727	981	171	363				688	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	100	100	96	100	100	95	100				100	
cM capacity (veh/h)	366	222	899	282	233	767	1120				821	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	34	41	426	426	45	333	189					
Volume Left	0	0	0	0	0	0	0					
Volume Right	34	41	0	0	45	0	23					
cSH	899	767	1700	1700	1700	1700	1700					
Volume to Capacity	0.04	0.05	0.25	0.25	0.03	0.20	0.11					
Queue Length 95th (m)	0.9	1.4	0.0	0.0	0.0	0.0	0.0					
Control Delay (s)	9.2	10.0	0.0	0.0	0.0	0.0	0.0					
Lane LOS	A	A										
Approach Delay (s)	9.2	10.0	0.0	0.0								
Approach LOS	A	A										
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			24.5%	ICU Level of Service					A			
Analysis Period (min)			15									

fathom

# APPENDIX E

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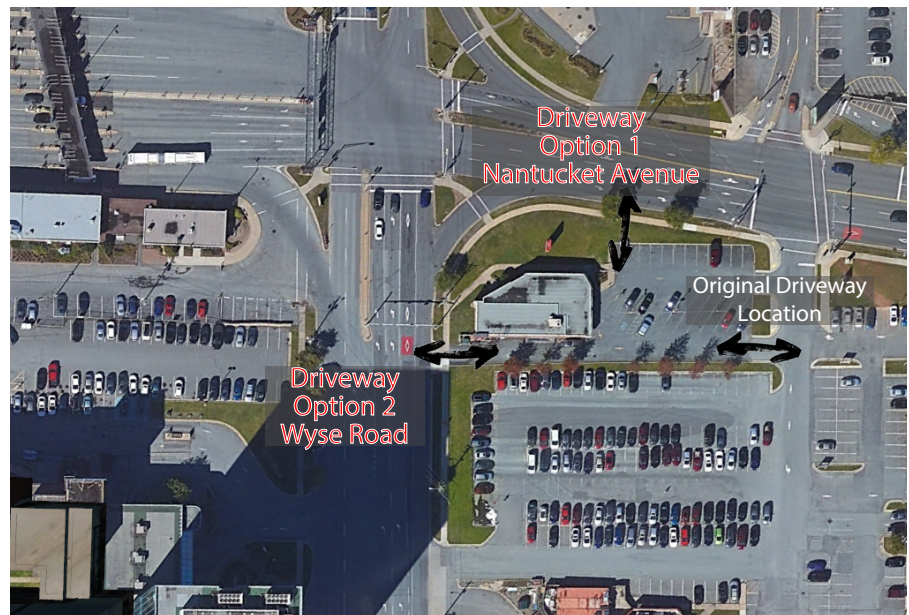
## Alternate Driveway Evaluation

## Wyse Road Development - Alternate Driveway Locations

Dear Mr. Dunphy,

This letter was prepared in response to the request to evaluate alternate access points to the Wyse Road Development and specifically the feasibility of access driveways off Wyse Road and / or Nantucket Avenue. The development is located in the northeast corner of the intersection of Wyse Road with Nantucket Avenue and the Macdonald Bridge approach with overall traffic operations being addressed in a Transportation Impact Study prepared by Fathom Studio in November 2019.

The original proposed location for the development driveway was off the west entrance roadway to the Dartmouth Sportsplex coinciding with one of the two existing driveways at the north end of the site's parking lot that serviced the previous development. Recent decisions have indicated that the original driveway location is no longer a feasible option therefore alternate access points to the site's underground parking structure off Nantucket Avenue or Wyse Road were explored as shown in the figure below.



The original transportation impact study estimated that between 70 and 80 trips enter and exit the building during the peak hours of traffic (just over one trip per minute) and that the added traffic volumes have very little impact to operations on the adjacent road network. Operationally, we do not expect the alternate driveway locations to change these conclusions. The impacts and implications of each access option is discussed in greater detail on the following pages.

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## Driveway to Wyse Road

A driveway to Wyse Road would be located near the east end of the property approximately 40 meters east of the nearest Nantucket Avenue curb line and 45 meters west of the nearest curb line of the existing Wyse Road driveway to the Dartmouth Sportsplex.

At that location Wyse Road is 7-lanes wide consisting of:

- 2 eastbound through lanes;
- 1 eastbound added lane receiving traffic from the Macdonald Bridge right turn channelization;
- 2 westbound left turn lanes to the Macdonald Bridge;
- 1 westbound transit priority lane allowing buses to turn left onto the bridge; and,
- 1 westbound shared through / right turn lane with a channelized right turn to Nantucket Avenue.

The proposed driveway location is in relatively close proximity to the Nantucket/Wyse Road intersection. Challenges created by the wide cross-section and diversity of lane uses suggest that this driveway be configured as a right-in, right-out (RIRO) access to the development's underground parkade. RIRO operations would require that all entering movements take place from the westbound curb lane of Wyse Road.

Vehicles approaching from east of the site (Downtown Dartmouth for example) will approach the driveway on Wyse Road with little inconvenience. Vehicles approaching from the south (Macdonald Bridge), west (Wyse Road, Victoria Road) and north (Thistle, Woodland Ave.) would be required to select routing that would allow them to access the westbound curb lane on Wyse Road. While this may increase travel distances slightly, there are numerous nearby options to gain access to the parkade entrance.

With respect to exiting movements, vehicles destined to the west and north would operate with little inconvenience. Vehicles destined to the south or east will be required to find routing options to support their trip which ultimately depends on their destination.

Other considerations that are relevant to a driveway on Wyse Road:

- The westbound through/right lane on Wyse Road has some of the lowest traffic volumes at the Wyse / Nantucket intersection and therefore entry and exit movements should be relatively easy to make;
- There is an existing driveway to the property at this location;
- Being close to the traffic signals at Wyse and Nantucket and on the upstream side, entry and exit movements will frequently (particularly during the AM peak hour) take place adjacent to vehicle queues in the double left turn lane and occasionally bus queues in the dedicated westbound bus lane;
- During off peak hours, it is expected that some vehicles may directly access the double left turn lanes onto the Bridge, and some could attempt to make a left turn exiting movement; and,
- Consideration should be given to appropriate signage and potentially a channelized island between the entry and exit lanes to deter left turn movements to and from the driveway.

## Driveway to Nantucket Avenue

The Nantucket Avenue driveway option would be located between Wyse Road and the existing western driveway to the Dartmouth Sportsplex. The distance between these two nearest curb lines is about 85 meters, which is similar to the Wyse Road spacing. It is anticipated that the driveway would be located approximately halfway between Wyse Road and the Sportsplex driveway, though exact positioning will need to be coordinated with the building design requirements.

Adjacent to this driveway, Nantucket Avenue is 5 lanes wide consisting of:

- 2 northbound through lanes with the median lane sharing a left turn movement into the Dartmouth Shopping Center and ESSO gas station;
- 1 right turn only lane that enters the Dartmouth Sportsplex driveway. North of the Sportsplex driveway, this lane transitions to a transit only lane that enters the Dartmouth Bridge Transit Terminal. Buses coming across the Macdonald Bridge have a signed dedicated lane to access this curb lane (though this lane is frequently used by regular vehicles) meaning drivers intending to turn right into the Sportsplex should make a lane change to the curb lane after clearing the Wyse Road intersection.
- 2 southbound through lanes to the Macdonald Bridge with the curb lane being shared as a channelized right turn movement to Wyse Road. Left turns are not permitted in the southbound direction.



Similar to the Wyse Road driveway alternative, lane configurations, vehicle movements and volumes suggest that the access be configured as a right-in, right-out (RIRO) driveway. One-way operations would require that all entering movements take place from the northbound curb lane of Nantucket Avenue.

Vehicles approaching from the south, east and west on Wyse Road can access the driveway with little inconvenience and vehicles approaching from the north would have to make minor route adjustments to Thistle Street or Boland Road to access northbound Nantucket to the entrance driveway. Exiting movements to the north are straightforward and movements to the east and west would have to use Victoria Road instead of Wyse Road but still remain relatively convenient. Movement to the Macdonald Bridge are more challenging requiring drivers to use alternate routing.

Other considerations that are relevant to an alternate driveway on Nantucket Road include:

- The northbound curb lane is already configured for right turns only;
- The driveway is close to the traffic signals at Wyse and Nantucket and on the downstream side meaning vehicles are still traveling relatively slowly, though cars will be part of a platoon once the northbound signals turn green at Wyse Road;
- There is unlikely to be significant congestion adjacent to the driveway as traffic is generally free flowing past the driveway. Queues from the pedestrian signals located immediately to the north generally occur in the two through lanes and right turning traffic is generally lower and not impeded by the signals;

- The driveway is adjacent to an area that is subject to some lane change activity (though limited weaving) and frequent bus traffic. The busiest periods adjacent to this driveway would be during the PM peak hour of traffic;
- During off peak hours, it is possible that some vehicles may attempt to make left turns to or from the driveway. These are considered undesirable and have safety implications therefore options such as extending the median on Nantucket Avenue past the driveway may be warranted; and,
- Consideration would have to be given to signage and potentially a channelized island between the entry and exit lanes to deter left turn movements to and from the driveway.

## Conclusions and Discussions

Two alternative access options were identified in this letter including one on Wyse Road and one on Nantucket Avenue. Both options are feasible from an external traffic perspective as well as from an internal building design perspective. As both intersections operate in relative close proximity to the signalized intersection at Nantucket, Wyse and the Macdonald Bridge, the detailed design process for this project will need to specifically address geometric, operational and safety elements of the driveway intersections (including pedestrian crossings) to provide a safe and controlled access to the site.

It is important to remember that volumes to and from driveways for this development are very low, which helps reduce the potential impacts of any risk factors that may be present. While there may be minor inconveniences to some drivers due to the right-in, right-out restrictions, there are a wide variety of route options adjacent to the site to minimize any such inconveniences.

The area is highly commuter oriented with direct access to robust transit service and active transportation networks. It is expected that this development will be viewed positively by a higher percentage of residents due to the existing alternative modal opportunities. Furthermore, there are significant initiatives underway in HRM to further promote transit ridership and active transportation modes of travel. This development is exceptionally well positioned to take advantage of these initiatives and these collective opportunities appear to significantly outweigh any minor inconveniences that drivers of private passenger vehicles may experience due to the left turn restrictions at the driveway.

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Should you have any questions regarding the content of this letter, or require any additional information, please contact the undersigned at (902) 233-1152, or by email at [Roger.Boyчук@FathomStudio.ca](mailto:Roger.Boyчук@FathomStudio.ca).

Yours sincerely,

Original Signed

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